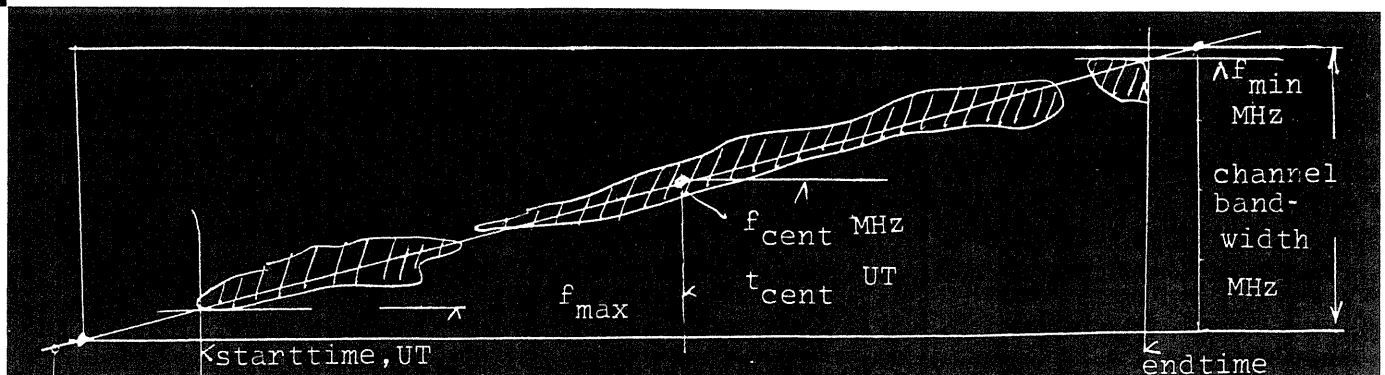
REPORT UAG-98

WORLD DATA CENTER A
for
Solar-Terrestrial Physics

TYPE II SOLAR RADIO BURSTS RECORDED AT WEISSENAU 1966-1987

February 1990

NATIONAL GEOPHYSICAL DATA CENTER



WORLD DATA CENTER A

National Academy of Sciences
2101 Constitution Avenue, NW
Washington, DC 20418 USA

World Data Center A consists of the Coordination Office and the following nine Subcenters:

COORDINATION OFFICE
World Data Center A
National Academy of Sciences
2101 Constitution Avenue, NW
Washington, DC 20418 USA
Telephone: (202)334-3368

GLACIOLOGY (Snow and Ice)
World Data Center A: Glaciology (Snow and Ice)
Cooperative Inst. for Research in Environmental Sciences
University of Colorado
Boulder, Colorado 80309 USA
Telephone: (303)492-5171

MARINE GEOLOGY AND GEOPHYSICS (Gravity, Magnetics, Bathymetry, Seismic Profiles, Marine Sediment, and Rock Analyses):
World Data Center A for Marine Geology and Geophysics
NOAA, NGDC E/GC3
325 Broadway
Boulder, Colorado 80303-3328 USA
Telephone: (303)497-6487

METEOROLOGY (and Nuclear Radiation)
World Data Center A: Meteorology
National Climatic Data Center
NOAA, E/CC
Federal Building
Asheville, North Carolina 28801 USA
Telephone: (704)259-0682

OCEANOGRAPHY
World Data Center A: Oceanography
National Oceanographic Data Center
NOAA, E/OC
1825 Connecticut Avenue, NW
Universal Building, Room 409
Washington, DC 20235 USA
Telephone: (202)673-5594

ROCKETS AND SATELLITES
World Data Center A: Rockets and Satellites
NASA/Goddard Space Flight Center
Code 630.2
Greenbelt, Maryland 20771 USA
Telephone: (301)286-7354

ROTATION OF THE EARTH
World Data Center A: Rotation of the Earth
U.S. Naval Observatory
Washington, DC 20392-5100 USA
Telephone: (202)653-1529 or 1527

SEISMOLOGY
World Data Center A: Seismology
U.S. Geological Survey
Branch of Global Seismology and Geomagnetism
Box 25046, Mail Stop 967
Denver Federal Center
Denver, Colorado 80225 USA
Telephone: (303)236-1500

SOLAR-TERRESTRIAL PHYSICS (Solar and Interplanetary Phenomena, Ionospheric Phenomena, Flare-Associated Events, Geomagnetic Variations, Aurora, Cosmic Rays, Airglow):
World Data Center A for Solar-Terrestrial Physics
NOAA, NGDC E/GC2
325 Broadway
Boulder, Colorado 80303-3328 USA
Telephone: (303)497-6324

SOLID-EARTH GEOPHYSICS (Seismicity, Earthquake Strong Motion, Tsunamis, Gravimetry, Earth Tides, Recent Movements of the Earth's Crust, Magnetic Measurements, Paleomagnetism and Archeomagnetism, Volcanology, Geothermics):
World Data Center A for Solid-Earth Geophysics
NOAA, NGDC E/GC1
325 Broadway
Boulder, Colorado 80303-3328 USA
Telephone: (303)497-6521

World Data Centers conduct international exchange of geophysical observations in accordance with the principles set forth by the International Council of Scientific Unions. WDC-A is established in the United States under the auspices of the National Academy of Sciences. Communications regarding data interchange matters in general and World Data Center A as a whole should be addressed to World Data Center A, Coordination Office (see address above). Inquiries and communications concerning data in specific disciplines should be addressed to the appropriate subcenter listed above.

WORLD DATA CENTER A
for
Solar-Terrestrial Physics

REPORT UAG-98

TYPE II SOLAR RADIO BURSTS RECORDED AT WEISSENAU 1966-1987

by

H.W. Urbarz
Astronomical Institute of Tubingen University
Weissenau Station
7980 Rasthalde, Ravensburg, GFR

February 1990

Published by World Data Center A for

Solar-Terrestrial Physics, NOAA
National Geophysical Data Center
Boulder, Colorado

and printed by

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE
National Geophysical Data Center
Boulder, CO 80303 USA

TABLE OF CONTENTS

Type II Solar Radio Bursts Recorded at Weissenau 1966-1987

by

H.W. Urbarz
Astronomical Institute of Tubingen University
Weissenau Station
7980 Rasthalde, Ravensburg, GFR

Description of the Lists and Legends

These Type II solar radio bursts are an improved list of the Weissenau Observatory Bulletin data. Preliminary data were also published in Solar-Geophysical Data (SGD) Part I "Solar Radio Emission Spectral Observations." The list was obtained by carefully reinspecting the film records. The films were viewed with a projecting magnifier device when the contrast of a projected image was sufficient. Otherwise an optical device was used. The film was put on an opaque glass strip for inspection and was illuminated on the reverse side and shifted by means of driving spools. Figure 1 shows both the devices in the laboratory at Weissenau Observatory.

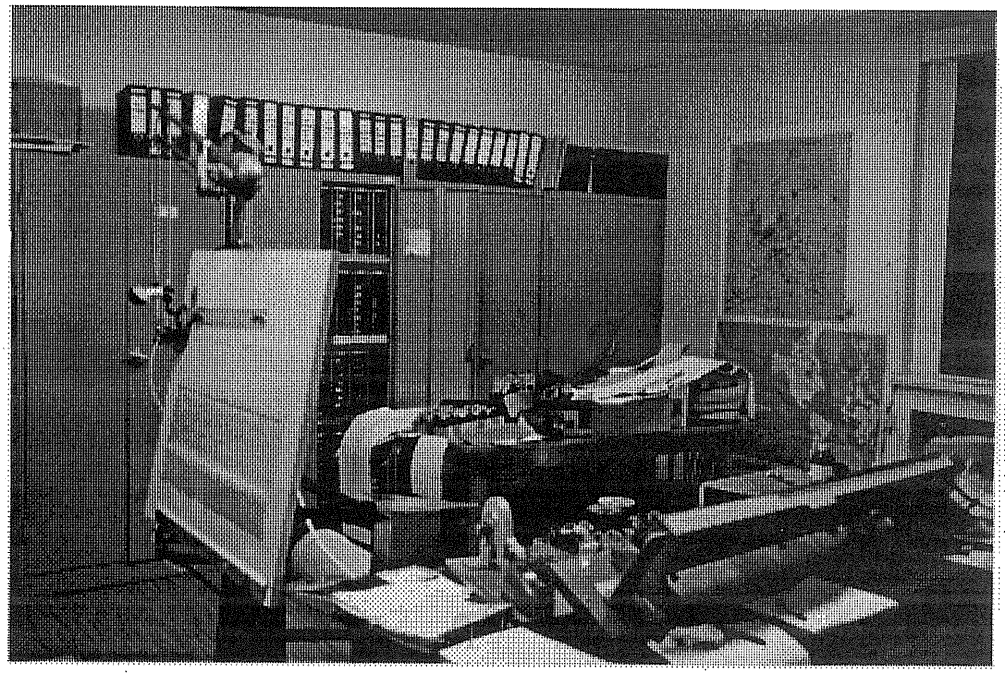


Fig 1. The magnifier projecting device. At the right a stripe of opaque glass may be illuminated from the rear side. The film is carried by this glass and shifted across the glass.

A list of solar cycle 20 Type II bursts was published by Krivsky and Lukac (1980). A list containing the events of solar cycle 21 was published by Robinson et al. (1983). Those data were obtained by the Dapto and Culgoora Observatory, Australia, while the list of Krivsky and Lukac depicts data of other Bulletins. The shock velocities were derived from the frequency drift assuming a proper density law [Meyer (1970); Gergely (1984); Robinson 1985].

The following is a description of all columns of the list. The user of this data list may obtain a crude image of a Type II emission band in the respective channels from the information of columns 3, 4, 5, 6, 7, 8, and 9:

Column 1: Year, day, month. An asterisk "*" indicates the film was analyzed on the simple optical device. Otherwise the projecting magnifier device was used.

Column 2: Burst types with terminology as in SGD Explanation of Data Reports Jul 1987. Bursts of other types are considered as associated to a Type II burst if they occur 30 minutes ahead or before the respective Type II bursts. The symbol II is used if there is only one emission band, which may be F (Fundamental) or H (Harmonic).

Columns 3,4: Start time t_{st} and end time t_{end} in UT. Refers to the earliest and latest burst feature seen on the film.

Columns 5,6: Start frequency, f_{st}, and end frequency, f_{end}, in MHz. If the burst feature is long enough in time duration, then a mid frequency is given.

Columns 7,8: f_{max}, f_{min}, in MHz. The maximum and minimum frequency of a burst feature occurring near the start and near the end of the burst (see Figure 2).

Column 9: Frequency drift $\Delta f/\Delta t$, in MHz/s. The frequency drift had to be determined separately in each channel, because channel bandwidth is higher by a factor of about 2 in the next higher channel. The same holds for the quantities given in columns 1 to 6. The parameters of our evaluation are shown in Figure 2. The frequency drift in Mhz/s was determined as: (channel bandwidth)/ duration.
The parameter duration is not included in the list. Duration was found from the difference between the time of the intersection of the channel boundary at the lower frequency side and the intersection of the channel boundary at the higher frequency side. Because the frequency scales are linear in each channel, the intersections were found by a ruler, optimally assigned to the emission band of the Type II burst that appears on film. The accuracies due to the sections determined in mm are: ±2.5% with the magnifier method and ±3% with a simple method. These accuracies are obtainable at smooth homogeneous regular emission bands. The practical obtainable accuracy is given by the distribution of the burst in the dynamic spectrum, i.e., the patchiness, irregular boundaries towards higher and lower frequencies. In this case the symbol "^" is applied prior to the value in the column. In cases of the merging into other burst types thereby masking the Type II emission band or of the overlap, the frequency drift cannot be given. There are a few cases of horizontal response or negative drift of an emission band. This is indicated in the remarks, Column 13. This feature may be a true feature of the emission but also may be due to an unequal distribution of brightness at one band edge. The frequency drift $\Delta f/\Delta t$ decreases with the decrease of the center frequency f_{cent}.

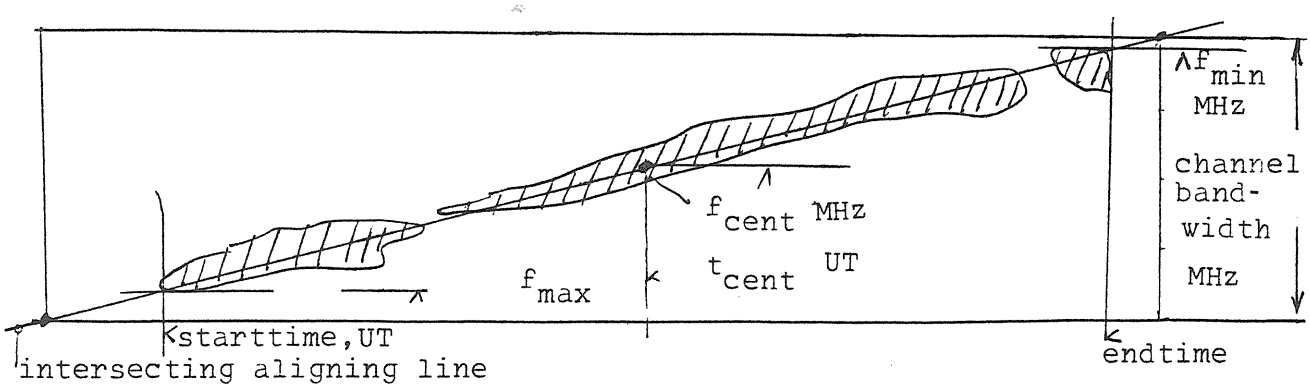


Fig. 2. Graphical display of the different columns given in the list.

Columns 10,11: Center frequency in MHz (f_{cent}) and t_{cent}, time of f_{cent}, gives the point of the dynamic spectrum where the frequency drift was determined. The emission band of a Type II burst may be fitted by a straight line as mentioned in Column 9, because the frequency drift is nearly constant over an octave, except in a few cases given in Column 13. f_{center} is in most cases equal to f_{start} -1/2 (f_{start} -f_{end}). The dynamic spectrum of other Observatories is nonlinear (exponential) in the f scale and the Type II bursts extending over several octaves show a curvature. In this case the tangent point gives the frequency to calculate the shock velocity and the frequency drift to be utilized is the slope $\Delta f/\Delta t$ of the tangent at that point.

Column 12: Bandwidth: 30-46-86-160-290-540-1000 MHz correspond to channel No. 1 to 6. Thus, Channel 1 = 30-46 MHz; Channel 2 = 46-86 MHz; Channel 3 = 86-160 MHz; Channel 4 = 160-290 MHz; Channel 5 = 290-540 MHz; and Channel 6 = 540-1000 MHz.

Column 13: Remarks: The time is given first, followed by the event to which it refers. Other different items are separated by a comma.

Explanation of symbols in the table:

<46	:	the true value is smaller than 46 but cannot be depicted from the film spectrum;
40-40	:	both values in column f_{st} and f_{end} are the same. See for example on 21 April 1978. While f_{max} is larger than f_{min} naturally, this may be found at narrow bands with low frequency drift.
^0,012	:	the given value is inaccurate: disturbed recording, failure of film processing, interference, etc.;
-	:	(horizontal short line): value cannot be depicted in principle due to similar reasons (see line above);
empty space	:	irrelevant to give a value here.

Supplementary Burst List Information

The main list in this Report is a result of the re-inspection of the Weissenau burst list published in the Weissenau Bulletin and in SGD 1966 to 1987. In those preliminary lists all the bursts of Type II, IV, IIIGG-V and V were re-inspected to find Type II bursts not yet identified. Therefore, the corrected list here differs from the preliminary lists. It was impossible to look at all of the films from start to the end because this would take too many working hours. To detect some more unidentified Type II bursts the following procedure was performed. All the Type II bursts recorded by other Observatories operating during the Weissenau observation hours were checked to see if they were included in the Weissenau list. In 28 cases Type II bursts could be identified there. These additional bursts are presented in this Supplementary list. There were also cases of "no event" on the Weissenau record. The reason is the different recording intensities versus the frequency of the various instruments. The reverse situation was also found: other Observatories gave "no event" during their observation hours when such an event was given by Weissenau. These events are mentioned already in the main list.

Other Introductory Remarks

The data presented here are not homogeneous in the sense of being recorded by the spectrograph having the very same technical properties from 1966 to 1987. Since 1978, high gain LP antenna groups were employed in channels 1, 2, 3 increasing sensitivity. The effective contrast of the burst events as white features on more or less dark background changed considerably during the period of operation due to changes in the circuitry feeding the intensity input of the recording scope.

Moreover the features of the radio bursts were different in some respects in solar cycle 20 and cycle 21.

A copy of the film record of a Type II event may be obtained from the author at $3.00 per 5 minute duration of event, plus a postal charge.

REFERENCES

GERGELY, T.E. 1984 "On the relative velocity of coronal transients and type II bursts." STIP Symposium on Solar/Interplanetary Intervals, M.A. Shea and D.F. Smart, AFGL, Bedford, MA, USA and S.M.P. McKenna-Lawlor, St. Patrick's College, Maynooth, Ireland, eds., pp. 347-357.

KRIVSKY, L. and B. LUKAC 1980 "Catalogue of the solar type II bursts and their source flares for the cycle No. 20 (1966-1976)." The Slovak Centre of Amateur Astronomy, Hurbanovo, pp. 1-37.

MEYER, O. 1970 "Untersuchungen Solarer Radiobursts vom Typ II," Dissertation, Mathematisch-naturwissenschaftliche Fakultat der Eberhard-Karls-Universitat zu Tubingen.

ROBINSON, R.D., J.M. TUXFORD K.V. SHERIDAN, and R.T. STEWART 1983 "A catalogue of major meter-wavelengths solar events recorded the Dapto and Culgoora solar radio observatories (1961-1981)," Proc. ASA 5 (1), pp. 84-113.

ROBINSON, R.D. 1985 "Velocities of Type II Solar Radio Events," Solar Phys., 95, pp. 343-357.

LIST OF THE TYPE II BURSTS AND ASSOCIATED BURSTS

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1966 02.9. *	II		0511,8		66		50	0,044	~70	0505,5	2	Typ II uncertain, type IV overlaps the start of type II
14.9. *	II	1019,6	1021,5	72	50	78	46	0,155	60	1021,0	2	
		1021,0	1029,8	80	46	86	46	0,054	60	1025,0	2	single, continuous broad band,
	III G	1019	1022			500	160					
	IV dm	1040	1043			540	170					
18.9. *	F	1501,0	1505,0	70	46	80	46	0,094	56	1504,5	2	patchy, faint narrow band
	H	1503,1	1508,9	82	54	86	52	0,079	70	1507,5	2	patchy, faint narrow band
	IVdm	1500,8	1505,4			540	400					
1967 31.10. *	II	1136,6	1139,1	75	46	75	46	0,222	60	1137,6	2	300-180 MHz type IS
	III GG	1123,9	1128,8			500	46					
2.11. *	F	0858,3	-	82	-	86	-	0,222	75	0858,8	2	0859,3 F and H merge into Cont.
	H	0858,3	-	130	-	130	-	0,206	120	0858,8	3	
	IV m	0858,3	0908,3			280	46					
	III G	0854,8	0855,4			450	46					
	IV	0855,0	0858,4			540	40					
	I S DC					350	180					
04.11.	F	1159,3	1203,8	55	46	86	46	~0,074	66	1202,0	2	F and H identification uncertain
	H	1202,5	1207,2	75	46	86	46	~0,145	66	1204,5	2	1205 RS HB
	III GG	1151,6	1156,8			510	46					
	I S DC					300	30					
19.11.	F	1044,3	1045,8	64	50	66	50	~0,145	62	1045,2	2	faint, narrowband features

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1967 19.11.	H	1046,1	1048,4	82	60	86	60	^0,163	73	1046,8	2	faint, narrowband features
03.12.	II	0854,4	0858,7	82	46	86	46	0,139	66	0855,8	2	patchy, faint
13.12. *	H	0949,0	0951,3	170	160	170	160	-	-	-	4	patchy, faint
		0950,8	0953,8	150	110	150	110	0,196	130	0952,5	3	
	F	0952,2	0957,0	70	60	70	60	-	-	-	2	faint feature
	III GG RS	0943,8	0947,7			540	46					
13.12. *	F	1353,0	1356,6	80	54	86	50	0,131	70	1355,0	2	split band
	H	1353,2	1356,6	150	120	155	120	0,154	135	1355,0	3	patchy, faint
	II	1358,5	1400,5	60	70	86	55	-0,095	74	1359,0	2	negative drift
	III GG	13445,7	1358,3			300	46					
27.12. *	F	0840,6	0841,4	125	110	140	110	-	-	-	3	
		0842,4	0847,5	86	46	86	46	0,056	72	0843,0	2	faint, narrow band, 1 min gap, 0844,5 step RS HB near end
								0,256	66	0844,7	2	
								0,078	56	0845,0	2	
	H	0840,5	0842,8	260	160	290	160	^1,140	225	0841,3	4	RS HB near end
		0841,5	0846,2	140	110	160	110	0,184	130	0844,0	3	
1968 15.01.	F	1228,2	1230,0	115	110	130	110	-	-	-	3	patchy, narrow band
		1228,9	1233,3	86	60	86	60	0,148	73	1231,0	2	patchy, narrow band
	H	1226,7	1232,8	230	160	290	160	^0,619	220	1229,0	4	RS HB near 1229
		1228,9	1233,2	160	110	160	110	0,164	135	1231,0	3	patchy, splitband
	III GG	1223,1	1227,2			540	100					100 MHz is the lf cutoff of the type III group

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1968 15.01.	III GG	1236,3	1238,8			130	30					
14.03. *	F	1013,0	1015,0	56	46	60	46	^0,095	52	1014,0	2	patchy, faint narrow band
		1015,5	1016,8	38	38	42	34	-1[illegible]	4[illegible]	-[illegible]	1	patchy, faint narrow band, HB
	H	1012,7	1014,4	135	115	140	115	0,176	125	1013,7	3	narrow band
		1015,8	1016,2	82	82	86	70	-	-	-	2	HB
	III G	1006,2	1007,4			300	30					
21.03. *	F	1425,8	1431,7	74	54	86	46	^0,056	60	1430,0	2	patchy, HB
		1429,2	1437,4	41	32	44	30	0,021	38	1433,0	12	patchy, faint, HB
	H	1425,7	1430,3	125	110	150	110	^0,091	130	1428,0	3	1429-1430,3 HB, 1425,2-1427,2 HB in chan. 4
	II	1436,4	1437,8	50	46	50	46	-	-	-	2	faint narrow band
	II	1444,3	1448,3	62	48	62	46	^0,056	55	1445	2	faint narrow band
	II	1440,7	1441,3	40	40	42	38	-	-	-	1	faint narrow band, 1442,0-1452 RS HB
30.03. *	II	1426,7	1427,8	190	160	200	160	-	-	-	4	2 faint split bands
		1426,9	1427,9	150	135	150	135	0,176	142	1427,4	3	
	III G	1422,6	1424,3			320	30					
	III	1430,6	1432,1			50	30					
01.04. *	F	1313,8	1315,9	56	46	60	46	0,083	50	1315,0	2	patchy, faint
		1316,4	1317,7	42	36	42	34	^0,033	39	1317,2	1	patchy, faint
	H	1310,2	1312,3	270	170	290	160	-	-	-	4	1310,8 broadband emission
	(H)	1312,5	1316,2	150	110	160	110	0,134	130	1314,5	3	patchy, narrow band, HB
		1316,6	1318,5	86	70	86	70	0,074	78	1317,3	2	patchy, narrow band,
	IV dm	1307,5	1310,6			700	300					weak
	III GG	1306,9	1309,7			500	30					

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1968 15.04.*	F	1328,3	1329,6	66	50	68	46	0,167	58	1329,0	2	narrow, split bands
		1339,1	1339,7	46	42	46	42	-	-	-	1	
	H	1329,0	1332,3	82	80	86	78	-	-	-	2	no measurement in chan. 3
08.05. *	F	1416,3	1417,1	260	255	290	255	-	-	-	4	
		1420,6	1421,0	82	66	86	55	-	-	-	2	
	H	1416,2	1418,6	440	300	540	290	~1,157	360	1417,0	5	broadband
		1417,5	1421,3	290	170	290	170	0,387	230	1419,5	4	patchy, narrow band
		1420,8	1426,3	140	130	160	110	0,123	140	1424,0	3	patchy
		1428,6	1431,2	86	70	86	66	0,083	80	1429,8	2	faint, narrow band
09.06. *	F	0849,7	-	70	-	80	-	-	-	-	2	0850,5 merges into type IV m 160-30 MHz, F uncertain,
	H	0848,0	-	140	-	160	-	-	-	-	3	0851 merges into type IV m, 0859-0902 RS HB in chan.2, H uncertain
	II	0901,0	0904,3	76	50	86	46	0,102	66	0903,0	2	uncertain drifting feature near end of type IV
	DCIM	0839,3	0842,6			320	200					
	DCIM	0842,8	0845,8			540	280					lf stopfrequency drifts to lower values
	IV dm	0849	1008			1000	160					
11.06. *	II	0936,6	0939,3	490	290	490	290	1,190	350	0938,5	5	patchy, faint
		0939,2	0940,5	290	160	290	160	-	-	-	4	patchy
		0941,4	0942,1	135	135	150	120	-	-	-	3	patchy
06.07.	F	0947,0	0951,5	86	46	86	46	~0,121	66	0949	2	patchy, broadband 0947,0-0948,3 HB

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1968 06.07.*	H	0946,8	0956,3	160	130	160	110	0,103	140	0951,0	3	0945,9-0946,6 HB, 0951,0-0952,0 HB, 0945,5-0956,5 HB
	F_2	0953,9	1000,0	35	30	46	30	0,022	38	0956,5	1	patchy, broadband, 1009,2-1016,5 RS in chan. 1
	H_2	0953,7	1000,0	55	60	70	46	^0,061	60	0956,5	2	0953,7-0955,0 splitband
	III G	0944,6	0947,2			500	30					
	IV dm	0946	0953			500	160					
08.07.	II	1711,3	1717,6	50	50	86	46	^0,074	66	1715,0	2	patchy, in chan. 3 no measurement
*	IV dm	1708,5	^1745			700	160					
	II	1730,3	1731,6	60	50	70	46	^0,121	55	1731,0	2	
13.08.	F	1300,5	1302,1	86	60	86	55	^0,121	75	1301,3	2	patchy, faint
*	H	1257,5	1302,5	240	160	250	160	^0,481	210	1259,0	4	patchy
		1258,7	1302,8	160	120	160	120	0,154	140	1301,0	3	patchy, splitband
	III G	1254,3	1258,0			400	35					
14.08.	F	1341,5	1347,2	46	35	46	32	^0,022	40	1344,0	1	1346-1350 HB
*	H	1340,6	1346,7	60	46	76	46	0,056	66	1344,0	2	1345,6-1346,2 splitband, 1346-1348 HB
		1350,5	1356,0	46	30	46	30	0,044	38	1353,0	1	patchy, narrowband
18.08.	II	1337,1	1342,2	60	55	72	46	0,067	60	1340,0	2	narrow, split bands
*		1343,7	1350,5	42	34	42	34	0,021	36	1348,0	1	faint, narrow split bands
	III G	1333,0	1334,3			66	30					
29.09. *	II	0951,7	0955,1	37	30	37	30	0,048	34	0952,9	1	patchy, faint
	IV dm	0931,7	0947,2			540	160					
	III GG	0930,4	0938,0			320	30					
29.09. *	F	1618,9	1622,0	70	46	86	46	0,222	66	1620,7	2	steplike feature

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end} MHz	f_{max} MHz	f_{min} MHz	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1968												
29.09.		1621,7	1623,2	44	36	46	30	-	-	-	1	patchy
	H	1618,8	1620,6	260	160	260	160	-	-	-	4	RSHB
		1618,8	1622,1	140	115	160	110	0,206	135	1620,5	3	patchy, split bands, HB RS
	II	1627,4	1629,8	70	66	70	52	^0,070	62	1628,8	2	faint split bands
	III G	1618,5	1618,7			350	150					
	DCIM	1620,0	1622,5			310	180					
01.11.	II	0851,8	0859,6	75	46	75	46	0,095	66	0855,0	2	0854-0858 HB, intense linear narrow band
		0903,4	0904,0					0			1	narrowband feature
		0907,0	0908,0					0			1	narrowband feature
	I					290	160					
	Cont.	0856	0904			400	160					
02.11. *	II	1009,3	1012,3	60	46	70	46	0,074	56	1010,5	2	patchy, HB
		1013,3	1017,5	38	30	40	30	-	-	-	1	patchy, 1022-1027 HB in chan. 2 and 1
	III GG DCIM F/B	0947,5	0959,2			500	30					
	IV dm	1000	1050			1000	160					
	III G	1004,8	1006,4			70	30					
18.11. *	F_1	1031,4	1035,3	70	50	70	46	0,078	55	1033,5	2	patchy, near 1034 merges into H in chan. 2
		1033,6	1035,7	46	38	46	36	-	-	-	1	negative drift, intense narrow band
	H_1	1031,3	1037,2	110	110	150	110	0			3	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1968 18.11.		1033,0	1035,6	80	80	86	76				2	negative drift
	II	1035,9	1038,5	86	56	86	50	0,167	70	1037,0	2	narrow, split bands
	F_2	1039,8	1054,2	38	38	46	30	0			1	1050,7-1104,3 strong HB RS, patchy, broadband 1041-1045 RS HB
	H_2	1040,1	1051,2	70	60	86	46	0			2	1050,3-1103,3 RS HB 1042 -1043 HB patchy, broadband
	III GG DCIM RS	1026,6	1034,5			1000	30					1026,6-1032 lf cutoff in chan.4
	IV dm	1026,0	1047,0			1000	170					
11.12. *	F	1154,2	1155,0	56	46	56	40	-	-	-	2	
		1153,7	1154,3	42	38	46	36	-	-	-	1	
	H	1153,7	1155,2	86	68	86	60	-	-	-	2	patchy, HB
	IV dm					1000	110					
14.12. *	F	1010,8	1012,4	150	120	160	120	0,385	135	1011,5	3	
	H	1010,6	1012,6	280	210	290	210	0,451	250	1011,4	4	
23.12. *	F	1119,6	1123,8	38	30	40	30	0,038	36	1122,0	1	patchy
	H	1119,9	1124,0	76	46	76	46	0,103	61	1122,0	2	patchy RS
		1124,5	1125,9	40	40	41	38	-	-	-	1	narrow band
	III GG	1111,5	1113,3			240	30					
27.12.	F_1	1058,5	1102,6	80	55	86	46	^0,074	70	1100,0	2	patchy spectral association uncertain

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1968 27.12.*	H_1	1058,6	1102,2	150	110	160	110	^0,154	130	1100,0	3	patchy, 1100,3-1101,3 RS HB	spectral association uncertain
	F_2	1106,8	1113,4	66	46	70	46	^0,067	58	1110,0	2	patchy, faint splitband feature	
		1112,0	1114,5	38	34	40	30	-	-	-	1	patchy, faint broadband	
	H_2	1102,8	1108,3	120	110	130	110	-	-1 -	-	3		
	III GG U	1054,3	1101,4			1000	30					low frequency cutoff decreases 1054,3-1056,4	
	I										4		
1969 17.01. *	F	1247,9	1248,0	72	60	80	54	-	-	-	2	patchy	
	H	1247,3	1248,8	200	160	200	160	-	-	-	4	patchy, narrowband	
		1247,9	1248,9	140	120	140	120	-	-	-	3	splitband features	
	II	1254,8	1257,3	60	50	60	46	^0,067	52	1256,4	2		
	III GG DCIM	1245,7	1249,8			500	30						
18.01. *	F	1229,2	1231,0	66	50	72	46	0,074	60	1230,0	2	splitband feature, HB	
		1229,7	1233,4	40	30	46	30	0,053	38	1231,0	1	patchy, splitbands	
	H	1229,2	1230,9	120	120	130	110	-	-	-	3	HB, narrowband	
		1229,6	1233,9	76	52	86	52	0,067	64	1232,0	2	patchy, narrowband	
	III GG DCIM	1219,4	1228,1			700	30					low frequency cutoff decreases during 1223,6-1226,8	
08.02. *	F	1207,6	1208,6	135	110	150	110	-	-	-	3	patchy, RS HB, splitband feature	
		1208,8	1212,3	82	46	86	46	0,133	66	1211,0	2	patchy, splitband	
		1211,6	1214,6	46	40	46	36	0,044	42	1213,0	1	patchy, narrow split bands	
	H	1207,5	1210,8	235	160	290	160	^0,409	220	1209,0	4	patchy, RS HB, splitband feature	
		1208,4	1212,3	150	110	160	110	0,268	135	1210,5	3	RS HB, patchy, split bands	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1969 08.02.		1211,6	1215,2	82	50	86	50	0,103	66	1213,5	2	patchy, narrow band	
	II	1217,5	1219,0	70	60	70	46	-	-	-	2	faint, broadband feature	
		1219,7	1221,1	42	40	42	38	-	-	-	1	narrowband feature	
	III GG DCIM	1203,9	1209,3			800	30						
09.02. *	II_1	1436,5	1438,4	135	110	145	110	0,224	122	1437,6	3	patchy, faint, narrowband	
	II_2	1441,7	1444,0	70	70	74	66	-	-	-	2	patchy, faint, narrowband, 1443,5-1444,8 faint drifting features	
	III GG	1430,4	1434,2			800	30						
25.02.	II	0918,7	0920,3	74	46	82	46	^0,167	60	0919,5	2	superposed by type III	
		0920,6	0922,5	42	32	46	30	0,103	38	0921,7	1	splitband features	
	III GG	0901,6	0928,3			600	30						
	IV dm,m	0904	1205			1000	30						
27.02.	F	1405,5	1409,0	70	46	86	46	^0,148	66	1407	2	patchy, split bands, 1409,0-1421,3 HB	1404,4-1406,8 drifting features in chan. 5 and 6. 1402,3-1410,9 in chan. 4 no measurement
		1407,8	1409,8	46	36	46	32	-	-	-	1	1409,0-1421,8 HB	
	H	1405,5	1409,5	160	120	160	120	-	-	-	3	patchy, faint	
	III GG	1402,3	1410,6			130	30						
	IV dm DCIM	1405,0	1440,0										
02.03. *	II	1115,2	1119,8	82	52	86	50	0,111	68	1117,0	2	patchy, narrowband, HB	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1969 02.03.	III G	1121,3	1125,4			70	30						
21.03. *	F	1336,3	1338,4	66	48	86	46	-	-	-	2	patchy	superposed by type III
	H	1335,4	1338,4	145	135	160	110	-	-	-	3	patchy, HB	
		1339,7	1345,8	86	62	86	46	0,102	74	1342,5	2	patchy, HB	
	III GG	1319,7	1344,6			280	30						
	IV dm DCIM	1324,0	13412,0										
22.03. *	F	0647,1	0650,3	130	110	145	110	0,206	127	0648,6	3		0646,3-0652,5 in chan. 1 and 2 drifting features due to sunrise effects
		0648,3	0656,3	86	50	86	50	0,070	70	0651,5	2	patchy, narrowband	
	H	0646,7	0654,7	200	160	290	160	0,255	230	0649,5	4	RS HB, broadband	
		0648,6	0655,2	160	130	160	125	0,117	145	0652,0	3	patchy, narrowband, HB	
	Spikes	0647,0	0648,5										
	III GG	0643,0	0647,1			800	30						
27.03. *	HB	1336,8	1346,0	46	32	46	30	0,021	38	1341,0	1	F indicated by HB	
	H	1331,3	1337,5	150	120	160	120	0,123	140	1334,5	3	patchy, faint	
	III GG DCIM	1325,3	1332,8			400	30						
	III G	1331,8	1332,8			270	180					lf cutoff	
02.05. *	F	1753,1	1754,2	70	66	70	60	-	-	-	2	faint, narrowband	1755,9 end of measurement
	H	1752,2	1755,8	140	120	150	110	~0,095	134	1754,0	3	1752,2-1753,5 HB, split bands	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end} MHz	f_{max} MHz	f_{min} MHz	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1969 26.05. *	F	1114,2	1114,5	120	120	123	117	-	-	-	3	narrowband feature	
		1115,7	1117,9	70	64	70	55	0,070	66	1116,5	2	patchy, faint, narrowband	
	H	1114,0	1115,6	210	160	220	160	-	-	-	4	patchy, merges into type IV dm	
		1115,3	1117,9	135	120	140	120	~0,176	130	1116,5	3	patchy, narrowband	
	IV dm	1118	1127									lf cutoff at H-level	
29.05. *	II	1508,2	1514,6	38	30	44	30	~0,021	36	1511,5	1	patchy, broadband	
05.06. *	II	0957,3	1001,7	230	180	270	160	-	-	-	4	0957,3-0959,6 splitband	
		0959,8	1009,5	160	110	160	110	0,103	135	1005,0	3	1000,0-1001,5 splitband feature 1006-1013, HB	type IV overlaps
		1008,0	1014,6	86	66	86	50	0,074	72	1011,0	2	HB, 1010,7-1013,0 HB in chan. 1	
	IV dm,m	1008	1013										
11.06. *	F	1622,0	1630,5	86	46	86	46	0,058	66	1627,0	2	patchy	
		1631,1	1639,0	42	36	44	34	-	-	-	1	patchy, faint	
	H	1622,4	1630,2	160	130	160	110	0,162	135	1625,0	3	patchy, broadband, merges into type IV dm	
	III GG	1619,0	1625,0			500	30						
	III G	1629,5	1630,5			80	30						
	I S					300	120						
07.07. *	II	0546,5	0550,2	40	30	42	30	0,041	36	0548,5	1	patchy, RS HB	
	III GG	0537,5	0540,5			320	30						

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end} MHz	f_{max} MHz	f_{min} MHz	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1969 07.08. *	II	0910,5	0914,4	130	130	150	110	-	-	-	3	patchy, faint splitband feature
08.10. *	F	0732,1	0732,6	74	66	86	66	-	-	-	2	patchy, narrowband feature
	H	0732,1	0733,2	150	120	160	110	0,103	136	0732,6	3	patchy, faint
	III GG	0725,0	0730,2			700	110					lf cutoff
1970 12.01. *	F	1504,4	1505,6	80	60	80	60	0,190	70	1505,0	2	patchy, faint, narrowband
	H	1505,2	1505,9	135	140	140	135	-	-	-	3	patchy, faint, narrowband
28.01. *	II	1317,8	1318,8	50	50	54	46	-	-	-	2	narrowband feature
		1317,7	1320,5	46	38	46	36	-	-	-	1	HB
		1315,6	1316,5			80	60					narrowband, horizontal feature
30.01. *	F	1504,0	1505,1	140	120	140	120	0,247	130	1504,5	3	patchy, faint, narrowband
		1507,1	1508,2	86	66	86	60	0,247	56	1507,5	2	patchy, faint, narrowband
	H	1503,3	1504,4	360	300	380	290	-	-	-	5	1504,3-1506,0 HB
		1503,9	1506,7	290	160	290	160	^0,433	235	1506,0	4	patchy, splitband features, HB
		1506,3	1508,1	140	130	140	120	^0,325	135	1507,5	3	homologous to F, patchy, faint, narrowband
	III GG	1500,4	1507,0			700	30					
31.01. *	II	1517,9	1519,3	120	110	130	110	-	-	-	3	
		1518,3	1520,9	86	60	86	55	0,190	70	1519,8	2	narrowband, splitband
01.03. *	F	0940,2	0945,4	86	50	86	46	^0,074	66	0942,5	2	0940,7-0941,8 HB in chan.1, 0942,3-0944,0 RS HB, broadband
		0943,7	0946,7	46	38	46	35	^0,033	42	0944,5	1	patchy, narrowband
	H	0940,0	0945,5	135	120	160	110	^0,112	130	0942,5	3	broadband, H merges into type IV dm at hf boundary, HB

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1970 01.03.	III GG RS Spikes	0933,0	0944,3			1000	30					
	IV dm	0937,5	0943,7			1000	160					
01.03. *	F	1130,2	1131,8	230	-	260	160	-	-	-	4	merges into H
		1131,7	1133,0	140	110	150	110	^0,220	130	1132,5	3	patchy
		1132,7	1135,7	86	50	86	46	^0,167	66	1134,5	2	patchy, HB, 1134,3-1134,7 HB in chan.[1]
	H	1131,3	1134,0	290	160	290	160	^0,361	245	1132,5	4	broadband, H merges into F at lf-boundary,
		1132,5	1136,3	160	120	160	110	^0,224	135	1134,0	3	patchy, broadband
	III GG U RS Spikes	1126,5	1133,3			700	30					lf cutof features
	IV dm	1116,0	1250,0			1000	100					near 1240 Fibers
01.03. *	F	1532,3	1535,6	86	48	86	46	^0,083	66	1534,0	2	patchy, superposed by III GG during 1532,3-1534,3
	H	1532,3	1534,5	160	160	260	160	-	-	-	4	patchy, RS
		1532,1	1542,8	160	110	160	110	0,100	135	1537,0	3	patchy, HB, 1540-1542 split bands
	III GG RS	1530,1	1535,7			1000	30					
	IV dm	1530,3	1535,0			1000	200					
02.03. *	F	1344,4	1350,5	46	30	46	30	^0,031	38	1346,5	1	broadband, RS HB, DP
	H	1344,8	1350,5	70	46	86	46	^0,095	60	1346,5	2	broadband, RS HB, DP
	III GG DCIM Spikes	1339	1349			800	30					

association of bands uncertain

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1970 02.03.	IV dm	1349	1435			700	130					Fibers	
17.03. *	II	1448,8	1450,1	130	110	140	110	^0,112	120	1449,5	3	patchy, faint, narrowband	
25.03. *	F	1225,2	1227,8	44	40	46	30	^0,044	40	1226,3	1	patchy	
	H	1224,9	1228,1	86	52	86	46	0,222	68	1226,8	2	1224,9-1226,3 zero drift, patchy, narrowband, splitband	
	III GG	1216,0	1222,0			450	30						
25.03. *	F	1606,0	1606,3	64	58	64	58	-	-	-	2	faint, narrowband	
	H	1605,3	1606,8	130	115	130	115	0,107	123	1605,6	3	narrowband	
	III GG	1559,8	1602,8			140	30						
18.04. *	II	1317,7	1324,6	140	120	145	110	0,137	130	1320,0	3	patchy, narrowband	no measurement from 1328,5
		1326,5	1328,5	75	68	80	66	-	-	-	2	patchy, narrowband	
05.06. *	II	1043,5	1046,8	360	300	380	290	0,926	330	1045,0	5	patchy, HB	
		1044,6	1046,6	270	220	290	200	^0,433	250	1045,8	4	patchy	
13.06 *	F	0924,3	0926,3	270	220	270	220	^0,619	250	0925,3	4	patchy, narrowband, HB	
	H	0923,1	0926,0	-	-	-	-	-	-	-	5/6	H is indicated in chan. 6 and 5 by HB only	
	III GG Spikes	0919,8	0923,6			800	30						
14.06. *	II	1318,3	1341,6	50	50	80	46	-	-	-	2	patchy, HB	1323,6 -1326,9 III GG
		1328,3	1351,2	46	36	46	30	0	-	-	1	patchy, broadband near 1330 HB	
	F	1324,5	1325,5	220	220	-	160	-	-	-	4	patchy, HB	
		1325,3	1340,3	160	136	160	110	-	-	-	3	near 1327 and 1332 negative drift, patchy, HB superposed	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end} MHz	f_{max} MHz	f_{min} MHz	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1970 14.06.	H	1328,3	1336,9	230	190	240	160	~0,271	190	1330,4	4	HB, 1328,2-1329,7 III G	superposed
	IV dm Spikes	1347	1418			800	300					Z	
	III GG Spikes	1323,6	1326,9			1000	30						
	III G	1328,2	1329,7			320	160						
07.07. *	F	1655,5	1656,4	78	70	78	68	-	-	-	2	patchy, narrowband	no measurement in chan. 5
	H	1634,6	1636,5	290	160	290	160	-	-	-	4	HB	
		1655,1	1700,8	160	110	160	110	0,170	135	1658,0	3	1655,1-1657,0 patchy, splitband features	
	III GG V	1649,9	1654,6			290	30						
13.07. *	II	1725,3	1727,7	290	180	290	180	0,310	245	1726,5	4	broadband, splitband features	
26.08. *	F	1458,6	1502,8	40	36	44	34	~0,019	38	1500,3	1	1501,3-1502,8 HB	
	H	1456,1	1502,4	82	48	82	48	0,121	62	1459,0	2	patchy, narrowband	
	III GG	1441,4	1447,6			290	30						
04.09. *	II	1633,8	1635,6	50	46	50	46	-	-	-	2	patchy, narrowband, RS	
		1633,0	1637,5	46	34	46	34	-	-	-	1	patchy, splitband feature, RS	
27.10. *	II	1422,5	1428,0	82	48	82	46	0,083	66	1425,0	2	narrowband, 1420,5-1424,0, HB in chan. 3	
	III GG	1414,2	1418,3			350	30						
28.10. *	F	1253,6	1257,3	76	46	86	46	~0,133	66	1255,5	2	patchy	
		1255,5	1301,0	46	30	46	30	~0,027	38	1258,0	1	broadband	
	H	1252,3	1258,5	140	120	160	110	~0,137	135	1256,0	3	broadband 1257,0-1301,3. patchy, HB	
		1256,8	1303,5	86	46	86	48	~0,121	66	1259,0	2	broadband	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1970 28.10.	III GG Spikes	1248,7	1252,0			700	110					
	III GG U	1301,8	1304,5			1000	46					
	IV dm	1250	1314									
01.11. *	F	1246,3	1247,3	42	42	46	38	-	-	-	1	F is indicated by HB
		1246,0	1251,0	70	64	82	64	0,051	70	1248,5	2	
10.11. *	F	1434,9	1435,8	66	48	66	48	0,190	57	1435,3	2	patchy, faint, narrowband
	H	1433,8	1435,3	140	120	140	120	^0,247	130	1434,8	3	patchy, faint, narrowband
11.11. *	II	0712,7	0717,5	66	46	66	46	0,103	56	0714,0	2	patchy, narrowband
09.12.	II	0813,8	0816,0	140	130	140	130	^0,154	135	0815,0	3	patchy, faint, narrowband
		0822,5	0825,4	66	52	66	52	0,095	59	0824,5	2	patchy, narrowband
11.12. *	F	1031,0	1043,7	^80	55	86	50	0,048	68	1035,0	2	patchy, HB, association of F and H uncertain
	H	1030,3	1042,0	145	115	160	110	^0,077	130	1035,0	3	patchy, HB, type III superposed, RS HB in chan. 3
	III GG	1030,3	1032,2			350	30					
	III GG Spikes	1027,3	1029,9			800	30					
	Cont.	1030,0	1034,2			450	160					Cont feature
12.12. *	F	0905,5	0908,7	125	110	160	110	-	-	-	3	patchy
	H	0905,3	0908,8	240	170	400	160	^0,197	130	0907,0	4/5	patchy broadband, HB
	III GG Spikes	0901,8	0907,3			500	46					
	IV dm	0904	0909									

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1971 14.01. *	II	1125,9	1128,0	120	110	135	110	-	-	-	3	patchy, narrowband	
		1127,3	1132,1	80	55	86	55	0,095	70	1130,0	2	patchy, narrowband	
	III GG Spikes RS	1120,3	1125,5			800	30						
20.02. *	II	0820,3	0822,7	125	115	135	110	~0,137	117	0821,8	3	patchy, narrowband	
		0820,5	0829,7	84	54	86	46	0,067	60	0826,0	2	patchy, RS	
		0824,1	0828,8	44	42	46	40	-	-	-	1	patchy	
21.04. *	F	1121,6	1125,6	76	46	80	46	0,051	63	1124,0	2	patchy, RS HB	$\Delta f/\Delta t$ decreases with frequency
		1122,7	1125,6	46	41	46	40	-	-	-	1	patchy	
	H	1121,6	1126,8	160	115	160	115	0,123	137	1123,8	3	patchy, narrowband	
03.05. *	F	1414,9	1418,1	230	180	290	160	0,200	225	1416,0	4	patchy, RS HB	
		1418,7	1420,3	140	120	160	110	0,123	135	1419,5	3	splitbands, HB	
	H	1419,2	1419,8	74	68	74	54	-	-	-	2	faint, splitband	
	III GG DCIM RS	1411,7	1415,7			500	30					Spikes	
14.05. *	F	1415,7	1420,0	86	46	86	46	0,303	66	1416,5	2	no measurement in chan. 1 1418-1420 patchy	
										1417,8			
	H	1416,0	1421,3	160	110	160	110	0,411	145	1416,7	3	patchy, 1418-1420, RS HB	
								0,176	125	1418,0	3		
	III G Spikes	1414,4	1417,2			400	46						
	IV dm	1414	1425										

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1971 03.08. *	F	1048,2	1049,2	70	62	70	62	~0,095	66	1048,2	2	patchy, faint, narrowband	
	H	1047,7	1053,3	130	110	150	110	0,082	130	1050,0	3	patchy, splitband	
	III G	1047,8	1048,1			200	110						
13.09. *	II	0841,4	0843,5	54	46	56	46	~0,048	50	0842,5	2	faint	
		0842,8	0844,0	46	40	46	40	-	-	-	1	patchy, narrowband, III G overlaps	
	III GG	0829,9	0833,6			140	30						
	III G	0840,1	0842,3			70	30						
17.09. *	II	1555,8	1559,3	76	56	80	50	0,103	64	1557,5	2	narrowband, RS, HB	
	III GG U	1545,5	1550,0			600	30						
03.10.	F	1346,0	1349,5	46	30	46	30	-	-	-	1	1348,0-1351,3 HB, HB in chan. 2	1346 start of measurement
*	H	1346,0	1349,0	70	50	74	46	0,148	60	1347,5	2	patchy, splitband feature	
	I S Cont	1346											
1972 19.02. *	F_1	1522,9	1525,1	52	46	80	46	0,111	50	1525,0	2	patchy, splitband features	III G overlaps
	H_1	1522,9	1525,1	125	120	160	110	0,137	130	1524,0	3	patchy, RS HB,	
	F_2	1524,8	1531,5	86	46	86	46	0,095	66	1527,5	2	patchy, splitband features	
	H_2	1525,5	1530,3	140	130	160	110	-	-	-	3	patchy, diffuse	
	II	1533,4	1535,0	52	48	70	46	0,095	58	1534,2	2	patchy, RS HB, splitband features	
	III GG	1522,2	1526,0			350	70						
	Fib.	1526,7	1531,0								1/2		
	III GG U RS Spikes	1514,0	1529,5			400	30						

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1972													
06.03. *	F	1123,1	1123,6	240	160	250	160	-	-	-	4		
		1118,3	1120,5	160	120	160	110	^0,411	135	1119,5	3	patchy	
	H	1117,7	1119,4	360	290	400	290	-	-	-	5	patchy, HB	homologous features
		1118,2	1121,0	290	160	290	160	0,481	240	1119,5	4	broadband, HB	III G overlaps
	III GG,RS Spikes DCIM	1114,2	1117,2			750	30						
	III G	1118,2	1118,5			500	30						
	IV dm P	1123	1317										
31.03. *	F	1525,0	1526,1	32	32	34	30	-	-	-	1	faint, narrowband	
	H	1524,8	1527,3	72	66	84	48	o			2	patchy, HB	
24.05.	F	0704,1	0705,0	60	46	70	46	^0,267	50	0704,5	2	patchy, two faint split bands	
*	H	0704,6	0707,3	160	110	160	110	0,095	135	0706,0	3	patchy, HB	patchy, HB
		0706,3	0710,6	86	54	86	46	0,222	62	0707,0	2		
								-0,133	62	0707,8	2	negative drift	
								0,067	60	0709,5	2		
	RS HB	0716,0	0717,8			60	46				2		
		0717,1	0718,0			36	30				1		
	III G	0706,7	0707,6			42	30						
	Fib.	0704,7	0707,8								1		
	Fib.	0711,0	0711,8								3		
	I S DC										4/5		
12.06. *	F	1338,6	1343,0	68	46	80	46	0,111	66	1340,5	2	patchy, splitband	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end} MHz	f_{max} MHz	f_{min} MHz	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1972 12.06.		1339,9	1344,0	46	30	46	30	0,053	38	1342,0	1	patchy, HB
	H	1338,8	1344,4	150	120	160	110	0,176	135	1340,5	3	homologous features to F, splitband, HB
		1342,2	1344,4	84	50	86	46	^0,095	70	1343,3	2	HB
	II	1357,7	1358,9	40	38	40	38	-	-	-	1	faint, narrowband feature
		1402,0	1405,3	38	38	44	32	-	-	-	1	patchy, narrowband feature
	III GG Spikes	1333,3	1338,3			400	30					
15.06. *	F	1000,3	1002,1	70	60	70	50	0			2	patchy, narrowband, intense RS HB
	H	1000,3	1002,0	130	130	145	110	0			3	splitband
	Fib.	1004,0	1004,5									
	III GG Fib.	0952,0	0955,8									
23.06. *	II	1738,2	1739,9	40	30	46	30	^0,133	38	1739,0	1	patchy, HB
24.06. *	F_1	0706,6	0707,2	150	130	155	130	0,411	135	0706,8	3	HB
	F_2	0708,2	0709,9	145	110	155	110	0,154	135	0709,0	3	patchy
	H_1	0706,2	0707,8	270	190	270	180	0722	230	0706,7	4	HB on upper split band, lower split band is narrow
	H_2	0708,2	0710,9	260	180	280	180	0,271	230	0709,5	4	HB, 0708,2-0709,0 homologous step feature in F and H
	Spikes	0714,7	0715,3								4	
	IV dm	0719	0755									
25.06. *	F_1	0454,3	0454,7	120	120	130	110	-	-	-	3	small patches

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1972 25.06.	H_1	0453,5	0455,0	230	230	240	220	0			4	HB
	F_2	0504,3	0505,1	36	32	36	30	-	-	-	1	HB, RS HB
	H_2	0504,3	0507,8	70	50	70	50	0,074	60	0505,3	2	H is indicated by HB
07.08. *	F_1	1518,8	1526.8	66	50	66	46	0			2	patchy, HB, 1528,5-1533,3 HB in chan.1
	(F)	1538,5	1540,3	36	34	44	30	-	-	-	1	homologous features of F and H near 1519
	H_1	1518,8	-	135	-	160	-	-	-	-	3	F and H homologous features near starttime
		1526,6	1531,5	74	50	86	46	0,074	70	1528,5	2	1528-1531,5 broadband, HB
	F_2	1525,1	1539,5	36	36	46	34	-	-	-	1	patchy, diffuse
	H_2	1532,4	1536,9	66	48	86	46	-	-	-	2	splitband features
	Fib.	1546,9	1547,9								1	
	III GG Spikes	1511,0	1520,6			700	30					
	IV dm P	1512	1604			1000	110					1521-1525 overlaps F_1, H_1
	IV m	1520	1543			110	30					
11.08. *	HB	1234,1	1234,8								1	F is indicated only by HB
	HB	1239,7	1241,6								1	
	HB	1239,2	1240,1								2	
	H	1235,5	1247,2	150	120	160	110	0,103	135	1240,0	3	patchy
	II	1248,6	1250,0	50	55	55	46	-	-	-	2	narrowband feature
		1300,0	1305,3	40	30	40	30	^0,028	35	1302,5	1	narrowband, RS HB, 1304-1305 splitband
	IV dm	1233,0	1240,0									
25.11. *	F	0824,3	0824,8	66	66	70	60	-	-	-	2	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1972												
25.11.	H	0824,3	0829,0	130	120	140	110	^0,154	130	0826,5	3	patchy, RS HB
	II	0927,0	0931,0	38	30	40	30	0,033	35	0927,5	1	diffuse, drifting feature
	Spikes plui	0826,5	0834,5									
	IV dm	0829,5	0900,0									
	IV dm	0924,5	0929,0									
1973												
10.02. *	F	1422,9	1423,8	34	34	36	30	-	-	-	1	patchy, faint feature
	H	1422,8	1427,8	54	46	58	46	^0,095	50	1425,0	2	narrowband feature
		1425,2	1431,5	46	30	46	30	0,053	38	1426,5	1	narrowband, 1426,5-1431,5 split bands
01.03.	F	1132,2	1135,9	44	34	46	32	0,048	38	1133,6	1	patchy, narrowband, splitband features RS HB
*	H	1120,8	1122,4	260	180	310	180	^0,432	240	1121,5	4	patchy
		1124,0	1133,3	130	110	160	110	0,154	135	1130,0	3	patchy, narrowband, splitband features, RS HB
		1133,6	1135,3	70	66	70	60	^0,061	65	1134,0	2	narrowband
	III G Spikes	1110,5	1139,0			700	30					III G overlaps start of type II
12.03. *	F	1108,8	1113,3	39	34	42	32	0,022	38	1111,0	1	patchy, narrowband, RS HB, HB
	H	1108,7	1116,0	70	48	74	48	0,056	64	1112,0	2	narrowband
		1117,0	1122,0	46	34	46	34	0,031	40	1119,0	1	faint, narrowband
	III GG	1106,0	1108,5			160	30					
20.03. *	F	1118,6	1118,8	66	60	66	60	-	-	-	2	narrowband feature

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1973 20.03.	H	116,1	1118,8	230	230	240	220	-	-	-	4	patchy	
		1116,6	1123,1	140	120	150	110	0,137	125	1119,5	3	patchy, narrowband, RS HB	
	III GG	1111,9	1118,8			500	130					lf cutoff	
04.04. *	II	1201,7	1207,8	40	34	42	30	0,025	35	1205,5	1	diffuse, splitband feature	
	F_1	0834,2	0838,5	250	180	290	160	0,271	230	0837,0	4	broadband, RS	association uncertain
		0836,8	0843,7	160	120	160	110	0,137	130	0840,0	3	patchy, RS HB, splitband features	
		0844,4	0852,3	70	50	74	46	0,074	60	0848,0	2	splitband features	
		0845,5	0854,1	42	32	46	30	0,038	38	0849,0	1	broadband, patchy near start	
	H_1	0834,2	0837,8	420	300	480	290	^0,641	390	0835,5	5	patchy, broadband	
	F_2	0836,0	0841,2	86	46	86	46	0,145	70	0836,5	2	patchy, narrowband	
								0,074	50	0837,5	2		
		0839,5	0842,0	46	38	46	30	0,059	38	0840,0	1	patchy, diffuse	
	H_2	0835,4	0838,0	140	120	160	110	-	-	-	3	overlaps with H_1	
		0838,4	0843,8	86	48	86	48	0,083	66	0839,0	2	patchy, emissionband with ripples, RS, homologous features to F_2 in chan. 1	
	Spikes	0832,7	0834,4								4/5/6		
	III G	0835,0	0840,0			400	30						
	III G	0843,1	0843,4			450	110						
	IV dm	0833,0	0958,0			1000	130					fluctuations	
10.06. *	II	0846,9	0848,7	48	46	50	46	-	-	-	2	faint feature	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1973 10.06.		0848,7	0854,5	46	34	46	34	0,028	42	0851,0	1	narrowband, HB	
07.07. *	II	0419,7	0422,2	160	120	160	110	0,411	130	0420,5	3	0419,7-0420,5 splitbands	
								0,137	120	0421,0	3		
		0423,8	0425,8	68	60	68	60	0,070	64	0425,0	2	patchy, narrowband	
04.09. *	F	1511,6	1512,8	66	52	70	52	0,111	66	1512.8	2	patchy, splitband features, HB	
	H	1511,5	1512,8	150	120	160	120	0,493	125	1512,0	3	patchy, splitband, HB	
								0,247	120	1512,5	3		
	III GG RS	1512,5	1514,4			220	30						
	III GG Spikes RS	1459,1	1507,2			500	30					lf cutoff in chan. 3	
07.09.	F	1201,3	1207,0	38	36	46	30	^0,030	38	1204,0	1	diffuse, 1204-1214 RS HB	superposed by III GG
	H	1200,3	1204,6	54	46	70	46	^0,061	54	1202	2		
	III GG	1200,2	1202,8			160	30						
	II	1218,2	1221,2	38	34	40	32	0,044	38	1220,0	1	1218,2-1219,0 diffuse, 1220,0-1221,2 narrowband	
	III GG V	1153,0	1159,5			280	30						
	Spikes	1200,7	1201,9								4		
11.09.	F	0703,7	0705,4	50	46	58	46	^0,074	48	0704,5	2	0704,5-0705,4 HB 0703,6-0706,8 HB in chan. 1	faint, narrowband
	H	0702,5	0706,8	130	130	150	110	^0,176	120	0704,0	3		
04.10. *	II	1129,8	1139,3	40	32	46	30	0,021	38	1134,0	1	patchy	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1973 06.10. *	II	1051,0	1051,9	48	48	50	46	-	-	-	2	narrowband feature
		1052,1	1059,0	46	30	46	30	0,041	38	1055,0	1	patchy, faint, narrowband
26.11. *	F	1403,5	1403,9	34	34	34	32	-	-	-	1	faint, narrowband feature
	H	1403,2	1404,1	78	66	80	66	0,111	70	1403,6	2	faint, split bands
1974 15.01. *	F	1059,4	1102,6	40	32	40	32	^0,067	36	1100,5	1	patchy, narrowband
	H	1056,7	1057,6	140	120	140	120	^0,617	130	1057,2	3	1056,6-1057,2 HB in chan. 4, patchy, faint
		1059,5	1059,8	74	70	70	70	-	-	-	2	narrowband
	IV dm	1057	1127									
23.06. *	F	0558,5	0601,2	42	30	46	30	^0,044	38	0600,0	1	HB, RS HB, RS HB in chan.2
	H	0558,5	0607,0	76	48	76	46	0,095	62	0602,0	2	HB
		0604,9	0611,0	46	34	46	34	0,033	42	0608,0	1	
04.07. *	F	1350,2	<1401,5	36	-	36	32	-	-	-	1	1400,0-1401,5 no measurement
	H	1359,2	<1430,1	70	-	80	46	^0,111	62	1401,0	2	1401,5-1403,1 no measurement, RS HB
	III GG V RS DCIM	1353,0	1411,5			800	30					
	IV dm	1355	1505			1000	120					
	III GG	1402,5	1411,5			150	30					
13.09. *	II	1501,3	1501,7	130	110	132	110	0,685	120	1501,5	3	superposed by III G, patchy, narrowband intense

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1974 13.09.		1502,0	1503,6	86	58	86	58	0,247	66	1502,8	2	
	III GG V	1458,2	1505,3			900	30					
	II	1526,5	1531,4	70	50	76	46	0,095	64	1528,0	2	faint
		1532,0	1540,3	46	35	46	35	~0,027	40	1535	1	near 1536 faint RS, endtime uncertain
	IV dm	1553	1601									
23.09. *	F	1225,5	1227,0	79	50	78	48	0,222	66	1226,3	2	patchy, narrowband III GG overlaps
		1227,2	1227,7	42	38	44	34	-	-	-	1	one broadband patch
	H	1225,4	1227,3	160	120	160	110	0,352	130	1226,5	3	patchy, RS, 1227,5-1228,6 RS, (III GG overlaps)
		1226,5	1228,9	86	46	86	46	0,208	66	1227,6	2	patchy, narrowband
	III GG	1225,5	1231,7			280	30					
		1216,5	1219,3									negative drift features
	III GG V, RS Spikes	1200,5	1211,3			400	30					
		1212,5	1215,7									HB in chan.1 RS HB in chan. 2
	IV dm	1201	1253			1000	110					
11.10. *	F	1033,8	1038,3	46	38	46	32	0,025	38	1036,0	1	splitband
	H	1034,7	1038,6	86	50	86	50	0,148	68	1037,0	2	1037,5-1038,5 faint RS
	III G	1028,3	1029,8			310	30					lf cutoff
	I S										3	
11.10.	H	1451,6	1454,0	150	110	160	160	0,411	130	1452,5	3	patchy, narrowband
	F	1449,6	1452,5	60	60	80	46	-	-	-	2	patchy, HB, F is indicated only by small patches and HB

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1974 11.10.	Spikes	1451	1453								5/4	
	III G	1446	1449			700	30					
	IV dm	1440	1450									1447,5-1448,3 negative drift, narrowband in chan. 2
06.11. *	II_1	1352,7	1354,2	135	120	140	110	^0,247	130	1353,5	3	patchy, HB, HB in chan. 2
	III GG V	1347,0	1359,5			430	30					
	II_2	1400,4	1407,3	86	52	86	48	0,074	67	1404,0	2	intense split bands, HB in chan. 1
1975 24.07. *	F	1446,9	1449,8	42	32	44	30	0,067	37	1448,5	1	RS HB, narrowband
	H	1446,8	1452,8	70	50	74	48	0,061	60	1449,0	2	narrowband, gap 1451,0-1452,3
		1454,2	1456,8	40	38	42	36	0			1	faint, narrowband
03.08. *	F	1307,7	1311,6	82	46	86	46	^0,148	60	1310,8	2	patchy
		1311,2	1321,0	42	36	46	32	^0,030	38	1314,0	1	broadband, diffuse
	H	1308,0	1312,6	140	110	160	110	0,206	130	1310,0	3	patchy, homologous features to F in chan. 2
		1311,3	1319,0	80	50	84	46	0,061	60	1314,0	2	
	III G	1307,5	1310,6			280	30					overlaps F and H
	III G	1312,2	1313,2			80	30					overlaps F and H
		1323	1329								2/1	horizontal narrowband features
21.08. *	F	<1523	1526	-	48	86	46	^0,111	66	1523,5	2	1526 merges into H, HB
		^1523	1532,8	-	30	46	30	0,027	38	1527,0	1	1532,0-1544,5 RS HB
	H	<1523	1527,5	-	110	>130	110	-	-	-	3	
		1523,7	1533,0	86	52	86	46	0,074	66	1528,0	2	splitband features

no measurement in chan. 5 III G V overlaps start of F and H

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks	
1975 21.08.	III GG V	1518,8	1523,0			700	30						
	IV dm										4	uncertain	
22.08. *	F_1	0604,2	0605,5	130	110	150	110	^0,247	130	0604,8	3	patchy	superposed by III GG DCIM
	H_1	0603,4	0605,3	250	240	270	230	^0,271	260	0604,0	4	HB	
	III GG DCIM	0600,3	0606,5			280	230						
	F_2	0612,6	0614,7	40	38	40	36	^0,022	38	0613,0	1	F indicated by two faint patches	
	H_2	0611,3	0619,8	80	50	80	48	0,083	66	0615,0	2	patchy, narrowband, faint split-bands near endtime	
15.11. *	F	1149,9	1154,0	44	32	46	30	0,053	38	1151,5	1	1149,9-1151,5 HB, 1151,5-1154,0 RS HB	no measurement in chan. 4
	H	1150,5	1154,3	120	52	120	50	0,126	66	1152,0	2	HB	
	III GG	1143,4	1144,9			290	30						
												16.11.75-1.3.76 no measurement	
1976 25.03. *	II	1329,1	1335,6	42	38	44	30	^0,025	37	1332,0	1	faint, HB, diffuse, type II uncertain	
	IV m	1215	1222,5										
	IV dm	1309	1330										

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1977	H	1543,2	1546,1	149	112	156	100	0,311	123	1544,6	3	F,H patchy, F fainter than H
21.Apr.	F	1543,0	1544,9	74	80	84	54	0,147	66	1544	2	
	IIIG/U	1537,8				60	30					
26.Aug.	II	0541,8	0550,4	86	46	120	46	0,195	72	0544,0	2	the emissionband is either a se-
								0,442	70	0548,4	2	quence of 2 consecutive bursts of different drift velocities or one burst with reversing drift velocity at 0544,8-0546,4
		0548,3	0550,3									split band
	IIIGG	0537,0	0541,2			160	30					measurement only on chan. 1,2,3
5.Sept.	H	0920,8	0926,5	70	39	86	38	0,123	66		2	0923-0924,2 split bands
	F	0922,6	0924,5	43	43	43	35	0,063	40		1	faint split bands, patchy
	II	0928,2	0931,7	64	46	75	45	0,094	66		2	
	II	0933,4	0935,8	70	56	70	48	0,101	66		2	0934 split bands
9.Sept.	II	1635,6	1653,5	70	60	100	30	0,030	40	1644,6		F and H overlap, measurement only on 160-30 MHz, HB
	III GG	1635,6	1638,6									
	III G	1633,0	1633,8			160	46					
19.Sept.	H	1035,3	-	149,8	105	160	100	0,262	123		3	patchy, 1038,3, merges into type IV 1035,4-1036 HB
	F	1035,3	-	86	-	80	46	-	70		2	patchy, 1038,3, merges into type IV 1036,5-1038,5 drifting narrow bands measurement only in ch 1,2,3
24.Sept.	II	0452	0505									disturbed type II

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1977 22.Nov.	II											1001,7-1045,0 type IV, overlaps type II, drifting features intense HB 1018-1033
24.Dec.	H	1307,5	1310,3	150	100	150	100	0,176	130		3	HB
	F	1307,5	1309,4	72	50	72	50	0,145	62		2	
	IIIG/V	1303,2	1306,3			1000	30					
26.Dec.	H	1206,5	1213,8	86	38	86	35	0,069	52	1213,8	2	intense HB
		1211,6	1213,8	41	38	46	36	-	-			
	F	1206,6	1212,2	43	36	46	30	-	-			patchy
	II	1215,8	1218,8	43	36	46	34	0,032				
	IIIGG	1203,2	1205,8			290	30					
27.Dec.	H	1100,4	1110,4	70	62	80	44	0,053	52		2	intense HB, F and H have the same initial features. 1103-1106 F and H overlap.
1978 3.Jan.	H	1020,4	1025,8	260	150	260	-	-				F and H partialy overlaped. Initial phase of F and H are very similar intense HB, F and H show negative drift from 1023,2 to 1024,5
	F	1020,4	1025,6	132	66	-	55	0,111	74	1023,2	2	
	III GG	1017,4	1022,8			700	30					spikes
9.Jan.	H	1229,1	1242,0	160	46	160	46	0,158	123	1235,6	3	
	H	1237,0	1243,0	70	46	80	46	0,103	55	1240,0	2	
	F	1229,0	1236,7	86	46	86	42	0,062	62	1232,9	2	patchy
	IIIG	1225,1	1230,6			140	30					
25.Febr.	H	0810,3	0828,0	290	46	320	46	0,416	225	0819,2	4	
	H	0814,1	0819,7	160	105	160	105	0,139	123	0817,0	3	split bands
	H	0824,2	0827,8	50	38	70	38	0,133	59	0826,0	2	split bands
	F	0810,3	0818,5	160	57	160	57	0,257	123	0814,4	3	
	F	0813,4	0819,3	86	46	86	46	0,091	66	0816,4	2	
	IIIG	0808,2	0810,6			540	30					

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1978 25.Feb.	H	1451,5	1508,0	290	46	460	46	0,355	260	1453,0	4	HB
								0,190	123	1458,0	3	
								0,106	60	1544,5	2	
	F	1451,4	1501,5	160	48	180	48	0,268	123	1453,0	3	
								0,078	68	1458,0	2	
	II	1517,0	1523,5	60	35	60	35	0,030	40	1251,0	1	
	IIIG	1449,0	1451,0			520	50					
26.Feb.	H	0652,5	0655,0	115	46	115	46	0,145	62	0653,5	2	two distinct split bands
	F	0652,7	0653,7	56	46	56	38	-	-	-		split band feature
27.Feb.	H	0911,7	0916,5	68	50	68	50	0,048	56	0913,7	2	
	F	0911,8	0916,7	36	30	36	30	0,021	34	0913,8	1	
6.March	H	1157,1	1207,6	80	46	146	46	0,070	66	1200,0	2	intense HB
		1201,8	1214,0	46	30	-	-	0,024	37	1205,0	1	
		1221,5	1224,0	46	30	46	30	0,263	37	1222,5	1	
	F	1156,4	1203,0	66	30	66	30	-	-	-		1219, F is overlaped by HB from
		1217,8	1219,2	40	34	42	34	0,038	37	1218,6	1	preceeding H, H of second type II is delayed to F by 3,5 min.
28.March	II	1635,4	1637,3	59	46	66	46	0,056	52	1636,3	2	1637,2-1638,6 gap
		1637,9	1642,8	46	30	46	30	0,044	38	1640,5	1	
2.Apr.	H	1108,7	1109,1	138	104	138	104	0,373	123	1108,6	3	
		1109,2	1115,4	86	46	86	46	0,109	76	1110,0	2	1110,6-1112,1 gap
	F	1112,6	1114,6	40,4	30	40,4	30	0,066	38	1113,4	1	
10.Apr.	H	1055,6-1056,1	1058,5	352-477	290	515	290	0,465	352	1056,6	5	
		1055,7-1056,1	1059,5	238	160	290	160	0,357	225	1057,2	4	
		1057,9	1106,2	115	100	152	100	0,134	115	1101,9	3	
	F	1055,6	1100,1	160	100	160	100	0,234	115	1057,2	3	
		1059,8	1103,9	82	46	82	46	0,126	66	1101,8	2	
	IIIGG	1055,8	1100,8			770	30					

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1978	II	1119,4	1121,5	76	56	78	50	0,105	60	1120,1	2	
10.Apr.		1123,0	1124,4	46	33	46	33	^0,067	40	1123,5	1	
11.Apr.	H	1358,5	-	60	-	82	46	^0,149	62	1359,6	2	HB in ch 3
		1401,2	-	40	-	46	30	0,028	38	1403,2	1	patchy, narrowband, HB
	F	1358,5	1400,4	33	35	40	30	^0,016	36	1359,7	1	patchy, 1403,3 F merges and 1403 H merges into intense type IVm Cont
16.Apr.	H	0920,9	0922,0	415	290	477	290	1,590	365	0921,4	5	0922,5-0927,1 spikes 480-300 MHz
	F	0920,9	0921,5	212	-	231	192	-	-	-	4	
	IIIGG/V	0921,1	0926,2			816	30					
19.Apr.	H	0555,5	0602,5	60	<46	82	<40	^0,025	54	0558,0	2	0600,8-0603 HB in ch.1
	F	-	0603,7	-	<30	-	<30	0,026	34	0602,5	1	0555,5-0558,7 IIIGG 140-30 MHz
	IIIGG	0544,1	0549,3			230	30					
	II	^0546,8	0552,0	-	52	78	46	0,056	58	0549,3	2	narrowband, patchy, IIIGG overlaps
21.Apr.	H	0730,5	0732,0	68	54	84	50	-	-	-	2	
	F	0729,3	0731,7	40	40	45	36	0,049	40	0738,0	1	narrowband, patchy
	IIIGG	0724,3	0727,8			500	30					RS
	IIIGG	0735,2	0839,6			200	30					
28.Apr.	II	1321,5										overlaped by intense type IV Cont
2.May	H	0615,8	0617,3	180	173	192	160	-	-	-	4	0613,9-0620,8 HB, IIIG/V overlaps
	III GG/V	0616,3	0622,3	-	108	160	100	0,144	119	0618,8	3	
4.May	H	0458,1	0459,6	130	-	160	-	-	-	-	3	intense type IS superposed
		0500,8	0505,1	68	62	84	46	0,070	64	0502,7	2	
	F	0457,5	0459,4	68	56	82	56	0,146	66	0458,7	2	
		0503,3	0504,3	38	30	44	30	-	-	-	1	
4.May	II	1059,2	1104,5	-	30	46	30	0,032	36	1201,1	1	
4.May	II	1112,5	1116,6	39	30	41	30	0,039	36	1115,2	1	narrowband patchy, faint type III overlaps

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1978 7.May	IIIGG/V	1530,7	1538,0			450	30					
	IIIGG/V	1550,0	1557,5			500	30					
	IVdm	1552,0	1602,0			400	300					
	IVm	1555,6	1722,0			300	20					
	H	1555,7	-	160	-	160	100	-	-	-	3	1656,7 merges into type IV Cont
	F	1556,8	-	86		86	46				2	1657,8 merges into type IVCont
		1657,4	-	46	30	46	30		38	1659,5	1	1701,0 merges into type IVmCont
8.May	II	1212,7	1219,5	76	-	78	46	0,062	70	1214,4	2	1217,5-1219,5 HB in ch. 2
		1215,9	-	44	-	44	37	0,025	40	1216,9	1	1218,1 type II band merges into Cont. 1223-1228,5 HB, type IV overlaps, type IV dm-m 1311,2-1425
9.May*	H	1439,2	1442,5	200	180	270	160	-	-	-	4	
		1439,2	1448,0	160	100	160	100	0,112	123	1444,0	3	patchy from 1442-1448 and 1445,5-1448 intense HB 160-40 MHz
	F	1439,4	^1446	70	46	86	46	0,083	66	1442,0	2	split bands at start
		1441,3	1443,2	46	38	46	38	0,024	40	1442,5	1	1450 start Cont
	H	1451,2	1453,6	40	34	42	30	0,029	38	1451,7	1	faint split bands, allocation of H uncertain
11.May	H	0735,2	0736,0	365	415	440	290	-	-	-	5	
		0735,4	0738,4	277	238	283,5	166,5	-	-	-	4	
		0739,3	0740,1	134	130	160	119	-	-	-	3	
	F	0735,9	0736,9	126	119	130	119	^0,187	126	0736,6	3	
*		0739,2	0741,3	70	46	75	46	0,683	66	0740,0	2	0737,8-0743,3 IIIGG overlaps
13.May	H	0743,1	0747,9	119	100	130	100	-	-	-	3	
		0743,1	0801	86	46	86	46	^0,05	-	0754,0	2	F and H overlap
	F	0743,1	0756,5	46	30	46	30	0,021	36	0752,2	1	0751,8-0756,5 HB
		0757,2	0812	46	<30	46	30	0,049	40	0759,3	1	0803-0812 HB
14.May	II	1352,7	1354,6	44	40	44	39	0,030	40,5	1353,2	1	1347,6-1352,9 IIIG 150-30 MHz
14. May	H	1447,2	1456,0	78	46	82	46	0,103	68	1449,7	2	
		1452,2	1505,4	44	37	45	32	0,043	40	1454,8	1	patchy, 1455 split bands
	F	1446,8	1452,5	41	30	44	30	0,038	36	1449,6	1	faint split bands

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1978 18.May	H		0528,5	116	86	130	108	0,090	101		3	0519-0523 HB
			0538,5	82	60	86	<46	0,060	66	0528,0	2	0519-0520,5 HB in ch.1 0525-0529 HB in ch.2
	F		0529	46	<30	46	<30	-	-	-	1	
22.May	H	1438,9	1440,7	130	115	140	115	~0,18	120	1439,8	3	Type IIIGG 1429,6-1434,7 ch.4-ch.1
	F	1438,7	1440,0	66	55	66	50	~0,07	60	1439,4	2	
24.May *	II	1758,2	1802,7	120	100	145	100	0,176	125	1759,8	3	
		1759,2	1808,6	86	50	86	46	0,083	66	1800,5	2	1801,2-1804,5 intense HB in ch 1
26.June *	H	1217,3	1229,5	52	46	75	46	0,055	60	1223	2	1223-1226 HB, in ch 2 1223-1229,5 HB in ch. 1
	F	1218,5	1226,0	36	30	40	30	0,028	36	1220,5	1	patchy, split bands, 1220-1223,8 HB
26.June *	H	1442,5	1448,3	122	100	135	100	0,112	110	1445,0	3	1444-1450 HB in ch.3
		1443,3	1453,4	86	46	86	46	0,055	66	1448,0	2	1450,5-1452,3 HB in ch.2
	F	1442,7	~1446	52	46	68	46	-	-	-	2	IS,IIIS overlap
		1443,3	1453,6	40	30	46	30	-	-	-	1	1451-1452,5 HB, H and F overlap 1430-1443,3 IIIGG ch.5-1 1533 type IVdm start, 1524 typeIVm start
3.July	H	0635,9	0639,2	62	54	70	46	0,049	56	0637,6	2	0636,6-0638,6 type III overlaps
	F	0638,5	0641,3	40	35	45	32	0,018	38	0641,2	1	
	IIIG/V	0613,3-0617,8				140	30				3-1	
	II?	0620,6	0630,7			86	30					
6.July	II	1555,2	1556,9	44	34	44	30	0,027	37	1556,1	1	split bands
	V	1530,2	1536,6			150	30					
	IIIGG	1538,2	1542,3			80	30					
	IN	1535,4	1544,3								2	noise storm features
7.July	H	0533,6	0533,9	390	390	415	352	-	-	-	5	
		0533,7	0540,0	245	160	264	160	0,171	225	0534,8	4	patchy
		0536,4	0543,5	104	104	160	100	~0,123	116	0541,6	3	0536,6-0537,3 HB in ch.4
	F	0533,9	0542	130	104	138	100	0,188	104	0534,8	3	patchy 0535,6-0536,4 gap

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1978 7.July	F	0536,4	0543,9	82	48	84	46	-	-	-	2	0536,8-0542,0 HB in ch.1 0536,8-0543,9 patchy
9.July *	F	0719,7	0727,0	76	80	86	46	0,056	64	0722,0	2	0720,5-0724,8 HB in ch.1
	H	0724,0	0726,0	76	76	82	65	0,476	70	0724,8	2	
	IIIGG	0704,9	0719,3			800	30					
9.July *	H	1014,9	1020,8	75	70	86	46	0,277	66	1018,0	2	1014,8-1019,9 HB in ch.3 1014,9-1019,3 HB in ch.2 1018,3-1020,8 F and H patchy
	F	~1018	1020,8	46	42	46	35	0,029	42	1020,0	1	
9.July *	H	1222,5	-	70	46	86	46	0,074	68	1225,0	2	1227 merges into type IVm 1235 intense Cont 520-30 MHz
	F	1222,5	1225,4	44	30	46	30	0,035	36	1224,5	1	
9.July	II	1832,1	1842,2	36	36	46	33	0,016	38	1838,0	1	1832,2-1838,4 intense HB in ch 1 1834,3-1836,5 HB in ch.2
	II	1844,2	1857,2	-	-	-	-	-	-	-		narrow horizontal emission band
11.July	H	0428,4	0435,6	212	193	382	160	0,161	212	0431,6	4	faint, patchy
		0428,4	0437,1	141	100	145	100	0,091	130	0433,5	3	patchy
		0442,3	0446,0	62	54	78	46	0,057	60	0444,0	2	0430.0-0431,2 F/H in ch.2 and 3 0433,9-0435,3 0435,4-0438,4 HB in ch 1
	F	0433,1	0438,7	60	46	86	46	0,068	66	0435,9	2	
	IIIGG	0428,9	0432,2			130	30					
11.July *	H	1051,4	1055,0	240	160	-	160	-	-	-	4	1055 merges into type IVdm
		1053,4	1055,5	160	110	160	110	0,205	140	1054,5	3	patchy
		1056,0	1058,5	72	-	86	-	-	-	-	2	patchy, 1058,5 merges into Cont
	F	1058,1	1058,9	34	-	38	<30	-	-	-	1	merges 1058,0 UT into Cont faint, narrowband
14.July	H	1736,8	1739,9	123	100	145	100	0,246	123	1738,1	3	split bands
		1738,8	1747,4	84	56	84	46	0,099	70	1742,6	2	
								0,074	70	1742,6		
	F	1737,0	1739,3	82	56	82	46	0,174	64	1737,8	2	
		1738,5	1745,3	44	30	44	30	0,025	38	1740,1	1	1737,8-1738,3 type IIIG overlaps 86-30 MHz

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1978 14.July	IIIGG/V	1730,2	1735,3			400	30					2 steps. in narrow emission band
17.July *	II	0922,7	0926,7	42	30	44	30	0,0532	38	0924,5	1	
	II	0930,9	0936,1	42	34	46	32	0,050	38	0934,0	1	
	IIIG	0928,4	0930,8			70	30					
1.Sept. *	H	1031,1	1042,8	75	46	75	46	0,063	66	1034,0	2	narrowband
		1037,6	1042,8	44	41	44	38	0,027	41	1038,5	1	1039-1142
	F	1033,9	1035,1	36	34	38	34	0,033	36	1034,5	1	narrowband
4.Sept. *	H	0816,2	0827,8	125	100	160	100	0,112	123	0821.0	3	0820-0822 split band
	F	0816,2	-	66	-	86	-	-	-	-	2	0816,9-0826,5 HB,0825,9-0826,5 HB
	II	0841,6	0849,5	46	30	46	30	0,033	38	0845	1	0842,8-0849,5 IIIS overlaps
22.Sept.	II	1427,2	1434,2	43	37	45	34	0,036	40	1430,3	1	up to 1432,3 lower split band 1432,8-1434,2 upper split band 1429,2-1430,0
23.Sept. *	II	1000,8	1009,3	40	38	46	30	0,029	38	1004,0	1	1005-1009 patchy 1000,8-1001,7 split band
	II	1017,8	1028,0	40	30	46	30	0,024	38	1019,5	1	0957 start of IIIS overlaps
27.Sept. *	H	0724,8	0727,3	120	100	130	100	-	-	-	3	0724-0727 H and F similar
		0724,8	0738,8	86	46	86	46	0,066	66	0730	2	Type IS overlaps
		0731,0	0742,0	46	30	46	30	0,038	38	0739,0	1	
	F	0724,7	0726,5	-	-	60	46	-	-	-	2	0729,5-0732,5 HB
		0725,0	0733,8	46	30	46	30	0,038	38	0728,0	1	
29.Sept. *	H	1055,2	1103,3	73	55	80	55	0,055	60	1057,5	2	patchy narrowband
	F	1055,3	1059,8	40	32	42	32	0,028	36	1057,5	1	patchy, narrowband
	II	1110,6	1120,4	40	35	46	32	0,022	38	1115,0	1	patchy, narrowband
1.Oct.	H	0818,5		160	100	160	100				3	0821, merges into type IVm, 0818,5-0819,3 HB in ch 3
	F	0818,8		70	46	70	46				2	0821, merges into type IVm, 0818,8-0820,3 HB in ch 2 and 1 0819,3-0821 F and H overlap

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1978 1.Oct.	IIIdm spikes RS	0815,7	0823,4									in ch 5,4,3 lf-stop frequencies near 180 MHz 0821 start of type IVdm in ch 5,4,3
3.Oct.	H	0858,3	0902,5	123	100	160	100	0,142	108	0900,6	3	
		0901,6	0907,1	86	70	86	46	0,055	79	0904,1	2	0901,8-0903,9 HB

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1978	F	0858,5	^0904,1		46	72	46	0,099	60	0859,8	2	
3.Oct.		0901,7	0906,8	36	34	46	30	0,020	37	0904,1	1	0901,6-0903,8 HB
4.Oct.	H	1538,5	1541,7	135	115	140	110	0,102	130	1540,5	3	narrowband, patchy
*	F	1539,0	1545,1	66	55	80	50	0,051	66	1542,5	2	narrowband, patchy
	IIIGG	1526	1536			1000	30					
8.Oct.	H1	0837,0	0840,3	238	205	277	160	0,366	212	0838,5	4	
		0837,3	0845,2	160	100	160	100	0,234	?123	0840,6	3	
	*	0843,4	0847,3	86	70	86	70	0,074	78	0845,5	2	
	F1	^0837,7	0845,2	-	47	86	46	0,076	62	0840,7	2	
		0843,6	0847,8	46	42	46	35	0,032	40	0845,3	1	
	H2*	0949,7	0951,7	140	140	140	100	-	-	-	3	narrowband, patchy
	*	0851,5	0852,4	75	68	80	68	0,066	74	0852,0	2	faint patchy, narrowband
	IIIGG/V	0834,5	0838,0			500	30					
13.Oct.	H	1337,3	-	290	160	320	160	-	-	-	4	1337,2-1339,8 HB in ch 4 and 5 1339 merges into type IV Cont
	F	1337,4	-	160	100	160	100	-	-	-	3	1337,8-1338,3 HB in ch 4, 1339 merges into type IV Cont
	IIIGG/b	1336,0	-			140	30				4,5	spikes in ch 4
	IVdm	1337										1350-1356, drifting features in ch 1 and 2
	IVm	1340	1700								1,2,3	1350-1424 gap in ch 1
7.Dec.	H	1000,4	1002,2	290	200	290	170	0,270	225	1001.4	4	HB
*	F	1000,7	1001,7	160	125	160	125	0,352	139	1001,5	3	superposed by IIIG
	H2	1008,3	1011,2	115	115	140	100	0,154	115	1010,0	3	patchy
		1010,5	1016,5	80	46	86	46	0,074	66	1013,0	2	
	F2	1008,4	1010,8	70	52	80	50	-	-	-	2	patchy
	IIIG	1003,8	1005,9			160	30					
30.Dec.	H	1301,8	1303,4	70	46	80	46	-	-	-	2	
*	F	1301,2	1305,2	46	35	46	30	^0,029	-	-	1	from 1303,7 patchy
	IIIG	1454,3	1458,3			160	30					
1979	H	1158,3	1159,1	200	160	200	160	-	-	-	4	
13.Jan.		1158,4	1201,3	160	100	168	100	0,256	130	1159,5	3	
*		1201,5	1205,1	86	70	86	70	-	-	-	2	
	F	1158,2	1159,1	110	100	110	100	-	-	-	2	
		1158,4	1203,1	86	46	86	46	0,175	66	1200,0	2	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1979		1201,6	1203,3	46	42	46	42	-	-	-	1	
13.Jan.*	IIIG DCIM	1154,4	1156,3			800	200					
14.Jan.	H	1156,2	1158,1	270	160	290	160	0,783	225	1157,2	4	
		1159	1200,8	160	123	160	115	0,127	134	1159,7	3	narrowband, patchy
	F	1156,4	1158,1	130	100	156	100	0,468	123	1156,8	3	1157,4-1157,8 HB in ch.2 split bands
		1158,2	1201,4	86	56	86	56	0,158	66	1159,6	2	1159,1-1200,6 steplike feature
	IIIG	1154,3	1155,1			700	200					
20.Febr.	II	0934,2	0939,1	130	100	160	100	0,213	123	0936,6	3	
	IIIG	0930,8	0931,3			100	30					
	DCIM	0932,2	0932,4			600	420					
	IIIB DCIM	0933,5	0939,0			460	30					
25.Febr.	H	0654,2	0657,9	141	100	141	100	0,276	112	0655,5	3	0655,8-0657,2 HB
		0650,8	0608,5	86	46	86	46	0,059	70	0654,7	2	
								0,053	62	0701,7		
		0703,2	0710,8	46	34	46	32	0,044	40	0706,4	1	
	F	0655,1	0658,0	62	46	68	46	0,115	56	0655,8	2	
		0651,3	0655,8	43	36	45	34	0,024	37	0652,8	1	
	IIIG	0650,0	0653,5			140	46					
1.March *	H	1021,2	1025,2	130	110	160	100	0,274	125	1022,5	3	
		1025,6	1027,5	70	50	80	50	0,148	62	1027,0	2	
	F	1021,5	1025,3	62	52	72	52	-	-	-	2	
	IIIGG/V	1003,4	1022,4			750	30					
9.March	II	1027,1	1028,8	42	32	46	30	-	-	-	1	
	IIIGG V	1021,6	1037,5			1000	30					HB
	dm Cont	1020,3	1032,5			800	220					
	DCIM											
	II	1038,4	1039,3	58	46	52	46				2	
		1038,7	1042,4	44	30	44	30	0,044	-	-	1	narrowband
11.March	H	1054,2	1058,5	70	52	80	52	0,055	62	1056,2	2	
	F	1054,4	1059,3	34	33	40	37	0,025	35	1056,2	1	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1979 23.March	H	0647,2	0649,8	390	290	490	290	0,647	390	0648,2	5	patchy
		0649,5	0653,9	264	160	264	160	0,336	225	0650,5	4	
		0652,4	0657,8	160	100	160	100	0,213	123	0654,9	3	
	F	0647,3	0647,6	173	173	205	160	-	-	-	4	
		0649,9	0652,1	119	86	123	100	0,213	101	0650,8	3	
		0652,6	0658,3	86	46	86	46	0,108	66	0654,8	2	
	IIIGGDCIM	0644,3	0647,5			1000	30					
27.March	H	0811,7	0813,2	377	290	452	290	-	-	-	5	
		0811,7	0817,6	277	160	277	160	0,351	225	0813,6	4	
		0817,6	0818,6	130	116	130	104	-	-	-	3	
	F	0815,1	0817,7	123	100	138	100	0,268	116	0816,5	3	
	IIIG	0811,7	0812,3			427	93					overlaps
27.March	II	1127,4	1131,2	36	40	40	30	^0,048	36	1129,6	1	1127,9-1131,3 IIIG 210-35 MHz
	IIIGG	1120,3	1125,5			260	30					
27.March	II	1146,5	1154,0	41	35	41	30	0,023	38	1148,5	1	1149,6-1154,0 patchy
1.Apr.	H	1449,2	1455,9	145	100	153	100	0,130	123	1451,8	3	1449,7-1453,8 no measurements
		1445,8	1451,6	84	72	84	64	0,065	72	1448,5	2	
	F	1448,3	1455,4	84	46	84	46	0,070	66	1451,7	2	
		1444,4	1451,6	46	35	46	34	0,629	40	1447,4	1	
	IIIGG V	1453,3	1454,3			380	30					
27.Apr.	H	0645,2	0646,8	218	173	284	160	-	-	-	4	
		0645,6	0654,3	160	86	160	0	0,162	13	0647,9	3	0649,5-0650,6 HB in ch 4
								0,138	116	0652,1		
	F	0645,0	0647,2	145	108	160	100	^0,174	116	0645,9	3	0649,6-0650,6 F and H negative drift U-shaped
		0645,4	-	82	-	86	46	0,118	74	0646,7	2	0651,9 F and H merges into
								0,094	68	0651,8		type IVm,dm
	Cont	0651	0706			80	30					
	IIIGG	0645	0651			160	30					
	IVdm RS	0646	0656			700	300					
	DCIM	0639,2	0644,7			800	220					
29.Apr.	H	0740,6	0743,8	116	100	149	100	0,146	119	0742,4	3	split bands
		0744,2	0751,5	86	62	86	52	0,081	70	0747,1	2	0745,8-0747,0 HB
								0,070	62	0750,2		

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch. No.	remarks
1979 29.Apr.	F	0740,9	0745,9	70	46	72	46	0,081	60	0743,0	2	IS in ch.4, IIIN in ch. 1 and 2
		0743,3	0749,9	46	30	46	30	0,039	40	0745,9	1	
	IIIGG	0831,3	0836,6			600	30					
2.May *	H1	1659,2	1713,2	60	70	86	46	0,061	66	1704,0	2	1659,2-1703,0 patchy, 1703,0-1706 narrowband later broadband, 1711-171 negative drift, 1701,8-1703,4 upper split band feature, 1711-1713 HB
	F1	1701,1	1713,3	42	35	46	30	0,024	38	1704	1	1703-1704 upper split band feature in ch. 2, 1701-1706 intense narrow-band, later broadband, F and H over-laped, 1701-1706 F and H are similar 1711-1714 HB in ch.1.
	H2	1715,2	1723,0	64	50	86	46				2	1715,5-1717,6 HB in ch.3, 1721 in ch.1 faint upper split band feature
	F2	1713,8	1719,4	40	35	46	30	0,024	38	1717,0	1	broadband , F and H overlaped, allocation uncertain
	IIIB	1722,4	1722,5			80	35					
	IIIGG	1655,4	1658,3			260	30					
10.June *	H1	0902,4	0912,8	110	96	140	96	0,102	125	0909,5	3	0902,4-0908,3 patchy, HB 0911,0-0911,6 HB in ch. 3 0914,5-0916,5 HB in ch. 2
		0903,2	0917,4	70	50	86	46	-	-	-	2	
	F1	0907,0	0918,0	42	40	46	30	^0,033	38	0910,0	1	0909-0910,2 split band feature
	H2	0918,8	0920,0	140	100	140	100	^0,205	110	0919,4	3	0909-0917,4 F and H overlap narrowband, split bands
		0919,4	0924,6	70	52	70	52	^0,060	60	0922,0	2	split bands
	F2	0920,2	0923,9	40	30	46	30	^0,038	40	0922,0	1	split bands
18.June	H1	0626,2	0629,4	152	100	152	100	0,253	119	0628,4	3	
		^0629	0640,4	82	52	84	48	0,079	68	0631,3	2	
	F1	0626,4	0629,3	72	46	82	46	0,079	64	0628,2	2	
		0627,8	0632,8	44	32	44	32	0,029	40	0629,3	1	0629,2-0630,2 HB in ch.2
	H2	0630,7	0634,8	127	116	134	93	0,180	127	0632,2	3	split bands, HB

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch. No.	remarks
1979	F2	0632,2	0643,2	78	52	80	46	0,133	70	0634,2	2	split bands, HB
18.June	IIIGG/b	0623,4	0625,3			450	30					
	IIIGG	0633,2	0636,9			125	-30					
18.June	II H	1818,2	1819,5	153	112	156	112	^0,247	134	1818,6	3	patchy, split bands
	F	1820,5	1825,7	80	64	82	50	0,084	68	1823,7	2	narrowband, patchy
	IIIGG/U	1810,9	1813,2			290	35					
25.June	H	0533,4	0537,0	112	101	156	90	0,313	116	0534,1	3	0533,4-0537,0 HB
		0533,1	0540	86	50	86	46	0,108	66	0538,0	2	0534,4-0537,2 HB
	F	0533,4	0536,9	56	48	66	48	^0,060	52	0535,1	2	split bands, patchy, narrowband
		0533,8	0541,7	44	30	44	30	0,041	37	0536,7	1	split bands, patchy, narrowband
	II	0540,0	0546,2	72	50	78	46	^0,061	60	0543,5	2	0538,4-0539,2 HB in ch.1
	IIIG	0539,4	0539,7			120	30					
	IIIGG/b	0528,9	0531,4			140	30					
26.June	H	1023,6	1027,0	153	138	160	108	0,162	142	1025,0	3	1025,5-end patchy
	F	1023,7	1026,7	84	70	86	66	^0,077	72	1025,1	2	narrowband
5.July	II	0702,5	0706,0	72	50	72	50	0,058	62	0704,1	2	narrowband
	III GG	0651,1	0654,8			160	40					
19.July	IIIGG	1054,7	1056,8			370	30					
*	H1	1057,2	1058,2	240	200	250	190	-	-	-	4	concave feature towards
	[illegible]	1058,9	1103,9	140	100	160	100	0,112	130	1100,5	3	higher f, 1059,4-1101,8 HB in ch 4 and 3
		1100,3	1101,7	86	78	86	72	-	-	-	2	timing may be too early
	F1	1100,6	1104,1	52	46	60	46	-	-	-	2	by 1 min
		1102,9	1103,9	46	42	46	40	-	-	-	1	
	H2	1106,7	1107,9	140	120	145	120	-	-	-	3	narrow split bands
	F2	1106,7	1107,2	60	56	66	56	-	-	-	2	narrow split bands
23.July	II	1651,9	1655,9	155	120	160	120	0,154	140	1653,0	3	narrowband, faint
*												
10.Aug.	H	0543,7	0549,5	58	48	80	48	0,074	60	0545,0	2	narrowband, patchy
*	F	0546,4	0548,5	40	38	42	38	-	-	-	1	patchy

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
14.Aug.	H	1143,9	^1149,2	75	^50	86	46	-	-	-	2	
* 1979	F	1142,9	1149,0	35	42	46	30	^0,038	36	1145,5	1	split bands at the start
16.Aug.	H	1147,1	1151,1	58	50	70	46	^0,060	54	1148,5	2	1148,5-1150,5 HB in ch.2 1149,8-1150,7 HB in ch.1
*		1150,8	1153,1	45	38	45	36				1	1151,8-1152,7 negative drift, narrowband
	F	1147,7	1151,1	40	30	40	30	0,027	35	1149,5	1	1147,7-1151,7,patchy,split bands, 1148,3-1150,8 HB
20.Aug.	H1	0915,1	0916,7	150	140	150	130	0,246	145	0916,0	3	split narrow bands, upper band delayed
*	F1	0915,1	^0916,6	76	70	80	70	0,190	75	0915,8	2	
	II	0917,8	0925,5	140	120	160	100	^0,246	140	0919,6	3	0921-0925,5 patchy 0921-0923,0 negative drift, split bands
	H2	0928,7	0933,6	70	52	80	46	0,063	55	0931,0	2	
		0930,6	0931,8	42	42	46	40	-	-	-	1	
	F2	0928,7	0930,1	42	38	42	38	^0,044	40	0929,5	1	
	IIIGG	0916,4	0927,8			160	30					no measurement in ch 3
21.Aug.	H	0615,0	0623,6	123	100	150	100	0,123	123	0619,0	3	start -0617,4 split bands 0617,2-0622,9 RS
*		0618,3	0638,4	86	48	86	46	0,051	66	0624,0	2	0627-0638,4 patchy,HB
		^0624,0	0639,4	41	40	46	30	-	-	-	1	0627,7-0632,9 split bands
	F	0615,4	^0619	72	46	86	46	0,083	66	0617,0	2	start -0618 HB
		0617,7	0622,0	42	30	46	30	0,048	40	0620,0	1	0622-0626 F and H overlap
	IIIGG/V	0607,3	0618,4			160	30					IIIGG/V/GG
11.Sept.	II	1603,1	1605,3	74	52	86	52	0,070	70	1604,0	2	faint narrow bands, negative drift
*												
4.Oct.	H	1554,8	1559,0	149	97	160	100	0,261	123	1556,9	3	
		1558,5	1603,0	80	58	86	58	^0,091	70	1600,3	2	split bands
	F	1554,9	1558,7	86	46	86	46	0,137	64	1557,0	2	1556,0-1558,2 F and H overlap
	IIIB	1603,0	1603,3			80	30					overlaps H in ch.2
	II	1606,3	1607,0	70	70	78	62	-	-	-	2	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1979 4.Oct.	IIIG	1549,8	1551,7			230	30					
5.Oct.	H	1148,1	1151,1	277	180	277	160	^0,471	218	1149,4	4	HB
		1150,7	1152,1	153	119	153	108	^0,261	130	1151,6	3	split bands
		1155,3	1156,8	82	62	82	62	^0,079	74	1156,2	2	
	F	1148,1	1150,8	138	93	160	100	^0,268	119	1149,2		
		1150,7	1151,9	84	64	84	64	^0,137	72	1151,3	2	1148,1-1150,1 superposed by type III
		1155,6	1156,6	43	35	44	34	-	-		1	
4.Nov. *	II	1501,5	1503,2	140	96	150	96	-	-		3	
		1502,0	1504,7	86	50	86	50	^0,148	68	1503,5	2	
	IIIG	1452,3	1453,2			140	40					
6.Nov. *	H	1457,6	1500,9	115	110	150	110	0,176	120	1458,3	3	split bands, HB
	F	1457,7	1502,7	66	50	80	50	0,083	60	1459,5	2	narrow split bands, patchy
	IIIG/V	1445,3	1454,6			700	30					RS 250-110 MHz overlaped by type I
8.Nov.	H	1122,7	1124,3	260	200	270	160	-	-	-	4	1123,0-1123,6 HB
		1124,0	1128,3	160	100	160	100	0,123	155	1125,0	3	1124,3-1128,4,HB in ch.4
		1130,3	1137,7	70	60	80	50	-	-	-	2	1130,3-1132,1 split band
	F	1122,9	1124,7	140	120	150	100	-	-	-	3	
		1128,6	1139,4	40	35	46	30	-	-	-	1	patchy, sporadic HB
	IIIG/IIIS	1121,3	1123,3			500	35					overlaps
17.Nov. *	H	1203,8	1212,8	80	50	86	50	0,061	70	1208,0	2	
	F	1204,6	1206,1	42	36	44	36	^0,049	40	1205,5	1	
	IIIGG/V	1151,2	1159,3	-	-	400	30					
	IIIG	1203,8	1206,3									overlaps, IS overlaps
1980 3.Jan. *	H	1029,2	1032,8	125	100	140	100	-	-	-	3	
		1032,6	1034,5	86	66	86	60	-	-	-	2	
	F	1029,4	1029,7	60	50	60	50	-	-	-	2	
5.Jan. *	H	1023,7	1024,2	86	100	130	100	-	-	-	3	
		1023,9	^1131	86	^60	86	50		70	1127,0	2	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1980	F	1023,7	1024,1	50	50	55	50	-	-	-	2	
5.Jan.		1024,3	1027,2	42	40	46	40				1	
*												
8.Jan.	H	1013,2	1023,3	160	100	160	100	0,117	128	1018,0	3	no measurement in ch 4
*		1023,4	1024,3	86	70	86	70	-	-	-	2	
	F	1011,5	1013,7	145	100	145	100	^0,176	112	1013,0	3	patchy
		1013,0	1022,9	86	52	86	52	0,089	66	1018,0	2	
		1020,7	1023,9	46	40	46	40	-	-	-	1	
11.Jan.	H	0810,3	0812,8	140	100	140	100	^0,308	115	0811,5	3	narrowband, patchy
*	F	0810,3	0811,3	70	64	70	64	0,190	67	0810,7	2	narrowband
17.Jan.	II	0821,4	0829,3	86	53	86	53	0,074	74	0825,0	2	narrowband, patchy
*												
27.Jan.	H	1152,0	1155,3	120	100	145	100	0,176	126	1153,0	3	1153-1155,3 HB
*		1153,5	1159,5	86	46	86	46	0,095	66	1156,0	2	
		1201,8	1208,8	40	38	42	30	0,033	38	1205,0	1	patchy, split bands
	F	1152,0	1153,3	70	50	86	46	-	-	-	2	
		1154,0	1155,0	42	38	46	36	-	-	-	1	patchy,IS overlaps 1204 start type IVm
8.Feb.	H	0909,3	0917,5	160	120	160	100	0,095	132	0913	3	
*	F	0910,2	0917,6	80	60	86	60	0,061	72	0913,5	2	
		0913,9	0915,6	46	35	46	35	-	-	-	1	narrowband, patchy
	IIIG	0905,2	0910,1			300	30					0905-0908 stop frequencies in ch.3
19.Febr.	H	0945,3	0946,7	135	100	135	100	0,385	110	0946	3	
	F	0945,2	0946,5	70	52	70	52	^0,222	61	0945,7	2	narrowband
		0942,5	0948,0	46	40	46	40	-	-	-	1	narrowband
27.Feb.	II	1140,3	1143,4	128	100	150	100	0,145	125	1141,5	3	narrow split bands
*												
28.Feb.	H	1206,2	1208,2	450	300	540	300	-	-	-	5	1207,2-1207,6 HB, 1205-1206 spikes with drifting lf-cutoff
	F	1206,1	1206,7	240	190	290	190	-	-	-	4	patchy
		1206,7	1210,6	150	120	150	100	-	-	-	3	patchy
	IIIGG	1205,3	1210,6			450	30					overlaps

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1980												
28.Feb.	H	1214,3	1217,9	74	65	86	50	^0,095	68	1216,5	2	patchy narrowband
*	F	1214,1	1219,8	42	35	46	30	0,033	38	1216,3	1	patchy narrowband
19.March	H	0808,4	0808,8	450	290	500	290	-	-	-	5	spikes overlap
		0808,8	0809,6	290	220	290	220	-	-	-	4	HB in ch 4 and 5
	F	0808,7	0808,9	220	220	240	180	-	-	-	4	spiky feature
	IIIG	0806,3	0807,6			540	30					spikes in ch 5
28.March	H1	0957,5	1001,9	240	180	290	160	-	-	-	4	0957,8 spiky and patchy feature in ch 4
		^0959,0	1006,9	150	130	160	110	0,130	135	1004,0	3	
	F1	0957,4	^0959,0	125	100	160	100	-	-	-	3	0957,7-0959,4 spiky, in ch 3 and 4, similar initial features
		0958,0	1003,3	86	55	86	50	-	-	-	2	spiky, patchy
	H2	1004,5	1013,7	66	80	86	46	0,067	66	1005,0	2	patchy, 1009-1013,7 negative drift, 1004-1005,5 split bands
	F2	1009,5	1010,6	38	38	46	35				1	negative drift feature 0957-1001,5 F and H overlap allocation of F and H uncertain
	IIIGG	1004,3	1012,5			270	30					
	IIIGG	0954,0	0957,3			700	30					spikes
3.Apr.	II	0717,1	0718,4	52	48	60	46				2	0717,3-0717,7 HB in ch 1 IIIS Cont overlaps
		0718,0	0722,4	46	34	46	32	0,038	38	0720,0	1	
4.Apr.	H	1503,3	-	145	-	160	100	-	-	-		1503,3-1506,5 in ch 4 and 5 grains, HB
	F	1503,4	-	70	-	70	46	-	-	-		1503,4-1504,2 HB 1503,4-1503,5 IIIB overlaps 130-30MHz 1505 F and H merge into typeIVm 1519-1536 drifting features in ch 1
6.Apr.	H	1424,8	1426,2	320	290	420	290	-	-	-	5	HB
		1424,7	^1427	290	^220	290	220	-	-	-	4	merges into typeIVdm
	F	1425,2	1428,3	140	100	160	100	-	-	-	3	merges into typeIVm, HB, patchy
		1432,7	1434,6	^70	^50	70	50	0,111	^60	1433,6	2	split bands, Cont overlaps

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1980 6.Apr. *	IIIGG/RS	1427,7	1431,9			450	30					
15.Apr. *	H	0550,3	0552,4	270	160	280	160	-	-	-	4	patchy, HB
		0551,3	0555,3	160	100	160	100	0,224	137	0553,0	3	HB
		0555,3	0608,3	70	50	80	46	0,070	66	0601,0	2	0606-0607 HB
	F	0550,3	0551,7	136	100	146	100	-	-	-	3	HB
		0551,3	0557,4	86	46	86	46	0,095	58	0553,0	2	0551,8-0555,3 HB
		0556,3	0602,6	46	35	46	30	^0,030	38	0559,0	1	split bands, patchy, 0554,5-0556,0 HB, 0605,7-0606,2 HB
	IIIGG/b RS	0547,1	0550,1			380	30					
15.Apr. *	II	1049,3	1051,7	66	60	75	50	-	-	-	2	1050,2-1051,3 gap
15.Apr. *	H	1101,7	1208,8	60	46	70	46	0,061	56	1106,0	2	1103,3-1105,7 HB, 1101,9-1103,6 HB in ch 1
		1108,0	1122,0	42	30	42	30	0,021	38	1115,0	1	narrowband, patchy
	F	1102,2	1108,9	35	30	-	30	-	-	-	1	1102,3-1103,8 HB in ch 1, F and H overlap 1104-1108, 1103,8-1109,7 patchy
17.Apr. *	II	0759,6	0808,0	46	32	46	30	0,024	38	0805,0	1	0800-0801,6 overlaped by calibration steps
	IIIGG/V											
26.Apr.	H1	1334,4	-	130	-	153	90	0,109	119	1337,7	3	
	F1	1334,7	-	80	-	84	46	^0,072	64	1337,6	2	1335,0-1339,HB in ch 2, 1339,9 H1, F1 merge into H2, F2
	H2	^1339,8	1344,7	-	100	153	100	^0,151	119	1342,0	3	
		1339,8	1352,1	86	54	86	46	-	-	-	2	
	F2	1339,8	1352,7	46	34	46	30	-	-	-	1	1350,1-1352,7 patchy, 1341,0-1348,8 H2 and F2 overlap
3.May *	H1	1258,7	1302,7	70	52	70	52	0,070	66	1301,0	2	narrowband

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch. No.	remarks
1980 3.May	F1	1258,7	1300,4	39	32	39	32	-	-	-	1	narrowband, patchy
	H2	1304,6	1312,3	~66	48	86	46	~0,056	66	1308,0	2	
	F2	1305,6	1313,3	38	32	44	30	-	-	-	1	patchy
	IIIG	1303,8	1311,4									overlaps 240-30 MHz
11.May *	H	1516,5	1518,5	140	120	150	100	~0,145	120	1517,5	3	
	F	1516,5	1518,4	60	52	70	42	~0,095	58	1517,5	2	1518,2-1522,8 intense HB in ch 1
	IIIGG/V DCIM	1512,2	1516,3			750	30					event is homologous to 1658-event
	IIIG	1517,3	1517,4			48	30					
	IIIGG	1521,4	1523,3			650	30					
11.May *	H1	1658,4	1701,2	140	86	140	100	-	-	-	3	patchy
	F1	1658,4	1700,8	62	46	66	46	-	-	-	2	1659,6-1702,7 intense HB in ch 1 and 2
	IIIG	1658,8	1659,3			160	30					overlaps
	H2	1701,8	1705,6	140	100	150	100	~0,154	125	1703,5	3	event is homologous to 1512 event
	F2	1701,4	1704,1	75	66	86	50	-	-	-	2	
	IIIGG/V DCIM	1652,1	1658,3			450	30					
12.May *	H	1001,3	1002,1	140	100	140	100	-	-	-	3	narrowband, patchy
	F	1001,3	1002,1	70	50	70	50	-	-	-	2	narrowband, patchy
	IIIGG/V IIIb	0953,4	0958,3	-	-	450	30					IS overlaps in ch 3
	IIIb	0958,7	1000,8	-	-	220	30					
14.May *	H	1305,3	1308,4	120	86	130	100	-	-	-	3	1305,6-1307,2 HB in ch 3
		1305,5	1324,5	86	60	86	~50	~0,048	66	1313,0	2	broadband
		1317,8	1321,3	42	42	46	40	-	-	-	1	
	F	1306,3	1316,2	46	30	46	30	0,022	38	1311,0	1	1309,5-1316,2 HB in ch 1, patchy narrowband
	IIIG	1306,1	1310,2			350	100					
*	IIIGG	1255,7	1302,7			290	30					
20.May *	H	1415,6	1419,3	80	56	80	56	0,121	68	1417,5	2	
	F	1416,7	1418,1	42	36	42	30	~0,053	36	1417,3	1	faint split bands

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1980 20.May	IIIGb	1416,4	1418,7			86	30					overlaps
26.May *	H	1525,8	1529,7	150	120	160	120	^0,206	135	1527,5	3	
		1528,1	1533,9	86	60	86	55	^0,067	72	1531,0	2	1532-1533,2 split bands
	F	1525,8	1529,4	80	50	86	46	0,133	66	1527,3	2	1527,0-1528,8 HB in ch 2
		1527,9	1533,3	46	34	46	34	0,041	40	1530,0	1	1529,0-1532,3 HB in ch 1
												1529,7-1533,3 patchy
	IIIG	1530,3	1532,3			140	30					IIIG overlaps, IS, IIIS Cont overlap
27.May *	H	1601,8	1604,7	420	300	470	290	-	-	-	5	split bands overlap
		1603,1	1605,2	290	160	290	160	-	-	-	4	patchy
	F	1601,9	1603,1	270	220	280	220	-	-	-	4	patchy
		1604,0	1605,2	140	-	160	110	-	-	-	3	
	IIIG	1604,4	1605,4			350	30					overlaps
	IIIGG	1559,4	1601,7			500	30					intense spherics superposed
8.June	H	1036,1	^1043,4	130	104	153	100	0,094	119	1039,5	3	1036,2-1045,5 HB in ch 3
		1042,0	1048,0	70	50	86	50	0,074	66	1046,0	2	
	F	1036,2	1043,0	66	46	86	46				2	F and H overlap
		1038,7	1044,8	46	^36	46	40	0,041	40	1042,9	1	1039,6-1044,8 patchy split bands
	H	1058,8	1101,8	42	36	42	36	^0,019	40	1100,0	1	
	IIIG	1031,1	1032,7			350	30					
	IIIGdm	1034,2	1036,1			260	100					
28.June *	H	0753,5	0753,8	120	110	120	110	-	-	-	3	
		0753,5	0757,5	86	60	86	52	0,074	66	0755,0	2	0752,7-0754,3 HB in ch 2
		0754,6	0755,3	36	34	36	34	-	-	-	1	short narrowband
	IIIGG	0745,3	0753,9			350	30					
28.June *	II	1117,2	1122,8	38	32	42	32	^0,033	38	1120,0	1	1117,2-1120,0 patchysplit bands
	IIIGG	1108,2	1117,3			170	30					
	IIIB	1122,8	1123,1			140	30					
29.June *	H	1049,1	1054,2	160	120	160	110	0,174	140	1051,0	3	1051-1054 HB, 1051 steplike feature
		1054,7	1059,3	86	68	86	68	0,061	77	1057,0	2	narrowband
	F	1047,6	1053,3	86	55	86	50	0,095	70	1051,0	2	1051-1053 patchy
	IIIGG	1041,6	1048,9			360	30					

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch. No.	remarks
1980 29.June	Z	1048,5	1048,9			46	38					
1.July *	H1	1628,8	1630,6	240	160	280	160	-	-	-	4	1629,7-1631,2 HB in ch 3
		1629,7	1635,3	160	100	160	100	0,137	135	1632,0	3	1632,0-1635,3 HB
		1634,2	1635,6	86	-	86	-	-	-	-	2	
	F1	1628,8	1629,9	140	100	146	100	-	-	-	3	patchy
		1632,1	1634,2	86	50	86	50	0,074	68	1633,1	2	
	H2	1638,8	1640,6	140	120	140	115	0,145	130	1639,0	3	
		1645,4	1648,2	70	55	80	50	0,121	68	1647,0	2	narrowband
	F2	1638,8	1639,9	70	58	70	58	-	-	-	2	
	IIIdm	1626,8	1628,7			650	100					drifting lf-cutoff
27.July *	H	1300,4	1304,1	150	100	160	100	0,274	135	1302,0	3	split bands
	F	1300,5	1302,7	80	54	86	54	0,166	70	1301,7	2	split bands,1300,1-1302,7 HB
	IIIGG	1242,4	1248,3			400	30					
30.July *	II	1311,4	1316,3	150	100	150	100	0,112	125	1313,0	3	patchy
13.Aug.	H	1251,8	1254,6	270	200	290	170	-	-	-	4	
	F	1251,8	1253,6	150	-	160	100				3	1253,6 merges into type IVm
	IIIGG	1249,3	1253,3			700	30					similar start phase of F and H
	DCIM											drifting features within type IV
14.Aug. *	H	0542,9	0546,3	260	160	290	160	0,254	235	0544	4	split bands
		0547,8	0548,8	140	125	150	125	-	-	-	3	narrowband
		0556,5	0605,1	70	48	70	46	0,056	60	0602	2	0603,8-0605,1 split bands, 0559,2-0603,2 HB
	F	0543,4	0545,3	160	130	160	130	-	-	-	3	patchy
												0613,7-0614,9 HB in ch 2
27.Aug.	II	0533,7	0540,7	86	46	86	46	0,083	66	0537	2	split bands, film record out of focus
1.Sept. *	II	1135,3	1137,9	60	50	60	46	-	-	-	1	
		1136,9	1143,2	46	35	46	35	0,027	40	1139	2	narrowband, patchy

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1980 8.Sept. *	II	0527,6	0530,9	160	110	160	110	0,176	135	0529	3	narrowband
22.Sept. *	H	1622,8	1624,3	140	120	140	110		130	1623,5	3	1622,8-1625,1 HB in ch 3 and 2
	F	1622,8	1624,9	70	50	80	46	^0,095	60	1623,5	2	1623,7-1624,8 HB in ch 2 and 1
23.Sept. *	H	1604,6	1607,3	140	100	140	100	0,112	118	1606,0	3	1603,0-1606,5 HB in ch 3, 1607,0-1612,6 HB in ch 2, narrowband
	F	1604,8	1606,7	60	50	60	50	^0,083	35	1605,5	2	faint
		1606,5	1607,8	46	38	46	38				1	faint
24.Sept. *	H	0735,1	0737,1	200	150	200	170	-	-	-	4	
		0735,0	0740,6	160	100	160	100	0,224	123	0737,5	3	0735-0740 patchy, broadband
	F	0735,4	0740,5	86	46	86	46	0,102	66	0737,5	2	0735,5-0736,4 patchy
14.Oct. *	H	0619,1	0622,3	125	125	150	125	0	-	-	3	narrowband, patchy
	F	0619,4	0622,3	70	72	82	50	0,121	64	0621,0	2	split narrow bands
3.Nov. *	H	1401,6	1405,2	240	160	280	160	0,255	220	1403,0	4	HB in ch 4
		1404,7	1409,0	160	120	160	110	0,137	145	1407,0	3	1403,7-1405,4 HB in ch 3
	F	1401,6	1405,2	150	100	150	100	^0,164	128	1403,0	3	patchy, split bands, 1403,0-1405,2 HB
		1404,5	1409,0	86	52	86	46	^0,095	70	1407,0	2	1403,8-1405,5 HB in ch 2
												similar HB-features in F and H
5.Nov. *	H	1347,3	1349,1	470	300	470	300	-	-	-	5	1308,2-1308,6 HB
		1348,2	1351,3	290	200	290	200	^0,433	245	1350,0	4	patchy split bands, HB
		1352,7	1354,2	150	130	150	130	^0,154	140	1353,5	3	narrowband patchy
	F	1347,3	1347,7	230	200	230	200	-	-	-	4	
		1348,6	1351,4	150	110	150	100	^0,164	130	1350,0	3	patchy split bands, HB, similar feature in F and H
	IIIGG	1345,4	1348,3			400	40					U
5.Nov. *	II	1406,9	1418,2	66	70	86	50	^0,063	60	1415,0	2	patchy, HB
10.Nov. *	H	1147,7	1152,4	150	100	160	100	0,126	126	1150,0	3	1148,7-1149,3 gap

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1980 10.Nov.	F	1147,6	^1152,4	86	50	86	50	0,078	68	1150,0	2	1148,7-1149,3 gap
	IIIGG	1139,0	1147,6			100	30					
14.Nov. *	H	1230,5	1232,4	125	100	140	100	^0,308	115	1231,5	3	split narrow bands
	F	1231,3	1231,4	70	66	70	66	-	-	-	2	faint narrowband feature
												1234,0-1242,5 faint HB
	II	1250,0	2354,3	42	44	44	35	-	-	-	1	patchy
	IIIGG V	1219,8	1231,3			350	30					
16.Nov.	H	0906,3	0914,0	150	100	160	100	0,102	125	0910,0	3	0906-0908 HB in ch 4, 0907-0909 split bands
												0906-0907,1 patchy
		0912,3	0923,2	86	50	86	50	0,051	68	0919,0	2	
	F	0907,3	0912,6	86	50	86	50	0,068	70	0909,5	2	narrowband
		0913,4	0917,8	42	40	46	38	-	-	-	1	patchy, faint
	IIIGGdm	0903,2	0905,2			700	180					spikes, RS
1981 5.Jan. *	II	0845,5	0848,9	140	110	160	100	^0,274	120	0846,5	3	faint split bands, patchy
		0847,7	0851,4	86	60	86	60	-	-	-	2	0849 steplike feature
	IIIGU	0839,2	0840,3			280	100					
25.Jan. *	H	0856,1	0901,7	140	130	160	100	0,130	135	0858,0	3	0858,5-0902, F and H overlap
		0859,0	0908,5	86	60	86	-	-	-	-	2	
		0908,1	0909,3	46	40	46	40	-	-	-	2	
	F	0856,5	-	70	46	86	40	-	-	-	2	0856,0-0857,8 HB
		0901,6	0903,7	40	40	46	38	-	-	-	1	
	IIIG	0906,3	0906,4			240	55					
14.Feb.	H	0837,3	0846,2	86	55	86	50	0,074	66	0842,5	2	0837,3, 0842,0 narrow upper split band,

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1981												
14.Feb. *	H											0842,0-0843,5 gap, 0842,5-0843,5 HB in ch 3 0839,5-0841,8 lower split band 120-100 MHz
	F	0843,1	0845,8	46	38	46	35	-	-	-	1	narrowband
24.Feb. *	H	1231,2	1234,3	140	100	140	100	0,112	120	1232,5	3	1231,2-1232,5 patchy split bands
		1233,6	^1241,5	86	55	86	46	^0,103	66	1239,5	2	
	F	1235,2	1240,8	46	33	46	30	0,031	66	1238,5	1	patchy, 1241,7-1242,7 HB in ch 1
2.March *	H	1458,2	1509,2	86	50	86	46	0,070	66	1501,0	2	1501,0-1509,2 patchy
	F	1458,7	1504,1	40	33	43	33	^0,024	38	1501,0	1	1500,9-1504,1 patchy, IIIS overlap
4.March	II	0810,4	0811,8	140	125	155	110	0,190	130	0811,0	3	patchy
7.March *	H	0630,8	0643,4	86	50	86	46	0,056	56	0641,0	2	0632,0-0633,3 gap, 0633,3-0636,8 HB, 0634,0-0637,0 negative drift, 0637,0-0640,0 zero drift
	F	0630,3	0640,2	42	40	46	30	0			1	0634,0-0637,0 negative drift, 0637,0-0640,0 zero drift
												0635,6-0639,4 split bands, 0632,0-0633,3 gap 0631,0-0636,5 HB
21.March *	H	1339,3	1341,1	160	120	160	120	0,308	140	1340,3	3	narrowband, patchy
	F	1339,5	1340,7	75	60	80	60	^0,148	70	1340,3	2	faint narrowband, patchy
	IIIGG/V	1331,0	1335,7			280	30					
23.March	H	0706,3	0708,7	135	100	150	100	^0,112	120	0707,5	3	0706,3-0707,5 HB in ch 3, upper split band
	F	0706,3	0710,7	80	58	86	56	^0,111	69	0708,5	2	lower split band 0710,0 faint drifting feature
		-	-	-	-	-	-	-	-	-		
	IIIG	0708,3	0710,4	-	-	240	40					

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch.	remarks
1981	IIIG/V/GG	0645,2	0703,9			800	30					
23.March		0702,0	0703,2									narrowband features superposed by IS and IIIS
*	II	1112,8	1113,3	120	120	130	110	-	-	-	3	faint, patchy
		1112,8	1115,9	86	80	86	70	0			2	1112,8-1116,7 intense HB in ch 2
	DCIM,B	1108,3	1109,8			500	100					
3.Apr.	H1	0947,6	0950,8	130	100	160	100	0,145	135	0949,0	3	0947,6-0948,0 patchy
*		0948,8	0954,1	86	50	86	48	^0,111	68	0951,0	2	0951,0-0954,1 patchy, split bands
	F1	0947,5	0950,5	66	50	86	46	^0,095	60	0949,5	2	0947,5-0948,4 split bands
		0948,8	0953,3	44	40	46	35	^0,038	38	0951,0	1	patchy, split bands
	H2	0955,0	-	70	-	80	46	^0,095	66	0958,0	2	1000 merges into type IVm
		0958,3	1001,0	46	-	46	30	^0,044	40	1001,0	1	1001 merges into type IVm
	F2	0955,7	0959,0	40	33	42	30	0,031	36	0957,0	1	0956,6-0958,7 HB, split bands
	IIIGG	0952,0	1003,0			750	30					overlaps 0958 IV dm start
8.Apr.	H	1300,7	1302,4	260	200	280	180	-	-	-	4	patchy, HB in ch 4 and 5
*		1301,5	1306,5	160	130	160	130	0,103	145	1302,5	3	1302,5-1304,8 HB, 1301,5-1302,3 split bands in ch 4 and 3
	F	1300,7	1302,2	135	100	150	100	-	-	-	3	patchy, split bands
		1301,4	1305,0	86	58	86	48	0,103	66	1303,0	2	patchy, HB, 1
	IIIGG	1303,2	1303,7			86	30					superposed
	IIIG/DCIM	1256,7	1259,5			750	30					
8.Apr.	H	1633,8	1636,5	130	110	140	100	0,145	120	1635,0	3	patchy, HB
*		1637,2	-	75	-	80	-	0,070	66	1639,0	2	near 1743 merges into Cont
		1642,5	1649,5	46	36	46	30	0,028	38	1646,0	1	patchy, HB
	F	1633,7	^1636	62	46	62	46	0,074	53	1635,0	2	narrowband
		1637,0	1639,0	46	36	46	36	0,031	42	1637,5	1	patchy, narrowband
	IIIGG	1634,5	1636,8			230	30					overlaps
	IIIGG/b	1621,7	1629,5			230	30					IS overlaps
10.Apr.	H	1110,2	1112,2	220	180	240	180	-	-	-	4	patchy, HB
*		1110,2	1115,1	160	100	160	100	0,103	135	1112,0	3	split bands, merges into type IVm
	F	1110,3	1114,0	70	55	80	55	0,111	60	1112,1	2	split bands, HB in ch 2 and 1

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch.	remarks
1981 10.Apr.	F	1115,9	1121,0	44	35	46	30	0,027	38	1118,0	1	patchy split bands, merges into type IVm
	H	1112,9	1115,2	84	66	86	66	-	-	-	2	patchy
	IIIGGb/V	1105,7	1110,0			240	30					
10.Apr.		^1648										^1648 in ch 2 and 3 type IV overlaps F and H
*	IIIGGb RS/DCIM	1644,3	1650,9			480	30					overlaps
												1752-1800 drifting feature in ch 3
												1701,0-1703,3 HB
	II	1704,7	1711,5	70	70	86	50	0				patchy
	IIIG	1705,0	*1714,0			240	30	-				overlaps
17.Apr. *	H	1424,2	1426,2	480	290	500	290	^0,44	380	1425,0	5	1423,2-1435,0 HB, patchy narrowband
		1425,6	1428,1	240	200	290	180	-	-	-	4	patchy, HB
		1427,8	1430,4	150	100	150	100	-	-	-	3	patchy, split bands
		1429,5	1433,6	86	50	86	50	0,083	60	1431,5	2	patchy, split bands
		1435,7	1436,8	46	42	46	40	-	-	-	1	patchy
	F	1426,4	1427,6	150	100	150	100	-	-	-	3	patchy
		1427,6	1428,1	80	70	80	70	-	-	-	2	patchy, faint
		1430,2	1430,6	42	40	42	40	-	-	-	1	faint, patchy
	II	1438,2	1445,3	70	60	80	55	-	-	-	2	patchy, split bands
	IIIGU	1426,6	1426,7			240	60					overlaps
	IIIB	1442,7	1442,8			80	30					
	IIIGG	1417,4	1420,6			280	30					F and H allocation uncertain
20.Apr. *	H	1613,6	1620,3	260	180	270	160	^0,17	220	1617,0	4	HB in ch 4 and 5
		1616,2	1625,3	160	100	160	100	0,065	130	1621,0	3	1614,5-1615,8 in ch 3
		1628,3	1639,1	55	50	66	46	0			2	1629,7-1639,3 HB
		1632,5	1640,3	40	35	46	30	-	-	-	1	patchy
		1616,3	1625,6	80	60	86	46	0,061	70	1622,0	2	patchy, split bands, HB
	IIIG	1615,6	1616,1			86	30					overlaps
24.Apr.												1428,0-1434,5 drifting feature in ch 1
												1424,5 type II may be masked by type IVdm

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch.	remarks
1981												
24.Apr.	H	1643,1	1649,6	60	46	70	46	0,061	54	1646,0	2	1645-1647 zero drift, 1643-1650,7 HB in ch 2
*	F	1644,2	1646,5	38	35	42	35	-	-	-	1	HB
27.Apr.	IVdm	0802	0812									0816-0821 drifting feature in ch 1
*												0831-0836 HB in ch 1
												type II may be masked by type IVdm
10.May	H1	0718,5	0722,6	125	100	140	100	^0,10	115	0722,0	3	
*		0719,0	0726,0	86	46	86	46	0,063	68	0723,0	2	
	F1	0718,5	0721,3	62	46	68	46	-	-	-	2	
		0719,2	0726,0	46	30	46	30	^0,028	38	0722,0	1	0724-0727 H1 and F1 merge into H2 and F2 and overlap, 0727,1-0728,7 HB in ch 1
	H2	0723,3	0725,8	120	100	130	100	-	-	-	3	
		0724,0	0735,2	86	50	86	46	0,056	66	0728,0	2	0731,0-0738,5 HB in ch 2
	F2	0724,0	0738,7	42	34	46	30	^0,018	38	0730,0	1	0738-0744 HB in ch 1 and 2
												allocation of H2 and F2 uncertain
14.May	H	0844,3	0849,7	62	50	86	46	0,126	62	0846,5	2	0844,4-0845,0 split bands, 0844,4-0849,3 HB in ch 2 and 3
	F	0844,3	0852,2	36	32	46	30	-	-	-	1	0845,0-0848,0 F and H overlap 0844,8-0845,3 in ch 1
	IIIG/b	0849,6	0850,6			70	30					overlaps
	DCIM	0838,0	0841,3			500	350					
	IIIGG	0839,2	0841,5			80	30					
		0845,3	0848,2	-	- -	-						pulses of 2 seconds period in ch 5 and 4
												0905-0906 drifting feature
4.June	H1	1757,4	1800,8	70	50	70	46	0,067	60	1759,8	2	patchy, HB
*	F1	1758,8	1801,8	42	40	46	36	-	-	-	1	patchy
	H2	1802,4	1806,0	62	48	62	46	0,063	52	1804,2	2	
	F2	1802,5	1807,8	46	32	46	30	-	-	-	1	HB patchy
27.June	H	0906,1	0912,0	70	48	86	48	0,063	66	0908,0	2	
*	F	0906,2	0908,5	34	30	46	30	-	-	-	1	0904,6-0926,3 IIIGGb overlaps

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch.	remarks
1981	IIIGG/DCIM	0859,3	0902,5			350	50					
27.June	II	0916,7	0927,1	42	32	42	32	0,019	37	0921,0	1	0921,3-0922,1 split band, 1017 patch in ch 2
12.July	H	1032,6	1039,3	70	50	80	40	0,089	66	1036,0	2	split bands, HB 1032,6-1041,3 in ch 2 and 1
*	F	1032,7	1039,3	40	30	42	30	0,033	35	1036,0	1	split bands, patchy, HB, DP
19.July	H	0535,3	0542,0	70	48	80	46	0,121	66	0537,0	2	
*		0541,3	0549,1	44	40	44	35	-	-	-	1	narrowband,drifting feature
	F	0536,1	0538,3	36	30	40	30	-	-	-	1	patchy,DP,0535,0-0535,4 IIIBU 160-30 MHz
	IIIG	0541,2	0542,9			480	30					IS in chan.4
19.July	H	0558,5	0600,0	60	70	70	46	-	-	-	2	
*	F	0558,5	0600,3	38	38	46	30	-	-	-	1	Type I in ch 2,3,4
20.July	H	1322,9	1325,2	130	100	130	100	-	-	-	3	
*		1324,7	1331,7	70	52	70	46	0,083	60	1327,0	2	split bands, 1433,2-1435,6 HB in ch 2 and 1
	F	1326,4	1329,8	34	34	40	30	0,036	36	1327,0	1	HB, elongated patches
	II1	1939,8	1344,0	60	46	60	46	-	-	-	2	elongated drifting patches
		1343,5	1348,9	44	32	46	30	0,031	38	1346,0	1	split bands, 1343,5-1346 patchy
	II2	1351,7	1354,4	46	35	46	32	-	-	-	1	1337,7-1351,3 IIIG superposed
20.July	H	1606,3	1614,3	70	46	70	46	^0,056	56	1612,0	2	1612-1614 HB in ch 2
		1613,5	1617,7	46	30	46	30	-	-	-	1	1612,3-1616,0 HB in ch 1, 1620,3-1624,4 HB in ch 1 and 2
	F	1609,7	1613,3	35	30	37	30	-	-	-	1	1607,1-1609,3 HB in ch 1
11.Aug.	H	0751,2	0751,6	130	120	160	100		-	-	3	HB
	F	0751,2	0751,7	66	50	70	50	-	-	-	2	patchy
	IIIG,G,DP	0740,5	0753,8			140	30					overlaps
	II	0755,3	0759,7	66	55	66	50	^0,11	56	0757,0	2	narrowband, HB
21.Aug.	II	0831,9	0833,2	240	180	260	180	-	-	-	4	patchy
		0835,0	0839,0	160	100	160	100	0,176	130	0836,5	3	split bands, merge into type IVm

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1981	H	0649,6	0651,6	66	55	70	50	-	-	-	2	narrowband, split bands
2.Sept.	F	0649,6	0650,9	35	30	35	30	-	-	-	1	narrowband, split bands
2.Sept.	II	0701,1	0704,8	32	32	40	30	-	-	-	1	split bands, HB
*	IIIGG	0655,0	0701,2	-	-	200	30					
9.Sept.	H	1201,5	1233,5	110	100	120	100	-	-	-	3	HB
*		1231,6	1243,2	70	50	86	46	0,061	66	1237,0	2	1206-1243,2 HB
		1206,9	1223,8	46	30	46	30	0,029	38	1214,0	1	1217-1224 HB in ch 1
	F	1201,5	1204,0	50	-	55	46	-	-	-	2	merges into H, HB
		1201,4	1211,0	46	30	46	30	0,025	36	1205,0	1	1205-1211 HB
	IIIGG/V DCIM,b	1143,1	1159,0			1000	30					
9.Sept.	F	1651,9	1659,4	64	46	86	46	-	-	-	2	patchy HB, 1652,5-1654,0 gap
*		1655,2	1659,3	46	46	46	30				1	1657-1659,3 negative drift, HB in
	H	1651,4	1654,2	130	100	150	100	-	-	-	3	patchy
		1655,8	1658,0	68	70	86	46				2	1656,5-1658 negative drift, 1653-1656 HB in ch 2 and 3 1657-1658 HB in ch 2
	IIIG	1649,3	1650,3			70	30					
22.Sept.	H 1	0852,0	0858,7	50	46	70	46	-	-	-	2	elongated patches
*	F 2	0857,6	0900,0	46	32	46	30	^0,067	38	0859,0	1	
	F 1	0851,8	0856,3	40	35	42	30	-	-	-	1	elongated patches
	IIIGG DCIM	0837,7	0851,6			480	30					
26.Sept.	F	1318,5	1325,5	60	46	68	46	0,053	52	1321,0	2	patchy
*		1319,5	1328,6	42	32	46	30	-	-	-	1	broadband
	H	1323,2	1328,8	70	65	86	46	^0,048	68	1326,0	2	HB H and F overlaps, 1330,5-1339,5 HB in ch 1 H and F allocation uncertain
	IIIG	1304,3	1304,4			110	30					
29.Sept.	II	1454,2	1458,6	52	48	60	46	-	-	-	2	faint, patchy, 1456,2-1501,1 HB

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch.	remarks
1981 29.Sept. *	II	1456,3	1501,3	44	42	46	40	-	-	-	1	HB, faint, patchy, position of emission band is indicated by HB distribution
	IIIGG	1444,2	1447,3			260	30					1451,7-1457,3 in ch 3, faint HB-like features
27.Oct. *	II	1036,0	1038,6	75	68	80	60	-	-	-	2	diffus bandlike feature
	IIIGG	1020,6	1023,8			450	30					
5.Nov. *	II	1240,9	1243,8	420	300	420	290	-	-	-	5	1238,3-1240,2 DCIM in ch 5, HB
		1242,3	1245,6	290	160	290	160	^0,36	225	1244,0	4	broadband, merges into type IVm
9.Nov. *	H	1242,9	1248,6	150	160	160	100	0,145	140	1245,0	3	HB in ch 4 and 3
		1247,1	-	86	-	86	-	0,063	70	1249,0	2	1254,5-1255,8 HB in ch 1, merges into type IVm
	F	1244,0	1248,7	70	46	86	46	^0,12	68	1246,0	2	patchy, HB
		1247,1	1248,9	46	42	46	42	-	-	-	1	
	IIIG	1250,6	1251,5			60	30					overlaps
13.Nov. *	H	1105,8	1106,3	350	290	350	290	-	-	-	5	
		1106,6	1108,7	230	180	230	180	-	-	-	4	HB
	F	1106,9	1108,5	140	100	140	100	-	-	-	3	narrowband, patchy
	IIIG	1107,5	1108,6			400	30					overlaps
	IIIGG/RS	1058,7	1106,7			1000	30					
	DCIM											
1982 30.Jan.*	H1	1138,0	1141,7	140	110	150	100	0,117	130	1140,0	3	split bands, patchy, HB
		1143,7	1152,4	80	48	80	46	0,067	66	1148,0	2	split bands, HB
		1154,8	1157,3	46	34	46	34	0,041	40	1156,0	1	HB in ch 1 and 2
	F1	1137,4	1142,0	68	50	70	46	0,056	59	1140,0	2	split bands, patchy, HB
		1146,4	1148,4	36	30	36	30	-	-	-	1	faint, patchy, HB
	H2	1140,4	1142,0	68	55	86	50	-	-	-	2	elongated patches
	F2	1140,5	1142,0	38	30	40	30	-	-	-	1	elongated patches, similar to H2
												IS, IIIS, DP superposed
4.Feb.	H	1325,6	1326,4	240	200	290	200	-	-	-	4	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1982 4.Febr.*	F	1325,6	1326,4	140	110	160	100	-	-	-	3	F similar to H, shorttime intense features 1320,1-1327,4 IIIGG,DCIM,b, 700-30 MHz superposed
4.Feb.	H	1543,2	1544,2	320	290	330	290	-	-	-	5	patchy, 1543,4-1543,7 gap
		1543,6	1546,0	260	180	260	160	-	-	-	4	patchy 1543,7-1544,6 gap, 1544,7-1546,0 broadband 1544,8-1546,0 upper split band
		1544,8	1546,0	140	140	160	130	-	-	-	3	lower split band
	F	1543,6	1546,0	120	120	130	100	-	-	-	3	1543,9-1544,8 gap, upper split band
		1544,3	1546,0	70	68	86	46	-	-	-	2	lower split band
												1546,0 end of observation
	IIIGG DCIM Grains	1539,3	1544,2			700	30					
	Cont	1540,8	1543,0								6	
5.Feb. *	H	0908,1	0909,5	320	290	320	290	-	-	-	5	
		0908,3	0910,5	280	180	290	160	0,621	230	0909,0	4	broadband, patchy, HB
		0909,5	0920,5	160	100	160	100	^0,112	130	0913,0	3	split bands, patchy, HB
	F	0908,8	0909,9	140	120	150	120	-	-	-	3	patchy, HB
		0909,0	0913,5	86	60	86	55	^0,074	66	0911,0	2	narrowband, patchy
	IIIGG	0904,6	0909,7			84	30					overlaps,0907,0-0908,6 380-120 MHz type II and type III emission disturbed type III and type II overlap 0904,3-0906,7 pulses in ch 6
7.Feb. *	II	1253,7	1255,3	300	290	450	290	-	-	-	5	HB
		1257,5	1258,3	220	220	230	200	-	-	-	4	patchy, split bands
	IIIGG	1251,3	1253,4			500	30					
	IIIGG	1254,3	1256,4			280	30					overlaps, in ch 3 and 4 disturbed

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1982												
7.Feb.	Cont	1252,0	1257,0								6	in ch 2 and 3 IS overlaps
8.Feb.												1250,7-1256,3 in ch 3 and 4 elongated patches, bandlike features, disturbed type II bands
*	IIIGG/V	1246,7	1258,0			450	30					1246,7-1250,5 undisturbed, overlaps
	II	1310,0	1313,5	70	50	70	46	0,070	57	1312,0	2	HB, IS and IIS overlap ch 3,2,1
9.Feb.	II	0924,7	0926,1	350	290	350	290	-	-	-	5	patchy
*		0924,1	0929,8	280	230	290	220	^0,181	250	0926,0	4	patchy, HB, 0924,4-0925,3 ripples
	IIIG	0925,2	0925,7			290	50					overlaps
9.Feb.	II	1408,3	1413,7	70	46	86	46	0,089	68	1411,0	2	narrow split bands, HB, IS, IIIS overlap in ch 3,2,1
*	Spikes	1403,5	1408,5								4	
10.Feb.	II	0949,0						^0,275			3	merges into type I Cont, type IS overlaps
*												
	IIIGG	0942,3	0946,7			380	30					
11.Feb.	H	1217,2	1220,2	125	115	150	100	0			3	1219,2-1220,2 patchy
*	F	1217,1	1220,3	68	52	70	40	0			2	HB in ch 1 and 2, 1219,2-1220,2 patchy
	IIIGG/V	1208,9	1214,4			450	30					
	IIIG,b	1215,3	1217,3			500	30					type III stop frequencies near 100 MHz
14.Feb.	H	0944,8	0951,2	140	100	160	100	0,112	120	0947,0	3	split bands, HB
*		0947,0	0958,0	86	46	86	46	0,061	66	0951,0	2	HB
	F	0944,9	0950,3	80	46	80	46	0,095	60	0947,0	2	split bands near start
		0947,0	0953,7	42	30	46	30	0,030	38	0951,0	1	patchy, narrow split bands, 0944,5-0949,3 overlap
	IIIGG	0944,5	0949,3			330	30					overlaps
	IIIG	0954,4	0955,7			230	50					overlaps

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch.	remarks
1982												
14.Feb.	IIIGG	0933,7	0943,7			450	30					
23.Feb.	H	0935,2	0936,6	130	100	130	100	^0,165	115	0936,0	3	narrowband
*		0938,4	0944,0	70	46	70	46	^0,083	58	0941,5	2	narrowband
	F	0935,0	0936,4	68	58	68	58	-	-	-		narrowband, patchy
	IIIG	0935,7	0936,1			290	35					superposed
	DCIM	0934,8	0937,7								5/4	
7.March	H	1355,8	1359,0	155	110	160	100	0,205	135	1357,0	3	HB in ch 4 and 3, 1357,5-1359,0 split band
*	F	1355,8	1359,1	75	58	86	58	^0,083	68	1357,0	2	1357,5-1359,0 narrowband
	IIIGG	1351,9	1354,4			360	46					
20.March	H	1501,8	1504,1	350	350	380	300				5	negative drift, narrowband, patchy, 1504 step
*		1504,0	1506,8	250	200	250	200	0			4	narrowband, patchy
	F	1505,7	1506,8	130	110	130	110	^0,206	120	1506,5	faint, narrowband	
2.Apr.	H	0911,4	0914,6	240	180	290	160	^0,361	210	0913,0	4	0913,4-0914,5 HB
*		0912,7	0919,0	160	100	160	100	0,154	130	0916,0	3	split bands, HB, near 1020 faint drifting feature in ch 2
	F	0911,5	0914,2	160	100	160	100	-	-	-	3	split bands, HB
		0912,8	0919,0	82	46	86	46	0,095	68	0915,0	2	split bands, 0916,5-0919,0 HB
		0919,8	0920,7	42	39	42	39	0,033	41	0920,3	1	faint, narrowband
	IIIGG	0906,1	0910,8			450	30					DP
7.Apr.	H	1229,1	1231,2	130	100	130	100	0,247	120	1230,0	3	narrowband
*	F	1229,0	1230,2	66	52	66	52	0,134	59	1230,0	2	narrowband
	IIIGG	1220,2	1223,9			360	30					
	DCIM,RS											
10.Apr.	H	0942,9	0946,4	140	100	150	100	0,154	120	0944,0	3	split bands, patchy, HB
*		0950,5	0951,6	73	68	73	68	^0,083	70	0951,0	2	faint, patchy, narrowband
	F	0942,8	0946,6	72	48	72	48	0,095	60	0945,0	2	narrowband, elongated patches
		0950,6	0951,8								1	elongated patches

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1982												
10.Apr.	IIIG,RS DCIM	0938,3	0940,6			330	30					
22.Apr. *	II	1332,4	1346,5	46	30	46	30	0,024	38	1338,0	1	1332,4-1334,3 HB, 1334,3-1336,0 gap, 1337-1341 split bands 1341,2-1343,0 gap, faint narrowband IS in ch 2,3,4
2.June *	II	<1519,3	1527,2	140	100	140	100	^0,112	120	1523,0	3	HB, patchy, start not observed
		1527,3	1531,8	86	68	86	68	0,078	77	1530,0		1528,0-1533,0 HB
		1537,0	1541,5	36	30	36	30	0,030	33	1539,0	1	split bands, 1540 merge into F
	H	1535,7	1541,0	140	100	150	100	0,137	150	1538,0	3	1537,8-1541,0 HB
		-	1544,2	-	46	86	46	-	-	-	2	H overlaps F near 1539, 1543-1544 HB
		1546,0	1548,1	46	35	46	35	0,059	40	1547,0	1	split bands, HB
	F	1534,3	1540,0	70	-	86	46	^0,067	68	1538,0	2	1540, merges into H
		1539,5	1545,9	46	30	46	30	-	-	-	1	1545-1546 HB, overlaps type II, 1542-1544 overlaps H
	IIIGG	1544,3	1545,5			230	30					overlaps
	H	1546,9	1549,3	135	100	160	100	-	-	-	3	patchy, split bands, HB, HB in ch 2
		<1553,5	155,7	-	46	-	46	-	-	-	2	faint, narrowband
	F	1548,7	1549,0	50	50	50	46	-	-	-	2	
		1548,7	1553,7	42	30	46	30	0,041	36	1551,0	1	1549,3-1551,7 gap, 1549,5-1553,5 no observation ch 2-6 1600,3-1602,5 drifting features in ch 1 and 2
3. June *	II	0410,8	0414,3	68	-	68	50	-	-	-	2	narrowband, patchy 0414,3-0418,0 ch 1,2,3 patchy features IIIGG overlaps 0416-0418 start of H and F in ch 1,2,3 overlaps broad emission bands from 0418,5, 0418,0-0426,6 HB in ch 3, F and H cannot be separated
		0423,8	0428,5	80	55	86	50	0,095	70	0427,0	2	split bands
	H1	0429,4	0430,1	100	100	120	100	-	-	-	3	
		0429,3	0430,3	80	-	86	66	-	-	-	2	
	F1	0429,5	0430,3	50	50	53	46	-	-	-	2	
		0429,6	0430,4	46	38	46	35	-	-	-	1	

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1982												
3.June	H2	0432,6	0434,2	135	100	135	100	0,309	117	0433,3	3	narrow split bands
	F2	0432,0	0434,6	60	60	68	50	^0,121	64	0433,3	2	patchy, HB
3.June	II	0444,2	0448,6	55	55	70	48	^0,070	60	0446,0	2	patchy, split bands, HB
	H	0837,7	0838,5	260	200	260	200	-	-	-	4	HB
*		0846,7	0848,4	120	110	130	110	^0,145	115	0847,5	3	HB
		0841,7	0842,6	146	130	140	13	-	-	-	3	0840,8-0842,0 HB in ch 3 and 4
	F	0837,3	0838,5	125	100	125	100	0,442	112	0838,0	3	narrowband
		0846,7	0848,4	50	46	62	46	^0,074	50	0847,5	2	patchy, HB
	IIIG	0837,1	0837,9			290	30					overlap
3.June	H	1146,5	1151,2	230	160	290	160	^0,181	220	1148,0	4	HB in ch 4 and 5
*		-	1158,0	160	100	160	100	^0,123	125	1153,0	3	HB overlaps F, 1157-1159 merges into type IVm
	F	1146,4	-	140	-	150	100	-	-	-	3	1149-1152 merges into H and type IV
	II	1203,3	1210,0	40	40	44	37	-	-	-	1	drifting features, 1202,4-1211,0 overlaps type IV dm,m
9.June	H	1251,0	1252,1	55	53	78	53	-	-	-	2	split bands
*	F	1251,4	1252,2	40	40	40	38	-	-	-	1	narrowband
	IIIG	1248,8	1250,6			80	30					
15.June	H	0825,3	0827,2	64	53	70	53	-	-	-	2	patchy, HB
*	F	0826,2	0828,0	36	32	46	32	-	-	-	1	narrowband, drifting features
15.June	H1	1514,5	1519,5	120	100	140	100	^0,123	112	1517,0	3	narrowband, HB
*		1517,4	1525,0	86	46	86	46	^0,695	66	1521,0	2	
		1524,0	1531,8	46	30	46	30	^0,028		1525,0	1	faint, patchy, gaps
	F1	1515,2	1519,2	50	46	53	46	-	-	-	2	faint patchy, HB
		1519,5	1525,6	38	30	42	30	-	-	-	1	patchy, HB
	H2	1529,3	1530,0	62	46	62	46	^0,148	52	1529,5	2	split bands
	F2	1529,3	1530,0								1	drifting band; drifting features, 1535,5-1543,3 HB in ch 1 and 2
4.July	H	0449,6	0452,0	120	100	142	100	^0,190	115	0451,0	3	split bands, HB
*		0450,9	0453,8	86	68	86	60	^0,095	79	0452,5	2	HB

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1982												
4.July	F	0449,8	0450,3	68	56	70	52	-	-	-	2	faint, split bands
	II	0457,7	0500,5	70	68	74	55	^0,067	72	0459,0	2	patches with negative drift
		0502,8	0505,0	50	46	45	46	0				narrowband
9.July	H	0743,8	0806,0	86	46	86	46	0,013	66	0751,0	2	HB in ch 2 and 3
*		0759,0	0814,0	42	40	46	30	^0,019	38	0806,0	1	0810-0814 gaps, split bands
	F	0744,0	0757,3	42	30	46	30	^0,018	38	0751,0	1	0757,0-0758,6 HB, F and H broad-band, overlap 0746-0754
	IIIGG/V DCIM	0735,4	0744,0			600	30					
12.July	II	0946,2	0948,7	160	120	160	120	0,190	140	0947,5	3	narrowband, patches, IIIG overlap 0946,7-0947,3
*												III overlap in ch 3 and 4, Cont overlaps
13.July	II	1004,4	1007,3	60	46	60	46	^0,070	53	1006,0	2	narrowband, patchy, IS and IIIS overlap
*												
22.July	II	1720,9	1725,4	38	32	46	30	^0,028	36	1723,0	1	narrowband, patchy, faint
*												
14.Aug.	II1	0511,8	0513,8	48	48	60	46	0			2	
*	II2	0521,3	0522,7	52	50	52	48	-	-	-	2	narrowband feature
	II3	0521,2	0523,3	42	38	44	38	^0,030	40	0522,0	1	narrowband, drifting features but type II uncertain
	IIIG/V	0506,9	0510,5			260	30					
17.Aug.	H	1520,0	1524,8	130	100	160	100	0,137	115	1522,5	3	patchy, split bands, in ch 2 and 3 HB
	F	1520,4	1523,9	68	46	68	46	^0,067	56	1522,0	2	patchy, split bands, HB
		1521,9	1525,1	46	40	46	30	0,030	43	1523,0	1	patchy, HB
	IIIGGb	1520,0	1524,0			160	30					overlaps
	IIIG/V	1516,3	1519,4	280	30							
15.Sept.	H	0609,2	0614,6	86	46	86	46	^0,056	66		2	0612-0614,6 HB, 0613,2-0614,6 split bands
	F	0608,6	0613,0	48	46	50	46	0,044	47	0611,0	2	narrowband feature, upper split band of F

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1982												
15.Sept.	F	0610,0	0614,6	46	35	46	30	0,033	40	0612,0	1	narrowband, 0616-0618 no measurement
19.	II	1459,3	1514,4	40	40	46	35				1	negative drift, 1506-1510, 1502-1505 gap, 1510,2-1511,2 gap, HB,DP fibers emerge from a horizontal band toward higher and lower frequencies.
												near 1530 a broadband Cont rises gradualy
												type II emission uncertain
21.Oct.	II	0741,0	0748,4	70	46	80	46	0,051	58	0745,0	2	narrowband, HB
7.Dec.	H2	0920,0	0927,1	80	46	86	46	^0,067	68	0921,0	2	broadband, overlaps with F 0922-0925
		0925,0	0932,0	46	42	46	35	^0,021	38	0928,0	1	HB
	F2	0920,0	0925,6	42	30	46	30	^0,030	38	0923,0	1	
	H1	0918,6	-	50	-	55	46	^0,067	-	-	2	merges into H2 0921,0
	F1	0918,8	-	34	-	38	30	-	-	-	1	0921 merges into F2
	IIIG	0913,8	0918,3			240	30					horizontal features in ch 1,2,3
9.Dec. *	II	1133,0	1134,9	42	32	46	32	^0,038	38	1134,0	1	1132-1135 HB
9.Dec. *	II	1158,6	1203,8	44	32	44	32	0,033	38	1202,0	1	faint, narrowband, patchy
16.Dec. *	II	1009,8	1011,5	130	100	130	100	^0,165	115	1010,5	3	faint narrowband feature, type II uncertain, fiber?
												narrowband type IVdm
	IIIGG/V DCIM IVdm	1002,8	1019,7			1000	30					
1983												
11.Feb.	II1	1328,0	1332,3	38	36	46	34	^0,027	36	1330,0	1	1323-1332,5 HB
*	II2	1343,2	1344,3	34	30	36	30	-	-	-	1	HB
4.March *	H	0713,8	0724,6	68	46	68	46	0,078	57	0717,0	2	0721-0722 HB, 0722,5-0724,6 narrow-band, drifting feature

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1983												
4.March	F	0714,5	0715,5	34	32	34	32	-	-	-	1	HB
10.March	II	0850,4	0850,8	120	110	120	110	-	-	-	3	narrowband, drifting feature
		0853,0	0857,1	60	46	70	46	0,056	56	0855,0	2	patchy, HB in ch 2 and 1
		0856,0	0901,6	44	40	46	36	0			1	patchy, HB
	IIIN	0836,0	0911,0			80	30					
25.March	H	1431,3	1438,0	58	46	60	46	0,051	57	1434,0	2	1431-1435 split bands
		1434,3	1447,8	46	32	46	30	0,022	38	1440,0	1	HB, split band
	F	1431,8	1436,1	32	30	39	30	-	-	-	1	1432,3-1433,7 fiber
1.May	II	144,1	1447,0	70	60	75	55	-	-	-	2	split bands, patchy, ripples
*		1451,4	1452,1	36	40	40	30	-	-	-	1	negative drift feature
	IIIG	1451,3	1451,7			70	30					
10.May	H	1210,3	1211,2	260	200	260	200	-	-	-	4	patchy
*		1213,5	1215,1	140	120	140	120	^0,309	130	1214,5	3	HB
	F	1213,6	1214,3	72	68	72	68	-	-	-	2	faint narrowband
	IIIGb	1212,2	1212,6			60	30					overlaps
11.May	H	1424,6	1425,3	140	125	140	125	-	-	-	3	narrowband
*	F	1424,7	1425,4	68	53	68	53				2	narrowband
25.May	H	0955,5	0956,7	150	160	160	150	-	-	-	3	patchy
*		0956,8	0958,3									no observation
		0958,3	1001,0	130	100	160	100	-	-	-	3	HB, 0951,3-0953,2 HB in ch 2
		1003,4	1005,1	70	55	70	55	^0,134	63	1004,5	2	1003,5-1005,0 HB narrowband patchy
	F	0958,3	1000,6	70	55	75	55	^0,056	64	0959,5	2	patchy, narrowband
	IIIG	0949,8	0953,5			380	30					
	DCIM											
6.June	H	1351,2	1354,4	70	60	70	50	-	-	-	2	narrowband patchy, negative drift, feature
*		1350,9	1354,8	42	35	46	30	^0,049	40	1353,0	1	HB, elongated patches
	IS										4	
26.June	II	1410,3	1416,7	210	200	290	160	-	-	-	4	multiple event F and H cannot be

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1983 26.June *												separated distinctly 1410,3-1412,8 broadband, HB; 1412,8-1413,8 290-260 MHz drifting band, 1413,8-1414,8 290-220 MHz narrow drifting band, 1414,6-1416,7 narrow drifting band, patchy, spikes
		1409,6	1417,8	110	110	160	100	-	-	-	3	1409,6-1410,8 diffuse patches, 1410,8-1412 split bands, 1413,0-1414,0 split bands, patchy 1415,0-1417,8 drifting edge, HB
		1411,6	1415,9	86	46	86	46	-	-	-	2	1413,8-1415,9 zero drift, 1413,1-1414,3 elongated patches
		1415,0	1420,4	70	46	80	46	^0,095	64	1418,0	2	split bands, HB
		1415,6	1419,8	46	30	46	30	^0,038	38	1417,5	1	1418,2-1419,5 HB, 1415,6-1417,6 elongated patches 1414,2-1414,7 DP
	IIIGb	1410,5	1410,7			80	30					
	Spikes RS	1408,2	1409,8								5	
26.June		1523,2	1524,3								2	horizontal narrowband
17.Oct.	II	1221,4	1223,3	40	37	46	37	^0,028	38	1222,0	1	narrowband
	IIIB	1222,9	1223,0			46	30					
	IIIGG/RS	1210,4	1214,6			280	30					
1984 12.Feb.	II	0938,2	0952,0	46	30	46	30	^0,018	38	0944,0	1	faint narrowband, HB 0938,6-0939,3; 0939,3-0940,3 gap
16.Feb.	H	0900,6	0904,1	300	180	300	160				4	0902-0904 negative drift; 0900,6-0903,0 $\Delta f/\Delta t \sim 3,340$ broadband, HB
	F	0900,6	0903,8	180	140	180	100				3	0902,5-0903,8 negative drift;

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1984 16.Feb.												0901,0-0901,3 $\Delta f/\Delta t$=1,633
												0901-0903 overlaps with type IVm
	II	0904,2	0915,1	120	125	160	100	0,117	125	0910,9	3	split bands, patchy, HB, type IVm overlaps H,F,II; 0914,8-0918,4 HB
	IIIG	0903,1	0905,6			260	30					
	IIIGU	0858,2	0900,7			650	30					1 f cutoffs
												0856 start of IVm in ch 1 and 2
												0904 gap of 0,5 min. in ch 1 and 2
												0901-0904 crosstalk in ch 5 and 6 from lower ch's
29.March *	H	1504,3	1505,1	140	120	150	100	^0,413	125	1504,5	3	patchy, HB
	F	1504,2	1504,9	71	60	71	60	-	-	-	2	steplike feature
	IIIGG/RS	1457,3	1502,6			650	30					
	DCIM											
13.Apr. *	II	1039,0	1148,0	68	46	68	46	^0,083	57	1043,0	2	narrowband
		1043,3	1051,1	46	30	46	30	0,025	38	1048,0	1	1048,6-1050,8 split bands
23.Apr. *	II	1640,2	1643,0	62	50	65	46	^0,089	56	1642,0	2	narrow split bands, gaps
												1642,7 faint drifting feature in ch 1
27.Apr. *	H	0543,1	0545,3	280	230	300	160	^0,271	260	0544,3	4	0544,4-0545,3 split bands
								1,805		0543,0	4	
		0544,6	0545,6	160	140	160	14	-	-	-	3	fibers
	F	0543,0	0545,3	160	130	160	100	^0,275	125	0544,0	3	0544,4 split bands
								1,233		0543,3	3	
		0544,1	0545,6	86	70	86	70	-	-	-	2	split band, lower split band
	IIIGG/RS	0538,3	0542,7			540	30					1 f cutoffs
	spikes											
	DP											
29.Apr. *	II	0507,6	0510,2	140	110	150	110	^0,206	125	0509,0	3	split bands, HB

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1984												
29.Apr.	II	0516,7	0519,2	80	70	86	50	^0,078	65	0517,0	2	narrow split bands
5.May	II	1149,3	1153,7	68	58	80	50	^0,038	63	1151,0	2	HB narrowband
*												
9.May	II	1543,4	1548,3	130	100	100	100	0,165	130	1546,0	3	1543,0-1545,7 lower split band, 1546,5-1548,3 upper split band
*	II F	1551,3	1558,3	80	43	86	43	0,070	68	1556,0	2	narrow split bands, HB in ch 2 and 1
	H	1553,0	1557,2	42	32	46	32	0,044	36	1555,0	1	narrow split bands, patchy
	IIIG/RS	1541,2	1542,6			450	180					
31.May	H	1122,7	1152,8	68	48	80	46	0,061	65	1145,5	2	1146,0-1147,4 HB, 1142,6-1144,2 patchy
*	F	1141,7*	1149,0	36	30	46	30	0,028	36	1145,0	1	1143,5-1146,3 HB, 1143,5-1146,0 elongated patches 1142,4-1143,5 gap
	II	1203,3	1208,3	42	30	42	30	0,030	35	1207,0	1	narrow split bands, gaps
16.Nov.	H	1418,1	1427,0	70	-	86	46	^0,067	60	1421,0	2	broadband, gradual decline
	F	1418,3	1421,1	40	40	40	32	^0,027	36	1420,0	1	1421,0 split band feature
21.Nov.	H	1131,8	1133,5	150	120	160	110	0,224	125	1132,5	3	broadband, spiky, 1135,3-1136,8 HB in ch 2
*	F	1132,3	1133,7	80	48	80	48	0,167	68	1133,0	2	spiky, HB
	IIIGG/V b,spikes	1125,3	1129,3			500	30					
1985												
22.Feb.	H	1248,3	1253,6	140	100	150	100	0,137	115	1251,0	3	
	F	1248,4	1254,4	70	46	86	46	0,070	68	1251,0	2	intense spiky HB with pos. and neg. drifts
22.Apr.	H1	1640,0	1641,1	400	290	400	290	8,33	360	1640,8	5	drift speed problematical
*		1640,9	1641,8	290	160	290	160	2,708	230	1641,3	4	
		1641,7	1642,2	160	110	160	100	-	-	-	3	split bands
	F1	1641,0	1641,7	150	100	160	100	0,137	130	1641,3	3	split bands
		1641,7	1642,1	80	68	80	68	-	-	-	2	patchy
	H2	1642,0	1646,2	150	120	160	110	0,123	145	1643,0	3	HB

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1985 22.Apr.	F2	1642,0	1644,3	86	55	86	55	0,095	66	1643,0	2	
24.Apr.	II	0924,8	-	290	-	>300	100	-	-	-		0926,3 merges into type IV Cont; type II uncertain. 0921,4-0926,3 IIIGGdm, 1 f cutoff drifts 350-100 MHz
2.May *	II	0757,3	0803,6	70	65	70	60	^0,074	44	0759,0	2	narrowband, patchy, 0880,0-0801,6 no observation
		0803,9	0809,1	46	32	46	32	0,038	38	0807,0	1	narrowband
27.June *	H	1704,3	1709,8	80	50	86	50	0,111	66	1707,0	2	faint HB
	F	1706,3	1706,8	35	32	36	32	-	-	-	1	narrowband
31.July *	H	0729,1	0730,1	125	110	130	110	0,353	117	0729,5	3	faint split bands
	F	0729,1	0730,2	60	50	60	50	0,223	55	0729,6	2	faint split bands
	IIIG	0719,3	0724,1			80	30					
14.Dec. *	H	1251,3	1253,0	210	170	210	160	-	-	-	4	faint patches
		1253,2	1254,4	160	130	160	100	^0,247	130	1253,5	3	spiky patches, HB in ch 4 and 3
	F	1252,2	1254,3	70	64	75	46	^0,134	65	1253,5	2	patchy
1986 4.Feb. *	II	1026,2	1026,7	200	200	240	200	-	-	-	4	
		1026,6	1030,3	150	130	150	130	0,274	140	1028,0	3	1029,3-1030,2 zero drift, narrowband 1027,2-1028,0 gap, 1028,8-1029,3 gap
7.Feb. *	II	1013,1	-	270	-	290	-	0,333	230	1015,0	4	1016 merges into type IVdm Cont
	RS	1012,0	1012,3			290	160					
	IIIG	1012,4	1013,5			220	30					
	IVdm,m	1012,9										
15.May *	II	0956,4	0958,3	66	55	68	46	0,190	58	0957,0	2	narrowband
	IIIGG	0949,5	0951,0			650	50					
	IIIG	0952,9	0953,4			55	46					in ch 4 IS, DC

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch	remarks
1987												
19.5.	II	1810,0	1814,3	46	37	46	30	0,048	38	1812,0	1	no measurement in ch 2
*		1809,5	1814,0	110	110	160	100	-	-	-	3	HB
	IIIGG	1759,3	1806,3			650	30					
17.9.	H	1512,8	1518,3	80	70	86	55	^0,121	70	1515,0	2	faint, patchy
*	F	1515,2	1520,4	38	30	42	30	^0,024	34	1518,0	1	indicated by a few faint features
16.Oct.	II	0958,8	-	160	100	160	100	-	-	-	3	1101 merges into type IIIGG/V
*												1001,5-1013 no measurement
	IIIGG/V	0955,8				260	30					

LIST OF THE SUPPLEMENTARY TYPE II BURSTS

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1968 01.06.	II	1633,1	1636,8	142	115	146	110	0,103	129	1634,9	3	horizontal stria, patchy, narrowband, faint
02.11.	II	1511,3	1517,9	37	30	38	30	-			1	afew patches, narrowband
30.12.	II	1434,2	1436,6	42	36	42	36	-			1	faint stria
1969 28.05.	II	1304,9	1309,0	70	50	72	50	0,056	60	1306,9	2	narrowband, patchy
	III G	1309,1	1311,2			310	30					
1970 06.01.	II	1412,2	1417,3	46	36	46	36	0,030	31	1414,7	1	narrowband, splitband
30.08.	II	1320,2	1321,8	150	140	160	140	^0,103	145	1321,0	3	narrowband, patchy
	III GG	1312,8	1318,0			500	160					
1971 21.04.	II	0620,1	0620,7	50	46	50	46	-			2	faint, narrowband
1972 30.08.	II	0656,7	0659,1	125	110	135	110	0,123	117	0658,0	3	narrowband
1973 18.05.	H	1532,7	1535,3	150	130	160	120	-			3	narrowband, patchy, step 1633,1, near 1633 III G overlaps
	F	1534,0	1535,3	60	58	64	48	-			2	faint stria
	III GG	1527,2	1533,2			400	30					
16.06.	II	1434,1	1437,0	37	30	46	30	^0,033	33	1435,5	1	narrowband, faint patches
	III GG,RS	1421,7	1425,3			650	30					
08.09.	II	1721,3	1721,7	270	270	280	260	-			4	16.06

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1978												
03.04.	II	0533,3	0540,4	70	54	70	54	0,042	62	0537,0	2	faint, narrowband, gap from 0634,2-0639,7
23.04.	II	-	0459,2	-	48	74	48	^0,103	61	-	2	start of Weissenau record 0556,3. start of event not observed.
17.05.	II	0425,8	0427,7	86	62	86	62	0,111	74	0426,7	2	narrowband
22.06.	F1	1703,7	1723,0	46	30	46	30	0,015	38	1710,0	1	broadband
	H1	1700,7	1718,0	^62	46	80	46	0,032	54	1709,0	2	broadband, HB 1810-1814
	F2	^1723,0	1754,0	^42	34	46	30	0,024	38	1733,0	2	broadband
	H2	^1720	^1748	^70	^48	86	46	0,020	59	^1734	2	broadband
	III GG	1657,3	1703,5			500	30					
	IV dm	1704	1749			700	160					
31.08.	II	1246,4	1250,9	86	46	86	46	0,083	66	1248,6	2	narrowband
18.09.	F	0931,7	0932,4	140	120	160	110	-			3	patchy, HB
	H	0931,7	0932,4	260	200	280	190	-			4	patchy, HB
	III GG	0929,2	0930,4			480	30					spikes
1979												
11.03.	F	0700,4	0701,2	38	34	38	34	-			1	two horizontal stria
	H	0658,7	0701,7	66	48	80	46	^0,067	57	0700,2	2	
	III GG	0658,2	0702,8			200	30					superposed
05.06.	F	^0519,2	0526,2	42	36	46	30	-			1	horizontal stria
	H	^0518	-	^86	-	86	46	-			2	merges into type IV m
	III GG	0457	0518			510	30					
	IVm	^0526	^0650			160	30					merges into type IV dm
	IVdm	^0510	^0650			1000	160					
13.06.	F	0405,5	0408,5	60	46	64	46	^0,083	53	0407,0	2	narrowband
	F	0412,2	0413,2	36	34	36	34	-			1	
	H	0409,0	0411,0	70	50	74	50	0,083	60	0410,0	2	
	I										2,3	
14.09.	F	0723,7	0725,4	40	32	42	32	^0,024	36	0724,5	1	patchy

Date	F,H,other types	t_{st} UT	t_{end}	f_{st} MHz	f_{end}	f_{max} MHz	f_{min}	$\Delta f/\Delta t$ MHz/sec	f_{cent} MHz	t_{cent} UT	ch No.	remarks
1979												
14.09.	H	0722,6	0724,6	66	68	72	60	-			2	horizontal stria
	III G	0720,8	0721,4			160	30					
1980												
28.11.	F	1446,2	1448,3	74	68	74	66	^0,048	71	1447,2	2	narrowband
	H	1443,7	1447,6	140	120	142	115	^0,095	130	1445,7	3	narrowband patchy
1982												
01.07.	II	1606,4	1607,8	160	120	160	110	-			3	type III overlaping
	II	1606,3	1607,2	200	190	210	190	-			4	
	III G	1606,4	1607,8			220	30					
01.08.	II	0718,0	0719,7	32	30	35	30	-			1	4 stria
1983												
25.02.	II	0709,3	0712,2	66	56	68	56	0,067	61	0710,8	2	narrowband
1987												
15.03.	II	0633,6	0638,5	74	46	80	46	0,110	60	0636,1	2	narrowband
24.07.	II	1730,5	1742,0	42	30	46	30	^0,021	36	1736,0	1	narrowband, patchy