small, gradual

Solar event on 22.12.1974 (Day 356 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.973
magn. Footpt.:	S01 W 35
Solar wind speed [km/s]:	616.
Time resolution [min]:	0.22
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	16:01 -	16:35 -	18:10	1N		N06 E 14
Gamma:						
soft X-rays:		- 16.36 -		C3.5		
hard X-rays:						
3-cm Microwaves:	16:05 -	16:10 -	16:28	7.4		
10-cm Microwaves:	15:00 -	16:20 -	20:30	20		

Radiobursts: II 16:15-16:24, 1 (16:29-16:44, 2) /III 16:06-16:14, 2 /IV 16:03.2-16:47.3, 1

Solar Particles:

Helios 1

Small event, onset in good time resolution only inaccurate to determine. Slow rise of the event, about 4 h before onset there is another small event or a precursor. There is no correlation between changes in the intensity and in the magnetic field. No increase in Helium intensity. Part of the electron intensity due to crosstalk of the P13 protons, real electrons possibly only in the slow increase of the precursor or other event.

Increase in E03 of 1, in P4 of 2.5 orders of magnitude. So the intensities are $(5\pm0.5)\cdot10^4$ in the E03 and 1200±200 in the P4. The electron to proton ratio is about 42:1.

Onset in E03 at about 17 UT, possibly 45 min earlier. Onset of the precursor or preceding event at about 13 UT. Onset of the protons at about 17:30 UT.

gradual

Solar event on 25.12.1974 (Day 359 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.966
magn. Footpt.:	S02 W 45
Solar wind speed [km/s]:	486.
Time resolution [min]:	0.22
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	19:07 -	19:26 -	20:30	1B		N04 W 26
Gamma:						
soft X-rays:		- 19:20 -		C7.5		
hard X-rays:						
3-cm Microwaves:	19:16 -	19:17 -	19:32	12		
10-cm Microwaves:	19:10 -	19:19 -	21:35	42		

Radiobursts: II 19:21.8-19:29, 3 (19:24-19:57, 2) /III 19:14-19:36,3
/IV 19:13.5-20:00, 1

Solar Particles:

Helios 1

Event is visible in the three main channels. Crosstalk of electrons into proton channel P4 well pronounced. Changes in magentic field direction seem to be not correlated with changes in intensity but lead to information losses in the anisotropy.

Intensity increase in electrons of 1.5, in protons of 2 and in Helium of 1 order of magnitude. Absolute intensities are $(2.5\pm0.3)\cdot10^4$ in E03, $(7.5\pm1.)\cdot10^2$ in P4 and (9 ± 4) in A4. The electron to proton ratio is about 33:1, the proton to alpha ratio is about 83:1.

Onset of electrons at about 19:45 UT, of protons at about 21:45 UT, and of Helium at about 22:30 UT.

Solar event on 05.01.1975 (Day 5 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.930
magn. Footpt.:	S03 W 28
Solar wind speed [km/s]:	649.
Time resolution [min]:	0.22
Tape No. (1-min):	15

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W115
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Event only visible in the two lowest energy channels of each particle species. Slow rise (time to Maximum in E03 about 9 h).

Increase of intensity of about two orders of magnitude in E03, in P4 2.5 and in A4 2 orders of magnitude. Absolut intensities are $(1.2\pm.2)\cdot10^5$ in E03, $(2.\pm1.)\cdot10^3$ in P4, and (70 ± 15) in A4. Electron to proton ratio is about 60:1, proton to Helium ratio is about 29:1.

Onset times at about 11:30 UT in E03, 13:30 UT in P4, and about 15 UT in A4.

RSF

Solar event on 27.07.1975 (Day 208 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.860
magn. Footpt.:	S04 E157
Solar wind speed [km/s]:	539.
Time resolution [min]:	5.33
Tape No. (1-min):	25

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						>E110
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Precursor in E03, event only visible in the two lowest energy channels of each particle species. Real onset of nucleii at the following day. Proton onset in P4 seems to be simultaneously with electron onset due to crosstalk of the electrons. Maximum intensities belong to the same event in all channels.

Increase of intensity in E03 of about 4, in P4 of about 3.5 and of 4 orders of magnitude in A4. Absolut intensities are $(1.3\pm.2)\cdot10^{7}$ in E03, $(2.8\pm.3)\cdot10^{4}$ in P4, and $(2.2\pm.2)\cdot10^{3}$ in A4. The electron to proton ratio is about 460:1, the proton to Helium ratio is about 13:1.

Onset (UT): Slow intensity increase in E03 starting at about 14 UT, real onset at about 22:45 UT.

small

Solar event on 01.08.1975 (Day 213 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.829
magn. Footpt.:	S04 E146
Solar wind speed [km/s]:	414.
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						E110
Gamma:						
soft X-rays:		- 00:42 -		C2		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 00:37-00:38

Solar Particles:

Helios 1

Magnetic field is relatively quiet, events is superposed by a relatively high background resulting from the events on doy 208 and 211. In the nucleii channels onset is also visible in a rise of the anisotropy. Event is only visible in the two lowest energy channels of each particle species.

Increase of intensity in E03 of about 1.5, in P4 of about 1 and in A4 of about 1.5 orders of magnitude. The absolut particle intensities are $(2.5\pm.2)\cdot 10^5$ in the E03, (800±400) in the P4, and (100±20) in the A4. The electron to proton ratio is about 250:1, the proton to Helium ratio is about 8:1.

Onset in E03 at about 0:50 UT, eventually prcursor or due to magnetic field fluctuations, sharp onset of electrons at about 1:15 UT. Onset in P4 at about 2:05 and in A4 at about 1:55 UT.

gap, gradual

Solar event on 21.11.1975 (Day 325 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.890
magn. Footpt.:	N03 W 50
Solar wind speed [km/s]:	392.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1B		S07 W 21
Gamma:						
soft X-rays:		- 06:29 -		M2		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 06:20-06:32

Solar Particles:

Helios 1

More gaps than data, magnetic field seems to be disturbed. In the nucleii channels the intensity maximum consits of two spikes superposing a gradual particle event. Correlation between magnetic field fluctuations and intensity fluctuations not possible because of the data gaps. Maxima of particle intensities and onset times are also influenced by data gaps.

Only in E03 the intensity can be determined as $(1.3\pm.2)\cdot 10^5$.

??????

Solar event on 19.03.1976 (Day 79 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.376	0.612
magn. Footpt.:	S06 W 34	S07 W 26
Solar wind speed [km/s]:	566.	491.
Time resolution [min]:	21.3	0.22
Tape No. (1-min):	35	36

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Only small intensity increase in E03 by about 0.5 orders of magnitude, no increase in protons and Helium. Electron onset at about 2:30 UT at doy 80.
Intensity of E03 is $(1.7\pm.3)\cdot 10^3$.

Helios 2

No increase in particle intensity.

double, MI, impulsive

Solar event on 21.03.1976 (Day 81 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.357	0.591
magn. Footpt.:	S05 W 43	S07 W 38
Solar wind speed [km/s]:	480.	353.
Time resolution [min]:	0.9	0.22
Tape No. (1-min):	711	712

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	13:06 -	13:10 -	13:23	N		N03 W 33
Gamma:						
soft X-rays:		- 13:07 -		M1		
hard X-rays:						
3-cm Microwaves:	12:44 -	12:59 -	13:39	20.7		
10-cm Microwaves:	12:47 -	12:50 -	13:46	24		

Radiobursts:

Solar Particles:

Helios 1

Small data gaps. First rise of about 1 order of magnitude in E03 at about 2:15 UT, followed by 4 our 5 fresh injections, lasting for 4 up to 6 hours. The first rise is overlayed by the fresh injections. The flare data relate to the second of the following injections. Each of the injections shows the profil of a δ-injection broadend by numerical diffusion. These separated injections smear out in the nucleii channels. Event is visible only in the lowest energy channels. In the injections 2-5 the ratios between the amplitues semm to be similiar. So the question rises if all the events occur in the same active region. Anisotopie different from zero for the whole duration of the events.

The intensities are in the first underlaying event $(2.\pm.4)\cdot10^4$. Intensities of the four following injections: $(1.8\pm0.5)\cdot10^5$, $(2.9\pm0.3)\cdot10^4$, $(2.1\pm1.)\cdot10^5$ and $(0.9\pm0.2)\cdot10^5$. The intensity in the underlaying proton event is given by (40.±10.). The intensities in the following proton injections are (400±60), (300±50), (900±100) and (120±30). In Helium only the first and third of the following injections is visible. Intensities are (180±40) and (350±50). The electron to proton ratio is about 97:1.

Onset times in E03 at about 2:15 UT for the first rise of intensity. The following injections start at about 5:45 (not sure, so there are no intensity values given), 7:45, 13:15, 19:00 and 23:00 UT.

Helios 2

Event is structured like on Helios 1, but intensity rises are smaller, in P4 smeared out to one small and long lasting profile. Data quality better than on Helios 1.

The intensity of the underlaying event is given by $(5.\pm1.)\cdot10^3$ in the E03. The intensities of the following injections are $(1.7\pm0.3)\cdot10^3$, $(4.\pm0.5)\cdot10^4$, $(3.\pm.5)\cdot10^4$, and $(3.\pm0.5)\cdot10^4$. In the nucleii channels the intensites are smeared out so that there is only one profile visible, peaking at the maximum intensity of (65±15) in the case of the protons and (30.±10) in the case of the α-particles.

Onset times in the E03 for the underlaying event at about 2:30 UT, for the following injections at about 8:15, 13:30, 19:00 and 23:00 UT.

gradual

Solar event on 23.03.1976 (Day 83 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.339	0.568
magn. Footpt.:	S05 W 57	S07 W 48
Solar wind speed [km/s]:	357.	285.
Time resolution [min]:	0.22	0.22
Tape No. (1-min):	711	360

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				-B/-N		S06 E 90
Gamma:						
soft X-rays:		- 08:55 -		X1	21	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

In E03 well defined and sharp onset at about 9:10 UT, followed by a slow decay superposed by three small intensity increases, possibly caused by magnetic field fluctuations. No increase in Helium intensity. Maxima possibly in data gaps, so only inaccurate intensity determination.

Intensity increase in E03 and P4 of 2 orders of magnitude. Absolute intensities are $(1.\pm0.3)\cdot10^5$ in the E03 and $(2.2\pm0.3)\cdot10^3$ in the P4. In Helium the intensity is (2±2). The electron to proton ratio is about 46:1.

Onset in E03 at about 9:10 and in P4 at about 10:25 UT.

Helios 2

Very slow rise (time to maximum in E03 16-20 h), possibly ESP-particles. Gap in magnetic field data. Very few α-particles Comparison of the profiles on Helios 1 and 2 is not in agreement with flare association, a flare behind the west limb would be a better candidate.

Intensity increase in E03 of about 2 and in P4 of about 2.5 orders of magnitude. Absolute intensities are $(2.4\pm0.4)\cdot10^4$ in E03 and (80±10) in P4. The electron to proton ratio is about 300:1.

Onset in E03 at about 9:30 and in P4 at about 12UT.

double, gradual

Solar event on 28.03.1976 (Day 88 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.310	0.495
magn. Footpt.:	S01 W 80	S06 W 38
Solar wind speed [km/s]:	450.	379.
Time resolution [min]:	1.	1.
Tape No. (1-min):	722	1806

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	19:05 -	19:40 -	20:21	1B		S07 E 28
Gamma:						
soft X-rays:		19:39 -		X1	32	
hard X-rays:						
3-cm Microwaves:	18:43 -	19:34 -	20:47	3719		
10-cm Microwaves:	18:40 -	19:36 -	01:00	1925		

Radiobursts: II 19:21-19:50, 3 /III 19:19-19:25, 3 /IV 19:31.6-01:12, 3

Solar Particles:

Helios 1

Small increase of intensity only in E03.
The electron intensity in E03 is $(3.5\pm0.3)\cdot10^4$.

Helios 2

Delayed onset of the protons (possibly due to coronal propagation). Large anisotropie for more than 6 h different from 0. Short fluctuations in intensity are correlated with magnetic field fluctuations. The interplanetary scattering is very small, the particles mean fre path is about 0.7±1 AU which, is in the order of the distance between sun and spacecraft. The scatter free propagation holds in the case of E03 electrons as well as P4 protons.

The intensities are $(2.8\pm0.2)\cdot10^6$ in E03, $(4.\pm1.)\cdot10^4$ in P4, and $(1.2\pm.1)\cdot10^3$ in A4. The electron to proton ratio is about 70:1, the proton to Helium ratio is about 33:1.

Onset times: E03: 19:26 ± 0.5 min; E08: 19:28 ± 1 min; E2: 19:55 ± 10 min; P4k: 10:35 ± 10 min; P13: 20:06 ± 2 min; P27: 20:07 ± 2 min; P37: 20:03 ± 2min; P>51: 19:57 ± 3 min; A2: 20:41 ± 0.5 min; A4: 20:27 ± 1 min. From that we find the following solar release times: E03: 19:21; E08: 19:23; E2: 19:51; P4: 19:58; P13: 19:44; P27: 19:50; P37: 19:49; P>51: 19:46; A4: 19:50; (A2:19:41)

Bieber; Neustock, 1984

GLE, gradual

Solar event on 30.04.1976 (Day 121 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.653	0.419
magn. Footpt.:	N06 E162	N07 E172
Solar wind speed [km/s]:	421.	319.
Time resolution [min]:	41.	
Tape No. (1-min):		732

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	20:48			1B		S08 W 46
Gamma:						
soft X-rays:		- 21:14 -		X2	19	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 21:06-21:29

Solar Particles:

Helios 1

Data gap during onset. Slow increase in electron channels of about a factor of 5 in 24 hours. Proton channels increase by about two orders in magnitude in 2 days. After this time they have reached the same absolute magnitude as on Helios 2. Magnetic field information is incomplete. No clear association to an interplanetary shock. Sector boundary between days 123 and 124. This is roughly the time when the intensities on Helios 1 and 2 become very similar!

Helios 2

Time resolution of 1 minute during onset. Onset for electrons seems to be well defined, starting close to 2130 UT. The elctrons reach a first maximum close to 2400 UT, but the total rise time is about 12 hours for electrons, about 18 hours for 4 MeV protons. Very long lasting decay for electrons and protons. The first phase of the 4 MeV protons is caused by electron crosstalk. Some irregularities in the intensity behaviour might be related to changes in the magnetic field direction. The relatively fast rise and large amplitude makes the flare association somewhat doubtful (144 degrees between flare and Helios 2 footpoint!). Very small amount of helium nuclei (hardly above background). If flare association can be confirmed - perhaps there was no other active center around - interesting candidate for the question of efficient coronal transport over large distance. First electrons seem to arrive fast!

Increase of intensity in E03 of 1.5, in P4 of 2.5 orders of mgnitude. Absolute intensities are $(1.3\pm0.3)\cdot10^4$ in E03 and (75 ± 35) in P4. Electron to proton ratio is about 170:1.

Onset at about 21:30 in E03, 21:30 in P4 (due to crosstalking electrons?) and real at about 0:30 UT in P4.

gap, gradual

Solar event on 22.08.1976 (Day 235 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.771	0.882
magn. Footpt.:	S05 E172	S06 E141
Solar wind speed [km/s]:	400.	450.
Time resolution [min]:	-999	41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				N		S02 W 90
Gamma:						
soft X-rays:		- 12:08 -		M3		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

data gap.

Helios 2

more gaps than data.

small

Solar event on 17.12.1976 (Day 352 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.944	0.884
magn. Footpt.:	N02 W 24	S02 W 54
Solar wind speed [km/s]:	488.	431.
Time resolution [min]:	2.	41.
Tape No. (1-min):	741	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						>W 40
Gamma:						
soft X-rays:		- 12:22 -		C2		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Time resolution before 7 UT and after 11:30 UT only 41 min. Small event, not visible in the higher energy channels.

Increase of intensity in E03 of 1.5, in P4 of 2.5, and in A4 of 0.8 orders of magnitude. Absolute intensities are $(1.\pm0.3)\cdot10^4$ in E03, (90±10) in P4 and (11±3) in A4. Electron to proton ratio of about 110:1, proton to Helium ratio of about 8:1.

Onset at about 11:30 UT in E03, at about 11:15 in P4 (effect of time resolution and crosstalk?) , and at about 12:30 in A4.

Helios 2

Many gaps, only a few data points. Event larger than on Helios 1.

Increase of intensity in E03 of about 1.5, in P4 of about 2.5 and in A4 of about 1,5 orders of magnitude. Absolute intensity values are $(3.2\pm0.3)\cdot10^4$ in E03, (280±40) in P4, and less than (25±10) in A4. Because of the data gaps the intensities are only inaccurate. Electron to proton ratio of about 110:1, proton to Helium ratio of about 11:1.

CIR

Solar event on 04.04.1977 (Day 94 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.370	0.491
magn. Footpt.:	S06 W 23	S06 W 23
Solar wind speed [km/s]:	654.	533.
Time resolution [min]:	1.	5.33
Tape No. (1-min):	751	46

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				IF		N30 E 77
Gamma:						
soft X-rays:		- 12:22 -		B2		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Gradual event, very disturbed magnetic field. In P4 at about 2:30 UT onset of an impulsive event, which has decayed nearly tatally until the onset of the event the electromagnetic data refer to. Event is not visible in the higher energy channels. Because of the lack of higher energetic particles it is not possible to distinguish between particles from the prompt event and possible ESP-particles. It is not sure whether the protons and α-particles belong to the prompt event.

Increase in intensity in E03 of about 1.5, in P4 of about 3 and in A4 of about 2 orders of magnitude.

Onset in E03 about 15:15 UT, in P4 at about 16:15, and in A4 at about 21:00. From that timing it seems possible that the α-particles do not belong to the prompt event.

Helios 2

Time resolution during onset phase 15 min. Data gap in onset. Increase of intensity slower than on Helios 1. Nearly no α-particles, event not visible in the higher energy channels. Magnetic field very disturbed (change of magnetic field direction by 180° for about 6h on the begin of Doy 95).

Increase of intensity in E03 of about 1 and in P4 of about 2.5 orders of magnitude. The absolute intensities are $(1.\pm0.1)\cdot10^4$ in E03, (220±20) in P4, and (8±5) in A4. Electron to proton ratio is about 45:1, proton to Helium ratio is about 28:1.

Onset in P4 at about 21:15 UT.

RSF, CoProp

Solar event on 05.09.1977 (Day 248 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.784	0.833
magn. Footpt.:	S05 W179	S07 E147
Solar wind speed [km/s]:	448.	415.
Time resolution [min]:	12.	41.
Tape No. (1-min):	761	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						E135
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 09:21-09:35

Solar Particles:

Helios 1

Very large, long lasting event, followed by another event on Doy 251. At about 20UT a second injection seems to occur, visible up to the highest nucleii channels, while the first injection is only visible up to about 25 MeV in protons and is not visible in Helium intensity. Rise of the α-particles in the second event very slow and late. The magnetic field is very quiet, on the following day fluctuations in magnetic field direction are large. Event occurs in the only active region on the sun. Up to Doy 267 many events occuring in that active region were observed.

Increase of intensity in E03 of about 2, in P4 of about 2.5, and in A4 of about 1.5 orders of magnitude. The absolute intensities for the first injection are $(2.7\pm0.3)\cdot10^5$ in E03 and (300±30) in P4, in the second injection the intensities are $(3.8\pm0.2)\cdot10^5$ in E03, $(1.\pm.5)\cdot10^3$ in P4 and (20±10) in A4. Electron to proton ratio in the first injection is 900:1 (that are to much electrons!), in the second injection the electron to proton ratio is 380:1 and the proton to Helium ratio is about 50:1.

Onset of the first injection at about 9:45 UT in E03 and 10:25 UT in P4. Onset of the second injection at about 20:20 in E03 and P4.

Helios 2

Gaps in the data. Event is structured like on Helios 1, but also in the first injection α-particles are observed while the second injection is only in the electrons accurate to identify.

Increase of intensity in E03 of 3, in P4 of 2.5, and in A4 of 2.5 orders of magnitude. Absolute intensities in the first injection are $(3.\pm.3)\cdot10^6$ in E03, $(4.\pm1.)\cdot10^3$ in P4, and (400±100) in A4. Intensity of electrons in the second injection is $(1.2\pm.2)\cdot10^6$. In the first injection the electron to proton ratio is about 750:1 and the proton to Helium ratio is about 10:1.

Onset times can not be determined.

gradual

Solar event on 08.09.1977 (Day 251 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.761	0.813
magn. Footpt.:	S05 W173	S07 E152
Solar wind speed [km/s]:	335.	451.
Time resolution [min]:	-999	41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1N		N10 E 90
Gamma:						
soft X-rays:		- 22:48 -		X2	35	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 22:31-23:30

Solar Particles:

Helios 1

Data gap in the onset. The event is superposed the decay phase of the event on doy 248. Structure in particle maxima seems to be a result of magnetic field fluctuations and not of three or more different injections. Maximum not well defined. Sector boundary?

Increase of intensity in E03 of about 1, in P4 of about 1, and in A4 of about 1.5 orders of magnitude. Intensity in E03 is $1.5 \cdot 10^6$.

Onset times can not be determined.

Helios 2

Gradual particle event, magnetic field disturbed. No structure in particle data, so no additional injections are following.

Increase of intensity in E03 of about 1.5, in P4 of about 1, and in A4 of about 1.5 orders of magnitude. Absolute intensities are $(1.7\pm0.2) \cdot 10^6$ in E03, $(2.\pm1.) \cdot 10^4$ in P4, and $(600\pm300) \cdot 10^2$ in A4. Electron to proton ratio is about 85:1, proton to Helium ratio is about 33:1.

Onset times in E03 at about 0:15 UT, in A4 at about 3:30 UT. Increase in P4 to slowto determine the onset time.

GLE, gradual

Solar event on 19.09.1977 (Day 262 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.646	0.709
magn. Footpt.:	S06 W176	S07 E169
Solar wind speed [km/s]:	447.	681
Time resolution [min]:	10.	
Tape No. (1-min):	771	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	09:55			3B		N08 W 57
Gamma:						
soft X-rays:		- 10:54 -		X2	23	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 10:38.5-10:44

Solar Particles:

Helios 1

Time resolution 10 minutes, data gap close to onset. Electron onset time a few minutes before 1115 UT. This is by more than 1 hour delayed with respect to the H-alpha onset time, rather unusual for electrons! Wrong flare association? Perhaps the H-alpha starts long before the acceleration, weak X-ray max is near 1054 UT. Electron rise time is of the order of 1 hour. After about 3 hours the intensity decreases slightly, followed by a second larger and slower maximum. Very broad profile in all nucleon channels. Event is seen for energies up to the integral channel (protons above 51 MeV). Inspection of the proton-to-helium ratio indicates a ratio of about 200 in the first peak, followed by a ratio of about a factor of 50 in the second (larger and slower peak). This indicates two different injections from two different flare sites. It can be seen best in the standard format of four days per 24 cm. The drastic change in the chemical composition speaks against a local shock effect. A small shock effect might be superimposed near 2200 UT on Sept 20.

Intensity in E03 is $(6.\pm1.)\cdot10^5$, in P4 $(5.\pm1.)\cdot10^4$, and in A4 (260±60). Electron to proton ratio is about 12:1, proton to Helium ratio is about 190:1.

Helios 2

Data gaps and low time resolution preclude onset studies. The 10 day plot shows interesting coronal propagation effects, rise very delayed with respect to Helios 1, total intensity about a factor of 10 smaller. No conclusions possible about two injections.

RSF, GLE, gradual

Solar event on 24.09.1977 (Day 267 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.590	0.657
magn. Footpt.:	S07 W174	S07 E145
Solar wind speed [km/s]:	485.	343.
Time resolution [min]:	8.	41.
Tape No. (1-min):	781	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	05:55					N10 W120
Gamma:						
soft X-rays:		- 05:57 -		B6		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 05:55-06:05

Solar Particles:

Helios 1

Time resolution 8 minutes. Electron onset between 0554 and 0600 UT, in good agreement with the H-alpha-onset. The event is seen up to the highest energies (integral above 51 MeV). The profile is drastically disturbed by a large ESP event. The fast increase of the electron channel (rise time about 35 minutes) indicates fast coronal transport over about 66 degrees in longitude!

Increase of intensity in all channels of about 3-5 orders of magnitude. Intensities are extrapolated from higher energies. The intensities are $(2.\pm.3)\cdot10^7$ in E03, $(3.\pm.5)\cdot10^5$ in P4, and $(4.8\pm0.5)\cdot10^3$ in A4. The electron to proton ratio is about 67:1, the proton to Helium ratio is about 63:1.

Onset in E03 at about 6:00, in P4 at about 7:00, and in A4 at about 6:40 UT.

Helios 2

Time resolution 41 minutes. Increase is very meager, very small increase in nucleon channels. Shock arrives about 10 hours later than on Helios 1, slightly less pronounced than on Helios 1. Event is interesting for fast onset in Helios 1, drastic effects of coronal transport, and large ESP event.

Increase of intensity up to 20% of the intensities on Helios 1, but the profiles are delayed by about 12 h with respect to Helios 1.

Scholz, 1983

ESP, gradual

Solar event on 07.11.1977 (Day 311 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.473	0.399
magn. Footpt.:	N07 E 26	N06 W 0
Solar wind speed [km/s]:	384.	294.
Time resolution [min]:	12.	1.
Tape No. (1-min):	791	792

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1N		S23 W 45
Gamma:						
soft X-rays:		- 06:14 -		B9		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 05:44-06:07

Solar Particles:

Helios 1

Protonrich event, slow increase, only visible in the lower energy channels, sector boundary at doy 309 at about 18 UT. Because of the slow increase of intensity it is not possible to distinguish between prompt event and ESP-particles. Possible correlation between magnetic field fluctuations (magnetic field jumps out of the plane of ecliptic up to 70° and sometimes changes its direction to the opposite) and intensity fluctuations in E03. Onset of particles in E03 nearly simultaneously with the onset of the shock.

Increase of intensity in E03 by about 1.5, in P4 by about 2.5, and in A4 by about 1.5 orders of magnitude.

Onset in E03 at about 17:00 UT and in P4 and A4 at about 14:00 UT.

Helios 2

Protonrich, slow rise, time course similiar to that on Helios 1 but delayed by about 8 h despite the smaller radial and coronal distance that contradicts propagation effects. At about 10:30 sector boundary. Shock? Particles fall into the detector mainly along the magnetic field direction that changes up to 180°. Is that an effect of the sector boundary? An explanation with a corotating struture is not useful because of the short delay between the two spacecraft (a corotating structure would be delayed by about 36 h like observed in the delay between the sector boundaries as observed on Helios 1 and 2). What is to do: Look if an increase of a corotating event follows on the next day. Possibly these particles are due to the turbulences related to the sector boundary.

Increase of intensity in E03 by about 1, in P4 by about 2.5, and in A4 by about 1.5 orders of magnitude. The inaccurate intensities are $(7.\pm3.)\cdot10^4$ in E03, $(2.5\pm.5)\cdot10^3$ in P4, and (30±10) in A4. The electron to proton ratio is about 28:1, the proton to Helium ratio is about 83:1.

Onset in E03 at about 22:00, in P4 at about 22:00 UT, and in A4 at about 27:00 UT.

double, GLE, gradual

Solar event on 22.11.1977 (Day 326 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.631	0.597
magn. Footpt.:	S06 W 18	N03 W 43
Solar wind speed [km/s]:	265.	286.
Time resolution [min]:	21.	0.5
Tape No. (1-min):		52

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	09:45 -	10:08 -	11:08	2B		N24 W 40
Gamma:						
soft X-rays:		10:06 -		X1.0	23	
hard X-rays:						
3-cm Microwaves:	09:49 -	10:02 -	11:52	3100		
10-cm Microwaves:	09:50 -	10:07 -	12:30	1400		

Radiobursts: II - /III 10:39.7-10:40.9, 1 /IV 10:01.7-10:45.0, 3

Solar Particles:

Helios 1

Prompt onset (rise of electron intensity by about 5 orders of magnitude within 2 hours, event lasting for about 9 days). Event visible up to the highest energies. Shock in magnetic field data indicated. Electrons and protons were injected simultaneously within the time resolution of about 21 min, but delayed with respect to onset and maximum of 3 cm microwaves. The lower Helium particles were injected about 20 min (one time intervall) later. Velocity dispersion in real time.

Increase of intensity in E03 and P4 by about 5 and in A4 by about 4 orders of magnitude. Absolute intensities are $(7.\pm1.)\cdot10^7$ in E03, $(6.5\pm1.5)\cdot10^5$ in P4, and $(2\pm.5)\cdot10^3$ in A4. The electron to proton ratio is about 108:1, the proton to Helium ratio is about 325:1.

Onset in E03 at about 10:00, in P4 at about 10:30, and in A4 at about 10:45 UT.

Helios 2

Data gap in the onset. Time course similiar to that on Heloios 1. Intensities a little bit larger than on Helios 1. In the decay phase ESP-particles superposed (intensity is constant for about 2 days and decreases then simultaneously with magnetic field fluctuations). The remaining part of the decay phase is similiar to that observed on Helios 1. Crosstalk of electrons in the P4 visible. Onset behaviuor similiar to that on Helios 1.

Intensities are $(2.\pm.2)\cdot10^8$ in E03, $(1.5\pm.2)\cdot10^6$ in P4, and $(1.5\pm.2)\cdot10^4$ in A4. The electron to proton ratio is about 133:1, the proton to Helium ratio is about 100:1.

Onset in E03 at about 10:10, in P4 at about 10:15, and in A4 at about 10:30 UT.

Schellert, 1985; Scholz, 1983

impulsiv

Solar event on 06.12.1977 (Day 340 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.792	0.754
magn. Footpt.:	N04 W 25	N00 W 56
Solar wind speed [km/s]:	323.	319.
Time resolution [min]:	21.	41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	19:35 -	19:38 -	19:45	-B		S18 W 18
Gamma:						
soft X-rays:		- 19:36 -		M4	3	
hard X-rays:						
3-cm Microwaves:	19:33 -	19:35 -	19:40	385		
10-cm Microwaves:	19:00 -	19:35 -	20:30	116		

Radiobursts: II 19:36-19:52, 2 /III 19:38-19;39, 1 (19:34-19:35, 2)

Solar Particles:

Helios 1

Data gap in the onset, small impilsive event, no increase in Helium intensity.

Increase of intensity in E03 by 1 and in P4 by 1.5 orders of magnitude. Absolute intensities are $(3.2\pm.4)\cdot 10^4$ in E03 and (550 ± 150) in P4. The electron to proton ratio is about 58:1.

Onset in E03 and P4 at about 20 UT (in P4 onset due to crosstalking electrons ?).

Helios 2

Like on Helios 1 but larger intensities, only a few α-particles. Anisotropy large at the time of the maximum.

Increase in intensity in E03 by 1.5 and in P4 by 2 orders of magnitude. Absolute intensities are $(5.\pm.5)\cdot 10^4$ in E03, $(1.2\pm.2)\cdot 10^3$ in P4, and (4 ± 2) in A4. The electron to proton ratio is about 42:1, the proton to Helium ratio is about 300:1.

Onset in E03 at about 19:30, in P4 at about 20:30, and in A4 at about 21:00 UT. (Onset in Helium delayed because of the small counting rates, only maximum increases above background?).

double, gradual

Solar event on 27.12.1977 (Day 361 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.923	0.904
magn. Footpt.:	N02 W 23	S02 W 50
Solar wind speed [km/s]:	374.	415.
Time resolution [min]:	0.66	0.22
Tape No. (1-min):	71	72

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	10:45 -	11:05 -	11:26	1N		S25 W 79
Gamma:						
soft X-rays:		- 10:58 -		M1	40	
hard X-rays:						
3-cm Microwaves:	10:47 -	11:11 -	11:42	82		
10-cm Microwaves:	10:48 -	11:30 -	12:31	376		

Radiobursts: II 10:59.5-11:09,3 /III 11:11.4-11:18 /IV 11:01-11:50, 3

Solar Particles:

Helios 1

Data gap inthe onset, time resolution in onset about 11 min, event not observed in the highest energy channels, only very few α-particles.

Increase in intensity in E03 and P4 by about 2 orders of magnitude. The intensity in E03 is about $2 \cdot 10^5$.

Injection of electrons simultaneously at 11:38 UT (possibly a few minutes earlier in the data gap).

Helios 2

Bad data quality in magnetic field data, event visible also in the higher energy channles, nearly no α-particles, intensities larger than on Helios 1 like expected from the spatial distribution of spacecrafts and flare.

Increase of intensity in E03 by about 2, in P4 by about 2.5, and in A4 by about 1 order of magnitude. The electron to proton ratio is about 16:1, the proton to Helium ratio is about 400:1.

Onset in E03 at about 11:15 UT, in P4 at about 11:40 UT. Onset seems to be deleyed with respect to the onset and maximum of 3 cm microwave emission.

Schellert, 1985; buda

double, ESP, gradual

Solar event on 01.01.1978 (Day 1 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.966	0.930
magn. Footpt.:	N01 W 21	S03 W 53
Solar wind speed [km/s]:	387.	396.
Time resolution [min]:	0.9	0.5
Tape No. (1-min):	81	82

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	21:45 -	21:53 -	22:16	2N		S21 E 06
Gamma:						
soft X-rays:		21:55 -		M3	20	
hard X-rays:						
3-cm Microwaves:	21:36 -	21:48 -	22:20			
10-cm Microwaves:	21:39 -	21:52 -	22:57	650		

Radiobursts: II 21:49-22:16, 3 /III 21:45-22:31, 2 /IV 21:55-24:00, 2

Solar Particles:

Helios 1

Prompt onset, visible in all energy channels. Solar wind shift in proton maximum. Sector boundary at about 4 UT on doy 2. Superposed particle population (due to shock or sector boundary) can be separated from prompt event. Data gaps in maxima of nucleii.

Increase of intensity in E03 by about 3.5, in P4 by about 4, and in A4 by about 3 orders of magnitude. Absolute intensities are $(5.\pm1.)\cdot10^6$ in E03, $(1.5\pm.5)\cdot10^5$ in P4, and (800±500) in A4. The electron to proton ratio is about 33:1, the proton to Helium ratio is about 188:1.

Onset in E03 at about 22:08, in P4 at about 23:10, and in A4 at about 23:10.

Helios 2

Clear onset of electrons, slow rise of nucleii, partly before onset in electron channels. Data gap in electron onset. ESP-particles superposed.

Increase of intensity in E03 by 2, in P4 by 4, and in A4 by 3 orders of magnitude. Absolute intensities are $(5.\pm1.)\cdot10^5$ in E03, $(3.3\pm.4)\cdot10^3$ in P4, and (20±10) in A4. The electron to proton ratio is about 150:1, the proton to Helium ratio is about 165:1.

Scholz, 1983

small, gradual

Solar event on 07.01.1978 (Day 7 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.962	0.951
magn. Footpt.:	N01 W 11	S03 W 40
Solar wind speed [km/s]:	460.	505.
Time resolution [min]:	5.33	12.
Tape No. (1-min):	65	1000

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				-F		S18 W 68
Gamma:						
soft X-rays:		-06:59	-	M3	45	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

visible only in E03, high background in nucleii channels resulting from the preceding event. Precursor or small event in E03 before onset of the event. Intesity of protons only inaccurate.

Intensities are $(9.\pm.8)\cdot10^4$ in E03, (140.±80.) in P4. The electron to proton ratio is about 64:1.

Helios 2

Multiple injections in E03, slow longlasting increase in nucleii intensities not related to one of the electron injections.

Intensities are $(2.3\pm.3)\cdot10^5$ in E03, (100±50) in P4, and (60±20) in A4. The electron to proton ratio is about 2300:1, proton to Helium ratio about 1.1:1. ratios of both spacecraft were not used for further analysis.

Schellert, 1985

small

Solar event on 08.01.1978 (Day 8 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.964	0.953
magn. Footpt.:	N01 W 07	S03 W 40
Solar wind speed [km/s]:	420.	554.
Time resolution [min]:	-999	
Tape No. (1-min):	65	1000

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Mainly in data gap, but it seems that there is only an increase in electron intensity and not in nucleii channels.

Helios 2

like on doy 7.

Schellert, 1985

small

Solar event on 11.01.1978 (Day 11 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.971	0.962
magn. Footpt.:	N01 W 06	S03 W 40
Solar wind speed [km/s]:	370.	410.
Time resolution [min]:	-999	
Tape No. (1-min):	65	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

event lost in data gap.

Helios 2

data gaps in the onset, event in nucleii channels only very weak increasing. Intensity is about $(4.2\pm.4)\cdot 10^4$ in E03, (950±50) in P4, and (8±4) in A4. The electron to proton ratio is about 467:1, the proton to Helium ratio is about 11:1.

small

Solar event on 10.02.1978 (Day 41 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.960	0.966
magn. Footpt.:	S02 W 08	S05 W 56
Solar wind speed [km/s]:	402.	325.
Time resolution [min]:		
Tape No. (1-min):	75	76

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Small electron event followed by 4 injections. Only the first of the following injections is also visible in nucleii. (or all nucleii injections were smeared out to one large profile).

Increase of intensity in E03 by less than 1 order of magnitude. The intensities in E03 are $(1.\pm.5)\cdot10^4$ for the first, $(.8\pm.4)\cdot10^4$ for the second, $(1.6\pm.4)\cdot10^4$ for the thir. $(4.8\pm1.)\cdot10^4$ for the fourth, and $(1.2\pm.2)\cdot10^5$ for the fifth injection.

The onset times in E03 are about 18:00 for the first, 22 UT for the second, 26 UT for the third, 32:45 UT for the fourth, and 46 UT for the fifth injection.

Helios 2

no visible

Schellert, 1985

double, gradual

Solar event on 13.02.1978 (Day 44 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.953	0.960
magn. Footpt.:	S02 W 07	S06 W 60
Solar wind speed [km/s]:	402.	306.
Time resolution [min]:	0.22	0.5
Tape No. (1-min):	91	1000

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	01:15 -		- 05:20	1N		N16 W 20
Gamma:						
soft X-rays:		- 02:55 -		M7	81	
hard X-rays:						
3-cm Microwaves:	01:35 -	02:02 -	02:35	317.3		
10-cm Microwaves:	01:35 -	02:06 -	02:35	737.1		

Radiobursts: II 01:38-02:00, 2 /III 02:26-02:33, 1 /IV 01:34-04:00, 2

Solar Particles:

Helios 1

Event visible in all channels, maximum intensity remains constant for about 18 h, anisotropy different from zero for nearly the whole duration of the event. Magnetic field is undisturbed. Maximum of electrons eventually due to crosstalking protons to high. Second injection some hours later is responsible for the long lasting maxima?

Increase of intensity in E03 and A4 by 4 and in P4 by 5 orders of magnitude. Absolute intensities are $(1.8\pm.4)\cdot10^7$ in E03, $(1.1\pm.2)\cdot10^6$ in P4, and $(2.\pm1.)\cdot10^4$ in A4. The electron to proton ratio is about 16:1, the proton to Helium raio is about 55:1.

Onset in E03 at about 2:10, in P4 at about 3:25, and in A4 at about 3:30 UT.

Helios 2

Increase slower than on Helios 1 but anisotropy larger than on Helios 1. Structures in maximum. Shock early on doy 46. Structures very similiar in all channels, partly related to magnetic field fluctuations.

Increase on intensity in E03 and P4 by about 5, and in A4 by about 4.5 orders of magnitude. Intensities are $(4.2\pm.4)\cdot10^6$ in E03 (in the second injection the intensity is $(3.5\pm.4)\cdot10^7$ in E03), $(2.8\cdot.2)\cdot10^6$ in P4, and $(1.\pm.1)\cdot10^5$ in A4. The electron to proton ratio is about 1.5:1, the proton to Helum ratio is about 28:1.

Onset in E03 at about 2:20, in P4 at about 3:15, and in A4 at about 4:40 UT.

Schellert, 1985

double, gradual

Solar event on 06.03.1978 (Day 65 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.846	0.860
magn. Footpt.:	S04 E 02	S07 W 34
Solar wind speed [km/s]:	390.	373.
Time resolution [min]:	1.3	0.22
Tape No. (1-min):	7101	7102

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	11:25 -		- 14:18	2B		N26 E 20
Gamma:						
soft X-rays:		- 12:13 -		M2	109	
hard X-rays:						
3-cm Microwaves:	11:29 -	11:58 -	13:35	61.3		
10-cm Microwaves:	11:35 -	12:05 -	12:57	79		

Radiobursts: II 11:56.5-12:27, 3 /III 11:39.4-11:39.9, 3 (11:47.0-11:48.7, 3) /IV -

Solar Particles:

Helios 1

High anisotropy in nucleii channels, structures in nucleii maxima related to magnetic field fluctuations? (no shock, magnetic field is directed opposite to the normal direction for about 10 h, which is also visible as a change in the sign of the anisotropy). Intensities correspond to the first peak which is interpreted as the prompt event.

Increase in intensity in E03 by about 1.5 and in P4 by about 2.5 orders of magnitude. Absolute intensities are $(1.5\pm.3)\cdot10^5$ in E03, $(1.7\pm.5)\cdot10^4$ in P4, and (40±20) in A4. The electron to proton ratio is about 9:1, the proton to Helium ratio is about 425:1.

Onset in E03 at about 12:10, in P4 at about 13:15, and in A4 at about 13:40 UT.

Helios 2

Event smaller, increase slower. Protons in high energy channels visible, but only a few α-particles. No anisotropy data.

Increase of intensity in E03 and P4 by 1.5 orders of magnitude. Absolute intensities are $(3.5\pm1.)\cdot10^4$ in E03 and $(3.\pm2.)\cdot10^3$ in P4. The electron to proton ratio is about 12:1.

Onset in E03 at about 13 UT, in P4 at about 15:20 and in A4 at about 16:10 (delayed because of the low counting rates ?).

klein

Solar event on 13.03.1978 (Day 72 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.795	0.810
magn. Footpt.:	S05 E 17	S07 W 31
Solar wind speed [km/s]:	511.	369.
Time resolution [min]:		41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

slow and weak increase of particle intensity to large values, but no well defined event. (is that a flare or a corotating structure or a magnetic field effect?)

Helios 2

similiar to Helios 1.

double

Solar event on 31.03.1978 (Day 90 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.617	0.633
magn. Footpt.:	S07 E 26	S07 W 25
Solar wind speed [km/s]:	662.	365.
Time resolution [min]:		
Tape No. (1-min):	7501	7502

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Data gap in the magnetic field, electron onset deleyed by about 1 h with respect to the proton onset, no increase in Helium intensity.

Helios 2

Increase in intensity in E03 by about 2, in P4 by about 3.5, and in A4 by about 1.5 orders of magnitude. The intensities are $(4.2\pm.4)\cdot10^5$ in E03, $(3.3\pm.4)\cdot10^4$ in P4, and (70 ± 20) in A4. The electron to proton ratio is about 12:1, the proton to Helium ratio is about 471:1.

Onset in E03 at about 4 UT.

klein

Solar event on 02.04.1978 (Day 92 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.588	0.604
magn. Footpt.:	S07 E 19	S07 W 10
Solar wind speed [km/s]:	515.	554.
Time resolution [min]:		
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Small event visible in the three main channels, intensity increase less than 1 order of magnitude and very slow.

Helios 2

No event observed.

small

Solar event on 07.04.1978 (Day 97 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.533	0.548
magn. Footpt.:	S07 W 02	S07 W 25
Solar wind speed [km/s]:	304.	365.
Time resolution [min]:	41.	
Tape No. (1-min):	0000	0000

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Small increase in intensity.
Intensity in E03 is $(3.\pm.8)\cdot 10^5$.

Helios 2

Small event superposed a longlasting rise in nucleii intensity.
Increase in itensity in E03 by 1.5 and in P4 and A4 by less than 1 order of magnitude. The intensities are $(4.\pm.5)\cdot 10^5$ in E03, (350±100) in P4, and (20±15) in A4. The electron to proton ratio is about 114:1, the proton to Helium ratio is about 18:1.
Onset in E03 at about 20:30.

double, gradual.

Solar event on 08.04.1978 (Day 98 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.519	0.520
magn. Footpt.:	S07 E 07	S07 W 25
Solar wind speed [km/s]:	391.	375.
Time resolution [min]:	41.	0.22
Tape No. (1-min):	111	112

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	01:09 -		- 04:45	2B		N19 W 11
Gamma:						
soft X-rays:		- 02:39 -		X1	40	
hard X-rays:						
3-cm Microwaves:	01:30 -	02:28 -	02:37	160.8		
10-cm Microwaves:	01:24 -	02:41 -	02:46	750		

Radiobursts: II 02:08-02:20.5, 2 /III 01:37.5-01:38.5, 1 (02:08.5-02:09.5, 1) /IV 01:55-07:34, 2

Solar Particles:

Helios 1

Fast rising event with high anisotropy in nucleii channels. In E03 preceding injection (doy 97). Are there two injections superposed ?

Increase of intensity in E03 by about 2.5 and in P4 and A4 by about 3 orders of magnitude. Absolute intensities are $(5.8\pm.8)\cdot10^6$ in E03, $(9.5\pm1.)\cdot10^5$ in P4, and $(9.\pm1.)\cdot10^3$ in A4. The electron to proton ratio is about 6:1, the proton to Helium ratio is about 106:1. Reduced e:p:α-ratio for the second injection is 0.2:1:0.01. ?

Onset in E03 at about 1:30, in P4 at about 2:15, and in A4 at about 3:00UT.

Helios 2

Time course similiar to Helios 1, in the decreasing flank of the electrons a fresh injection or ESP-particles are superposed (close to the maximum, possibly crosstalking protons from P13). Small anisotropy with change in sign. Shock doy 99 at about 12 UT.

Increase of intensity in E03 and A4 by 3 and in P4 by 4 orders of magnitude. The intensities are $(1,1\pm.1)\cdot10^7$ in E03, $(1.2\pm.2)\cdot10^6$ in P4, and $(3.5\pm.5)\cdot10^3$ in A4. The electron to proton ratio is about 9:1, the proton to Helium ratio is about 343:1. Reduced e:p:α-ratio for the first injection is 0.2:1:0.01. ? In both cases particle ratios refer to the first injection.

Onset in E03 at about 2:30, in P4 at about 2:50, and in A4 at about 3:00 UT.

double, gradual

Solar event on 11.04.1978 (Day 101 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.474	0.487
magn. Footpt.:	S07 E 09	S06 W 22
Solar wind speed [km/s]:	476.	439.
Time resolution [min]:	5.3	0.5
Tape No. (1-min):	95	122

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	13:42 -	14:10 -	15:05	1B		N22 W 56
Gamma:						
soft X-rays:		13:51 -		X2	60	
hard X-rays:						
3-cm Microwaves:	13:42 -	14:08 -	15:42	1210		
10-cm Microwaves:	13:24 -	14:21 -	22:50	2878		

Radiobursts: II 13:58.7-14:25, 3 /III 13:44-13:46, 2 (14:06-14:13, 3; 14:36-14:52, 3) /IV 13:49-15:21, 3

Solar Particles:

Helios 1

strong scattering, particles mean free path about 1/100 AU, coronal propagation influences particle onsets.

The intensities are $(5.5\pm.5)\cdot10^5$ in E03, (2000±500) in P4, and (15±10) in A4. The electron to proton ratio is about 275:1, the proton to Helium ratio is about 133:1. Reduced e:p:α-ratios: 5:1:0.005 ?

Onset times in UT: E03: 14:26 ± 2.5 min; E08: 14:26 ± 2.5 min; E2: 14:55 ± 5 min; P13: 15:15 ± 2.5 min; P37: 15:06 ± 2.5 min; P>51: 15:00 ± 2.5 min; P4:15:06 ± 11 min; P4K 15:17 ± 16 min; (Helium is delayed !). Time of solar injection (SRT): E03: 14:21; E08: 14:21; E2: 14:51; P4k: 14:53; P13 :14:53; P37: 14:51; P>51: 14:48

Helios 2

The intensities are $(3.5\pm.5)\cdot10^6$ in E03, $(1.1\pm.1)\cdot10^5$ in P4, and (450±50) in A4. The electron to proton ratio is about 32:1, the proton to Helium ratio is about 244:1. Reduced e:p:α-ratios: 1.47:1:0.004 ?

Onset times in UT: E03: 14:08 ± 1 min; E08: 14:13 ± 1 min; E2: 14:18 ± 2 min; P13: 14:34 ± 2 min; P27: 14:32 ± 1.5 min; P37: 14:33 ± 1 min; P>51: 14:23 ± 6 min; P4: 14:28 ± 5 min; P4k: 14:55 ± 7 min; (Helium is delayed!). Time of injection (SRT): E03: 14:03; E08: 14:08; E2:14:14, P4k: 14:18; P13: 14:12; P27: 14:15; P37: 14:18; P>51: 14:11

Schellert, 1985

double, small

Solar event on 16.04.1978 (Day 106 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.412	0.419
magn. Footpt.:	S07 E 04	S05 W 31
Solar wind speed [km/s]:	578.	405.
Time resolution [min]:		
Tape No. (1-min):	105	106

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Multiple injection of electrons, in nucleii not clear visible, shock at the end of the day?

Helios 2

Small single electron event starting at about 7 UT.
Intensity in E03 about $(3.\pm.5)\cdot 10^4$.

Schellert, 1985

Solar event on 16.04.1978 (Day 106 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.405	0.412
magn. Footpt.:	S07 E 01	S05 W 32
Solar wind speed [km/s]:	466.	418.
Time resolution [min]:		
Tape No. (1-min):	105	106

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

No magnetic field data, shock particles?

Helios 2

Prompt electron event followed by a second injection. α-particles only n the second injection.

Increase of intensity in E03 by about 1.5 and in P4 by about 2 orders of magnitude. For the first injection the intensities are $(5.5\pm.5)\cdot10^5$ in E03 and $(4.\pm1.)\cdot10^3$ in P4. For the second injection the intensities are $(7.2\pm.8)\cdot10^5$ in E03, $(2.2\pm.2)\cdot10^4$ in P4, and (380±40) in A4. In the first injection the electron to proton ratio is about 138:1. In the second injection the electron to proton ratio is about 33:1, the proton to Helium ratio is about 58:1.

Onset of the first injection in E03 at about 23:30 and in P4 at about 24:00 UT.

Schellert, 1985

double, gradual

Solar event on 28.04.1978 (Day 118 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.647	0.294
magn. Footpt.:	S06 E 09	N03 W 82
Solar wind speed [km/s]:	383.	400.
Time resolution [min]:	0.66	0.66
Tape No. (1-min):	7111	7112

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	13:04 -	13:37 -	22:32	3B		N22 E 38
Gamma:						
soft X-rays:		- 13:35 -		X5		
hard X-rays:						
3-cm Microwaves:	13:11 -	13:29 -	14:36	7530		
10-cm Microwaves:	13:08 -	13:55 -	22:58	24000		

Radiobursts: II 13:18-13:24, 3 (13:23-13:37.9, 3) /III 13:15.5-13:22.5, 3
(13:18.5-13:23, 3) /IV 13:19-15:40, 3

Solar Particles:

Helios 1

Prompt event with high and longlasting high anisotropy (scatter-poor?), followed by a second injection on doy 119. Visible up to the high energy channels despite high background.

Increase of intensity in E03 by 1.5 and in A4 and P4 by 2 orders of magnitude. Intensities are $(1.1\pm.1)\cdot10^7$ in E03, $(2.8\pm.4)\cdot10^6$ in P4, and $(1.6\pm.5)\cdot10^4$ in A4. The electron to proton ratio is about 4:1, the proton to Helium ratio is about 175:1.

Onset in E03 at about 13:40, in P4 at about 14:05, and in A4 at about 14:30.

Helios 2

Only a small increas in P4.

Schellert, 1985

double, bubble

Solar event on 29.04.1978 (Day 119 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.640	0.292
magn. Footpt.:	S06 E 00	N04 W 86
Solar wind speed [km/s]:	311.	385.
Time resolution [min]:	1.2	0.22
Tape No. (1-min):	141	142

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Structure of rise, slow decay and new rise in all channels at nearly the same time. Bubble event.

Increase of intensity in E03 and P4 by 3 and in A4 by 4 orders of magnitude. Intensities are $(5.\pm1.)\cdot10^7$ in E03, $(1.4\pm.3)\cdot10^7$ in P4, and $(3.5\pm.5)\cdot10^5$ in A4. The electron to proton ratio is about 3.6:1, the proton to Helium ratio is about 40:1.

Helios 2

similiar to Helios 1 data, additional spikes are superposed.

Intensities are $(9.5\pm.5)\cdot10^7$ in E03, $(2.1\pm.2)\cdot10^7$ i P4, and $(4.\pm.5)\cdot10^5$ in A4. The electron to proton ratio is about 4.5:1, the proton to Helium ratio is about 53:1.

GLE

Solar event on 07.05.1978 (Day 127 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:		
magn. Footpt.:		
Solar wind speed [km/s]:		
Time resolution [min]:		
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	03:27	-				N23 W 72
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Event superposed on decay phase of preceding event. Factor of 10 increase in electrons.

Helios 2

No increase in all channels. May be hidden in decay of preceding event (super-event?).

double

Solar event on 11.05.1978 (Day 131 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.402	0.382
magn. Footpt.:	N07 W124	N07 W162
Solar wind speed [km/s]:	389.	356.
Time resolution [min]:		
Tape No. (1-min):	7121	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

In all channels (exept high α-channels) visible slow rising event with low anisotropy. Magnetic filed very quiet. Flare at the west side of the sun could fit the observations, shock doy 132. data gap near electron maximum. At about 20 UT a second injection follows with faster rise in electrons and small increase in nucleii (high background).

Increase of intensity in E03 and A4 by about 1 and in P4 by about 2 orders of magnitude. In the first injection the intensities are $(1.4\pm.2)\cdot10^6$ in E03, $(4.\pm.5)\cdot10^4$ in P4, and $(350.\pm50)$ in A4. In the seond ijection the intensities are $(3.5\pm.5)\cdot10^6$ in E03, $(2.\pm1.)\cdot10^4$ in P4, and $(1.5\pm.5)\cdot10^3$ in A4. In the first injection the elecron to proton ratio is about 35:1 and the proton to Helium ratio is about 114:1, in the second injection the electron to proton ratio is about 175:1 and the proton to Helium ratio is about 13:1.

Onset of the first injection in E03 at about 7:45 and in P4 at about 8:05.

Helios 2

Only very small increase in E03 and P4.

RSF?

Solar event on 13.05.1978 (Day 133 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.430	0.413
magn. Footpt.:	N07 W125	N06 W174
Solar wind speed [km/s]:	525.	324.
Time resolution [min]:		
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

no well defined event with strutures in the intensity maxima (possibly fresh injection because related to a new increase in ansiotropy).
Intensities are $(7.\pm1.)\cdot10^5$ in E03, $(5.\pm1.)\cdot10^3$ in P4, and $(1.2\pm.2)\cdot10^3$ in A4. The electron to proton ratio is about 47:1, the proton to Helium ratio is about 13:1.
Onset in E03 at about 13:30 UT.

Helios 2

no increase in intensity

Solar event on 01.06.1978 (Day 152 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.660	0.655
magn. Footpt.:	N06 W178	N02 E144
Solar wind speed [km/s]:	351.	350.
Time resolution [min]:	41.	41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				3B		N20 W 43
Gamma:						
soft X-rays:		- 11:04 -		3B		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 10:40-10:53

Solar Particles:

Helios 1

Slow and weak increase in particle intensity possibly related to a jump in magnetic field strength. Data for electromagnetic radiation refer to doy 151 (wrong flare association ?). Sector boundary at doy 151 at about 7 UT.

Helios 2

to much data gaps.

RSF

Solar event on 11.06.1978 (Day 162 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.760	0.759
magn. Footpt.:	N05 E176	N00 E149
Solar wind speed [km/s]:	381.	
Time resolution [min]:	41.	41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W172
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Prompt onset, in electron channels followed by an exponential decay, in the nucleii channel the maximum intensity lasts for about 40 h.

Increase in intensity in E03, P4, and A4 by 3 orders of magnitude. The intensities are $(3.8\pm.6)\cdot10^6$ in E03, $(1.3\pm.2)\cdot10^5$ in P4, and $(3.8\pm.5)\cdot10^3$. The electron to proton ratio is about 29:1, the proton to Helium ratio is about 34:1.

Onset in E03 at about 6:00, in P4 at about 5:40 (crosstalking electrons?), and in A4 at about 7:00 UT.

Helios 2

to much data gaps.

Solar event on 18.06.1978 (Day 169 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.818	0.818
magn. Footpt.:	N04 E165	S01 E145
Solar wind speed [km/s]:	345.	
Time resolution [min]:	41.	41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Small electron injection starting at about 4:00 UT. Start of an 'event' at about 14 UT simultaneously (?) with a jump in strength and direction of the magnetic field (Shock?) Because of the bad time resolution a correlation between magnetic field fluctuations and intensities as well as between intensities in different energy channels is not possible.

The intensity is $(4.8\pm.5)\cdot10^{4}$ in E03, (300±50) in P4, and (50±20) in A4. The electron to proton ratio is about 160:1, the proton to Helium ratio is about 6:1.

Helios 2

Helios black out.

Solar event on 20.06.1978 (Day 171 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.838	0.839
magn. Footpt.:	N04 E177	S01 E145
Solar wind speed [km/s]:	441.	
Time resolution [min]:	10.	41.
Tape No. (1-min):	7131	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Prompt event, only a few α-particles, visible up to P13. Anisotropy provides not many informations because of the magnetic field fluctuations.

Increase of intensity in E03 by 1.5 and in P4 by 2 orders of magnitude. Intensities are $(3.8\pm.4)\cdot10^4$ in E03, (750±10) in P4. The electron to proton ratio is about 51:1.

Onset in E03 at about 22:15 UT, in P4 at about 23:40, and in A4 at about 25:30.

Helios 2

Helios black out.

Solar event on 23.06.1978 (Day 174 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.856	0.857
magn. Footpt.:	N03 E179	S01 E144
Solar wind speed [km/s]:	472.	
Time resolution [min]:		41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Start of a slow longlasting increase in intensity (duration about 5 days, rise of 1 order of magnitude in E03 in about 50 h and in P4 in about 40 h).

Helios 2

Event visible but too much data gaps.

RSF

Solar event on 15.07.1978 (Day 196 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.959	0.960
magn. Footpt.:	N01 E180	S03 E130
Solar wind speed [km/s]:	330.	399.
Time resolution [min]:	10.	41.
Tape No. (1-min):	7141	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						E136
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 03:50.5-04:35.5

Solar Particles:

Helios 1

Prompt event, maxima and onsets of nucleii in data gap, no magnetic field data, electrons and protons visible in higher energies.

Helios 2

Prompt event, many data gaps in it, no magnetic field data.
Intensities are $(1.5\pm.3)\cdot10^6$ in E03, $(4.5\pm.5)\cdot10^4$ in P4, and (110 ± 30) in A4. The electron to proton ratio is about 33:1, the proton to Helium ratio is about 409:1.

nothing

Solar event on 18.07.1978 (Day 199 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.967	0.968
magn. Footpt.:	N01 E170	S04 E143
Solar wind speed [km/s]:	413.	320.
Time resolution [min]:	-999	41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Helios black out.

Helios 2

Slow increase in intensity (in E03 0.5 orders of magnitude in 2 days), no solar event (?)

Solar event on 29.08.1978 (Day 241 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.927	0.918
magn. Footpt.:	S03 W168	S06 E151
Solar wind speed [km/s]:	502.	452.
Time resolution [min]:	10.	41.
Tape No. (1-min):	7151	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						E123
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 06:08-06:42

Solar Particles:

Helios 1

Slow rising event, small data gaps, no magnetic field data, event visible in higher proton channels but no increase in Helium intensity.

Intensities are $(2.5\pm.5)\cdot10^5$ in E03 and $(1.3\pm.3)\cdot10^3$ in P4. The electron to proton ratio is about 192:1.

Helios 2

Prompt event, onsets and maxima in data gaps, visible in higher nucleii channels.

Increase of intensity (at least) in E03 by 3, in P4 by 4, and in A4 by 2.5 orders of magnitude. The inaccurate intensities are $(9.\pm1.)\cdot10^5$ in E03, $(4.\pm1.)\cdot10^4$ in P4, and (200±20) in A4. The electron to proton ratio is about 22.5:1, the proton to Helium ratio is about 200:1.

GLE, gradual

Solar event on 23.09.1978 (Day 266 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.760	0.736
magn. Footpt.:	S05 W163	S07 E165
Solar wind speed [km/s]:	446.	
Time resolution [min]:	41.	41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	09:44			3B		N35 W 50
Gamma:						
soft X-rays:		- 10:21 -		X1	47	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 09:58-10:28

Solar Particles:

Helios 1

Prompt onset followed by an additional slow increase of intensity shock at doy 268 at about 4 UT, event superposed by ESP-particles?, data gaps, difficult to distinguish between prompt particles and additional particles.

Increase of intensity in E03 by about 4.5, in P4 by 6 and in A4 by 5 orders of magnitude. The (inaccurate) intensities are $(1.2\pm.2)\cdot10^6$ in E03, $(9.\pm3.)\cdot10^4$ in P4, and (500±100) in A4. The electron to proton ratio is about 13:1, the proton to Helium ratio is about 180:1.

Onset in E03 and P4 at about 11 UT (crosstalking electrons in P4?), the onset in A4 is at about 14 UT.

Helios 2

Similiar to Helios 1, smaller increase of intensities, data gaps, shock stronger (?) than on Helios 1.

Increase of intensity in E03 and A4 by 4 and in P4 by 5 orders of magnitude. The intensities are $(1.3\pm.5)\cdot10^6$ in E03, $(4.\pm1.)\cdot10^4$ in P4, and (420±100) in A4. The electron to proton ratio is about 33:1, the proton to Helium ratio is about 95:1.

RSF

Solar event on 17.10.1978 (Day 290 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.488	0.441
magn. Footpt.:	S07 W164	S06 E156
Solar wind speed [km/s]:	518.	
Time resolution [min]:	5.	-999
Tape No. (1-min):	7161	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W167
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Two injections, visible up to high energies, magnetic field very strong disturbed (correlations between magnetic field fluctuations and changes in particle intensity?).

Increase of intensity in the first injection in E03 and A4 by about 1 and in P4 by 2 orders of magnitude, increase of intensity in the second injection in E03 by 3, in P4 by 3.5, and in A4 by 2.5 orders of magnitude. In the first injection the intensities are $(8.5\pm1.)\cdot10^4$ in E03, $(1.8\pm.2)\cdot10^4$ in P4, and (70±20) in A4. In the second injection the intensities are $(5.\pm1.)\cdot10^6$ in E03, $(3.5\pm.5)\cdot10^5$ in P4, and $(1.8\pm.5)\cdot10^3$ in A4. In the first injection the electron to proton ratio is about 5:1, the proton to Helium ratio is about 257:1. In the second injection the electron to proton ratio is about 17:1 and the proton to Helium ratio is about 167:1.

Onset of the first injection in E03 at about 10:00 and in P4 and A4 at about 10:40 UT, onset of the second injection in E03 at about 17:00, in P4 at about 17:30, and in A4 at about 17:40 UT.

Helios 2

data gap

RSF

Solar event on 19.10.1978 (Day 292 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.470	0.422
magn. Footpt.:	S07 W164	S05 E153
Solar wind speed [km/s]:	552.	
Time resolution [min]:	10.	-999
Tape No. (1-min):	7161	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						E175
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Prompt onset, nucleii superposed the decaying flanc of the event on doy 290, therefor only small particle increases. No magnetic field data.

Increase of intensity in E03 by about 2.5 orders of magnitude. The intensities are $(2.\pm.2)\cdot10^6$ in E03, $(2.\pm1.)\cdot10^3$ in P4, and (110±30) in A4. The electron to proton ratio is about 1000:1, the proton to Helium ratio is about 18:1.

Onset in E03 at about 1:05 UT.

Helios 2

data gap.

Solar event on 23.10.1978 (Day 296 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.416	0.366
magn. Footpt.:	S07 E176	S03 E142
Solar wind speed [km/s]:	332.	
Time resolution [min]:	41.	41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Prompt event with high anisotropy, magnetic field quiet.
Increase of intensity in E03 and P4 by 4 and in A4 by two orders of magnitude. The intensities are $(2.\pm.2)\cdot10^7$ in E03, $(3.\pm.5)\cdot10^5$ in P4, and (70±30) in A4. Possibly the proton intensity is to high caused by crosstalking electrons. The electron to proton ratio is about 67:1, the proton to Helium ratio is about 4290:1.
Onset in E03 at about 10:45, in P4 at about 12:00, and in A4 at about 12:20 UT.

Helios 2

Many data gaps, magnetic field is disturbed, shock ? .

Solar event on 25.10.1978 (Day 298 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.392	0.343
magn. Footpt.:	S07 E176	S02 E134
Solar wind speed [km/s]:	394.	453.
Time resolution [min]:	41.	21.
Tape No. (1-min):		7172

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:				C1		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 04:42.5-04:44

Solar Particles:

Helios 1

Many small data gaps, two peaks in E03, only a slow increase in nucleii intensity, small event.

Increase of intensity in E03 by about 0.5 orders of magnitude in the first and 2 orders of magnitude in the second injection. The intensities are $(1.\pm.1)\cdot 10^5$ in E03, (200±10) in P4, and (20±10) in A4 (only approximations, middled over two injections).

Onset in E03 at about 3:00 and at about 4:45 UT.

Helios 2

Two small electron injections, only very weak i the nucleii channels.

Intensity in the first injection: $(1.1\pm.2)\cdot 10^4$ in E03. Intensities in the second injection $(1.3\pm.2)\cdot 10^6$ in E03 and (160±40) in P4.

Solar event on 04.11.1978 (Day 308 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.310	0.297
magn. Footpt.:	N00 E123	N06 E 68
Solar wind speed [km/s]:	386.	356.
Time resolution [min]:		41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

no increase in intensity.

Helios 2

data gaps, small rise superposed by a few small injections in the following days.

small, impulsiv

Solar event on 08.11.1978 (Day 312 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.319	0.329
magn. Footpt.:	N03 E109	N07 E 47
Solar wind speed [km/s]:	500.	500.
Time resolution [min]:		41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1B		N18 E 12
Gamma:						
soft X-rays:		- 17:53 -		C5	7	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 18:03-18:05

Solar Particles:

Helios 1

no increase in intensity.

Helios 2

Small electron event, high background in nucleii channels caused by ESP-particles from preceding day, data gaps.

RSF

Solar event on 19.10.1978 (Day 292 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.470	0.422
magn. Footpt.:	S07 W164	S05 E153
Solar wind speed [km/s]:	552.	
Time resolution [min]:	10.	-999
Tape No. (1-min):	7161	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						E175
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Prompt onset, nucleii superposed the decaying flanc of the event on doy 290, therefor only small particle increases. No magnetic field data.

Increase of intensity in E03 by about 2.5 orders of magnitude. The intensities are $(2.\pm.2)\cdot10^6$ in E03, $(2.\pm1.)\cdot10^3$ in P4, and (110±30) in A4. The electron to proton ratio is about 1000:1, the proton to Helium ratio is about 18:1.

Onset in E03 at about 1:05 UT.

Helios 2

data gap.

Solar event on 23.10.1978 (Day 296 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.416	0.366
magn. Footpt.:	S07 E176	S03 E142
Solar wind speed [km/s]:	332.	
Time resolution [min]:	41.	41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Prompt event with high anisotropy, magnetic field quiet.
Increase of intensity in E03 and P4 by 4 and in A4 by two orders of magnitude. The intensities are $(2.\pm.2)\cdot 10^7$ in E03, $(3.\pm.5)\cdot 10^5$ in P4, and (70±30) in A4. Possibly the proton intensity is to high caused by crosstalking electrons. The electron to proton ratio is about 67:1, the proton to Helium ratio is about 4290:1.
Onset in E03 at about 10:45, in P4 at about 12:00, and in A4 at about 12:20 UT.

Helios 2

Many data gaps, magnetic field is disturbed, shock ? .

Solar event on 25.10.1978 (Day 298 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.392	0.343
magn. Footpt.:	S07 E176	S02 E134
Solar wind speed [km/s]:	394.	453.
Time resolution [min]:	41.	21.
Tape No. (1-min):		7172

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:				C1		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 04:42.5-04:44

Solar Particles:

Helios 1

Many small data gaps, two peaks in E03, only a slow increase in nucleii intensity, small event.

Increase of intensity in E03 by about 0.5 orders of magnitude in the first and 2 orders of magnitude in the second injection. The intensities are $(1.\pm.1)\cdot 10^5$ in E03, (200±10) in P4, and (20±10) in A4 (only approximations, middled over two injections).

Onset in E03 at about 3:00 and at about 4:45 UT.

Helios 2

Two small electron injections, only very weak i the nucleii channels.

Intensity in the first injection: $(1.1\pm.2)\cdot 10^4$ in E03. Intensities in the second injection $(1.3\pm.2)\cdot 10^6$ in E03 and (160±40) in P4.

Solar event on 04.11.1978 (Day 308 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.310	0.297
magn. Footpt.:	N00 E123	N06 E 68
Solar wind speed [km/s]:	386.	356.
Time resolution [min]:		41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

no increase in intensity.

Helios 2

data gaps, small rise superposed by a few small injections in the following days.

small, impulsiv

Solar event on 08.11.1978 (Day 312 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.319	0.329
magn. Footpt.:	N03 E109	N07 E 47
Solar wind speed [km/s]:	500.	500.
Time resolution [min]:		41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1B		N18 E 12
Gamma:						
soft X-rays:		- 17:53 -		C5	7	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 18:03-18:05

Solar Particles:

Helios 1

no increase in intensity.

Helios 2

Small electron event, high background in nucleii channels caused by ESP-particles from preceding day, data gaps.

gradual

Solar event on 10.11.1978 (Day 314 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.326	0.344
magn. Footpt.:	N04 E101	N07 E 60
Solar wind speed [km/s]:	492.	307.
Time resolution [min]:		41.
Tape No. (1-min):	115	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1N		N17 E 01
Gamma:						
soft X-rays:		- 01:22 -		M1	55	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 01:09.5-01:28.5

Solar Particles:

Helios 1

data gap in onset, visible up to highest energies, very slow rise in nucleii intensities like in an ESP-event.

Intensities are $(8.\pm1.)\cdot10^4$ in E03, $(2.6\pm.3)\cdot10^3$ in P4, and $(10.\pm5)$ in A4 (only inaccurate). The electron to proton ratio is 31:1, the proton to Helium ratio is about 260:1.

Helios 2

Looks like a large prompt event, possible coupling between magnetic field fluctuations and structures in nucleii intensities.

Increase of intensity in E03 by about 3.5, in P4 by about 5, and in A4 by about 4.5 orders of magnitude. The intensities are $(1.2\pm.2)\cdot10^7$ in E03, $(1.8\pm0.3)\cdot10^6$ in P4, and $(1.2\pm.2)\cdot10^4$ in A4. The electron to proton ratio is about 7:1, the proton to Helium ratio is about 150:1.

Onset in E03 at about 0:50, in P4 at about 1:05, and in A4 at about 1:20 UT.

small, ESP, gradual

Solar event on 28.11.1978 (Day 332 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.540	0.586
magn. Footpt.:	S07 E 28	N03 W 27
Solar wind speed [km/s]:	380.	344.
Time resolution [min]:	11.	0.5
Tape No. (1-min):	ii10	6 10

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	05:11 -	05:35 -	06:46	2N		N14 E 47
Gamma:						
soft X-rays:		- 05:51 -		M1	42	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:	05:29 -	05:47 -	05:54	93.5		

Radiobursts: II 05:29.5-05:32, w /III - /IV 05:40-<07:19, 2

Solar Particles:

Helios 1

Prompt onset in electrons, behaviour like in an impulsive event, in nucleii channel high intensities for a long time (ESP-particles ?), shock at doy 333 at about 8 UT.

The intensities are $(1.2\pm.1)\cdot10^5$ in E03, $(2.2\pm.3)\cdot10^3$ in P4, and $(4.5\pm.5)\cdot10^2$ in A4. The electron to proton ratio is about 55:1, the proton to Helium ratio is about 5:1.

Onset in E03 at about 5:50, in P4 at about 7:10, and in A4 at about 7:00 UT.

Helios 2

Slow and weak increase in intensity, small electron event (increase by less than 1 order of magnitude), start of an ESP-event?, short befor sector boundary.

Schellert, 1985

Solar event on 29.11.1978 (Day 333 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.551	0.597
magn. Footpt.:	N07 E 43	N03 W 34
Solar wind speed [km/s]:	696.	300.
Time resolution [min]:		
Tape No. (1-min):	ii10	6 10

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				2N		N15 E 38
Gamma:						
soft X-rays:		- 05:20 -		M2		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 05:17.5-05:26

Solar Particles:

Helios 1

ESP particles from preceding event, small intensity increase from this event, gaps in the data.

Helios 2

Only small increase of intensity.
The intensities are about $(8.\pm2.)\cdot10^3$ in E03 (at least), $(3.5\pm.5)\cdot10^3$ in P4, and (35±15) in A4. The electron to proton ratio is at least 3:1, the proton to Helium ratio is at least 100:1.

gradual

Solar event on 10.12.1978 (Day 344 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.688	0.810
magn. Footpt.:	S06 E 02	N01 W 49
Solar wind speed [km/s]:	376.	309.
Time resolution [min]:	21.	11.
Tape No. (1-min):	ii10	6 10

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	23:32 -	24:00 -	01:19	2N		S13 E 29
Gamma:						
soft X-rays:		- 24:03 -		M3	47	
hard X-rays:						
3-cm Microwaves:	23:39 -	23:47 -	00:24	28.7		
10-cm Microwaves:	23:30 -	23:40 -	00:17	98		

Radiobursts: II 23;45.5-00:02.5, 1 /III - /IV 23:42-24:00-02:10, 3→2

Solar Particles:

Helios 1

Data gap in onset, after 24:40 time resolution of 1.4 min, prompt event, increase of about 2 orders of magnitude above background, hihg anisotropy in nucleii channels, no increase in Helium intensity.

Intensities are $(1.\pm.1)\cdot10^6$ in E03 and $(8.\pm2.)\cdot10^4$ in P4. The electron to proton ratio is about 13:1.

Helios 2

Small evemt with slow rise and slow decay. (jump in background intenstity?), possibly result of sector baoundary/ change in magnetic field direction.

Increase of intensity in E03, P4, and A4 by less than 1 order of magnitude. The intensities are $(9.\pm2.)\cdot10^3$ in E03 and (60±10) in P4. The electron to proton ratio is about 150:1.

Einsatzzeit (UT): E03: 27:30, P4: 27:30, A4: 28:00.

double, gradual

Solar event on 11.12.1978 (Day 345 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.697	0.737
magn. Footpt.:	N05 E 04	N01 W 52
Solar wind speed [km/s]:	351.	301.
Time resolution [min]:	43.	0.22
Tape No. (1-min):	ii10	172

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	18:33 -	19:45 -	20:14	1B		S15 E 14
Gamma:						
soft X-rays:		- 19:45 -		X1	48	
hard X-rays:						
3-cm Microwaves:	19:18 -	20:05 -	>21:05	4150		
10-cm Microwaves:	19:10 -	20:12 -	>22:54	8320		

Radiobursts: II - /III 19:52.8-20:07.4, 1 /IV 19:53-21:17-21:36, 3→2

Solar Particles:

Helios 1

Event in nucleii channels superposed the decreasing flanc of the preceding event, only low and short lasting anisotropy.

Increase of intensity in E03 and P4 by 2 and in A4 by three orders of magnitude. The intensitites are $(4.2\pm.5)\cdot10^6$ in E03, $(2.7\pm.3)\cdot10^5$ in P4, and $(3.\pm.6)\cdot10^3$ in A4. The electron to proton ratio is about 16:1, the proton to Helium ratio is about 90:1.

Onset in E03 at about 19:30, in P4 at about 21:00, and in A4 at about 22:30.

Helios 2

Prompt onset, additional slow increase in nucleii intensities, high and longlasting anisotropy (scatter poor), crosstalk of electrons in proton channles pronounced.

Increase of intensity in E03 by 2, in P4 by 3.5, and in A4 by 4 orders of magnitude. The intensities are $(1.4\pm.2)\cdot10^6$ in E03, $(3.2\pm.5)\cdot10^5$ in P4, and $(4.\pm2.)\cdot10^3$ in A4. The electron to proton ratio is about 5:1, the proton to Helium ratio is about 80:1.

Onset in E03 at about 20:00, in P4 at about 22:00, and in A4 at about 21:30 UT.

Schellert, 1985

double, gradual

Solar event on 05.01.1979 (Day 5 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.888	0.931
magn. Footpt.:	N03 W 06	S02 W 38
Solar wind speed [km/s]:	380.	458.
Time resolution [min]:	0.9	1.2
Tape No. (1-min):	611	612

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	-	00:33	-	N		S19 E 54
Gamma:						
soft X-rays:	-	00:40	-	C3	>20	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 00:22.5-00:54.5

Solar Particles:

Helios 1

small data gap in onset, slow increasing event (time to maximum in E03 about 7 h, increase of intensity by about 1.5 orders of magnitude), slowly decaying (decrease by 50% within about 18 h). Event not visible in higher energy channels, only small increase in Helium intensity.

Increase of intensity in E03 by about 1.8 and in P4 by about 1 order of magnitude. Intensities are $(1.\pm.1)\cdot 10^5$ in E03, $(4.5\pm.5)\cdot 10^3$ in P4, and (15 ± 8) in A4. The electron to proton ratio is about 22:1, the proton to Helium ratio is about 300:1.

Onset in E03 at about 0:55, in P4 at about 5:20.

Helios 2

Time course similiar to that on Helios 1 but intensities are smaller, only small and slow increase in P4 but better visible in P13. Large magnetic field fluctuations.

Increase of intensity in E03 by 1 and in P4 by 0.5 orders of magnitude. Intensities are $(4.\pm.4)\cdot 10^4$ in E03.

Onset in E03 at about 2:10 UT, in P4 at about 5 UT.

Schellert, 1985

Solar event on 05.02.1979 (Day 36 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.984	0.983
magn. Footpt.:	N00 W 13	S05 W 38
Solar wind speed [km/s]:	331.	419.
Time resolution [min]:	2.7	1.2
Tape No. (1-min):	621	622

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

No magnetic field data, no increase in Helium intensity. Increase in E03 by about 1, in P4 by about 0.7 orders of magnitude.

The intensity is about $(2.\pm.3)\cdot 10^4$ in E03 and about (25±5) in P4. The electron to proton ratio is about 800:1

Helios 2

No magnetic field data, two small electron injections, decaying fast. In the nucleii channels only the second injection is visible, intensity remains nearly constant forabout 2 days. Is the first injection a precursor?

Increase of intensity in E03 by about 2.5 in the first injection. In the second injection increase of intensity in E03 by about 1, in P4 and A4 by about 1.5 orders of magnitude. The intensities are $(3.3\pm.3)\cdot 10^4$ in E03, (70±20) in P4, and (20±8) in A4. The electron to proton ratio is about 429:1, the proton to Helium ratio is about 3.5:1.

Onset of the first injection in E03 at about 16:40. Onset of the second injection in E03 and P4 at about 19:10 and in A4 at about 19:40 UT.

double, gradual

Solar event on 16.02.1979 (Day 47 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.980	0.970
magn. Footpt.:	S01 E 20	S05 E 42
Solar wind speed [km/s]:	554.	366.
Time resolution [min]:	3.	54.
Tape No. (1-min):	181	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	01:23 -	01:52 -	03:15	3B		N16 E 59
Gamma:						
soft X-rays:		- 01:59 -		X3	27	
hard X-rays:						
3-cm Microwaves:	01:48 -	01:52 -	>02:03	465		
10-cm Microwaves:	01:42 -	02:29 -	03:56	30000		

Radiobursts: II 01:49.5-02:31.5, 3 /III 01:25-01:26, 3 (01:48.5-01:49, 2; 01:54.5-01:56, 2) /IV 01:49.5-03:28, 1

Solar Particles:

Helios 1

Prompt onset in all channels (Precursor in E03 ?), crosstalk of electrons in P4, is crosstalk of electrons in A4 possible? Visible up to the highest energy channels. no magnetic field data.

Increase of intensity in E03 by 3, in P4 by 4.5, and in A4 by 3.5 orders of magnitude. The intensities are $(1.3\pm.2)\cdot10^7$ in E03, $(6.\pm1.)\cdot10^5$ in P4, and $(9.\pm2.)\cdot10^4$ in A4. The electron to proton ratio is about 22:1, the proton to Helium ratio is about 7:1. Reduced e:p:α-ratios: 1:1:0.016

Onset in E03 at about 2:05, in P4 at about 3:10, and in A4 at about 2:55 UT.

Helios 2

slow and delayed increase in intensity despite small coronal distance (wrong flare association?). Correlation between structures in intensities and magnetic field fluctuations?

Increase of intensity in E03 by 2.5, in P4 by 3.5, and in A4 by 4 orders of magnitude.

Onset in E03 at about 16:50, in P4 at about 21:45, and in A4 at about 19:45.

Schellert, 1985

gradual

Solar event on 26.02.1979 (Day 57 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.960	0.939
magn. Footpt.:	S02 E 03	S06 W 31
Solar wind speed [km/s]:	378.	406.
Time resolution [min]:		
Tape No. (1-min):	135	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1N		S20 E 60
Gamma:						
soft X-rays:		- 07:04 -		M1		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 06:54.5-07:24

Solar Particles:

Helios 1

Intensity profile looks like an event with inverse time course, shock at doy 58 at about 8 UT. Electromagnetic data given above refer to Doy 56.

Helios 2

no increase in intensity.

double, gradual

Solar event on 01.03.1979 (Day 60 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.950	0.925
magn. Footpt.:	S02 E 14	S06 W 19
Solar wind speed [km/s]:	440.	400.
Time resolution [min]:	3.	0.22
Tape No. (1-min):	191	146

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	09:55 -	10:10 -	11:00	3N		S23 E 58
Gamma:						
soft X-rays:		- 10:19 -		X1	11	
hard X-rays:						
3-cm Microwaves:	10:11 -	10:15 -	11:16	451		
10-cm Microwaves:	10:09 -	10:17 -	10:52	766		

Radiobursts: II 10:18-10:36, 2 /III 10:04-10:21, 2 (10:15.8-10:18.7, 2)

Solar Particles:

Helios 1

Well defined onset, fast decaying anisotropy (diffusive particle propagation?), anisotropy remains different from 0 for a long time. Short injection? Struture in electron maximum possibly due to second injection that leads also to an additional increase in nucleii intensities. Event visible in all energy channels. Shock at the begin of doy 62, sector boundary at the end of doy 62.

Increase of intensity in E03 and P4 by 3 and in A4 by 4 orders of magnitude. The intensities are $(3.\pm.1)\cdot10^7$ in E03, $(1.\pm.3)\cdot10^6$ in P4, and $(3.\pm1.)\cdot10^4$ in A4. The electron to proton ratio is about 30:1, the proton to Helium ratio is about 33:1.

Onset in E03 at about 10:30, in P4 at about 10:30 (crosstalking electrons?), and in A4 at about 11:45 UT.

Helios 2

Data gap in the onset, very slow increase of intensity in A4 and P4, relative sharp onset in E03 and P13, rising slower up to the maximum intensity.

Increase in intensity in E03 of about 2 and in P4 and A4 of about 2.5 orders of magnitude. The intensities are $(1.1\pm.1)\cdot10^6$ in E03, $(3.\pm2.)\cdot10^4$ in P4, and (180±60) in A4. The electron to proton ratio is about 37:1, the proton to Helium ratio is about 167:1.

gradual

Solar event on 09.03.1979 (Day 68 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.917	0.883
magn. Footpt.:	S03 W 00	S06 W 20
Solar wind speed [km/s]:	331.	450.
Time resolution [min]:	41.	
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1N		N17 E 80
Gamma:						
soft X-rays:		- 10:32 -		M9	30	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 10:27-10:42

Solar Particles:

Helios 1

Slow increase of intensity (high background). Is this a solar event? Large magnetic field fluctuations.

Helios 2

Increase slower than on Helio1, maximum is delayed by about 2 days with respect Helios 1. Is this a corotating structure?

no event

Solar event on 26.03.1979 (Day 85 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.811	0.754
magn. Footpt.:	S05 E 32	S07 W 14
Solar wind speed [km/s]:	518.	429.
Time resolution [min]:	41.	
Tape No. (1-min):		7182

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

No magnetic field data, slow rising and decaying event or shock, more nucleii than electrons. Not in data for particle ratios included.

Increase of intensity in E03 by 0.5, in P4 by 4, and in A4 by 3 orders of magnitude. The intensities are $((6.\pm1.)\cdot10^4$, $(3.5\pm1.)\cdot10^4$, and (75 ± 15) in A4. The electron to proton ratio is abou1.7:1, the proton to Helium ratio is about 467:1.

Onset in E03 at about 12:16, in P4 and A4 at about 7 UT.

Helios 2

Gaps in magnetic field data, shock at doy 86?, profiles similiar to that on Helios 1 but superposed by a spike (data not complete!)

Increase of intensity in E03 by 3 (in the spike by more than 5), in P4 by 5.5 (>7), and in A4 by 3.5 (>5) orders of magnitude.

Onset in E03 at about 13:10, in P4 at about 11:30, and in A4 at about 13:00 UT.

Magnet, gradual

Solar event on 03.04.1979 (Day 93 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.747	0.678
magn. Footpt.:	S05 E 14	S07 W 08
Solar wind speed [km/s]:	332.	479.
Time resolution [min]:	3.	0.5
Tape No. (1-min):	201	202

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	01:05 -	01:34 -	02:30	1B		S25 W 14
Gamma:						
soft X-rays:		- 02:13 -		M4	70	
hard X-rays:						
3-cm Microwaves:	01:19 -	01:35 -	01:54	202		
10-cm Microwaves:	01:07 -	01:46 -	02:33	475		

Radiobursts: II - /III 01:07-07:36, ? /IV 01:33-07:36, ?

Solar Particles:

Helios 1

slow increasing event, no magnetic field data.

Increase in intensity in E03 and P4 by 1.5, and in A4 by 1 order of magnitude. The intensities are $(6.\pm.5)\cdot10^4$ in E03, (900±100) in P4, and (25±15) in A4. The electron to proton ratio is about 67:1, the proton to Helium ratio is about 36:1.

Onset in E03 at about 2:00 UT, in P4 at about 2:40 UT, and in A4 at about 3:40 UT.

Helios 2

Shock, large magnetic field fluctuations, onset and structures in maxima related to magnetic field fluctuations ? Complex event with jumps everywhere.

Increase in intensity in E03 by 3 and in P4 and A4 by 5 orders of magnitude. The intensities are $(3.5\pm.5)\cdot10^6$ in E03, $(1.3\pm.3)\cdot10^5$ in P4, and $(3.\pm1.)\cdot10^3$ in A4. The electron to proton ratio is about 27:1, the proton to Helium ratio is about 43:1.

Onset in E03 and P4 at about 2:00 (crosstalking electrons?), and in A4 at about 4:00 UT.

small

Solar event on 11.04.1979 (Day 101 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.661	0.576
magn. Footpt.:	S06 E 30	S07 W 03
Solar wind speed [km/s]:	452.	610.
Time resolution [min]:		
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Small electron event increasing by less than 1 order of magitude.
The electron intensity is about $(1.\pm.3)\cdot 10^4$.

Helios 2

No increase in intensity.

impulsiv

Solar event on 14.04.1979 (Day 104 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.627	0.537
magn. Footpt.:	S06 E 25	S07 W 06
Solar wind speed [km/s]:	389.	563.
Time resolution [min]:		
Tape No. (1-min):	7191	7192

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1B		N04 E 08
Gamma:						
soft X-rays:		- 14:43 -		M2	2	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 14:47-15:01.5

Solar Particles:

Helios 1

Prompt electron event, in nucleii channels superposing an ESP-event (visible in P13, only small and slow increasing in P4). No magnetic field data.

Increase in intensity in E03 by 2 and in A4 by about 0.8 orders of magnitude. The intensities are $(1.2\pm.2)\cdot10^6$ in E03, $(1.5\pm.5)\cdot10^3$ in P4, and (90±10) in A4. The electron to proton ratio is about 800:1, the proton to Helium ratio is about 38:1.

Onset in E03 at about 14:40, in P4 at about 15:10.

Helios 2

Small electron event, nearly no increase in nucleii intensities.

Increase of intensity in E03 by 1 order of magnitude, in P4 by a factor of three. The intensities are $(4.\pm1.)\cdot10^4$ in E03, (120±40) in P4, and (5±3) in A4. The electron to proton ratio is about 333:1, the proton to Helium ratio is about 24:1.

Onset in E03 at about 15:10, in P4 at about 15:40, and in A4 at about 17 UT. Delay of the α-particles result of the small counting rates.

Solar event on 26.04.1979 (Day 116 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.475	0.370
magn. Footpt.:	S07 E 18	S03 W 25
Solar wind speed [km/s]:	386.	663.
Time resolution [min]:	11.	43.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	20:01	- 20:13	- 20:48	1B		N12 E 31
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II 20:12-20:33, 3 /III - /IV -

Solar Particles:

Helios 1

Increase of electron intensity by a factor of three, pronounced increase in nucleii intensities with high anisotropies.

Increase in intensity by a factor of 3 in Eo3, in P4 by 2 and in A4 by 1 order of magnitude. The intensities are $(2.5\pm1.)\cdot10^3$ in E03 and $(2.\pm0.5)\cdot103$ in P4. The electron to proton ratio is about 1.3:1.

Onset in E03 at about 20:10, in P4 at about 20:50, and in A4 at about 21:00 UT.

Helios 2

No increase in intensity.

impulsiv

Solar event on 27.04.1979 (Day 117 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.468	0.363
magn. Footpt.:	S07 E 16	S03 W 30
Solar wind speed [km/s]:	369.	574.
Time resolution [min]:	-999	
Tape No. (1-min):		176

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1B		N18 E 17
Gamma:						
soft X-rays:		- 06:52 -		X1	12	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 06:44.9-07:13

Solar Particles:

Helios 1

Data gaps in the onset, prompt event, quiet magnetic field.
Increase in E03 by about 3 and in A4 and P4 by about 1.5 orders of magnitude. The intensities are $(9.\pm1.)\cdot10^5$ in E03, $(6.5\pm.5)\cdot10^3$ in P4, and (15±10) in A4. The electron to proton ratio is about 138:1, the proton to Helium ratio is about 433:1.

Helios 2

Quiet magnetic field, slow increase in intensity (time to maximum about 10 h for an increase of 1 order of magnitude). No increase in Helium intensity.
Increase of intensity in E03 and P4 by 1 order of magnitude. The intensities are $(2.2\pm.2)\cdot10^4$ in E03 and (110±10) in P4. The electron to proton ratio is about 200:1.
Onset in E03 at about 7:30, in P4 at about 11:30 UT.

double, small, gradual

Solar event on 02.05.1979 (Day 122 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.400	0.793
magn. Footpt.:	S07 W 02	N01 W 63
Solar wind speed [km/s]:	281.	343.
Time resolution [min]:	1.3	21.
Tape No. (1-min):	185	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	16:51 -	16:59 -	17:59	2B		N20 W 55
Gamma:						
soft X-rays:		- 17:01 -		M9	8	
hard X-rays:						
3-cm Microwaves:	16:51 -	17:00 -	17:23	369		
10-cm Microwaves:	16:51 -	17:00 -	18:30	188		

Radiobursts: II 16:59-17:30, 3 /III 16:55.3-16:58.3, 3

Solar Particles:

Helios 1

Many protons, only a few electrons and no increase in Helium intensity, shock at doy 122 at about 23 UT.

Increase of intensity in E03 by 1 and in P4 by 2 orders of magnitude. The intensities are $(1.2\pm.2)\cdot10^4$ in E03 and $(1.4\pm.2)\cdot10^3$ in P4. The electron to proton ratio is about 9:1.

Onset in E03 at about 17:30 and in P4 at about 18:00 UT.

Helios 2

Time course of intensity similiar to that on Helios 1, intensities a little bit larger, shock at doy 123 at about 14 UT.

Increase of intensity in E03 by 1.5 and in P4 by 2 orders of magnitude. The intensities are $(3.1\pm.3)\cdot10^4$ in E03, $(1.8\pm.5)5\cdot10^3$ in P4, and (3 ± 2) in A4. The electron to proton ratio is about 17:1, the proton to Helium ratio is about 600:1.

Onset in E03 at about 17:00, in P4 at about 17:30, and in A4 at about 17:45 UT.

RSF

Solar event on 08.05.1979 (Day 128 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.337	0.293
magn. Footpt.:	S04 W 10	N06 W101
Solar wind speed [km/s]:	427.	346.
Time resolution [min]:		1.3
Tape No. (1-min):		632

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:		- 14:27 -		-N		N14 W 73
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

no increase in intensity.
The electron to proton ratio is 9:1, the proton to Helium ratio is 240:1.

Helios 2

Only observed in the three lowest energy channels, data gap in the onset, start of a series of three small injections, that are smeared out in the proton channels, H_α-time refers to the third injection, intensities too.
The intensities are about $(5.5\pm.5)\cdot10^4$ in E03, $(6.\pm2.)\cdot10^3$ in P4, and 25±15 in A4.

Solar event on 13.05.1979 (Day 133 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.310	0.327
magn. Footpt.:	S01 W 35	N07 W140
Solar wind speed [km/s]:	440.	265.
Time resolution [min]:	41.	
Tape No. (1-min):		7202

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W141
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

no increase in intensity.

Helios 2

Small and prompt event, chaotic magnetic field jumping in intensity as well as in direction, event not observed in higher energies.

Increase of intensity in E03 and P4 by 1.5 and in A4 by 2 orders of magnitude. The intensities are $(3.\pm0.2)\cdot10^4$ in E03, $(1.\pm.2)\cdot10^3$ in P4, and (400±100) in A4. The electron to proton ratio is about 30:1, the proton to Helium ratio is about2.5:1.

Onset in E03 at about 11:35, in P4 at about 12:10, and in A4 at about 12:05 UT.

double

Solar event on 23.05.1979 (Day 143 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.370	0.463
magn. Footpt.:	N06 W 94	N05 W175
Solar wind speed [km/s]:	454.	386.
Time resolution [min]:	1.3	
Tape No. (1-min):	641	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:		- 22:12 -		-N		N25 W 55
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Prompt event, decreasing flanc superposed by three fresh injections (smeared out in nucleii channles). Observed only in the three lowest energy channels.

Increase in intensity in E03 by 1.5, in P4 by 2, and in A4 by 3 orders of magnitude. The intensities are $(5.2\pm.5)\cdot10^4$ in E03, $(6.\pm1.)\cdot10^3$ in P4, and $(1.2\pm.2)\cdot10^3$ in A4. The electron to proton ratio is about 9:1, the proton to Helium ratio is about 5:1.

Onset in E03 at about 22:05, in P4 at about 22:35, and inA4 at about 22:15 UT.

Helios 2

No increase in intensity, no magnetic field data.

Solar event on 24.05.1979 (Day 144 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.379	0.475
magn. Footpt.:	N07 W104	N05 W171
Solar wind speed [km/s]:	356.	486.
Time resolution [min]:		41.
Tape No. (1-min):	641	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

slow rise, ESP particles or sector boundary ?
Onset in E03 at about 19:00 UT and in P4 at about 22:10.

Helios 2

Similiar to Helios 1.
Onset in E03 at about 20:00 and in P4 at about 20:50 UT.

small, ESP

Solar event on 28.05.1979 (Day 148 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.420	0.520
magn. Footpt.:	N07 W113	N04 E167
Solar wind speed [km/s]:	426.	319.
Time resolution [min]:		
Tape No. (1-min):	7211	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Event superposed the event on doy 146, shock doy 148 at about 24 UT. No prompt particles but ESP-particles?

Onset in E03 at about 1:00, in P4 at about 2:00, and in A4 at about 4:00 orders of magnitude.

Helios 2

no magnetic field data, small impulsiv electron event.

Increase of intensity in E03 by 1 order of magnitude. The intensities are $(1.9\pm.2)\cdot10^5$ in E03, $(1.5\pm1.)\cdot10^3$ in P4, and (50±30) in A4. The electron to proton ratio is about 127:1, the proton to Helium ratio is about 30:1.

Onset in E03 at about 5:15 UT.

RSF, CoProp

Solar event on 30.05.1979 (Day 150 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.450	0.552
magn. Footpt.:	N07 W124	N04 E178
Solar wind speed [km/s]:	379.	528.
Time resolution [min]:		
Tape No. (1-min):	7211	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						E100
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

no increase in intensity, ESP-particles in nucleii channels are caused by the shock on doy 148/149.

Helios 2

no magnetic field data. Protmpt onset of an elecron event, multiple injections? Proton increase slow, with structures in the maximum, which could be interpreted as multiple injections or caused by magnetic field fluctuations.

Increase of intensity in E03 by 1.5, in P4 by 3, and in A4 by 4 orders of magnitude. The intensities are $(3.\pm.3)\cdot10^5$ in the first injection in E03, $(1.\pm.2)\cdot10^6$ in the second injection in E03, $(9.\pm3.)\cdot10^5$ in P4, and $(1.2\pm.4)\cdot10^4$ in A4.

Onset in E03 at about 12:00 UT, in P4 at about 15:00 UT, and in A4 at about 12:14 UT.

Solar event on 06.06.1979 (Day 157 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.542	0.640
magn. Footpt.:	N07 W153	N02 E168
Solar wind speed [km/s]:	296.	537.
Time resolution [min]:		41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				2B		N17 E 14
Gamma:						
soft X-rays:		- 05:53 -		X2		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 05:414-05:46

Solar Particles:

Helios 1

slow increase lasting for about 8 days (rise of 1 order of magnit within 16 h, decay of 1 order of magnitude within 2 days). Data of electromagnetic radiation refer to doy 156. Is this a real solar event or caused by changes in the direction of the magnetic field and a following sector boundary?.

Helios 2

similiar to Helios 1, on June 9, 1979 superposed by a solar event.

RSF, small

Solar event on 24.06.1979 (Day 175 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.737	0.811
magn. Footpt.:	N05 W167	S00 E147
Solar wind speed [km/s]:	384.	447.
Time resolution [min]:		41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						>E 90
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

only slight increase in intensity of E03.
The intensities are $(7.\pm1.)\cdot10^4$ in E03, (200±20) in P4, and (10±5) in A4. The electron to proton ratio is about 350:1, the proton to Helium ratio is about 20:1.

Helios 2

Small event observed in the three main channels, many gaps in the data.

gap

Solar event on 11.07.1979 (Day 192 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.871	0.919
magn. Footpt.:	N03 E171	S02 E148
Solar wind speed [km/s]:	318.	340.
Time resolution [min]:	-999	-999
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

large event, too much data gaps.

Helios 2

same as Helios 1.

Solar event on 02.08.1979 (Day 214 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.968	0.982
magn. Footpt.:	N01 W177	S04 E150
Solar wind speed [km/s]:	402.	
Time resolution [min]:	41.	-999
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Data gap in the onset, no magnetic field data, strong rise on both spacecraft superposed by something unidentified.

Increase of intensity in E03 by 5, in P4 by 6, and in A4 by 4.5 orders of magnitude. The inaccurate intensities are $(3.5\pm.5)\cdot10^7$ in E03, $(2.\pm.5)\cdot10^5$ in P4, and $(2.\pm.5)\cdot10^3$ in A4. The electron to proton ratio is about 175:1, the proton to Helium ratio is about 100:1.

Helios 2

similiar to Helios 1 with smaller increase and worse data.
Increase of intensity in E03, P4, and A4 by about 4 orders of magnitude.

double, impulsiv

Solar event on 18.08.1979 (Day 230 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.985	0.974
magn. Footpt.:	N00 W162	S05 E155
Solar wind speed [km/s]:		
Time resolution [min]:		
Tape No. (1-min):	7221	7222

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1B		N08 E 90
Gamma:						
soft X-rays:				X		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

no magnetic field data, data gaps in the onset. After increase the intensity remains at a high level for a long time with superposed structures in the nucleii channels. Two candidates in SMYFL.

Increase of intensity in E03 by 2, in P4 by 2.5, and in A4 by 3 orders of magnitude. The intensities are $(1.\pm.3)\cdot10^6$ in E03, $(1.\pm.2)\cdot10^3$ in P4, and (25±15) in A4. The electron to proton ratio is about 1000:1, the proton to Helium ratio is about 40:1.

Onset in E03 at about 15:10, in P4 at about 18:10, and in A4 at about 21:20 UT.

Helios 2

Prompt onset of electrons, nucleii are superposed to another event. Difficult to determine onset times. No magnetic field data. No clear interpretation of the event.

Increase in intensity in E03 by 3 and in P4 and A4 by 2 orders of magnitude. The intensities are $(8.\pm2.)\cdot10^7$ in E03, $(2.5\pm1.)\cdot10^5$ in P4, and $(1.5\pm.5)\cdot10^4$ in A4. The electron to proton ratio is about 320:1, the proton to Helium ratio is about 17:1.

Onset in E03 at about 14:30, in A4 at about 17:30 UT.

Solar event on 07.09.1979 (Day 250 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.949	0.904
magn. Footpt.:	S02 W156	S06 W177
Solar wind speed [km/s]:		493.
Time resolution [min]:	41.	
Tape No. (1-min):		236

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				SB		S21 W 78
Gamma:						
soft X-rays:	06:43	- 06:52	- 07:03	M2		
hard X-rays:		- 13:48	-	131		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 06:47.3-06:47.9, 3, Typ-III-U-Burst.

Solar Particles:

Helios 1

Electromagnetic data refers to a small electron event located in front of a large event on doy 251, which the following particle data refer to. Data gaps in the onset, high anisotropy in the nucleii channels, shock on doy 253 at about 16 UT.

Increase of intensity in E03 by 3 and in P4 and A4 by 4 orders of magnitude. The intensities are $(2.1\pm.2)\cdot10^7$ in E03, $(1.4\pm.2)\cdot10^6$ in P4, and $(5.\pm1.)\cdot10^4$ in A4. The electron to proton ratio is about 15:1, the proton to Helium ratio is about 28:1.

Onset in E03 at about 19:30.

Helios 2

Only event on doy 251 observed, similiar to Helios 1, structures in maxima possibly due to shock on doy 252 at about 18 UT. Large anisotropy in the onset of the event, diffusive event. Data gaps in the onset.

Increase in intensity in E03 by 3 and in P4 and A4 by 5 orders of magnitude.

RSF, ESP

Solar event on 10.09.1979 (Day 253 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.949	0.891
magn. Footpt.:	S02 W155	S06 W177
Solar wind speed [km/s]:		869.
Time resolution [min]:		41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						E154
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

ESP-particles superposed on the event of doy 251.

Helios 2

Real small electron event, ESP-particles like on Helios 1.
Intensities are $(1.7\pm.3)\cdot 108$ in E03, $(6.\pm1.)\cdot 10^6$ in P4, and $(2.\pm.2)\cdot 10^5$ in A4. The electron to proton ratio is about 28:1, the proton to Helium ratio is about 30:1.

gap, gradual

Solar event on 14.09.1979 (Day 257 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.923	0.865
magn. Footpt.:	S03 W153	S07 E160
Solar wind speed [km/s]:		442.
Time resolution [min]:	10.	41.
Tape No. (1-min):	7231	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1N		N06 E 90
Gamma:						
soft X-rays:	06:52	- 08:02	- 09:29	X2	50	
hard X-rays:		- 06:59	-	8610		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 06:59-08:05, 3 /III: 3 /IV: 3

Solar Particles:

Helios 1

small event with prompt rise, no decrease of intensity, strucutres in maxima (due to multiple injections?). Anisotropy different from 0 for a long time. Event observed up to the higest energies. Data gaps.

Increase in intensity in E03, P4, and A4 by about 1 order of magnitude.

Onset in E03 at about 7:40, in P4 at about 9:10, and in A4 at about 10:20 UT.

Helios 2

Large magnetic field fluctuations, slow rising event with many data gaps.

small

Solar event on 27.10.1979 (Day 300 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.562	0.403
magn. Footpt.:	S07 W169	S05 E148
Solar wind speed [km/s]:	265.	346.
Time resolution [min]:	41.	41.
Tape No. (1-min):	255	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

small event, followed by two fresh injections.
Increase of intensity in E03, P4, and A4 by about 1.5 orders of magnitude. The intensities are $(1.4\pm.2)\cdot10^5$ in E03, $(3.5\pm.8)\cdot10^3$ in P4, and $(10.\pm5)$ in A4. The electron to proton ratio is about 40:1, the proton to Helium ratio is about 350:1.
Onset in E03 at about 3:45, in P4 and A4 at about 6 UT.

Helios 2

Stucture similiar to that on Helios 1, only a few data.
Increase of intensity in E03 and A4 by 2 and in P4 by about 1 order of magnitude. The inaccurate intensities (not used in particle ratios) are $(5.\pm1.)\cdot10^5$ in E03, $(2.\pm.2)\cdot10^3$ in P4, and (130 ± 20) in A4. The electron to proton ratio is about 250:1, the proton to Helium ratio is about 15:1.
Onset in E03 at about 4:00 and in P4 and A4 at aout 6 UT.

small

Solar event on 27.10.1979 (Day 300 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.554	0.394
magn. Footpt.:	S07 W166	S04 E150
Solar wind speed [km/s]:	282.	400.
Time resolution [min]:		41.
Tape No. (1-min):	255	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Electron injection observed. In nucleii channels smeared out together with the preceding event on doy 300.
Increase in intensity in E03 by about 1.5 orders of magnitude. The intensity in E03 is $(7.\pm1.)\cdot10^4$.
Onset in E03 at about 20:10 UT.

Helios 2

same as on Helios 1.
Increase of intensity in E03 by about 1.5 orders of magnitude. The intensity in E03 is $(2.\pm.2)\cdot10^5$.
Onset in E03 at about 20:15 UT.

small

Solar event on 28.10.1979 (Day 301 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.544	0.383
magn. Footpt.:	S07 W170	S04 E145
Solar wind speed [km/s]:	282.	350.
Time resolution [min]:	41.	41.
Tape No. (1-min):	255	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Third injection, same as for the second injection on doy 300 but small increase innucleii channels.

Increase in intensity in E03 by about 1.5 orders of magnitude. The intensities are $(1.5\pm.2)\cdot 10^5$ in E03, (120±50) in P4, and (8±5) in A4. The electron to proton ratio is about 1250:1, the proton to Helium ratio is about 15:1.

Onset in E03 at about 17:45.

Helios 2

same as on Helios 1.

Increase in intensity in E03 by zbout 1.5 orders of magnitude. The intensities are $(1.3\pm.2)\cdot 10^5$ in E03, (140±40) in P4, and (15±10) in A4. The electron to proton ratio is about 929:1, the proton to Helium ratio is about 9:1.

Onset in E03 at about 16:30.

RSF, ESP, small

Solar event on 01.11.1979 (Day 305 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.498	0.339
magn. Footpt.:	S07 W161	S02 E124
Solar wind speed [km/s]:	334.	254.
Time resolution [min]:	-999	
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						>E110
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

data gaps, shock !

Helios 2

data gaps, shock !

RSF

Solar event on 03.11.1979 (Day 307 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.471	0.318
magn. Footpt.:	S07 W165	S00 E119
Solar wind speed [km/s]:	334.	283.
Time resolution [min]:	41.	
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						E114
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Is this an event, only slight electron increase by a factor of 3.
The intensity in E03 is about $(3.\pm1.)\cdot10^4$.

Helios 2

Looks like an event, too many data gaps.

double, DF?, gradual

Solar event on 27.11.1979 (Day 331 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.342	0.484
magn. Footpt.:	N05 W101	N05 W 02
Solar wind speed [km/s]:	378.	350.
Time resolution [min]:	21.	1.
Tape No. (1-min):		232

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	06:47 -		- 08:04	1N		N18 E 05
Gamma:						
soft X-rays:	06:30 -	08:48 -	12:00	C1	250	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

only small increase in E03.
Intensity in E03 about $(1.5\pm.5)\cdot 10^3$.

Helios 2

Disappearing filament (N5 W30, 06:00 UT). Prompt onset, only a few α-particles, crosstalk of electrons in protons pronounced, only in the low energy channels observed, data gaps in maximum.

Increase of intensity in E03 and P4 by 2.5 orders of magnitude. Intensities are $(4.\pm.3)\cdot 10^5$ in E03, $(9.\pm3.)\cdot 10^4$ in P4, and (15±10) in A4. The electron to proton ratio is about 4:1, the proton to Helium ratio is about 600:1.

Onset in E03 at about 7:40 and in P4 at about 9:20 UT.

Schellert, 1985; Howard et al., mass ejections, JGR

impulsiv

Solar event on 18.12.1979 (Day 352 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.604	0.739
magn. Footpt.:	N06 E 21	N01 W 21
Solar wind speed [km/s]:	287.	280.
Time resolution [min]:	41.	
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1B		N09 W 39
Gamma:						
soft X-rays:	18:59	- 19:04	- 19:13	M2		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II 3 /III 3

Solar Particles:

Helios 1

Small event, observed in the three main channels, relatively large anisotropies.

Increase in intensity in E03 by 1, in P4 by 2.5, and in A4 by 1.5 orders of magnitude. The intensities are $(2.8\pm.3)\cdot10^4$ in E03, $(1.3\pm.2)\cdot10^2$ in P4, and (10 ± 3) in A4. The electron to proton ratio is about 22:1, the proton to Helium ratio is about 130:1.

Onset in E03 at about 18:45, in P4 and A4 at about 19:00 UT.

Helios 2

No well defined event, only a slow increase in intensity.

Schellert, 1985

impulsiv

Solar event on 19.12.1979 (Day 353 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.618	0.750
magn. Footpt.:	N06 E 23	N00 W 46
Solar wind speed [km/s]:	311.	304.
Time resolution [min]:	1.4	0.9
Tape No. (1-min):	651	652

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:		- 22:17 -		2B		S15 E 36
Gamma:						
soft X-rays:	22:01	- 22:16 -	22:42	X1	7	
hard X-rays:		- 22:14 -		7230		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 22:12-22:47.5, 3 /III 3 /IV 3 /V 2

Solar Particles:

Helios 1

Prompt onset with data gap, second electron injection during decay of the event, small anisotropy lasts long in nucleii channels.

Increase of intensity in E03 by 5, in P4 by 4, and in A4 by 3 orders of magnitude. The intensities are $(6.5\pm.5)\cdot10^7$ in E03, $(9.\pm1.)\cdot10^5$ in P4, and $(1.\pm.1)\cdot10^3$ in A4. The electron to proton ratio is about 72:1, the proton to Helium ratio is about 900:1.

Onset in E03 and P4 at about 22:00, in A4 at about 22:10 UT.

Helios 2

Slow rising event in E03, very slow increase of intensity in P4, no increase in Helium intensity.

Increase of intensity in E03 by 2 and in P4 by 1 order of magnitude. The electron to proton ratio is about 117:3.

Onset in E03 and P4 at about 23:00 UT.

Schellert, 1985

Solar event on 08.01.1980 (Day 8 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.811	0.898
magn. Footpt.:	N04 E 10	S02 W 47
Solar wind speed [km/s]:	356.	348.
Time resolution [min]:	1.3	0.5
Tape No. (1-min):	241	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						S10 E 29
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Small electron event, only few nucleii.
Increase in intensity in E03 and P4 by about 1 order of magnitude. The intensities are $(2.6\pm.2)\cdot 10^4$ in E03, (700±300) in P4, and (3±2) in A4. The electron to proton ratio is about 37:1, the proton to Helium ratio is about 233:1.
Onset in E03 and P4 at about 20:30 (crosstalking electrons?).

Helios 2

data gaps, no increase in intensity.

gradual

Solar event on 10.01.1980 (Day 10 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.822	0.905
magn. Footpt.:	N04 E 07	S02 W 58
Solar wind speed [km/s]:	343.	299.
Time resolution [min]:	21.	0.5
Tape No. (1-min):		266

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	04:48 -	05:14 -	06:30	2N		S11 E 09
Gamma:						
soft X-rays:		- 05:15 -		M6		
hard X-rays:						
3-cm Microwaves:	04:42 -	05:07 -	>07:17	375		
10-cm Microwaves:	04:57 -	05:30 -	06:57	2050		

Radiobursts: II 05:07-05:40, 3 /III 04:52- ,2 (05:13-05:15.5, 2) /IV
05:14->07:39, 3

Solar Particles:

Helios 1

Small event, short duration, no influence of magneitc filed fluctuations on particle intensities observed.

Increase in intensity in E03 by 1.5 and in P4 and A4 by 2 orders of magnitude. The intensities are $(1.6\pm.2)\cdot10^5$ in E03, $(2.5\pm.5)\cdot10^3$ in P4, and (35±15) in A4. The electron to proton ratio is about 64:1, the proton to Helium ratio is about71:1.

Onset in E03 at about 6:15, in P4 and A4 at about 7:45 UT.

Helios 2

Increase of electron intensity by less than 1 order of magnitude, remaining constant, slow rise i proton intensity but sharp onset in Helium intensity about 14 h after onset of electron event. This onset is also observed as an increase in proton intensity.

Increase of intensity in E03 by 0.8, in P4 by 3 and in A4 by 2 orders of magnitude (possibly another event?). The intensities in the event the electromagnetic radiation refers to are $(1.1\pm.2)\cdot10^4$ in E03 and (60±20) in P4. The electron to proton ratio is about 183:1.

Onset in E03 at about 6:30, in P4 at about 8:30 UT.

gradual

Solar event on 25.01.1980 (Day 25 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.917	0.966
magn. Footpt.:	N02 E 28	S03 W 52
Solar wind speed [km/s]:	569.	327.
Time resolution [min]:	41.	-999
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				2B		S19 W 50
Gamma:						
soft X-rays:		- 22:00 -		M7	45	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 21:00-21:41

Solar Particles:

Helios 1

Increase in intensity in E03 by less than 1 order of magnitude, only a few protons, no increase in Helium intensity. The intensity in E03 is about $(1.\pm.2)\cdot 10^4$.

Helios 2

Data gap in the onset, no magnetic field data, in E03 well defined event, in nucleii only a 'buckel'.

Intensities are $(3.2\pm.5)\cdot 10^5$ in E03, $(5.\pm1.)\cdot 10^3$ in P4, and (28 ± 10) in A4. The electron to proton ratio is about 64:1, the proton to Helium ratio is about 179:1.

double, gradual

Solar event on 06.02.1980 (Day 37 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.961	0.983
magn. Footpt.:	N01 E 05	S04 W 17
Solar wind speed [km/s]:	362.	590.
Time resolution [min]:	1.35	1.5
Tape No. (1-min):	661	662

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	-	10:51	-	2N		S18 W 37
Gamma:						
soft X-rays:	-	11:27	-	C7	>33	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

small diffusive electron event, only slow increase in proton intensity, no increase in Helium intensity, event not obsered at higher energies.

Increase in intensity in E03 by 1 order of magnitude. The intensities are $(2.5\pm.3)\cdot10^4$ in E03 and $(2.6\pm.7)\cdot10^3$ in P4. The electron to proton ratio is about 10:1.

Onset in E03 by about 11:30 UT.

Helios 2

diffusive event, observed up to the highest energies.

Increase in intensity in E03 and P4 by 1.5 orders of magnitude. The intensities are $(4.\pm.3)\cdot10^5$ in E03, $(5.\pm1.)\cdot10^4$ in P4, and (65±25) in A4. The electron to proton ratio is about 64:1, the proton to Helium ratio is about 179:1.

Onset in E03 at about 11:00 and in P4 at about12:15 UT.

impulsiv

Solar event on 11.02.1980 (Day 42 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.974	0.984
magn. Footpt.:	N01 E 02	S05 W 49
Solar wind speed [km/s]:	344.	324.
Time resolution [min]:	41.	41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1B		N12 E 62
Gamma:						
soft X-rays:		- 20:38 -		M4	4	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II. 20:43-20:58

Solar Particles:

Helios 1

Electron event, increase in nucleii intensity, strong magnetic field fluctuations, shock at doy 44.

Increase in intensity in E03 by 1.5 and in P4 and A4 by 0.8 orders of magnitude. The intensities are $(3.5\pm1.)\cdot10^5$ in E03, $(2.4\pm.3)\cdot10^3$ in P4, and (80±30) in A4. The elecrton to proton ratio is about 146:1, the proton to Helium ratio is about 30:1.

Onset in E03 at about 21:00 and in P4 at about 22:00 UT.

Helios 2

Electron event, in P4 only small increase, no magnetic field data.

Solar event on 15.02.1980 (Day 46 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.980	0.982
magn. Footpt.:	N00 E 18	S05 W 36
Solar wind speed [km/s]:	436.	384.
Time resolution [min]:		41.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

no increase in intensity.

Helios 2

only slight increase inE03 and P4.

impulsiv

Solar event on 02.03.1980 (Day 62 of the year)

Spacecraftdata:

Spacecraft	Helios 1	Helios 2
rad. distance [AU]:	0.980	0.944
magn. Footpt.:	S01 E 15	S06 W 17
Solar wind speed [km/s]:	378.	470.
Time resolution [min]:	2.7	21.
Tape No. (1-min):		

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	16:34 -	16:36 -	16:56	B		S28 W 71
Gamma:						
soft X-rays:		- 16:37 -		M2	11	
hard X-rays:						
3-cm Microwaves:	16:33 -	16:37 -	17:12	814		
10-cm Microwaves:	16:34 -	16:37 -	16:49	119		

Radiobursts: II 16:36-16:47, 3 /III 16:35-16:39, 2 /IV -

Solar Particles:

Helios 1

only slight increase in E03.
Intensity in E03 is $(5.\pm1.)\cdot10^3$.

Helios 2

small event with prompt onset, observed in the three main channels, large magnetic filed fluctuations (changes in direction out of the plane of ecliptic) has no visible influence on intensity profiles.

Increase in intensity in E03, P4, and A4 by about 2 orders of magnitude. The intensities are $(1.6\pm.3)\cdot10^5$ in E03, (800±200) in P4, and (10±9) in A4. The electron to proton ratio is about 200:1, the proton to Helium ratio is about 80:1.

Onset in E03 at about 16:45, in P4 at about 17:10, and in A4 at about 18:15.

gradual

Solar event on 25.03.1980 (Day 85 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.911
magn. Footpt.:	S03 E 15
Solar wind speed [km/s]:	328.
Time resolution [min]:	11.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W 25
Gamma:						
soft X-rays:		- 04:29 -		C8		
hard X-rays:	04:26	- 04:28		520		
3-cm Microwaves:	04:10	~04:30 -	06:20	9.9		
10-cm Microwaves:	04:00	~04:30 -	06:40	6.6		

Radiobursts:

Solar Particles:

Helios 1

Fast rising event, visible in all relevant energy channels. Crosstalking electrons in P4. Protonintensity- and anisotropy profiles like expected for diffusive particle propagation. Fluctuations in magnetic field direction

Increase of intensity in E03 of about 2, in P4 of about 3, and in A4 of about 2 orders of magnitude. Absolute values for the intensity are $(2.4\pm0.5)\cdot10^5$ in E03, $(7.\pm1.)\cdot10^3$ in P4, and (35±15) in A4. Electron to proton ratio is about 34:1, proton to Helium ratio is about 200:1.

Onset in E03 at about 4:30, in P4 at 5:45, and in A4 at about 5:45 UT.

Solar event on 27.03.1980 (Day 87 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.846
magn. Footpt.:	S03 E 19
Solar wind speed [km/s]:	338.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Slow increase in intensity, starting in E03 with a small event. At doy 91 followed by three electron injections. Electron profiles similiar to that on doy 80.159. In nucleii channels only one profile is observed. Shock at doy 89 at about 12 UT.

small, gradual

Solar event on 03.04.1980 (Day 94 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.857
magn. Footpt.:	S04 E 34
Solar wind speed [km/s]:	415.
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1B		N28 W 18
Gamma:						
soft X-rays:	06:37	07:25	10:36	M2		
hard X-rays:	07:17	07:19		1830		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II 2 /III 1 /IV 2

Solar Particles:

Helios 1

Small, diffusive electron event, increase of intensity also in P13 but not in P4 and A4. Sector boundary?
Increase of intensity in E03 of about 1 order of magnitude.
Onset in E03 at about 8:50 UT.

gradual

Solar event on 26.04.1980 (Day 117 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.654
magn. Footpt.:	S06 E 41
Solar wind speed [km/s]:	407.
Time resolution [min]:	1.3
Tape No. (1-min):	281

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	13:32 -	13:35 -	13:54	N		S21 E 23
Gamma:						
soft X-rays:		- 13:41 -		C2	30	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:	13:23 -	~13:45 -	14:35	3.6		

Radiobursts: II 13:34-13:52.5, 3 /III 13:37-13:39, 2

Solar Particles:

Helios 1

Event in all electron channels and up to P27 observed, no increase in Helium intensity. Electron onset eventually correlated with change in the magnetic filed direction (has to be proofed by using 1-min-averages). Large amount of electrons.

Increase of intensity in E03 of about 2 and in P4 of about 2.5 orders of magnitude. Absolute values for the intensities are $(7.5\pm1.)\cdot10^5$ in E03 and $(5.\pm1.)\cdot10^3$ in P4. The electron to proton ratio is about 150:1

Onset in E03 at about 13:45 and in P4 at about 14:20 UT.

small, impulsiv

Solar event on 29.04.1980 (Day 120 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.620
magn. Footpt.:	S07 E 34
Solar wind speed [km/s]:	345.
Time resolution [min]:	1.35
Tape No. (1-min):	671

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						S17 W 68
Gamma:						
soft X-rays:	12:55	- 12:58	- 13:09	M2		
hard X-rays:	12:38	- 12:40		144		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: III 2

Solar Particles:

Helios 1

small diffusive event, visible only in the lowest energy channels, magnetic field relatively quiet.

Increase in intensity in E03 and P4 of about 1.5 and in A4 of less than 1 order of magnitude. The intensities are $(8.\pm1.)\cdot10^4$ in E03 and (180.±30.) in P4. The electron to proton ratio is about 440:1.

Onset in E03 at about 13:10 and in P4 at about 14:20 UT.

Solar event on 01.05.1980 (Day 122 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.595
magn. Footpt.:	S07 E 45
Solar wind speed [km/s]:	465.
Time resolution [min]:	1.3
Tape No. (1-min):	291

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	16:22 -	16:25 -	16:47	N		S21 E 63
Gamma:						
soft X-rays:	16:19 -	16:32 -	16:39	M4		
hard X-rays:	16:27 -	16:28 -	16:45	1480		
3-cm Microwaves:	16:20 -	16:24 -	17:05	819		
10-cm Microwaves:	16:21 -	16:24 -	17:00	258		

Radiobursts: II 16:27-16:38, 2 /III 16:21.2-16:21.3, 2 (16:25.7-16:25.9, 1; 16:29-16:35, 2; 16:34.3-16:34.7, 1) /IV -

Solar Particles:

Helios 1

Precursor, shock at about 14UT, magnetic field very disturbed, maximum intensities influenced by magnetic field fluctuations. Event visible up to highest energies. Relative large delay between hard X-ray burst and electron event (wrong flare association, is the precursor part of the event or is the precursor the event, is the onset delayed because of the magnetic field fluctuations?). Is there a second electron injection superposed?

Intensity increase in E03 and P4 of about 3 and in A4 of about 2 orders of magnitude. Absolute intensities are $(2.5\pm0.3)\cdot10^6$ in E03, $(9\pm2)\cdot10^4$ in P4 and (800±200) in A4. Electron to proton ratio is about 28:1 and proton to Helium ratio is about 113:1.

Onset in E03 at about 19:10, in P4 at about 20:05 and in A4 at about 20:10 UT.

impulsiv

Solar event on 03.05.1980 (Day 124 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.575
magn. Footpt.:	S07 E 37
Solar wind speed [km/s]:	379.
Time resolution [min]:	1.35
Tape No. (1-min):	681

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	-	08:03	-	1B		N25 E 35
Gamma:						
soft X-rays:	-	08:06	-	C9	11	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Two injetions with different e:p ratios, in A4 not separable. Event not visible in higher energy channels.

Increase of intensity in the first injection in E03 of about 1.5, in P4 of about 0.3, and in A4 of about 2 orders of magnitude, in the second injection the increase of intensity in E03, P4, and A4 is about 1 order of magnitude. Absolute intensities of the first injection are $(2.5\pm.2)\cdot10^5$ in E03, $(1.2\pm.3)\cdot10^3$ in P4, and (120±20) in A4. The electron to proton ratio of the first injection is about 208:1, the proton to Helium ratio is about 10:1.

Onset of the first injection at about 8:05 in E03, 8:20 in P4, and about 8:30 in A4. Onset of the second injection at about 13:45 in E03 and about 14:50 in P4.

Solar event on 10.05.1980 (Day 131 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.480
magn. Footpt.:	S07 E 25
Solar wind speed [km/s]:	303.
Time resolution [min]:	21.
Tape No. (1-min):	7241

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Small electron event with precursor. Only a few protons and α-particles observed. Substaines of two increases in radio intensity.

Intensity increase in E03 of about 1.5 and in P4 of about 0.5 orders of magnitude. Intensity is $(6.5\pm.5)\cdot 10^4$ in E03, (70±30) in P4 and (15±8) in A4. The electron to proton ratio is about 93:1, the proton to Helium ratio is about 5:1.

Onset in E03 and P4 at about 20:20, onset of the precursor at about 18:10 UT.

impulsiv

Solar event on 11.05.1980 (Day 132 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.468
magn. Footpt.:	S07 E 31
Solar wind speed [km/s]:	370.
Time resolution [min]:	1.3
Tape No. (1-min):	301

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				-B		S14 E 16
Gamma:						
soft X-rays:				C8		
hard X-rays:						
3-cm Microwaves:	15:12	- 15:15	- 15:23	270		
10-cm Microwaves:	14:50	~15:17	- 16:20	38.4		

Radiobursts: II: 15:16.6-15:22.8

Solar Particles:

Helios 1

Magnetic field very disturbed. Shock could explain the slow intensity increase started earlier as well as the strutures in the intensity maxima. Event is visible in all electron and the lower three proton channels. Angle between plane of the ecliptic and magnetic filed direction is large.

Intensity increase in E03 of about 2 and in P4 and A4 of about 1.5 orders of magnitude. The intensities are $(3.5\pm1.)\cdot10^5$ in E03, $(2.\pm.3)\cdot10^3$ in P4, and (380±50) in A4. The electron to proton ratio is about 175:1, the proton to Helium ratio is about 5:1.

Onset at about 15:10UT in E03, at about 16:50 in P4 and at about 17:00 UT in A4.

Solar event on 12.05.1980 (Day 133 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.462
magn. Footpt.:	S07 E 28
Solar wind speed [km/s]:	345.
Time resolution [min]:	1.3
Tape No. (1-min):	301

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				-B		S14 E 11
Gamma:						
soft X-rays:				C4		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Event with classical diffusive intensity and anisotropy profile in electrons. In nucleii channels only small increase because of a high background from preceding events.

Intensity increase in E03 of about 2.5, and in P4 and A4 of about 0.8 orders of magnitude. The intensities are $(3.1\pm.1)\cdot 10^6$ in E03, $(3.\pm 0.3)\cdot 10^3$ in P4, and (200±50) in A4. The electron to proton ratio is about 1000:1, the proton to Helium ratio is about 15:1.

Onset at about 3 UT in E03, 4UT in P4, and 3:50 in A4.

impulsiv

Solar event on 21.05.1980 (Day 142 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.345
magn. Footpt.:	S05 E 02
Solar wind speed [km/s]:	316.
Time resolution [min]:	11.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	20:49	- 20:59	- 22:33	2N		S14 W 15
Gamma:	>0.3 MeV: 19.84 ± 1.73; 4-8 MeV: -					
soft X-rays:	20:51	- 21:07	- 21:44	X1	13	
hard X-rays:	20:54	- 20:56	- 21:36	14300		
3-cm Microwaves:	20:53	- 20:59	- 21:55	1248		
10-cm Microwaves:	20:52	- 20:56	- 01:23	800		

Radiobursts: II 20:57-21:27, 3 /III 20:56-20:56.5,2 (20:59-21:30/23:40/00:00/02:15-02:45, ? /IV 20:57-21:10, 3

Solar Particles:

Helios 1

Diffusive event superposed by two following injections with different e:p:α ratios (first injection not visible in Helium). Event not influenced by ESP particles.

Intensity is $(1.2\pm.2)\cdot10^5$ in E03, $(1.2\pm.2)\cdot10^3$ in P4, and (9±6) in A4. Electron to proton ratio in the first injection 100:1, proton to Helium ratio about 133:1.

Onset in E03 at about 21:19 UT, in P4 at about 21:38 UT.

Bai und Dennis (1985); P. Hoyng et al.: Origin and location of the hatd X-ray emission in a two ribbon flare, APJ 246, L155, 1981; A. Duijveman et al.: X-ray imaging of three flares during the impulsive phase, Sol. Phys. 81, 137, 1982; Evenson, 1985

onset, impulsiv

Solar event on 28.05.1980 (Day 149 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.310
magn. Footpt.:	N00 W 37 → $\Delta\phi$ = 25.5°
Solar wind speed [km/s]:	259.
Time resolution [min]:	1.4
Tape No. (1-min):	331

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	15:53 -	15:58 -	16:19	SF		S24 W 28
Gamma:						
soft X-rays:		- 16:02 -			16	
hard X-rays:	15:50 -	15:52		315		1090 sec
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

This is a sequence of 5 events occuring in Boulder Region 2470. The fourth event is a gamma flare, which is observed only as a slight increase in E03. The other four events show a similiar behaviour (short rise and decay times, well defined maxima). At the start of each event up to its maximum the particles arrive in the sectors parallel to the magnetic field. Also the intensity increase in the rearward sectors starts at the time of the maximum. Therefor in the onset phase the particles arrive only from the sun and so onset times can de determined accurate. The coronal distances in all evevnts are about 20°, most as difference in latitude. The longitudinal difference is only about 3°. Betwen the second and third injection there is a small shock observed in the magnetic filed data and only very weak in the lowest particle channels. In all injections (especially in the second) the crosstalk of electrons in all proton channels up to high energies is pronounced. This crosstalk is clearly to ident because it is visible as a pronounced peak before the event (compare with SRT-plots). Explanation trough the direction dependence of the incoming particles (sharp bundled incidence of electrons) or with the existence of a lage population of low energetic electrons (weak spectrum).

The intensity in E03 is $(3.1\pm.2)\cdot10^6$, in P4 $(2.1\pm.2)\cdot10^4$, and in A4 $(7.\pm0.5)\cdot10^3$. the electron to proton ratio is about 148:1, the proton to Helium ratio is about 3:1.

Onset in all energy channels simulatneously with the onset of the hard X-ray emission.

onset, impulsiv

Solar event on 28.05.1980 (Day 149 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.310
magn. Footpt.:	N00 W 41 → $\Delta\phi$ = 18.4°
Solar wind speed [km/s]:	239.
Time resolution [min]:	1.4
Tape No. (1-min):	331

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	17:05	- 17:18	- 17:53	1B		S18 W 35
Gamma:	no GRS-signal above treshhold					
soft X-rays:	17:05	- 17:21	- 17:53	M4	11	
hard X-rays:	17:20*	- 17:20	- 17:32	1558		
3-cm Microwaves:	16:36	- 17:18	- 17:53	2505		
10-cm Microwaves:	17:05	- 17:18	- 17:50	316		

Radiobursts: II 17:18-17:35, 3 /III - /IV 16:53.4-17:32.8, 3 /V 2

Solar Particles:

Helios 1

Second injection, crosstalk !

Intensity in E03 $(9.\pm1.)\cdot10^7$, in P4 $(4.\pm.5)\cdot10^5$, and in A4 $(7.\pm.5)\cdot10^4$. The electron to proton ratio is about 225:1, the proton to Helium ratio is about 5:1.

Release of all particle species in all energy ranges at the time of the onset of microwave emission (onset of protons is determined by comparison with the Helium profile in the same energy range). Maximum of electrons simultaneously with the maximum or the deacay of the hard X-rauys.

onset, impulsiv

Solar event on 28.05.1980 (Day 149 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.310
magn. Footpt.:	N00 W 38 → $\Delta\phi$ = 18.7°
Solar wind speed [km/s]:	259.
Time resolution [min]:	1.4
Tape No. (1-min):	331

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	19:24	- 19:47	- 19:49D	2B		S18 W 33
Gamma:	? possible detection on ISEE 3					
soft X-rays:	19:43	- 19:52	- 19:57	X1	9	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Third injection, crosstalk not so pronounced like in the second, but also visible in higher proton channels.

Intensity on E03 $(7.\pm.5)\cdot10^7$, in P4 $(2.2\pm.5)\cdot10^5$, and in A4 $(5.\pm1.)\cdot10^4$. The electron to proton ratio is about 318:1, the proton to Helium ratio is about 4:1.

Onset in all channels nearly simultaneously with onset in microwave emission.

impulsiv

Solar event on 28.05.1980 (Day 149 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.310
magn. Footpt.:	
Solar wind speed [km/s]:	
Time resolution [min]:	1.4
Tape No. (1-min):	331

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	21:53	2:05	22:36	1B		S24 W 33
Gamma:						
soft X-rays:	21:56	22:07	22:22	M2		
hard X-rays:	22:07	22:08	-	228		403 sec
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: III, 2

Solar Particles:

Helios 1

γ-event, only in E03 observed as a slight intensity increase. Possibly not observed because of a high background resulting from the preceding events.

onset, impulsiv

Solar event on 28.05.1980 (Day 149 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.310
magn. Footpt.:	N00 W 43 → $\Delta\phi$ = 17.5°
Solar wind speed [km/s]:	223.
Time resolution [min]:	1.4
Tape No. (1-min):	331

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	23:42 -	23:44 -	23:46D	2B		S17 W 39
Gamma:	no GRS-signal above treshhold					
soft X-rays:	23:35 -	23:44 -	00:10	M7		
hard X-rays:	23:43*-	23:43		1558		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Fourth and last of the observed particle events. The smallest (partly due to the high background) event, but iopposite to the first event observed also in the higher energy ranges.

Intensity in E03 $(1.9\pm.2)\cdot10^7$, in P4 $(7.2\pm.5)\cdot10^4$, and in A4 $(2.2\pm.2)\cdot10^4$. The electron to proton ratio is about 263:1, the proton to Helium ratio is about 3:1.

impulsiv

Solar event on 02.06.1980 (Day 154 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.325
magn. Footpt.:	N04 W 70
Solar wind speed [km/s]:	240.
Time resolution [min]:	0.9
Tape No. (1-min):	341

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						S11 W 28
Gamma:						
soft X-rays:	07:15	- 07:36	- 08:00	M2		
hard X-rays:	08:21	- 08:22	- 08:23	179		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: III 3

Solar Particles:

Helios 1

Magnetic filed very quiet. Only a few electrons but with pronounced anisotropy. Protons visible, only a few α-particles. Possibly a small precursor before the event.

Increase of intensity in E03 and A4 of about 0.8 and in P4 of about 2 orders of magnitude. The intensities are $(4.\pm0.2)\cdot10^4$ in E03, $(2.8\pm0.3)\cdot10^4$ in P4, and (10 ± 5) in A4. The electron to proton ratio is about 1.5:1, the proton to Helium ratio is about 2800:1.

Onset in E03 at about 9:00 UT, in P4 and A4 at about 10:00.

Solar event on 04.06.1980 (Day 156 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.343
magn. Footpt.:	N05 W 77
Solar wind speed [km/s]:	298.
Time resolution [min]:	1.3
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

After 16:00 UT time resolution 15 min. Only a few electrons, more protons and many α-particles.

Increase of intensity in E03 of 2, in P4 of 1, and in A4 of 2 orders of magnitude. The intensities are $(4.5\pm1.)\cdot10^3$ in E03, (260±30) in P4, and (55±10) in A4. Electron to proton ratio is about 17:1, proton o Helium ratio is about 5:1.

Onset of E03 at about 14:30, of P4 at about 16:15, and of A4 at about 16:00 UT.

onset, impulsiv

Solar event on 07.06.1980 (Day 159 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.368
magn. Footpt.:	N06 W 77
Solar wind speed [km/s]:	∿250
Time resolution [min]:	1.3
Tape No. (1-min):	555

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	03:11	- 03:15	- 03:30	1B		N12 W 74
Gamma:						
soft X-rays:	03:09	- 03:14	- 03:20	M8	2	
hard X-rays:	03:11	- 03:12		39391		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 03:13-03:32 /III 03:10-03:16 mit anschließendem Typ V Kontinuum von 03:12-03:25 /IV 03:14-03:25

Solar Particles:

Helios 1

Scatter-free event. A gradual rising particle event (possibly a backside flare) is superposed by three injections. The second injection is a GRL to which the electromagnetic data refer. Prompt onset of the electrons simultaneously with hard X-rays. The onset of the P4 protons is delayed by about 40 min (at the spacecraft protons of different energies arrive at the same time), but it is not sure whether this delay is an effect of the injection or of interplanetary conditions (e.g. the spacecraft enters a flux tube filled with that population). The intensities given below are maximum intensities despite the fact that in scatter free events the maximum intensity is not proportional to the number of accelerated particles like in diffusive events.

The intensities are $(8.\pm1.)\cdot10^5$ in E03, $(2.5\pm0.5)\cdot10^3$ in P4 and (320±30) in A4. The electron to proton ratio is about 320:1, the proton to Helium ratio is about 8:1.

Onset in E03 at about 03:07 UT, in Pa and A4 at about 04:12 UT.

Neustock, 1984; Bai and Dennis, 1985

onset, impulsiv

Solar event on 08.06.1980 (Day 160 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.383
magn. Footpt.:	N07 W 84
Solar wind speed [km/s]:	480.
Time resolution [min]:	1.3
Tape No. (1-min):	555

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W Limb
Gamma:						
soft X-rays:	10:25	- 10:38	- 11:17	M4		
hard X-rays:	<10:36	- 10:37	- 10:48	347		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II 10:36.2-11:02, 3 /III 2

Solar Particles:

Helios 1

Event with very weak scattering. Onset of the electrons simultaneously with the onset of the radio emission. Release of the protons is delayed by about 10 minutes, but the relase time is the same for protons in different energy ranges and occurs simultaneously with a second increase in electrons as well as in electromagnetic emission. The angle distributions of the protona are smaller than that of the electrons. A similiar observation was made in the events of May 28, 1980.

Intensity in E03 is $((1.\pm.1)\cdot 10^6$, in P4 it is $(2.2\pm.2)\cdot 10^4$, and in A4 it is (600±100). The electron to proton ratio is about 46:1, the proton to Helium ratio is about 37:1.

The onset of the electrons occurs at about 10:24.5 SRT, the onset of the nucleii at about 10:35.5 SRT.

Kallenrode, 1987

RSF

Solar event on 09.06.1980 (Day 161 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.394
magn. Footpt.:	N07 W100
Solar wind speed [km/s]:	303.
Time resolution [min]:	
Tape No. (1-min):	7251

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W102
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Small electron event, in the nucleii only on 'buckel' superposed the preceding event. Shock passes at about 20 UT.

Intensity increases in E03 of about 1.5 orders in magnitude and in P4 by a factor of 3. The intensities are $(5.\pm1.)\cdot10^5$ in E03, $(1.\pm.5)\cdot10^3$ in P4, and (220±50) in A4. The electron to proton ratio is about 500:1, the proton to Helium ratio is about 5:1.

Onset in E03 at about 8:20, in P4 at about 9:40 and in A4 at about 9:10.

ESP

Solar event on 09.06.1980 (Day 161 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.400
magn. Footpt.:	N07 W 98
Solar wind speed [km/s]:	343.
Time resolution [min]:	
Tape No. (1-min):	7251

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Shock at about 20 UT (eventually about 11 UT another shock). ESP with double spike superposed, but only with weak prompt phase.

impulsiv

Solar event on 21.06.1980 (Day 173 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.545
magn. Footpt.:	N07 W125
Solar wind speed [km/s]:	425.
Time resolution [min]:	1.3
Tape No. (1-min):	583

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	01:21	- 01:21	- 01:35	1B		N19 W 90
Gamma:						
soft X-rays:	01:15	- 01:20	- 01:46	X2	5	
hard X-rays:	01:13	- 01:19	- 01:35	141391		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II 01:20-01:38, 2 /III 01:17-01:19.5, 3 /IV 01:35-01:50, w

Solar Particles:

Helios 1

Data gap in the onset. Longlasting large and diffusive event woth precursor in nearly all energy channels. Event is observed up to the highest energies.

Increase of intensity in E03 of 4.5, in P4 of 3.5, and in A4 of 2.5 orders of magnitude. Absolute intensities are $(3.2\pm.1)\cdot10^8$ in E03, $(5.5\pm.5)\cdot10^5$ in P4, and $(1.6\pm.2)\cdot10^4$ in A4. The electron to proton ratio is about 580:1, the proton to Helium ratio is about 34:1

Onset in A2 at about 2:20 UT.

Murphy et al., Adv. Space Res. 4, 127, 1985; MacDonald and van Hollebeke, SH 1.3-8, 1985; van Hollebeke et al., SH 2.1-3, 1985; Evenson et al., SH 1.4-2, 1985; Kouveliotou et al.: Analysis of solar flare gamma ray events

gradual

Solar event on 06.07.1980 (Day 188 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.714
magn. Footpt.:	N05 W152
Solar wind speed [km/s]:	374.
Time resolution [min]:	
Tape No. (1-min):	7261

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				2N		N28 W 28
Gamma:						
soft X-rays:		- 22:46 -		M9	22	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 22:44-22:55

Solar Particles:

Helios 1

Data gaps in onset as well as in maximum. Shock at doy 189? Electromagnetic data refer to doy 187. Extrapolation from higher to lower nucleii channels not possible because of the data gaps.

Increase of intensity in E03 by 3, in P4 by 4.5, and in A4 by 4 orders of magnitude.

Onset in E03 at about 0:40, in P4 at about 0:30 (crosstalking electrons?), and in A4 at about 1 UT.

gradual

Solar event on 17.07.1980 (Day 199 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.814
magn. Footpt.:	N04 W163
Solar wind speed [km/s]:	357.
Time resolution [min]:	21.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				2N		S11 E 06
Gamma:						
soft X-rays:		- 06:12 -		M3	29	
hard X-rays:	06:11	- 06:15 -		110		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Slow and longlasting intensity increase, in A4 starting about 2 days later than in the other channels. Intensity for about 14 days above background (superevent?). Changes in magnetic field direction.

Solar event on 06.08.1980 (Day 219 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.932
magn. Footpt.:	N02 W176
Solar wind speed [km/s]:	328.
Time resolution [min]:	5.
Tape No. (1-min):	7271

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Sharp and well defined onset of a gradual particle event. In electron maxima structures similiar to that of a double injection, but such an additional injection is not visible in anisotropie data. In the onset phase high anisotrpy in all channels, for more than 36 h different from 0. Event visible up to the highest energies.

Increase in Eo3 by 3.5, in P4 by 4.5, and in A4 by 3 orders of magnitude. The intensities are $(9.\pm1.)\cdot10^6$ in E03, $(1.1\pm.5)\cdot10^6$ in P4, and $(5.\pm1.)\cdot10^5$ in A4. The electron to proton ratio is about 8:1, the proton to Helium ratio is about 2:1.

Onset in E03 at about 6:50, in P4 and A4 at about 8:00 UT.

Solar event on 17.08.1980 (Day 230 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.968
magn. Footpt.:	N01 W180
Solar wind speed [km/s]:	313.
Time resolution [min]:	
Tape No. (1-min):	325

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Large fluctuations in the magnetic filed, No shock? In electron channels the shape of an event, in nucleii channels the intensities are extrapolated from the channels with higher energie. Is this really an event?

The intensity is $(1.2\pm.2)\cdot10^6$ in E03, $(2.5\pm1.)\cdot10^4$ in P4, and (100 ± 25) in A4. The electron to proton ratio is about 48:1, the proton to Helium ratio is about 250:1.

Solar event on 30.08.1980 (Day 243 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.985
magn. Footpt.:	S00 E171
Solar wind speed [km/s]:	274.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Data gaps in the onset, gradual electron event, slow rise of the nucleii intensities.

Increase of intensity in E03 by 2, in P4 by 2.5, and in A4 by 1.5 orders of magnitude. The intensities are $(2.2\pm.2)\cdot10^5$ in E03, $(1.5\pm.2)\cdot10^4$ in P4, and (100±40) in A4. The electron to proton ratio is about 15:1, the proton to Helium ratio is about 150:1.

Onset in E03 at abour 20:15, in P4 at about 23:45, and in A4 at about 26:30.

gradual

Solar event on 15.10.1980 (Day 289 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.823
magn. Footpt.:	S04 E128
Solar wind speed [km/s]:	554.
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				3N		N21 E 55
Gamma:						
soft X-rays:	05:09	- 05:43	- 06:38	M2	117	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 05:19.5-05:49, 2 /III 1 /IV 1

Solar Particles:

Helios 1

Very slow rise (time to maximum in E03 about 20 h, maximum lasting for about 60h). The A4 is delayed very long. Gaps in the magnetic field data but no hint for a shock.

The intensities are $(1.9\pm1.)\cdot10^5$ in E03, $(1.8\pm.4)\cdot10^3$ in P4, and (20 ± 10) in A4. The electron to proton ratio is given by 106:1, the proton to Helium ratio is given by 90:1.

Onset in E03 at about 8:30, in P4 at about 9:00, and in A4 at about 23:00 UT.

Solar event on 10.11.1980 (Day 315 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.557
magn. Footpt.:	S07 W140
Solar wind speed [km/s]:	363.
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Very slow rise in all channels.

RSF, gradual

Solar event on 14.11.1980 (Day 319 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.514
magn. Footpt.:	S07 W134
Solar wind speed [km/s]:	467.
Time resolution [min]:	3.
Tape No. (1-min):	7281

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W110
Gamma:						
soft X-rays:	06:20	- 08:08	- 08:12	M8		
hard X-rays:	07:31	- 07:48		396		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Mainly ESP-particles (Shocks at doy 319 at about 12 UT and a stronger shock on doy 320 at about 6 UT). Is it possible that these shocks have caused all or a part of the particles on doy 315 (it looks like one large profile)? Or is it another more interplanetary effect (CIR?). Whatever the accelerator for these particles was it has accelerated them up to the highest energies, so that it is difficult to extrapolate the intensities of the prompt event from the higher to the lower energies.

The intensities are (very inaccurate) $(7.\pm3.)\cdot10^7$ in E03, $(1.5\pm.5)\cdot10^7$ in P4, and $(8.\pm2.)\cdot10^5$ in A4. The electron to proton ratio is about 5:1, the proton to Helium ratio is about 18:1.

impulsiv

Solar event on 14.01.1981 (Day 14 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.740
magn. Footpt.:	N05 E 25
Solar wind speed [km/s]:	317.
Time resolution [min]:	2.6
Tape No. (1-min):	381

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	20:57 -	21:02 -	21:32	1B		N12 E 02
Gamma:						
soft X-rays:		- 21:05 -		C7	7	
hard X-rays:	20:59 -	21:00 -	21:05	340		
3-cm Microwaves:	20:49 -	21:01 -	21:20	10		
10-cm Microwaves:	20:59 -	21:00 -	21:19	37		

Radiobursts: II 21:09.5-21:23, 1 /III 20:58-21:03.5, 3

Solar Particles:

Helios 1

Small event with very weak electron spectrum (rise in E08 not very well defined), weak proton spectrum (no increase above P13). Velocity dispersion between A2 and A4 is visible.

Increase of intensity in E03 and P4 by 1.5 orders of magnitude. The intensities are $(3.4\pm.2)\cdot 10^4$ in E03, (150±50) in P4, and (25±10) in A4. The electron to proton ratio is about 230:1, the proton to Helium ratio is about 6:1.

Onset in E03 at about 21:00, in P4 at about 22:30, and in A4 at about 22:45 UT.

impulsiv

Solar event on 25.01.1981 (Day 25 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.828
magn. Footpt.:	N04 E 30
Solar wind speed [km/s]:	400.
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				-N		S12 E 90
Gamma:						
soft X-rays:		- 09:08 -		M9		
hard X-rays:	08:47	- 09:05 -		1281		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 08:56.1-09:16.2

Solar Particles:

Helios 1

'Buckel' in E03, in nucleii channels mainly ESP-particles (shock on doy 27 causes also a fast rise in intensity on doy 26).

The intensities are $(3.\pm.5)\cdot 10^4$ in E03 and (90±40) in P4. The electron to proton ratio is about 330:1.

Solar event on 31.03.1981 (Day 90 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.948
magn. Footpt.:	S02 E 41
Solar wind speed [km/s]:	418.
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Slow rising, diffusive event mainly on doy 91, starting at the end of a data gap, so the background is lost. No magnetic field data, small data gaps in the event, so maxima are only inaccurate.

The intensities are $(5.8\pm.5)\cdot 10^4$ in E03 and $(6.\pm3.)\cdot 103$ in P4. The electron to proton ratio is about 10:1.

GLE, ESP

Solar event on 10.04.1981 (Day 100 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.910
magn. Footpt.:	S03 E 48
Solar wind speed [km/s]:	436.
Time resolution [min]:	3.
Tape No. (1-min):	391

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	10:59 -	11:14 -	12:04	1B		N11 E 53
Gamma:						
soft X-rays:	11:00 -	11:17 -	12:00	X1	23	
hard X-rays:	11:08 -	11:09 -	11:39	2098		
3-cm Microwaves:	04:20 -	11:25 -	12:27	1500		
10-cm Microwaves:	04:20 -	11:15 -	12:20	430		

Radiobursts: II 11:10.2-11:21, 3 /III 11:05.9-11:10.2, 3 (11:12.8-11:14.9, 2) /IV 11:14-13:03, 3

Solar Particles:

Helios 1

Impulsive particle event, in nucleii a second injection is superposed. Electrons seems to be disturbed by crosstalking protons while protons seem to be undisturbed by crosstalking electrons.

The intensities are $(3.5\pm.5)\cdot 10^5$ in E03, $(2.\pm.2)\cdot 104^4$ in P4, and (800 ± 100) in A4. The electron to proton ratio is about 18:1, the proton to Helium ratio is about 25:1.

Onset in E03 at about 11:39, in P4 at about 12:09, and in A4 at about 11:54.

Scholz, 1983

Solar event on 12.04.1981 (Day 102 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.894
magn. Footpt.:	S03 E 35
Solar wind speed [km/s]:	340.
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Mainly ESP-particles, shock at about 24 UT. Is it a sector boundary or are the changes in the magnetic field direction a result of the shock? It seems not possible to distinguish between the particles coming from the prompt event and the ESP-particles.

Solar event on 20.04.1981 (Day 110 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.848
magn. Footpt.:	S04 E 58
Solar wind speed [km/s]:	498.
Time resolution [min]:	
Tape No. (1-min):	7291

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Time course similiar to that on doy 100, shock at about 2UT?
Intensities are $(9.\pm2.)\cdot10^5$ in E03, $(2.5\pm.5)\cdot10^5$ in P4, and $(1.8\pm.2)\cdot10^3$ in A4. The electron to proton ratio is about 4:1, the proton to Helium ratio is about 139:1.
Onset in E03 at about 1:00, in P4 at about 2:00, and in A4 at about 3:00 UT.

impulsiv

Solar event on 25.04.1981 (Day 115 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.812
magn. Footpt.:	S04 E 49
Solar wind speed [km/s]:	389.
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				2B		N18 W 50
Gamma:						
soft X-rays:		- 14:00 -		X5	22	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 13:55-14:29

Solar Particles:

Helios 1

Slow rising intensities, really a solar event? Jump in magnetic field strength about 11 UT, connected with changes in magnetic field direction (data gaps in the magnetic field do not allow a detailed analysis).

RSF

Solar event on 02.05.1981 (Day 122 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.753
magn. Footpt.:	S05 E 40
Solar wind speed [km/s]:	314.
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						∿W137
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Slow rise, chaotic magnetic field (shock?, sector boundary?).

gradual

Solar event on 08.05.1981 (Day 128 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.685
magn. Footpt.:	S06 E 57
Solar wind speed [km/s]:	425.
Time resolution [min]:	2.7
Tape No. (1-min):	401

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	22:01	22:39	01:51	2B		N09 E 37
Gamma:						
soft X-rays:	22:21	22:52	23:04	M7	114	
hard X-rays:	22:08	22:33		3271		
3-cm Microwaves:	22:00	22:34	05:30	860		
10-cm Microwaves:	21:50	22:35	01:00	1065		

Radiobursts: II 22:33-22:54, 1 /III - /IV 22:35-24:00->07:28, 2,1

Solar Particles:

Helios 1

Precursor, slow rise and late onsets because of the high background of the preceding event on doy 122. Event visible up to the highest energies. Shock on doy 133 at about 3UT?

Intensity increase in E03 by 1.5, in P4 and A4 by about 2 orders of magnitude. The absolute intensities are $(1.05\pm.1)\cdot10^{8}$ in E03, $(3.\pm.1)\cdot10^{6}$ in P4, and $(3.5\pm.5)\cdot10^{4}$ in A4. The electron to proton ratio is about 35:1, the proton to Helium ratio is about 86:1.

Onset in E03 at about 22:45, in P4 at about 23:10, and in A4 at about 24:50.

GLE

Solar event on 10.05.1981 (Day 130 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.667
magn. Footpt.:	S06 E 69
Solar wind speed [km/s]:	597.
Time resolution [min]:	
Tape No. (1-min):	401

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Strong Shock Doy 131 at about 18 UT, many ESP-particles, data gaps.

gradual

Solar event on 13.05.1981 (Day 133 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.640
magn. Footpt.:	S06 E 69
Solar wind speed [km/s]:	617.
Time resolution [min]:	2.7
Tape No. (1-min):	711

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	-	04:12	-	3B		N10 E 55
Gamma:						
soft X-rays:	03:28 -	04:25 -	04:32	X1	86	
hard X-rays:	04:04 -	04:16 -		5418		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: III 1

Solar Particles:

Helios 1

Prompt event, profiles superposed by ESP particles and influenced by magnetic field fluctuations, that lead to a time course in anisotropy like expected for multiple injections. Multiple injections are not visible in the particle intensities. Diffusive interplanetary propagation.

The intensities are $(1.8\pm.2)\cdot10^6$ in E03, $(1.8\pm.6)\cdot10^6$ in P4, and $(4.3\pm.5)$ in A4. The electron to proton ratio is about 1:1, the proton to Helium ratio is about 42:1.

The onset in E03 is at about 4:05, in P4 at about 4:34.

Spektrale Entwicklung bei Bai und Dennis, 1985; Vilmer et al., EGS 5.3.6, 1986; Yoshimori and Watanabe, SH 1.3-6, 1985

gradual

Solar event on 16.05.1981 (Day 136 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.602
magn. Footpt.:	S07 E 58
Solar wind speed [km/s]:	439.
Time resolution [min]:	2.7
Tape No. (1-min):	411

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	07:53	- 08:34	- 10:13	3B		N11 E 14
Gamma:						
soft X-rays:	07:34	- 08:59	- 09:31	X1	52	
hard X-rays:	08:58	- 09:00	- 09:32	972		
3-cm Microwaves:	07:46	- 08:39	- 09:52	1580		
10-cm Microwaves:	07:50	- 08:39	- 09:50	1400		

Radiobursts: II 08:24.8-08:40.7, 2 /III 08:10.5-08:16.5, 3 /IV 08:12.5-11:05, 3

Solar Particles:

Helios 1

Promp onset, corotating structure? (there is no velocity dispersion between the different proton channels and only a small velocity dispersion between electrons and nucleii. Structures of particle intensity are similiar in all channels up to the highest energies, also the fine structuers are very similiar in each energy channel. Possibly only a few electrons, most electrons due to crosstalking protons?). The anisotropy is large for about 15 h, what contradicts the assumption of the entrance of the spacecraft in an existing particle population.

The intensities are $(6.\pm.2)\cdot10^6$ in E03, $(6.\pm2.)\cdot10^6$ in P4, and $(1.5\pm.5)\cdot10^5$ in A4. Especially the electron intensitis are very inaccurate. The electron to proton ratio is about 1:1, the proton to Helium ratio is about 40:1.

Onset in E03 at about 8:30, in P4 at about 9:20, and in A4 at about 9:10.

Solar event on 25.05.1981 (Day 145 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.492
magn. Footpt.:	S07 E 41
Solar wind speed [km/s]:	310.
Time resolution [min]:	3.
Tape No. (1-min):	405

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Modulation Event; no electrons, looking like an event with negative time course. Fast decrease of particle intensity in all channels possibly correlated with increase in magnetic filed strength. Shock?

gradual

Solar event on 04.06.1981 (Day 155 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.360
magn. Footpt.:	S06 E 28
Solar wind speed [km/s]:	403.
Time resolution [min]:	
Tape No. (1-min):	415

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				-N		N20 W 16
Gamma:						
soft X-rays:		- 19:28 -		C3		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 19:06-19:20

Solar Particles:

Helios 1

Slow rising event, visible in the three main channels, Shock at doy 156 at about 18 UT.

The (inaccurate) intensities are $(1.\pm.2)\cdot 10^4$ in E03, $(8.\pm4.)\cdot 10^3$ in P4, and (25±10) in A4. The electron to proton ratio is about 1.3:1, the proton to Helium ratio is about 320:1.

impulsiv

Solar event on 10.06.1981 (Day 161 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.317
magn. Footpt.:	S02 W 11
Solar wind speed [km/s]:	236.
Time resolution [min]:	1.3
Tape No. (1-min):	431

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	06:20	- 06:25	- 06:58	1N		N13 E 24
Gamma:						
soft X-rays:	06:21	- 06:28	- 06:36	M2	7	
hard X-rays:						
3-cm Microwaves:	05:00	- 06:30	- 07:20	105		
10-cm Microwaves:	06:22	- 06:23	- 06:31	112		

Radiobursts: II 06:24.9-06:40, 3 (06:31.5-06:32.5, 3) /III 06:21.5-06:33.3, 3 (06:29.5-06:30.5, 1; 06:55-06:56, 3) /IV -

Solar Particles:

Helios 1

Small impulsiv electron event, in nucleii channels only very small (high background in P4).

Increase of intensity in E03 by about 2, in A4 by about 1 order of magnitude, and in P4 by about a factor of 2-3. Absolute intensities are $(8.\pm1.)\cdot10^5$ in E03, $(2.5\pm.5)\cdot10^3$ in P4, and (80±20) in A4. The electon to proton ratio is about 320:1, the proton to Helium ratio is about 31:1. Therefore the reduced e:p:α-ratio is 11:1:0.036.

Onset in E03 at about 6:30, in P4 and A4 at about 7:00 UT.

impulsiv

Solar event on 17.06.1981 (Day 168 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.323
magn. Footpt.:	N03 W 40
Solar wind speed [km/s]:	425.
Time resolution [min]:	0.7
Tape No. (1-min):	721

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	09:54			SF		S23 W 21
Gamma:						
soft X-rays:		- 09:50 -		M1	5	
hard X-rays:	09:47	- 09:49 -		571		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Shock doy 169/170, small event, only visible in the lower energy channels. Increase of intensity in E03 by about 1.5, in A4 and P4 by about 1 order of magnitude. Absolute intensities are $(3.6\pm.3)\cdot 10^4$ in E03, (55±5) in P4, and (11±4) in A4. The electron to proton ratio is about 655:1, the proton to Helium ratio is about 5:1.

Onset in E03 at about 10:15, in P4 at about 10:10 (crosstalking electrons ?), and in A4 at about 12:00 UT.

gradual

Solar event on 18.06.1981 (Day 169 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.330
magn. Footpt.:	N04 W 46
Solar wind speed [km/s]:	411.
Time resolution [min]:	0.9
Tape No. (1-min):	441

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	08:56 -	09:35 -	13:00	1N		S25 W 35
Gamma:						
soft X-rays:		- 09:59 -		M1		
hard X-rays:						
3-cm Microwaves:	09:58 -	10:09 -	12:00	20		
10-cm Microwaves:	09:05 -	10:12 -		20		

Radiobursts: Event not compnied by a type-II-radio burst.

Solar Particles:

Helios 1

Shock doy 169/170, only a few electrons, gradual proton event, only a few α-particles.

Increase of intensity in E03 by 0.8, in P4 by 3, and in A4 by 2 orders of magnitude. Absolute intensities are $(9.\pm1.)\cdot10^3$ in E03, $(5.\pm1.)\cdot10^3$ in P4, and (18±8) in A4. The electron to proton ratio is about 1.8:1, the proton to Helium ratio is about 278:1. (The reduced e:p:α-ratio is 0.47:1:(0.003...0.006) ?).

Onset in E03 at about 10:00, in P4 at about 10:30, and in A4 at about 11:45

gradual

Solar event on 20.07.1981 (Day 201 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.706
magn. Footpt.:	N05 W139
Solar wind speed [km/s]:	356.
Time resolution [min]:	3.
Tape No. (1-min):	451

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	13:10 -	13:30 -	14:41	1B		S25 W 75
Gamma:						
soft X-rays:		- 13:29 -		M5	67	
hard X-rays:	13:07 -	13:19 -	13:50	1540		
3-cm Microwaves:	13:05 -	13:18 -	14:00	500		
10-cm Microwaves:	13:07 -	13:20 -	16:10	645		

Radiobursts: II 13:22-13:54.6, 3,2 /III 13:13-13:26, 2 (13:34.7-13:46, 1; 13:51.1-13:51.3, 2) /IV -

Solar Particles:

Helios 1

Gradual event, superposed by ESP-particles (shock doy 203 at about 2 UT. Longlasting anisotropie (scatter-poor event?). In the nucleii channels is a peak showing velocity dispersion superposed a slow increase. Longlasting injection of nucleii (?), could be explained by a coronal shock. Proton to Helium ratio is typical for large event. Onset is possibly not the real onset (angle between magnetic filed and plane of ekliptic about 70°, protons arrive first at the time the angle decreases, electron onset possibly delayed, because particles were observed first when the angle distribution has broadened.

The intensities are $(1.\pm0.5)\cdot10^6$ in E03, $(2.5\pm.5)\cdot10^5$ in P4, and $(3.\pm0.5)\cdot10^3$ in A4. The electron to proton ratio is about 4:1, the proton to Helium ratio is about 83:1. (The reduced e:p:α-ratio is 0.15:1:0.01 or 0.03:1:0.01 depending on the determination of the electron maximum).

Onset (UT): E03: 13:38 ± 1.5 min; E08: 13:38 ± 1.5 min; E2: 14:03 ± 1.5 min; P13: 14:05 ± 1.5 min; P27: 14:18 ± 1.5 min; P37: 14:06 ± 1.5 min; P>51: 14:22 ± 1.5 min; A2: 15:12 ± 15 min; A4: 14:58 ± 9 min; A27: 15:11 ± 1.5 min; A37: 14:57 ± 1.5 min. Do the time of injection (SRT) is given by: E03: 13:30; E08: 13:30; E2: 13:56; P13: 13:32; P27: 13:53; P37: 13:44; P>51: 14:04; (A2: 13:43); A4: 14:03; A27: 14:46; A37: 14:35

impulsiv

Solar event on 26.07.1981 (Day 207 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.764
magn. Footpt.:	N05 W133
Solar wind speed [km/s]:	462.
Time resolution [min]:	2.7
Tape No. (1-min):	425

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:	23:35	- 23:51	- 00:39		1670	
10-cm Microwaves:	23:33	- 00:08	- 00:30		1510	

Radiobursts:

Solar Particles:

Helios 1

Small event, nearly no α-particles, superposed the decaying phase of the event on doy 201. Magnetic field very quiet. Wrong flare association ?

Increase of intensity in E03 and P4 by about 1 order of magnitude. The Absolute intensities are $(3.2\pm.2)\cdot10^6$ in E03 and $(2.2\pm.2)\cdot10^4$ in P4. The electron to proton ratio is about 145:1.

Onset in E03 at about 14:40, and in P4 at about 16:00 UT.

Solar event on 07.08.1981 (Day 219 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.855
magn. Footpt.:	N03 W160
Solar wind speed [km/s]:	314.
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Real event or due to magnetic field? Onset of electrons about 12 h delayed with respect to the protons (or are that crosstalking electrons?), does not look like a solar event.

The intensities are $(1.3\pm.3)\cdot 10^5$ in E03, (750±50) in P4, and (100±20) in A4. The electron to prton ratio is about 173:1, the proton to Helium ratio is about 8:1.

RSF, gradual

Solar event on 19.11.1981 (Day 323 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.641
magn. Footpt.:	S06 W108
Solar wind speed [km/s]:	387.
Time resolution [min]:	-999
Tape No. (1-min):	7301

Solar electromagnetic radiation

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W100
Gamma:						
soft X-rays:					72	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Classical diffusive event, precursor in P4, data gaps in the onset and in electron maximum, visible also in higher energies. Increase of intensity by about 3-4 orders of magnitude.

The intensities are more than $6.\cdot10^6$ in E03, about $(1.\pm0.1)\cdot10^6$ in P4, and about $(4.5\pm.5)\cdot10^3$ in A4. The electron to proton ratio is larger than 6:1, the proton to Helium ratio is about 222:1.

Solar event on 20.11.1981 (Day 324 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.624
magn. Footpt.:	S06 W108
Solar wind speed [km/s]:	582.
Time resolution [min]:	3.
Tape No. (1-min):	7301

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						>W 53
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 02:30-02:46

Solar Particles:

Helios 1

Electron event similiar to that on doy323, nearly no protons, structures in onset and maximum of Helium possibly correlated with magnetic field fluctuations. Shock doy 324 in the evening.

The intensities are $(1.2\pm.2)\cdot 10^6$ in E03, $(8.\pm2.)\cdot 10^3$ in P4, and $(1.2\pm.2)\cdot 10^3$ in A4. The electron to proton ratio is about 150:1, the proton to Helium ratio is about 7:1.

impusliv

Solar event on 22.11.1981 (Day 326 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.607
magn. Footpt.:	S07 W125
Solar wind speed [km/s]:	353.
Time resolution [min]:	3.
Tape No. (1-min):	7301

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:	03:22	-	03:23		3700	
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Prompt electron onset, slow rise in nucleii channels, magnetic field fluctuations, shock doy 327 at about 18 UT.

Increase of intensity in E03 and P4 by 1 order of magnitude. Absolute intensities are $(8.5\pm1.)\cdot10^4$ in E03, (310±30) in P4, and (35±10) in A4. The electron to proton ratio is about 274:1, the proton to Helium ratio is about 8:1.

Onset in E03 at about 3:30

ESP

Solar event on 23.11.1981 (Day 327 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.568
magn. Footpt.:	S07 W113
Solar wind speed [km/s]:	499.
Time resolution [min]:	
Tape No. (1-min):	7301

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Looks like an event in E03, at the same time with a spike produced by an interplanetary shock.

DF, gradual

Solar event on 05.12.1981 (Day 339 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.436
magn. Footpt.:	S07 W135
Solar wind speed [km/s]:	344
Time resolution [min]:	41.
Tape No. (1-min):	731

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						N20 W 40
Gamma:						
soft X-rays:		- 14:40 -		C3		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Filament dissapearence; time resolution partly 0.9 min; in E03 and P13 like a gradual eventl, in lower nucleii channels slow rise like caused by a shock. Time to maximum in E03 about 9 h (7.8 h for 0.2-3 MeV electrons on ISEE-3).

The intensities are $(9.\pm1.)\cdot10^3$ in E03, (90±10) in P4, and (18±6) in A4. The electron to proton ratio is about 100:1, the proton to Helium ratio is about 5:1.

Kahler et al., APJ **302**, 549, 1986; Cane et al., JGR **91**, 13321, 1986

gap, gradual

Solar event on 10.12.1981 (Day 344 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.379
magn. Footpt.:	S06 W140
Solar wind speed [km/s]:	420.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				2B		N10 W 16
Gamma:						
soft X-rays:		- 19:18 -		M5		
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

To much gaps to anlyze it.

gap

Solar event on 28.12.1981 (Day 362 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.361
magn. Footpt.:	N06 E111
Solar wind speed [km/s]:	262.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Many gaps in the profiles, but event seems to be undisturbed by a shock. Inaccurate intensities are $(1.3\pm.2)\cdot10^5$ in E03, $(5.\pm1.)\cdot10^4$ in P4, and (400±100) in A4. The electron to proton ratio is about 3:1, the proton to Helium ratio is about 125:1.

gradual

Solar event on 28.01.1982 (Day 28 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.722
magn. Footpt.:	N05 E 60
Solar wind speed [km/s]:	479.
Time resolution [min]:	43.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:		- 07:00 -		2B		N08 E 42
Gamma:						
soft X-rays:		- 07:17 -		M8	30	
hard X-rays:	07:13	- 07:22 -		9763		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 07:03-07:34

Solar Particles:

Helios 1

Diffusive event, precursor in electrons and protons (?), small preceding event on doy 27 at about 23 UT. Deviation in intensity profiles caused by magnetic field fluctuations.

Increase of intensity in E03 by about 3.5, in P4 and A4 by about 4 orders of magnitude. The electron to proton ratio is about 88:1, the proton to Helium ratio is about 100:1.

Onset in E03 at about 7:20, in P4 at about 7:00 (?), and in A4 at about 8:00 UT.

gradual

Solar event on 31.01.1982 (Day 31 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.953
magn. Footpt.:	N05 E 54
Solar wind speed [km/s]:	433.
Time resolution [min]:	3.
Tape No. (1-min):	7311

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				2B		S14 E 13
Gamma:						
soft X-rays:		- 23:58 -		X1	20	
hard X-rays:						
3-cm Microwaves:	15:42	- 15:45 -	16:30	281		
10-cm Microwaves:	15:40	- 15:46 -	16:35	251		

Radiobursts:

Solar Particles:

Helios 1

Data gap, time resolution partly only 41 min, gradual event with large anisotropy in nucleii channels, deviations in intensity-time profiles possibly caused by magnetic field fluctuations. Located on the decaying flank of the event on doy 28. Soft X-ray data correspond to doy 30. Microwave data for the wrong event.

Increase in intensity in E03 by about 3 and in P4 by about 2 orders of magnitude. Absolute intensities are $(1.\pm.2)\cdot10^7$ in E03, $(2.1\pm.5)\cdot10^5$ in P4, and $(9.\pm1.)\cdot10^3$ in A4. The electron to proton ratio is about 48:1, the proton to Helium ratio is about 23:1.

Onset in E03 at about 0:00, in P4 at about 2:45, and in A4 at about 3:00 UT.

gradual

Solar event on 10.02.1982 (Day 41 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.831
magn. Footpt.:	N04 E 55
Solar wind speed [km/s]:	497.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				2B		N17 E 54
Gamma:						
soft X-rays:		- 01:01 -		M3	17	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 00:59-01:25

Solar Particles:

Helios 1

Small diffusive events, data gaps, nearly no α-particles, visible up to P13. The intensities are $(2.1\pm.1)\cdot10^6$ in E03, $(7.\pm1.)\cdot10^3$ in P4, and (22±8) in A4. The electron to proton ratio is about 300:1, the proton to Helium ratio is about 320:1.

small, MI

Solar event on 17.02.1982 (Day 48 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.897
magn. Footpt.:	N03 E 49
Solar wind speed [km/s]:	447.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

no magnetic field data, series of four injections visible in the electron channels, but smeared out to one profile in the nucleii channles. Increase of intensity less than 2 orders of magnitude.

impulsiv

Solar event on 02.06.1982 (Day 153 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.579
magn. Footpt.:	S07 E 72
Solar wind speed [km/s]:	444.
Time resolution [min]:	3.
Tape No. (1-min):	481

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	15:26 -	15:59 -	16:17	B		S08 E 81
Gamma:						
soft X-rays:		- 15:54 -		X1	10	
hard X-rays:	15:27 -	16:05 -	16:18	85		
3-cm Microwaves:	05:41 -	06:05 -	07:50	7530		
10-cm Microwaves:	05:55 -	06:14 -	07:10	2586		

Radiobursts: II 15:47-16:02.5, 3 /III 15:30-15:33, 2 (15:44-15:46, 2) /IV
-

Solar Particles:

Helios 1

Diffusive event, visible in some of the higher energy channles, onset in P4 contaminated by crosstalking electrons, only a few α-particles but many electrons, so the event does not fit the classification in protonrich and protonpoor.

Increase in intensity in E03 by about 2 and in P4 by about 1 order of magnitude. The absolute intensities are $(2.8\pm.2)\cdot 10^5$ in E03, (700±100) in P4, and (11±3) in A4. The electron to proton ratio is about 400:1, the proton to Helium ratio is about 64:1. (reduced e:p:α-ratio is 12.5:1:0.014).

Onset in E03 at about 15:45, in P4 at about 16:30, and in A4 at about 17:00 UT.

impulsiv

Solar event on 03.06.1982 (Day 154 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.368
magn. Footpt.:	N07 E 70
Solar wind speed [km/s]:	421.
Time resolution [min]:	3.
Tape No. (1-min):	481

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	11:42 -	11:44 -		2B		S09 E 71
Gamma:						
soft X-rays:		- 11:47 -		X8	6	
hard X-rays:	11:41 -	11:42 -	12:05	213791		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 11:44-12:10.5

Solar Particles:

Helios 1

Diffusive gamma ray event (decaying anisotropy), precursor in all energy channels, starting as an impulsive event and changing to gradual, followed by a shock (compare with doy 80.173). In Helium the precursor is so large, that it is not possible to ditinguish between precursor and prompt event. The precursor is possibly the start of a superevent.

The intensities are about $(1.7\pm.1)\cdot10^{8}$ in E03, $(1.5\pm.2)\cdot10^{6}$ in P4, and $(2.5\pm.3)\cdot10^{4}$ in A4. The electron to proton ratio is about 113:1, the proton to Helium ratio is about 60:1. (The reduced e:p:α-ratio is 4:1:0.02). The portion of electrons is smaller than in the preceding event.

Onset in E03 at about 11:50, in P4 at about 11:47 (crosstalking electrons and precursor?).

Murphy and Ramaty, 1985; Bai, 1986; van Hollebeke, 1985, SH 2.1-3; Evenson, 1985, SH 1.4-2

Solar event on 09.07.1982 (Day 190 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.387
magn. Footpt.:	N07 W 56
Solar wind speed [km/s]:	
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

starts in a dat agp, very slow rise leading to a large anisotropy during a shock (?) on doy 191.

ESP, gradual

Solar event on 22.07.1982 (Day 203 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.561
magn. Footpt.:	N07 W 91
Solar wind speed [km/s]:	550.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1N		N16 W 89
Gamma:						
soft X-rays:		- 17:34 -		M5	81	
hard X-rays:	17:34 - 17:35			109		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 17:20-17:30

Solar Particles:

Helios 1

Sharp rise in all channels, increase of intensity by some orders of magnitude, Shock (which are the ESP-particles and which are the particles of the prompt event?), magnetic field disturbed (series of shocks?).

Increase of intensity in E03 by 3, in P4 by 5, and in A4 by 4 orders of magnitude. Absolute intensities are $(5.\pm1.)\cdot10^5$ in E03 and (130±30) in A4 (both inaccurate).

Onset in the three main channels at about 17:30 UT.

impulsiv

Solar event on 08.08.1982 (Day 220 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.739
magn. Footpt.:	N05 W110
Solar wind speed [km/s]:	550.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1N		S09 W 65
Gamma:						
soft X-rays:		- 02:05 -		M7	5	
hard X-rays:	02:02	- 02:05 -		101		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 02:05-02:20

Solar Particles:

Helios 1

no magnetic field data, small diffusive electron event (increase of intensity by less than 2 orders of magnitude), P13 looks similiar to electron channels, while in P4 and A4 there is a slow rise.

The intensities are $(6.\pm1.)\cdot10^4$ in E03, (800±100) in P4, and (14±6) in A4. The electron to proton ratio is about 75:1, the proton to Helium ratio is about 57:1.

gap, gradual

Solar event on 21.11.1982 (Day 325 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.772
magn. Footpt.:	S05 W 99
Solar wind speed [km/s]:	
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1N		S12 W 81
Gamma:						
soft X-rays:		- 06:50 -		M1	160	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

prompt onset, many data gaps, looks like a well defined diffusive event. Intensities are grater equal $(2.5\pm.5)\cdot10^5$ in E03, $(1.3\pm.3)\cdot10^4$ in P4, and (35 ± 15) in A4. The electron to proton ratio is greater equal than 19:1, the proton to Helium ratio is about 370:1.

gap, ESP?, gradual

Solar event on 22.11.1982 (Day 326 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.760
magn. Footpt.:	S05 W 99
Solar wind speed [km/s]:	
Time resolution [min]:	
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1N		S11 W 36
Gamma:						
soft X-rays:		- 18:29 -		M7	97	
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

many data gaps, event superposed by a shock, because of the data gaps difficult to distinguish between prompt event and ESP-particles.

The inaccurate intensities are $(3.\pm2.)\cdot10^5$ in E03, $(1.1\pm0.3)\cdot10^5$ in P4, and $(1.\pm.2)\cdot10^3$ in A4. The electron to proton ratio is about 3:1, the proton to Helium ratio is about 110:1.

GLE, gradual

Solar event on 26.11.1982 (Day 330 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.728
magn. Footpt.:	S05 W 96
Solar wind speed [km/s]:	524
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1N		S12 W 87
Gamma:						
soft X-rays:		- 02:53 -		X4	57	
hard X-rays:	02:17	- 02:33		22747		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 02:34-02:50

Solar Particles:

Helios 1

Sharp onset in all energy channels, event visible up to the highest energies, shock-spike superposed the intensity profiles. In the shock the particles arrive mainly from the direction opposite to the sun. No magnetic field data.

Increase in intensity in E03 by about 4 (in the spike 6), in P4 by about 2.5 (5), and in A4 by about 3 (5) orders of magnitude. The absolute intensities of the prompt event are $(1.\pm.2)\cdot 10^{8}$ in E03, $(1.8\pm.6)\cdot 10^{6}$ in P4, and $(1.3\pm.5)\div 10^{5}$ in A4. The electron to proton ratio is about 56:1, the proton to Helium ratio is about 14:1.

Onset in E03 at about 2:36, in P4 at about 3:00, and in A4 at about 3:58 UT.

Bai, 1986

GLE, gradual

Solar event on 07.12.1982 (Day 341 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.599
magn. Footpt.:	S07 W 99
Solar wind speed [km/s]:	484.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	23:40			1B		S19 W 86
Gamma:						
soft X-rays:		- 23:54 -		X3	31	
hard X-rays:	23:36	- 23:53		23654		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 23:43.5-00:23.5

Solar Particles:

Helios 1

prompt onset, shock at about 18 UT visible as decrease of intensity and change of sign in anisotropy.

Increase in intensity in E03 by 2, in P4 by 3.5, and in A4 by 4 orders of magnitude. The absolute intensities are $(1.1\pm.1)\cdot10^8$ in E03, $(6.\pm1.)\cdot10^6$ in P4, and $(1.1\pm.3)\cdot10^5$ in A4. The electron to proton ratio is about 18:1, the proton to Helium ratio is about 55:1.

Onset in E03 at about 24:20, in P4 at abou 23:51, and in A4 at about 24:00 UT.

Bai, 1986

gap

Solar event on 14.12.1982 (Day 348 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.519
magn. Footpt.:	S07 W101
Solar wind speed [km/s]:	
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

To much gaps in the data.

gradual

Solar event on 19.12.1982 (Day 353 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.451
magn. Footpt.:	S07 W118
Solar wind speed [km/s]:	340.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				1B		N10 W 75
Gamma:						
soft X-rays:		- 16:50 -		M9	92	
hard X-rays:	15:49	- 16:49		304		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 16:25-16:33

Solar Particles:

Helios 1

Sharp onset in electrons, decay, new rise, in nucleii sharp onset followed by a slow rise. Sudden decrease of intensity in all channels. Shock.

Increase of intensity in E03 by 2, in P4 by 3.5, and in A4 by 5 orders of magnitude. The intensities are about $(6.\pm1.)\cdot10^{7}$ in E03, $(5.2\pm1.)\cdot10^{6}$ in P4, and $(1.5\pm.3)\cdot10^{5}$ in A4. The electron to proton ratio is about 12:1, the proton to Helium ratio is about 35:2.

Onset in E03 at about 16:50, in P4 at about 17:10, and in A4 at about 17:30 UT.

RSF

Solar event on 26.12.1982 (Day 360 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.368
magn. Footpt.:	S06 W128
Solar wind speed [km/s]:	424.
Time resolution [min]:	21.
Tape No. (1-min):	7321

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						>W126
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Sharp onset in E03, further rise of intensity, gaps in magentic field data, anisotropy large, many ESP-particles.

Increase of intensity in E03 by 4, in P4 by 5.5, and in A4 by 7 orders of magnitude. The intensities are $(1.8\pm.2)\cdot10^7$ in E03, $(1.1\pm.2)\cdot10^7$ in P4, and $(2.5\pm1.)\cdot10^5$ in A4. The electron to proton ratio is about 1.6:1, the proton to Helium ratio is about 44:1.

Onset in all channels at about 11 UT.1:00, A4: 11:00.

gap

Solar event on 06.01.1983 (Day 6 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.313
magn. Footpt.:	N02 E178
Solar wind speed [km/s]:	330.
Time resolution [min]:	41.
Tape No. (1-min):	

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

To much gaps in the data.

gradual

Solar event on 03.02.1983 (Day 34 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.623
magn. Footpt.:	N06 E 89
Solar wind speed [km/s]:	524.
Time resolution [min]:	7.
Tape No. (1-min):	445

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	05:41 -	06:12 -	08:08	2B		S17 W 07
Gamma:	>.3 MeV: 1158; 4-8 MeV: 14					
soft X-rays:		- 06:11 -		X4	14	
hard X-rays:	05:50 -	06:04 -	7:53	46354		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II 06:02.5-06:28.5, 3 /III 05:40-05:50, 3 /IV 06:02.5-09:47, 3

Solar Particles:

Helios 1

after ∿ 7:30 time resolution of 41 min, gradual event visible up to high proton energies, only a few α-particles, slow rise of electron intensity lasting for many hours.

Increase of intensity in E03 by about 3, in P4 by about 2, and in A4 by about 1 order of magnitude. The intensities are $(4.\pm1.)\cdot10^5$ in E03, $(1.\pm.2)\cdot10^3$ in P4, and (20±8) in A4. The electron to proton ratio is 400:1, the proton to Helium ratio is about 50:1.

Onset in E03 at about 6:50, in P4 at about 7:54 UT.

gap, RSF

Solar event on 15.06.1983 (Day 166 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.611
magn. Footpt.:	S07 E 73
Solar wind speed [km/s]:	314.
Time resolution [min]:	41.
Tape No. (1-min):	7331

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						W126
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts: II: 03:10-03:41.5

Solar Particles:

Helios 1

slow rise in intensity, visible up to the highest energies, more gaps than data.

Solar event on 24.07.1983 (Day 205 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.381
magn. Footpt.:	N07 W 36
Solar wind speed [km/s]:	594.
Time resolution [min]:	41.
Tape No. (1-min):	7351

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Multiple injection, small events, only very few nucleii
Increase of intensity in E03 in first injection by about 1, in second injection by about 1.5, and in third injection by less than 1 order of magnitude.

gradual

Solar event on 03.08.1983 (Day 215 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.515
magn. Footpt.:	N07 W 80
Solar wind speed [km/s]:	386.
Time resolution [min]:	41.
Tape No. (1-min):	7341

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:				2B		S16 W 02
Gamma:						
soft X-rays:		- 15:15	-	M2	56	
hard X-rays:	15:17	- 15:18	-	75		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Only a few electrons, a second injection follows, visible in all particle species. Wrong flare association (onset of particles earlier)?

Intensities are $(5.5\pm1.)\cdot10^4$ in E03 and (75 ± 10) in P4. The electron to proton ratio is about 733:1.

RSF

Solar event on 07.02.1984 (Day 38 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	0.485
magn. Footpt.:	N07 E117
Solar wind speed [km/s]:	410.
Time resolution [min]:	41.
Tape No. (1-min):	7361

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						>W127
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Slow rise, event visible in the three main channels.

impulsiv

Solar event on 21.01.1985 (Day 21 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	∿0.4
magn. Footpt.:	∿W 75
Solar wind speed [km/s]:	
Time resolution [min]:	41.
Tape No. (1-min):	7371

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:	23:58			1N		S10 W 40
Gamma:						
soft X-rays:		- 24:04 -		X5	11	
hard X-rays:	23:52	- 24:02 -		133000		
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

Increase of intensity by 2-3 orders of magnitude in the three main channels, structures in A4 look like shock or second injection. Gradual gamma ray line flare.

Intensities are $(4.5\pm.5)\cdot10^5$ in E03, $(1.5\pm.5)\cdot10^3$ in P4. The electron to proton ratio is about 300:1

Onset in E03 at about 26:23, in P4 at about 24:30 UT.

gap

Solar event on 17.02.1985 (Day 353 of the year)

Spacecraftdata:

Spacecraft	Helios 1
rad. distance [AU]:	
magn. Footpt.:	
Solar wind speed [km/s]:	
Time resolution [min]:	41.
Tape No. (1-min):	7381

Solar electromagnetic radiation:

	Tons.	Tmax.	Tend.	Class.	τ	Flare Loc.
H_α:						
Gamma:						
soft X-rays:						
hard X-rays:						
3-cm Microwaves:						
10-cm Microwaves:						

Radiobursts:

Solar Particles:

Helios 1

To much data gaps.