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F. Jackson, D. Vandemark, S. Bailey, C. Vaughn, and D. Hines
NASA Goddard Space Flight Center
Greenbelt, Maryland and Wallops Island, Virginia

J. Ward and K. Stewart
Computer Sciences Corporation
Wallops Island, Virginia

B. Chapron
SM Systems and Research Corporation
Landover, Maryland

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771

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1.0 MISSION OVERVIEW

The NASA/Goddard Space Flight Center K_u-band radar ocean wave spectrometer (ROWS) instrument was flown in the SAXON-FPN (SAR and X-Band Ocean Nonlinearities Experiment-Forschungsplattform Nordsee) experiment in the North Sea in the Fall of 1990 for the purpose of documenting the wave conditions in the vicinity of the FPN research tower in terms of the directional wave spectrum (DWS) of the longer, energy-containing waves (reference 1).

The ROWS measurement technique, although indirect, has been demonstrated to be capable of yielding accurate, high-resolution estimates of the DWS of waves longer than 75 m or so (references 2-6). However--and as stated at the outset of our participation in the experiment--measurement fidelity could not be assured for much shorter wavelengths or for seas with significant wave heights much below 2 m, mainly because of the relative lack of training data in this range. As wave heights in SAXON-FPN were for the most part less than 2 m, this caveat should be kept mind. Further, in SAXON-FPN, in addition to this basic measurement fidelity uncertainty, the short wavelength response of the instrument has been compromised somewhat in the data processing as discussed in section 3. Thus, for the DWS data set presented here it is suggested that the data be used only to determine the dominant modes, namely their wavelength and direction. If the modes are relatively long (> 100 m), the data should give the relative strengths (vis-a-vis slope) of different directional components to within about 20%.

The ROWS was operated on all ten NRL (Naval Research Laboratory) P-3 flights in SAXON. These flights took place between November 1, 1990 and November 20, 1990. The instrument failed only on one day (November 2); however, a data system problem, unrealized at the time of the recording, resulted in substantial data loss on several other days, particularly on November 15 and November 19 when no data at all was recorded on the ROWS digital data acquisition system (DAS). Fortunately, however, some redundancy was achieved by cross strapping the ROWS to the NRL DAS (via the ROWS IF signal), and data for these missing days may be recovered if need be from the NRL data set (these data are not contained in this report).

The ROWS was operated in SAXON in two modes (Figure 1). Most of the time the ROWS was operated in its 'spectrometer mode'; less frequently data were taken in the instrument's 'altimeter mode' (see, for example, reference 7). This report contains only spectrometer mode data. However, if it should be deemed worth while at some point to analyze the altimeter mode data for near nadir cross section data for surface investigations (reference 7) or for providing additional data for computing the sensitivity coefficient α (the modulus squared of the essentially constant (in wavenumber) modulation transfer function--cf. references 2 and 3) for the ROWS for absolute scaling of the DWS, these data can be processed with existing software with little trouble, and a few altimeter mode files have been archived on disk for this eventuality.

Spectrometer mode data were collected between 12,000 and 27,000 feet altitudes, usually in about a half hour period at a given flight level, and generally in the immediate vicinity of the FPN tower, within about 20 km; on a few occasions, however, we failed to record ROWS data in the immediate vicinity of the tower, and for these occasions we shall have to rely on a few DWS estimates obtained as far as 30 km from the tower.

Table 1 summarizes the ROWS data collected in SAXON. Approximately one third of the total data collected in SAXON have been selected for processing. We have elected to process the data uniformly in fixed records consisting of either 10 or 12 antenna rotations, or equivalently 100 or 120 seconds of continuous 100 Hz pulse return data (yields 10 or 12 M-byte records). The selected files are shown in Table 2. The wave spectra reported here are in the form of:

(1) Hard copy polar plots of peak-scaled slope DWS in raw and symmetrized form (shown here as Figures 5-52), and

(2) Matrices of same data in ascii format on DOS-generated diskettes (available on request).

Scaling factors for the spectra to convert them to geophysical units may be supplied in the near future.

Table 1. ROWS data summary for SAXON-FPN

NRL P3 FLIGHT	1990 DATE	GMT	06	07	08	09	10	11	12	13	14	15	16	SAXON PRIORITY
1	1 NOV								ssNNssss					3
2	2 NOV		------------------NO DATA------------------											3
3	5 NOV			NN		aaa		sssN						3
4	6 NOV						sN		HH		ssN			1
5	8 NOV						s	sa			ss			1
6	14 NOV						ss							2
7	15 NOV							N						2
8	16 NOV		ssNN			s								?
9	19 NOV							N			N			2
10	20 NOV			saN		ssN								3

Key: ROWS data takes within any quarter hour period are indicated by:
a = altimeter mode data
s = spectrometer mode data
N = ROWS data recorded on NRL data acquisition system

2.0 DATA COLLECTION

The ROWS was operated in SAXON for the first time with a new digital DAS consisting of a 386-33 PC configured with a Signatec 10 ns resolution, 8 bit A/D board and an Exabyte tape drive (reference 8). Owing to the relatively short time for preparation and the limited resources available to the activity, the new system could not be configured exactly as desired. In particular, on board display was bare-bones (e.g., the system could only display every 16th waveform) and certain ancillary data, particularly navigation data, could not be logged on the DAS, as the necessary interfacing to the NRL P-3 inertial navigation system (INS) was not carried out. We thus have to rely on the NRL DAS navigation data (reference 9) and on the navigator's log for those times when the NRL DAS or aircraft INS malfunctioned. Pitch and roll from a stand-alone

Table 2. Processed Spectrometer Mode Data for SAXON-FPN

Dir.	File hhmmss	# of Rots	Alt Kft	Spd m/s	Hdg °T	Lat ddmm	Lon ddmm	Run ID	Comments
NOV01	120117	12	21.5	162	088	5442	0715	N003	N = NRL run ID
	121037	12	21.5	146	261	5442	0716	?	Tape problems;
	133729	12	15.0	130	065	5435	0658	N008	no processed data
	133929	12	15.0	130	065	5439	0710	N008	as yet for day.
NOV05	112710	10	16.2	126	044	5442	0648	A003	A = A/C nav log ID
	113131	10	16.2	152	220	5422	0651	A004	2 runs 15 nmi SW FPN
NOV06	142250	10	18.0	158	220			A	Nav data missing
	142641	10	18.3	131	045			A	
	143541	10	18.3	160	313			A	[Run near tower]
	143958	10	18.3	132	036			A	
	144516	10	18.3	155	182			A	[Run near tower]
NOV08	104436	10	16.0	123	012	5431	0714	N001	
	105054	10	16.0	145	188	5447	0708	N002	
	144500	10	12.3	138	351	5440	0717	N006	
NOV14	103120	10	21.5	160	025	5438	0707	A001	
	103340	10	21.5	160	025	5446	0714	A001	
	103849	10	21.5	144	213	5452	0707	A002	
	104429	10	21.5	161	040	5446	0721	A003	
	105248	10	21.5	145	198	5450	0726	A004	
NOV16	065109	12	21.5	111	301	5445	0711	N001	
	065716	12	21.5	143	130	5440	0703	N002	
	070240	12	21.5	115	306	5440	0713	N003	
	094634	12	16.0	118	280	5443	0712	N007	Estimated gnd. spd.
	095247	12	16.0	135	101	5449	0705	N008	based on 50 kt wind
NOV20	092306	12	24.0	130	143	5444	0707	N007	Estimated gnd. spd.
	093003	12	24.0	130	352	5441	0711	N008	for all files
	093951	12	24.0	130	226	5444	0713	N009	
	094151	12	24.0	130	226	5440	0702	N009	

sensor was recorded, but these data were not precise or accurate enough to be useful. Nevertheless, despite these shortcomings, the new DAS performed according to specification. Rather uniquely, this DAS permitted uninterrupted data recording at the full ROWS pulse repetition rate of 100 Hz for practically unlimited periods (up to 3 hours of data).

Some of the system-related problems affecting the data collection and data quality in SAXON were:

1) Tape recording failure: Failure of the data system to record data occurred on several occasions, and resulted in total data loss on two days. It is now generally recognized that this problem can be mitigated by exercising the tape prior to actual recording of data.

2) Asynchronous operation of the digitizer: This results in a small range jitter that mainly

affects the inferred significant wave height in the instrument's altimeter mode. (This problem has since b... orrected. The digitizer was properly synchronized with the radar just prior to the Grand Banks ERS-1 SAR Waves Experiment in October, 1991).

3) Acquired signal level: Because of the lack of better on-board display estimation of signal level was often poor, and resulted in generally lower than desired digitizer counts. Thus in addition to the usual residual Rayleigh fading noise, digitizer noise may affect the data.

4) Aircraft attitude and antenna alignment (mainly relative pitch up): This results in more beam motion (incidence angle variation) than desirable, and may also produce an azimuth error. Data quality can be checked on this score by examining the window statistics on an individual sector basis using the --.LST outputs (see section 3).

5) Time tag and position uncertainties: Times listed here, which are used as file IDs, are PC tic times which have not been precisely tied to UT. This contributes to a position uncertainty of the order of ± 5 km in the along track direction.

6) Shaft encoder: Only the zero degree azimuth bit functioned, and this could be noisy. To cope with this problem, the data are manually examined for the zero degree bit change, skipping to another rotation if the bit change is ambiguous.

7) Pulse dropouts: The occurrence of occasional pulse dropouts is related to the system gain setting.

8) Clock signal: There is some evidence of a low-amplitude clock signal in the data; it is possible that this may be contributing to the low frequency content of the spectra when the signal levels are low.

3.0 DATA PROCESSING

ROWS mainframe software has been rewritten in TURBO-C for running on a 486-33 cache PC. Tape reading and preprocessing steps are however accomplished by the QUICKBASIC program 'PREROWS', which can display data in several forms and write output files to another tape or to a hard disk (reference 10). For the SAXON data here, all selected files were first assembled on a system hard disk, and then processed in a batch mode with the TURBO-C program 'SAXSPEC'. Preprocessed pulse data on hard disk are also copied to Exabyte for permanent storage.

3.1 ROWS Algorithm for SAXON Data.

The following routines differ somewhat from the routines described in references 2 and 3, and are therefore noteworthy:

1) Range window: Inner and outer incidence angle limits are 7° and 20°, but the window may be smaller if the 10% of peak power points lie interior to this interval.

2) Delay time to surface range transformation: The rebinning of the 10 ns time bins into 12 m surface range bins involved a 24 m boxcar smoother; this results in a poorer resolution and a faster high-frequency rolloff than found in previous ROWS products (wavelengths shorter than 50 m highly attenuated). If so warranted, a second pass at processing the SAXON data set could be undertaken with 8 m rebinning using a 12 m smoother. An indication of the difference between the spectral products for these two rebinning routines is given by Figure 2, which shows the 360°-integrated nondirectional height spectra obtained with the two bin sizes using an example from the more recent SWADE experiment.

3) Azimuth sectors: An 18° sector is chosen for the basic pulse integration (50 pulse average). The spectra for these sectors are then interpolated and output in 12° azimuth bins in a true north oriented reference frame.

4) Average power estimation and normalization: The average power envelope estimate for any sector is given by a model function fit based on a skewed normal quasi-specular scattering cross section. Four parameters are derived from the average power envelope fit using a third degree polynomial approximation to the logarithm of the return power for each sector. While the fit is generally excellent, there is some low frequency content that is not accounted for, and so these data may have a fair amount of 'dc' component. From the cubic fit parameters we may recover pitch and roll and surface skewness (the last only if external attitude data are available), surface mean square slope, and principal axis direction. These parameters are listed in the last four columns of the sector summary data in the --.LST files (see section 3.2). After power normalization, the usual Hanning window is applied to the wave modulation signal.

5) Noise background subtraction and point target response: The average value of the spectrum in the highest 32 wavenumber bins in any azimuth sector is subtracted from the spectrum to produce a crude final estimate of the wave modulation signal spectrum. Until better characterization of overall system response, including the new digitizer, noise background is assumed flat and no point target correction is applied.

6) Scaling: The spectra provided here are modulation spectra, and have not been scaled so as to correspond to the actual directional wave slope spectrum. The directional slope spectrum S is obtained from the modulation spectrum data by dividing by the sensitivity coefficient α according to

$$S(K,\Phi)\ [m^2] = \alpha^{-1}\ [m]\ P_{mod}(K,\Phi)\ [m]$$

where $S = K^2 F(K,\Phi)$, F being the directional height spectrum in m^4. As described in references 1 and 2, α is a function of the cross section rolloff and altitude which can either be directly estimated from the parameters of the average power data or alternatively, in the absence of such data can be estimated from the observed wind speed through the wind-speed dependence of the mean square slope parameter. Also once converted to height spectra, scaling can be done using the (buoy) observed wave height. We will attempt to provide such scaling as an addendum to this report in the near future.

7) Spectral resolution and degrees of freedom: The FFT surface range window generally is much larger than the actual data window and so the record for FFT will generally be padded with zeros outside of the actual data window. Therefore the spectral resolution will be less than that indicated by the elementary wavenumber bin size. The elementary wavenumbers are given by:

$$K_j = (j-1)*(256 \text{ X } 12 \text{ m})^{-1},\ j = 1,2,3...256$$

where 12 m is the nominal surface range resolution bin for processing. The elementary resolution is given by K_1 = 0.0003255 cpm. Since the actual effective record lengths are closer to 1000 m than the 3072 m FFT record, the true resolution is less, and there is a high correlation overlap between spectral estimates in adjacent elementary wavenumber bins. For data compression, we block average the data in logarithmically spaced intervals to produce 32 output bins as shown in Table 3 along with the estimated degrees of freedom. Directionally, the ROWS resolution is about 20° for the shortest waves, and on the order of 30° for the longer waves (100-200 m wavelengths), the exact resolution depending on aircraft altitude.

Table 3. Wavenumber Bins and Degrees of Freedom
in Directional Spectrum Estimates

FFT Bin Numbers	Number of Bins Avg'd	Wavenumber Range (cpm)	DOF for 10 revs.	Correlation Overlap
1-7	Zeroed	0-	n/a	n/a
8-15	1	0.0022786	40	100%
16-31	2	0.0050456-	40	Small overlap
32-63	4	0.0105794-	80	Negligible overlap
64-127	8	0.0216471	160	Negligible overlap

3.2 Data Products.

Peak-scaled wavenumber slope spectra in raw (asymmetrical) and folded (symmetrical) form are given in the following polar contour plots (with linearly spaced contour levels). Matrices of these data are available on request in ascii format on DOS diskette (including the position data missing on the polar plots) as --.SRF files under directories for each flight day. In addition to the DWS data, output listings of sector by sector processing statistics corresponding to each data file are given as --.LST files. Examples of --.SRF and --.LST files are given in Figures 3 and 4.

The presentation of ROWS data in raw as well as symmetrized form permits some assessment of data quality based simply on the appearance of the raw spectra. If very asymmetrical, this may be an indication of poor aircraft attitude for example. Examination of the time series of the cubic fit parameters in the --.LST files, will show immediately if there is any untoward attitude excursions during the data take. Another aircraft attitude effect may be seen as an unseemly pulling toward the origin evident in some spectra as a result of a shorter record length when the beam moves in toward the 7° nadir angle inner boundary.

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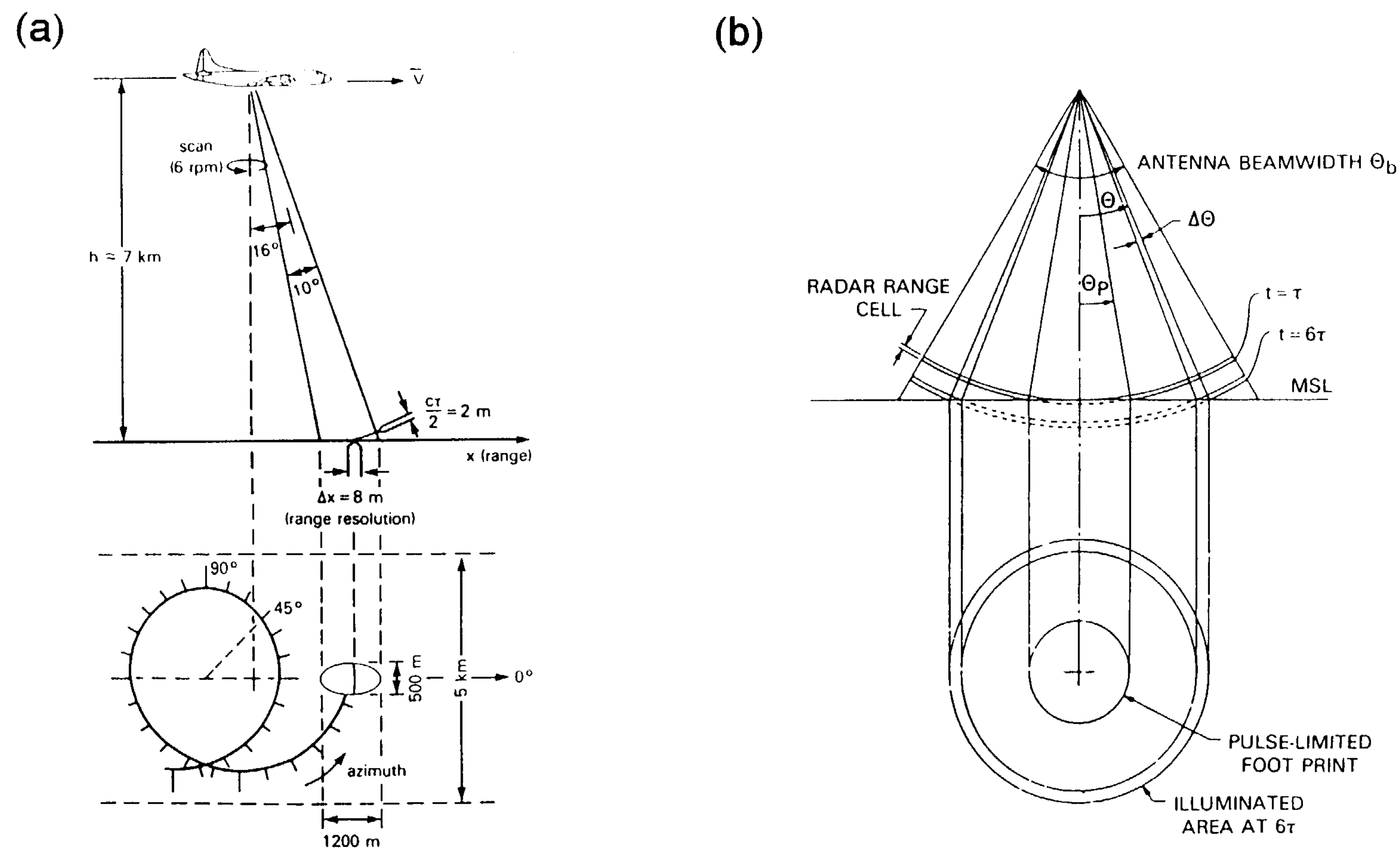
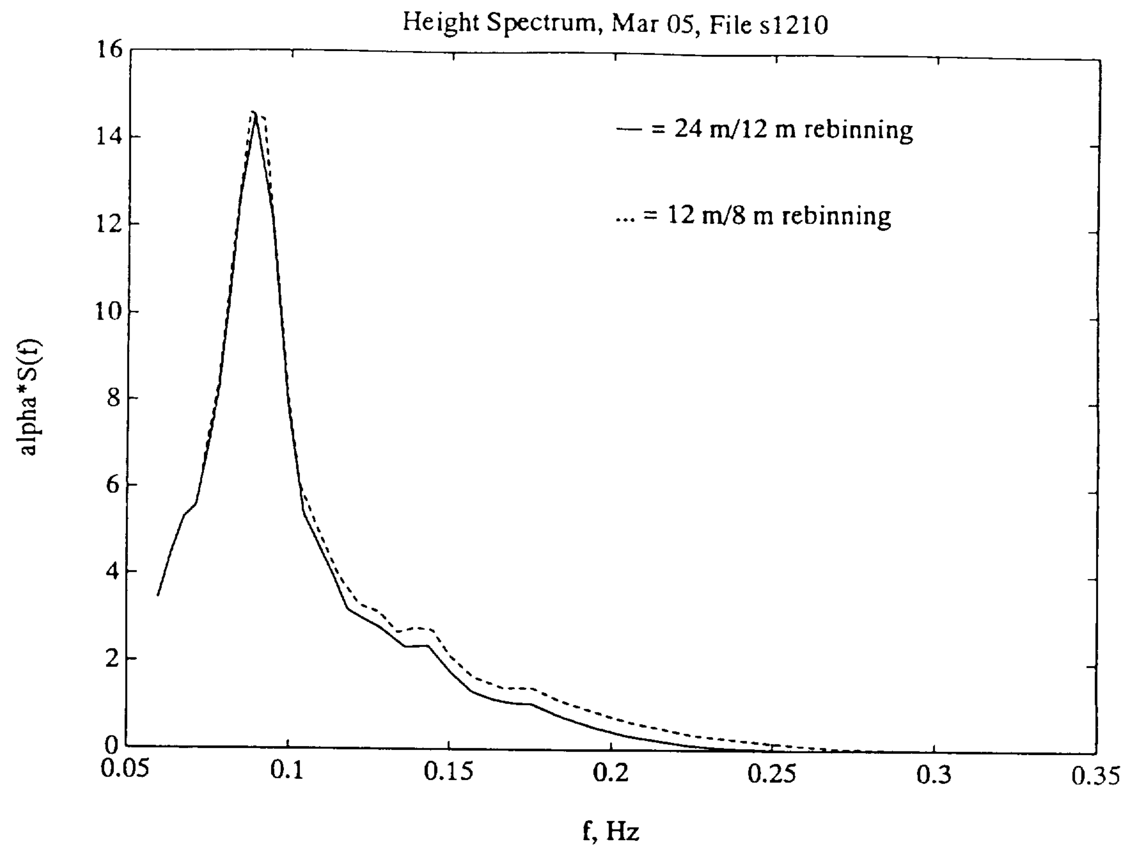


Figure 1. ROWS measurement geometries, (a) spectrometer mode, and (b) altimeter mode.



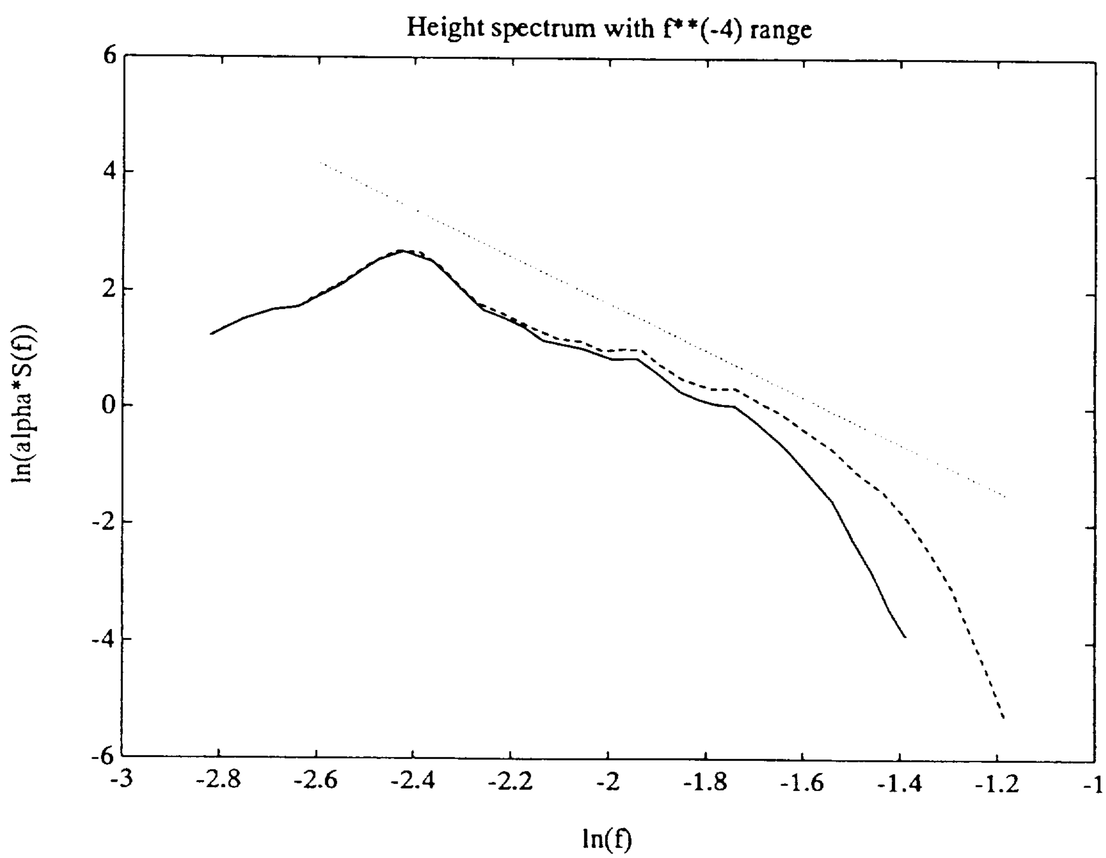


Figure 2. ROWS nondirectional spectrum in the frequency domain for two implementations of the delay time to surface range rebinning routine. This example is from the SWADE experiment, 1991.

u112710.srf Fri Sep 18 09:28:05 1992 1

\ROWS SPECTROMETER MODE OUTPUT - SAXON-FPN
\Input file: p:\rawspec\1105\112710.raw, Output file: 112710.srf
\Time =11:29: 0, Lat. =, Long. =
\Gnd. Speed = 126.0(m/s), Heading =44.0 (deg.)
\Offset=1047 records, X-axis spacing = 12.0
\SWH*sqrt(Alpha)=2.256 (m^0.5), Spectrum Peak =0.00050797 (m), Folded Spectrum Peak =0.00050407 (m)
33 31

0.0	358.7	346.4	334.5	322.5	310.6	298.3	286.4	274.4	262.5	250.2	238.3	226.3	214.4	202.1	190.1	178.2	166.3	154.0	142.0	130.1	118.1	105.8	93.9	82.0	70.0	57.7	45.8	34.5	22.6	10.7
0.0022786	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1160	0.1871	0.0000	0.0000	0.3308	0.2903	0.2502	0.2011	0.0000	0.0000	0.2988	0.2948	0.1014	0.2970	0.0000	0.3257	0.4032	0.3303	0.2532	0.2165	0.3696	0.0000
0.0026042	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1288	0.2039	0.0000	0.0000	0.2890	0.3081	0.2640	0.2357	0.0000	0.0000	0.3096	0.2840	0.1936	0.2923	0.0000	0.3026	0.3694	0.3616	0.2797	0.2279	0.3198	0.0000
0.0029297	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1750	0.1504	0.2096	0.0000	0.0000	0.2123	0.2867	0.2714	0.2458	0.0000	0.0000	0.2718	0.2657	0.2011	0.2788	0.0000	0.2431	0.2986	0.3305	0.2856	0.2051	0.2274	0.0000
0.0032552	0.0000	0.1068	0.0000	0.1696	0.1282	0.0000	0.1185	0.1757	0.1709	0.2038	0.0000	0.1112	0.1467	0.2500	0.2778	0.2283	0.1005	0.0000	0.2202	0.2610	0.2007	0.2639	0.0000	0.1856	0.2316	0.2572	0.2698	0.1722	0.1580	0.0000
0.0035807	0.0000	0.1100	0.0000	0.1817	0.1495	0.0000	0.1191	0.1936	0.1723	0.2036	0.0000	0.1477	0.1142	0.2102	0.2785	0.1917	0.1073	0.0000	0.1887	0.2756	0.1911	0.2487	0.0000	0.1521	0.1909	0.1799	0.2294	0.1514	0.1498	0.0000
0.0039062	0.0000	0.1321	0.1162	0.1955	0.1915	0.0000	0.1331	0.2090	0.1472	0.2220	0.0000	0.1551	0.1082	0.1725	0.2633	0.1497	0.1109	0.0966	0.1839	0.2948	0.1784	0.2319	0.0000	0.1412	0.1716	0.1253	0.2060	0.1415	0.1796	0.0857
0.0042318	0.0000	0.1603	0.1298	0.1964	0.2292	0.0835	0.1527	0.2086	0.1091	0.2447	0.0000	0.2125	0.1106	0.1394	0.2284	0.1144	0.1061	0.0983	0.1889	0.3001	0.1697	0.2181	0.0000	0.1411	0.1563	0.0950	0.1797	0.1272	0.1988	0.0975
0.0045573	0.0000	0.1031	0.1755	0.1906	0.2477	0.0935	0.1776	0.1922	0.0803	0.2420	0.1692	0.1905	0.1064	0.1149	0.1039	0.0921	0.0978	0.1248	0.1873	0.2064	0.1654	0.2173	0.0000	0.1424	0.1367	0.0766	0.1629	0.1048	0.1866	0.1261
0.0050456	0.1143	0.1802	0.2770	0.2144	0.2397	0.1215	0.1957	0.1549	0.0858	0.1846	0.1753	0.1362	0.0848	0.1070	0.1346	0.0826	0.0909	0.2027	0.1792	0.2543	0.1566	0.2486	0.0850	0.1392	0.1148	0.0586	0.1455	0.0877	0.1485	0.1627
0.0056966	0.1347	0.1312	0.3639	0.2309	0.2412	0.1484	0.1538	0.1151	0.1471	0.1603	0.1692	0.1193	0.0980	0.1540	0.1066	0.0953	0.1088	0.3852	0.2334	0.2247	0.1522	0.2825	0.1347	0.1348	0.1098	0.0708	0.1096	0.0957	0.1247	0.1769
0.0063477	0.1200	0.1227	0.4507	0.4521	0.2791	0.2036	0.1269	0.1102	0.1934	0.1870	0.1327	0.1366	0.1669	0.2370	0.0983	0.1262	0.1944	0.6888	0.3908	0.1943	0.1605	0.2323	0.1433	0.1527	0.0931	0.1281	0.0631	0.0759	0.1113	0.1454
0.0069987	0.1217	0.2379	0.7202	0.4767	0.2931	0.2059	0.1706	0.1328	0.1470	0.1462	0.0988	0.1409	0.1695	0.2678	0.1044	0.1555	0.3730	0.9464	0.5470	0.2192	0.1406	0.1517	0.1246	0.1800	0.1021	0.1801	0.0591	0.0882	0.1182	0.1033
0.0076497	0.1665	0.4741	1.0000	0.5786	0.4213	0.1463	0.2033	0.1490	0.0734	0.1418	0.0950	0.1618	0.0978	0.2043	0.1041	0.1826	0.3524	0.9846	0.6372	0.3420	0.1174	0.1201	0.1764	0.1906	0.1591	0.2044	0.1049	0.1492	0.1106	0.0813
0.0083008	0.2299	0.4819	0.9041	0.8035	0.6496	0.1683	0.1952	0.1128	0.0753	0.1942	0.1014	0.1941	0.0539	0.1607	0.1127	0.2146	0.5564	0.9040	0.6742	0.3768	0.1285	0.1424	0.2281	0.1828	0.1694	0.2197	0.1285	0.1684	0.0638	0.0702
0.0089518	0.2298	0.3455	0.6955	0.7463	0.7001	0.2122	0.1667	0.0729	0.1112	0.2188	0.0871	0.1976	0.0901	0.1873	0.1239	0.2087	0.4443	0.8794	0.6528	0.2432	0.1329	0.1946	0.2247	0.1717	0.1274	0.2223	0.1077	0.1459	0.0608	0.0511
0.0096029	0.1687	0.3330	0.4916	0.4233	0.5382	0.1724	0.1232	0.0760	0.1210	0.1759	0.0640	0.1789	0.1119	0.1773	0.1253	0.1677	0.4208	0.8722	0.6158	0.1598	0.1128	0.2195	0.2101	0.1728	0.1036	0.1887	0.0742	0.0991	0.0952	0.0477
0.0105794	0.2050	0.2609	0.3478	0.3428	0.3508	0.1259	0.1226	0.0937	0.0850	0.1034	0.0725	0.1542	0.1067	0.1016	0.1028	0.1444	0.3948	0.7055	0.3247	0.1875	0.1397	0.1598	0.1910	0.1776	0.1405	0.1315	0.0634	0.0822	0.1016	0.0833
0.0118815	0.1367	0.1328	0.3733	0.3190	0.1618	0.1095	0.1008	0.0609	0.0830	0.1038	0.0980	0.1220	0.0777	0.0763	0.1397	0.1312	0.2849	0.4423	0.2436	0.1541	0.2057	0.1527	0.0953	0.1743	0.1737	0.1328	0.0702	0.1106	0.0926	0.0717
0.0131836	0.0839	0.0976	0.1636	0.1785	0.1470	0.1233	0.1091	0.1043	0.0999	0.0575	0.0976	0.0852	0.0671	0.0999	0.0620	0.1602	0.3544	0.2262	0.3110	0.1420	0.1930	0.1293	0.0695	0.0864	0.1185	0.0944	0.0581	0.0853	0.0924	0.1320
0.0144857	0.0684	0.1900	0.1588	0.1154	0.1436	0.1076	0.1267	0.0820	0.0937	0.0470	0.0701	0.0565	0.0810	0.0908	0.0557	0.1342	0.2132	0.1077	0.3165	0.1748	0.1198	0.1464	0.0579	0.0408	0.1211	0.0835	0.0624	0.0585	0.0736	0.1017
0.0157878	0.0696	0.1145	0.1688	0.1357	0.1319	0.0897	0.1141	0.0763	0.0895	0.0544	0.0404	0.0785	0.0459	0.0822	0.0456	0.1114	0.1036	0.1936	0.1771	0.1894	0.1020	0.0807	0.0534	0.0837	0.1028	0.0569	0.0674	0.0533	0.0784	0.0577
0.0170898	0.0792	0.0811	0.0765	0.0940	0.0967	0.0931	0.0967	0.0813	0.0937	0.0420	0.0389	0.0601	0.0420	0.0306	0.0508	0.1251	0.0712	0.1960	0.1070	0.0977	0.0919	0.0609	0.0883	0.0739	0.0826	0.0388	0.0611	0.0325	0.0699	0.0576
0.0183919	0.0470	0.0924	0.0630	0.0829	0.0884	0.1132	0.0853	0.0486	0.0343	0.0209	0.0682	0.0349	0.0412	0.0384	0.0431	0.0766	0.1022	0.1042	0.0669	0.0601	0.0543	0.0503	0.0684	0.0598	0.0455	0.0380	0.0371	0.0416	0.0432	0.0552
0.0196940	0.0294	0.0967	0.0688	0.0510	0.0918	0.0740	0.0386	0.0325	0.0228	0.0297	0.0406	0.0292	0.0447	0.0655	0.0354	0.0630	0.0990	0.0466	0.0447	0.0539	0.0328	0.0395	0.0306	0.0716	0.0563	0.0497	0.0392	0.0321	0.0527	0.0290
0.0216471	0.0531	0.0571	0.0460	0.0372	0.0565	0.0321	0.0256	0.0267	0.0284	0.0305	0.0173	0.0324	0.0232	0.0394	0.0308	0.0399	0.0447	0.0320	0.0363	0.0383	0.0381	0.0214	0.0324	0.0454	0.0312	0.0320	0.0211	0.0350	0.0374	0.0188
0.0242513	0.0340	0.0259	0.0329	0.0244	0.0257	0.0206	0.0135	0.0148	0.0269	0.0134	0.0191	0.0242	0.0230	0.0301	0.0197	0.0390	0.0318	0.0374	0.0271	0.0268	0.0208	0.0203	0.0207	0.0207	0.0201	0.0074	0.0165	0.0116	0.0177	0.0153
0.0268555	0.0169	0.0131	0.0225	0.0154	0.0167	0.0173	0.0096	0.0105	0.0195	0.0130	0.0108	0.0128	0.0144	0.0108	0.0145	0.0194	0.0295	0.0286	0.0236	0.0204	0.0155	0.0215	0.0192	0.0191	0.0110	0.0142	0.010	0.0112	0.0152	0.0079
0.0294596	0.0128	0.0073	0.0131	0.0076	0.0087	0.0089	0.0077	0.0102	0.0050	0.0073	0.0069	0.0081	0.0098	0.0078	0.0050	0.0064	0.0123	0.0099	0.0091	0.0095	0.0098	0.0146	0.0034	0.0037	0.0085	0.010	0.0087	0.0065	0.0078	0.0096
0.0320638	0.0020	0.0029	0.0043	0.0079	0.0047	0.0048	0.0036	0.0029	0.0016	0.0042	0.0022	0.0021	0.0049	0.0037	0.0037	0.0061	0.0049	0.0068	0.0064	0.0042	0.0057	0.0061	0.0046	0.0034	0.0037	0.0027	0.0044	0.0028	0.0032	0.0023
0.0346680	0.0016	0.0023	0.0014	0.0011	0.0020	0.0020	0.0009	0.0021	0.0022	0.0012	0.001	0.0007	0.001	0.0012	0.0006	0.0013	0.0013	0.0010	0.0008	0.0012	0.0011	0.0008	0.0015	0.0024	0.0017	0.0010	0.0011	0.0016	0.001	0.001
0.0372721	0.0000	0.0002	0.0003	0.0001	0.0003	0.0002	0.0003	0.0003	0.0001	0.0000	0.0006	0.0006	0.0001	0.0003	0.0002	0.0002	0.0003	0.0003	0.0002	0.0006	0.0006	0.0002	0.0002	0.0002	0.0001	0.0001	0.0004	0.0001	0.0002	0.0003
0.0398763	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0002	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000

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0.0	358.7	346.4	334.5	322.5	310.6	298.3	286.4	274.4	262.5	250.2	238.3	226.3	214.4	202.1	190.1	178.2	166.3	154.0	142.0	130.1	118.1	105.8	93.9	82.0	70.0	57.7	45.8	34.5	22.6	10.7
0.0022786	0.1013	0.0000	0.0000	0.1505	0.1485	0.0914	0.1496	0.0000	0.2226	0.2975	0.1664	0.1276	0.2758	0.3366	0.1261	0.1013	0.0000	0.0000	0.1505	0.1485	0.0914	0.1496	0.0000	0.2226	0.2975	0.1664	0.1276	0.2758	0.3366	0.1261
0.0026042	0.1187	0.0000	0.0000	0.1560	0.1431	0.0975	0.1473	0.0000	0.2174	0.2889	0.1822	0.1409	0.2604	0.3164	0.1330	0.1187	0.0000	0.0000	0.1560	0.1431	0.0975	0.1473	0.0000	0.2174	0.2889	0.1822	0.1409	0.2604	0.3164	0.1330
0.0029297	0.1239	0.0000	0.0000	0.1369	0.1339	0.1013	0.1405	0.0882	0.1983	0.2561	0.1665	0.1439	0.2103	0.2590	0.1368	0.1239	0.0000	0.0000	0.1369	0.1339	0.1013	0.1405	0.0882	0.1983	0.2561	0.1665	0.1439	0.2103	0.2590	0.1368
0.0032552	0.1151	0.1045	0.0000	0.1964	0.1961	0.1011	0.1927	0.0885	0.1796	0.2193	0.1296	0.1920	0.1606	0.2056	0.1400	0.1151	0.1045	0.0000	0.1964	0.1961	0.1011	0.1927	0.0885	0.1796	0.2193	0.1296	0.1920	0.1606	0.2056	0.1400
0.0035807	0.0966	0.1095	0.0000	0.1867	0.2142	0.0963	0.1053	0.0975	0.1635	0.1988	0.0906	0.1951	0.1339	0.1814	0.1403	0.0966	0.1095	0.0000	0.1867	0.2142	0.0963	0.1053	0.0975	0.1635	0.1988	0.0906	0.1951	0.1339	0.1814	0.1403
0.0039062	0.0754	0.1224	0.1072	0.1912	0.2450	0.0899	0.1839	0.1053	0.1454	0.1983	0.0632	0.2021	0.1258	0.1774	0.1759	0.0754	0.1224	0.1072	0.1912	0.2450	0.0899	0.1839	0.1053	0.1454	0.1983	0.0632	0.2021	0.1258	0.1774	0.1759
0.0042318	0.0577	0.1342	0.1149	0.1941	0.2667	0.1276	0.1868	0.1051	0.1261	0.2020	0.0479	0.1976	0.1198	0.1704	0.1642	0.0577	0.1342	0.1149	0.1941	0.2667	0.1276	0.1868	0.1051	0.1261	0.2020	0.0479	0.1976	0.1198	0.1704	0.1642
0.0045573	0.0464	0.1415	0.1513	0.1904	0.2691	0.1305	0.1990	0.0968	0.1122	0.1908	0.1238	0.1781	0.1064	0.1519	0.1562	0.0464	0.1415	0.1513	0.1904	0.2691	0.1305	0.1990	0.0968	0.1122	0.1908	0.1238	0.1781	0.1064	0.1519	0.1562
0.0050456	0.0992	0.1366	0.2417	0.1983	0.2489	0.1401	0.2239	0.1208	0.1134	0.1508	0.1178	0.1420	0.0870	0.1287	0.1498	0.0992	0.1366	0.2417	0.1983	0.2489	0.1401	0.2239	0.1208	0.1134	0.1508	0.1178	0.1420	0.0870	0.1287	0.1498
0.0056966	0.1159	0.1209	0.3775	0.2843	0.2347	0.1515	0.2198	0.1259	0.1420	0.1361	0.1209	0.1153	0.0976	0.1404	0.1428	0.1159	0.1209	0.3775	0.2843	0.2347	0.1515	0.2198	0.1259	0.1420	0.1361	0.1209	0.1153	0.0976	0.1404	0.1428
0.0063477	0.1240	0.1398	0.5742	0.4247	0.2385	0.1835	0.1810	0.1277	0.1744	0.1412	0.1314	0.1006	0.1224	0.1755	0.1228	0.1240	0.1398	0.5742	0.4247	0.2385	0.1835	0.1810	0.1277	0.1744	0.1412	0.1314	0.1006	0.1224	0.1755	0.1228
0.0069987	0.1397	0.3078	0.8397	0.5158	0.2581	0.1746	0.1624	0.1297	0.1648	0.1251	0.1405	0.1008	0.1298	0.1945	0.1046	0.1397	0.3078	0.8397	0.5158	0.2581	0.1746	0.1624	0.1297	0.1648	0.1251	0.1405	0.1008	0.1298	0.1945	0.1046
0.0076497	0.1759	0.5173	1.0000	0.6126	0.3846	0.1329	0.1629	0.1640	0.1330	0.1516	0.1509	0.1344	0.1245	0.1588	0.0934	0.1759	0.5173	1.0000	0.6126	0.3846	0.1329	0.1629	0.1640	0.1330	0.1516	0.1509	0.1344	0.1245	0.1588	0.0934
0.0083008	0.2240	0.5232	0.9110	0.7446	0.5171	0.1495	0.1701	0.1718	0.1301	0.1832	0.1618	0.1626	0.1120	0.1131	0.0922	0.2240	0.5232	0.9110	0.7446	0.5171	0.1495	0.1701	0.1718	0.1301	0.1832	0.1618	0.1626	0.1120	0.1131	0.0922
0.0089518	0.2210	0.3980	0.7935	0.7050	0.4753	0.1739	0.1821	0.1499	0.1426	0.1744	0.1559	0.1538	0.1189	0.1250	0.0882	0.2210	0.3980	0.7935	0.7050	0.4753	0.1739	0.1821	0.1499	0.1426	0.1744	0.1559	0.1538	0.1189	0.1250	0.0882
0.0096029	0.1695	0.3808	0.6872	0.5236	0.3517	0.1437	0.1777	0.1442	0.1489	0.1408	0.1273	0.1275	0.1063	0.1373	0.0872	0.1695	0.3808	0.6872	0.5236	0.3517	0.1437	0.1777	0.1442	0.1489	0.1408	0.1273	0.1275	0.1063	0.1373	0.0872
0.0105794	0.1761	0.3305	0.5327	0.4421	0.2713	0.1338	0.1423	0.1438	0.1323	0.1229	0.1028	0.1096	0.0952	0.1024	0.0938	0.1761	0.3305	0.5327	0.4421	0.2713	0.1338	0.1423	0.1438	0.1323	0.1229	0.1028	0.1096	0.0952	0.1024	0.0938
0.0118815	0.1350	0.2105	0.4109	0.3339	0.1592	0.1588	0.1277	0.0787	0.1296	0.1398	0.1163	0.0968	0.0949	0.0851	0.1065	0.1350	0.2105	0.4109	0.3339	0.1592	0.1588	0.1277	0.0787	0.1296	0.1398	0.1163	0.0968	0.0949	0.0851	0.1065
0.0131836	0.1230	0.2277	0.1964	0.2466	0.1456	0.1594	0.1201	0.0876	0.0939	0.0887	0.0967	0.0722	0.0768	0.0969	0.0977	0.1230	0.2277	0.1964	0.2466	0.1456	0.1594	0.1201	0.0876	0.0939	0.0887	0.0967	0.0722	0.0768	0.0969	0.0977
0.0144857	0.1021	0.2031	0.1343	0.2176	0.1605	0.1145	0.1376	0.0705	0.0678	0.0847	0.0774	0.0599	0.0703	0.0829	0.0793	0.1021	0.2031	0.1343	0.2176	0.1605	0.1145	0.1376	0.0705	0.0678	0.0847	0.0774	0.0599	0.0703	0.0829	0.0793
0.0157878	0.0912	0.1099	0.1826	0.1576	0.1619	0.0966	0.0981	0.0653	0.0873	0.0792	0.0491	0.0735	0.0500	0.0809	0.0521	0.0912	0.1099	0.1826	0.1576	0.1619	0.0966	0.0981	0.0653	0.0873	0.0792	0.0491	0.0735	0.0500	0.0809	0.0521
0.0170898	0.1029	0.0768	0.1383	0.1013	0.0979	0.0932	0.0794	0.0854	0.0844	0.0628	0.0392	0.0611	0.0381	0.0506	0.0546	0.1029	0.0768	0.1383	0.1013	0.0979	0.0932	0.0794	0.0854	0.0844	0.0628	0.0392	0.0611	0.0381	0.0506	0.0546
0.0183919	0.0623	0.0981	0.0842	0.0755	0.0749	0.0844	0.0683	0.0590	0.0475	0.0335	0.0535	0.0363	0.0417	0.0411	0.0495	0.0623	0.0981	0.0842	0.0755	0.0749	0.0844	0.0683	0.0590	0.0475	0.0335	0.0535	0.0363	0.0417	0.041.	0.0495
0.0196940	0.0470	0.0986	0.0581	0.0482	0.0734	0.0538	0.0393	0.0318	0.0476	0.0433	0.0455	0.0344	0.0387	0.0595	0.0324	0.0470	0.0986	0.0581	0.0482	0.0734	0.0538	0.0393	0.0318	0.0476	0.0433	0.0455	0.0344	0.0387	0.0595	0.0324
0.0216471	0.0469	0.0513	0.0393	0.0370	0.0478	0.0354	0.0237	0.0298	0.0372	0.0412	0.0248	0.0270	0.0344	0.0387	0.0250	0.0469	0.0513	0.0393	0.0370	0.0478	0.0354	0.0237	0.0298	0.0372	0.0412	0.0248	0.0270	0.0344	0.0387	0.0250
0.0242513	0.0368	0.0291	0.0354	0.0260	0.0265	0.0208	0.0171	0.0179	0.0240	0.0168	0.0134	0.0205	0.0174	0.0241	0.0176	0.0368	0.0291	0.0354	0.0260	0.0265	0.0208	0.0171	0.0179	0.0240	0.0168	0.0134	0.0205	0.0174	0.0241	0.0176
0.0268555	0.0183	0.0215	0.0257	0.0196	0.0187	0.0165	0.0157	0.0190	0.0194	0.0121	0.0126	0.0115	0.0129	0.0131	0.0113	0.0183	0.0215	0.0257	0.0196	0.0187	0.0165	0.0157	0.0190	0.0194	0.0121	0.0126	0.0115	0.0129	0.0131	0.0113
0.0294596	0.0097	0.0099	0.0116	0.0084	0.0092	0.0094	0.0112	0.0069	0.0054	0.0079	0.0085	0.0084	0.0082	0.0079	0.0074	0.0097	0.0099	0.0116	0.0084	0.0092	0.0094	0.0112	0.0069	0.0054	0.0079	0.0085	0.0084	0.0082	0.0079	0.0074
0.0320638	0.0041	0.0039	0.0056	0.0072	0.0045	0.0053	0.0049	0.0038	0.0026	0.0040	0.0025	0.0033	0.0039	0.0035	0.0030	0.0041	0.0039	0.0056	0.0072	0.0045	0.0053	0.0049	0.0038	0.0026	0.0040	0.0025	0.0033	0.0039	0.0035	0.0030
0.0346680	0.0015	0.0018	0.0012	0.001	0.0016	0.0016	0.0008	0.0018	0.0023	0.0014	0.0010	0.0009	0.0013	0.0012	0.0008	0.0015	0.0018	0.0012	0.001	0.0016	0.0016	0.0008	0.0018	0.0023	0.0014	0.0010	0.0009	0.0013	0.0012	0.0008
0.0372721	0.0001	0.0002	0.0003	0.0001	0.0004	0.0004	0.0002	0.0002	0.0001	0.0001	0.0003	0.0005	0.0001	0.0003	0.0003	0.0001	0.0002	0.0003	0.0001	0.0004	0.0004	0.0002	0.0002	0.0001	0.0001	0.0003	0.0005	0.0001	0.0003	0.0003
0.0398763	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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Figure 3. Example of peak-scaled wavenumber spectra contained on diskette as --.SRF files. Upper and lower matrices are respectively raw and folded (symmetrized) spectra. The first row entry is direction in degrees relative to true north, and the first column entry is wavenumber in cycles per meter. (Diskette also contains nondirectional spectrum).

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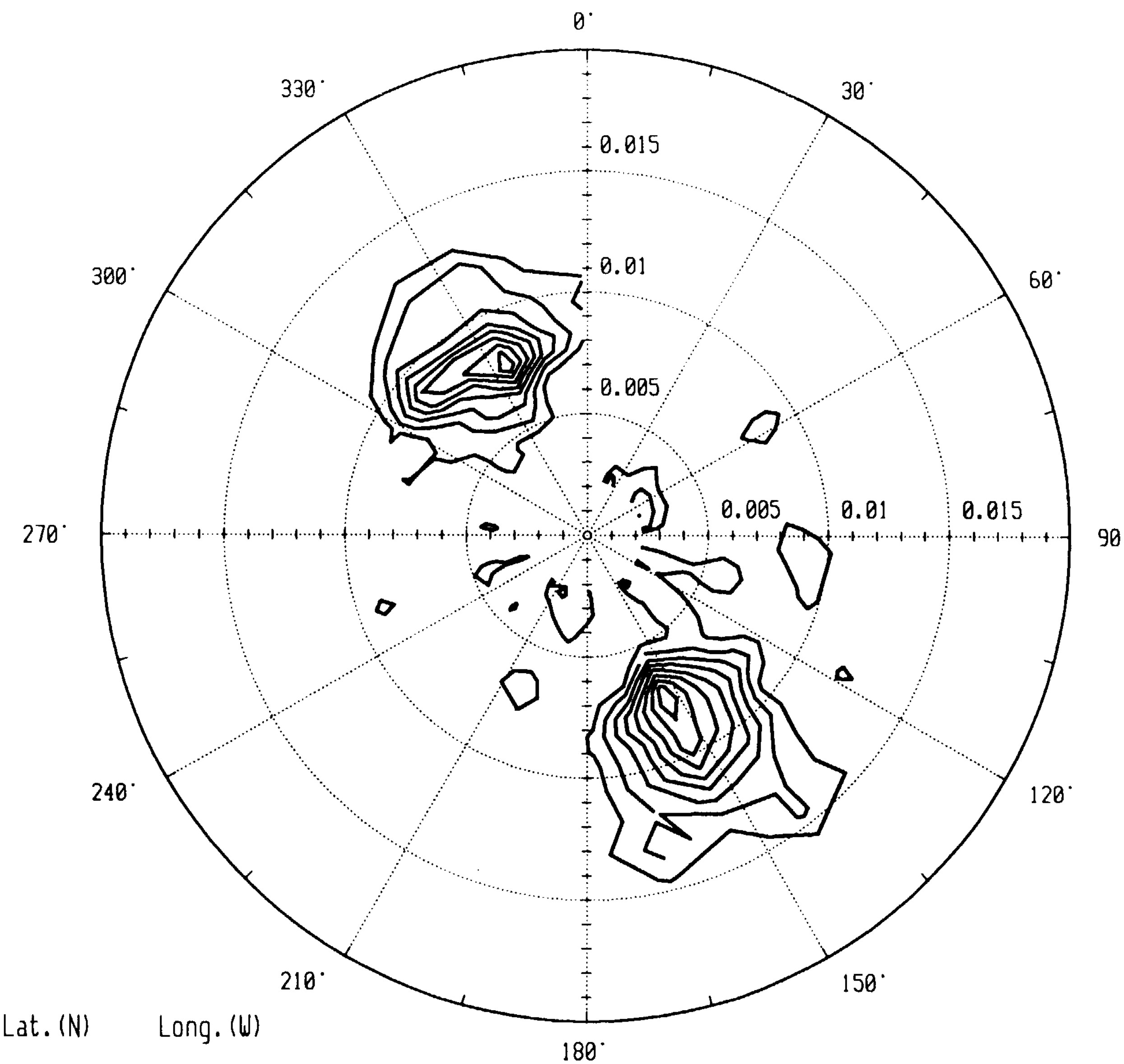
u112710.lst          Fri Sep 18 09:28:18 1992          1

\ROWS spectral processing SAXSPECT
\Input file: p:\rawspec\1105\112710.raw, Output file: 112710.srf
\Speed = 126.0(m/s), Heading =44.0 (deg.)
\Offset=1047 records, X-axis spacing = 12.0
\Time   sct roll  alt  shang  wfnois   window(deg)  modmax   pkwvnm   specpk   specnoiz  douts    cubic coefs
11:27:21   1 -1.0 4830.0  351 0.1393 9.93 20.02 38.6 4.557e-03 1.454e-04 1.287e-06  2 1.6327 -1.3893e-03 1.5357e-05 -1.3422e-08
11:27:21   2 -1.0 4830.0  339 0.1309 8.53 20.02 43.7 3.906e-03 1.592e-04 8.317e-07  1 1.2811 -7.6404e-04 1.3657e-05 -1.1265e-08
11:27:21   3 -1.0 4830.0  327 0.1453 8.04 19.74 48.1 3.581e-03 2.132e-04 6.477e-07  3 1.6556 -1.5023e-03 1.4572e-05 -1.1766e-08
11:27:22   4 -1.9 4830.0  315 0.1601 7.39 19.02 49.6 3.906e-03 3.267e-04 1.708e-06  6 1.7633 -7.4087e-04 1.2043e-05 -9.9803e-09
11:27:22   5 -0.9 4830.0  302 0.1389 6.97 18.97 55.0 4.232e-03 1.486e-03 1.843e-06  3 1.4000 1.6023e-03 7.8105e-06 -7.6192e-09
11:27:22   6 -0.8 4828.5  290 0.1371 6.97 18.73 55.9 3.581e-03 8.254e-04 1.396e-06  3 1.5571 1.3722e-03 8.2869e-06 -8.1571e-09
11:27:23   7 -0.7 4830.0  279 0.1257 6.97 18.48 56.4 4.232e-03 4.628e-04 2.993e-06  2 1.9376 -1.0730e-04 1.0736e-05 -9.5688e-09
11:27:23   8 -0.7 4830.0  267 0.1283 6.97 18.17 55.5 4.883e-03 3.955e-04 1.671e-06  3 1.5350 1.6509e-03 8.5348e-06 -8.7707e-09
11:27:23   9 -0.7 4830.0  254 0.1127 6.97 18.12 61.0 3.581e-03 1.751e-04 9.973e-07  3 1.7183 1.0699e-03 9.2075e-06 -9.0550e-09
11:27:24  10 -0.7 4830.0  242 0.1374 6.97 18.07 59.6 3.906e-03 2.244e-04 2.263e-06  1 1.3900 2.5937e-03 7.0385e-06 -8.0653e-09
11:27:24  11 -0.7 4830.0  230 0.1744 6.97 18.43 56.8 5.208e-03 9.037e-05 1.334e-06  0 1.9416 -1.5912e-03 1.4606e-05 -1.1881e-08
11:27:24  12  3.0 4830.0  218 0.1451 7.12 18.88 51.0 3.581e-03 1.642e-04 1.790e-06  3 2.1874 -2.4869e-03 1.4847e-05 -1.1442e-08
11:27:25  13  6.6 4828.5  206 0.1583 7.40 19.17 53.8 3.906e-03 3.613e-04 1.000e-06  0 1.0898 3.3773e-03 5.9810e-06 -7.4200e-09
11:27:25  14  6.5 4830.0  194 0.1270 7.26 19.55 57.0 3.581e-03 1.963e-04 1.017e-06  1 1.4166 3.7884e-04 1.0849e-05 -9.4555e-09
11:27:25  15 -1.3 4830.0  182 0.1072 7.66 19.64 54.9 3.581e-03 2.380e-04 1.604e-06  0 1.9442 -1.3489e-03 1.3219e-05 -1.0679e-08
11:27:26  16 -0.9 4828.5  170 0.1428 8.29 19.93 52.9 3.581e-03 1.571e-04 1.450e-06  0 0.7962 3.7974e-03 5.6162e-06 -7.1723e-09
11:27:26  17 -1.5 4830.0  158 0.1697 8.87 20.02 48.6 3.581e-03 2.119e-04 1.155e-06  1 1.7604 -5.7865e-04 1.1909e-05 -1.0271e-08
11:27:26  18  4.0 4830.0  146 0.1491 9.42 20.02 38.9 4.232e-03 1.617e-04 1.660e-06  1 1.4256 1.6338e-04 1.1496e-05 -1.0469e-08
11:27:27  19  3.6 4830.0  134 0.0968 9.73 20.02 37.0 3.581e-03 2.924e-04 1.807e-06  1 1.6780 -1.7577e-03 1.4484e-05 -1.1918e-08
11:27:27  20 -1.1 4830.0  122 0.1340 10.03 20.02 29.9 3.581e-03 6.262e-04 9.239e-07  5 1.0122 1.4404e-03 8.8871e-06 -9.1362e-09
11:27:27  21  1.2 4828.5  110 0.1282 10.23 20.02 24.7 4.557e-03 5.372e-04 9.337e-07  3 0.2985 4.5549e-03 2.9979e-06 -5.5993e-09
11:27:28  22  0.3 4828.5   98 0.1228 10.23 20.02 23.5 3.581e-03 2.217e-04 1.406e-06  2 1.1131 -1.5084e-03 1.4187e-05 -1.1732e-08
11:27:28  23 -2.0 4830.0   86 0.1263 9.93 20.02 21.9 4.232e-03 2.903e-04 1.625e-06  0 1.1790 -3.4745e-03 1.7992e-05 -1.3478e-08
11:27:28  24 -1.9 4828.5   74 0.1284 10.03 20.02 22.8 3.581e-03 1.645e-04 2.086e-06  0 1.0492 -1.8196e-03 1.4510e-05 -1.1625e-08
11:27:29  25  2.8 4828.5   62 0.1322 9.93 20.02 23.2 3.581e-03 2.035e-04 2.253e-06  2 0.6625 1.6640e-03 7.1658e-06 -7.1287e-09
11:27:29  26  1.0 4830.0   50 0.1375 9.83 20.02 26.3 3.581e-03 2.056e-04 1.796e-06  4 1.0001 -2.6363e-04 1.1086e-05 -9.4556e-09
11:27:29  27 -0.7 4828.5   38 0.1555 9.73 20.02 29.6 4.557e-03 3.413e-04 1.239e-06  1 1.5968 -4.3085e-03 1.9234e-05 -1.4087e-08
11:27:30  28 -0.7 4828.5   26 0.1237 10.23 20.02 31.6 4.232e-03 1.864e-04 9.354e-07  1 1.2200 -1.6517e-03 1.6060e-05 -1.3374e-08
11:27:30  29 -0.7 4828.5   14 0.1366 10.42 20.02 33.2 3.581e-03 9.656e-05 8.061e-07  0 1.5565 -2.6194e-03 1.8237e-05 -1.5206e-08
11:27:30  30 -0.6 4828.5    2 0.1418 10.33 20.02 36.3 4.883e-03 3.177e-04 8.779e-07  0 1.6009 -3.1819e-03 2.0239e-05 -1.6876e-08
11:27:31  31 -0.7 4830.0  351 0.1398 9.73 20.02 36.9 3.906e-03 1.438e-04 8.151e-07  0 1.4550 -1.9842e-03 1.7473e-05 -1.4771e-08
11:27:31  32 -0.6 4828.5  339 0.1181 9.21 20.02 45.1 4.232e-03 9.973e-05 1.661e-06  1 1.8280 -2.3295e-03 1.5781e-05 -1.2628e-08
11:27:31  33 -0.9 4828.5  327 0.1342 8.29 19.69 45.3 4.557e-03 3.296e-04 7.077e-07  1 1.9688 -3.5815e-03 1.8148e-05 -1.3670e-08
11:27:32  34   -1 4828.5  314 0.1474 7.66 19.07 56.8 3.581e-03 3.887e-04 6.155e-07  0 2.0838 -2.6303e-03 1.5913e-05 -1.2352e-08
11:27:32  35 -0.9 4828.5  302 0.0854 7.12 18.98 52.9 4.883e-03 5.316e-04 2.011e-06  0 1.5673 2.7054e-04 1.0680e-05 -9.3952e-09
11:27:32  36  2.8 4830.0  290 0.1598 6.97 19.02 59.1 3.581e-03 5.797e-04 2.556e-06  1 1.3977 1.5232e-03 8.9551e-06 -8.7988e-09
11:27:33  37 -2.7 4828.5  279 0.1331 6.97 18.63 51.7 5.208e-03 2.411e-04 2.644e-06  3 1.3880 2.4751e-03 6.7570e-06 -7.5933e-09
11:27:33  38  0.4 4828.5  266 0.1419 6.97 18.12 56.5 4.557e-03 2.392e-04 1.041e-06  3 1.7965 6.0204e-04 1.0248e-05 -9.6675e-09
11:27:33  39  0.1 4830.0  254 0.1297 6.97 18.02 60.4 3.581e-03 1.184e-04 9.599e-07  1 1.8965 2.2166e-03 6.3158e-06 -7.4761e-09
11:27:34  40 -1.2 4830.0  242 0.1384 6.97 17.91 59.5 3.581e-03 2.067e-04 1.215e-06  1 1.7205 2.8988e-03 5.6767e-06 -7.3487e-09
11:27:34  41 -1.2 4828.5  230 0.1270 6.97 17.97 62.3 3.581e-03 1.135e-04 6.906e-07  2 1.7448 3.2257e-04 1.2195e-05 -1.1329e-08
11:27:34  42 -1.2 4828.5  218 0.1469 7.12 17.91 61.3 3.581e-03 1.674e-04 8.400e-07  0 2.1773 -2.1436e-03 1.5890e-05 -1.2881e-08
11:27:35  43  3.6 4828.5  206 0.1496 7.12 18.17 61.4 3.906e-03 2.493e-04 1.069e-06  1 1.9932 -1.0035e-03 1.3508e-05 -1.1407e-08
11:27:35  44  4.8 4828.5  194 0.1639 7.40 18.53 57.6 3.581e-03 1.258e-04 1.110e-06  2 1.9282 -1.3963e-03 1.4242e-05 -1.1699e-08
11:27:35  45 -1.1 4828.5  182 0.1570 8.05 19.55 59.2 4.232e-03 2.979e-04 8.945e-07  2 2.1614 -2.6198e-03 1.5993e-05 -1.2631e-08
11:27:36  46   -1 4828.5  170 0.1402 8.17 19.36 49.1 3.581e-03 1.127e-04 1.186e-06  2 1.4937 -3.9628e-04 1.2912e-05 -1.1030e-08
11:27:36  47  1.4 4830.0  158 0.0973 8.53 19.83 44.8 3.581e-03 2.697e-04 1.593e-06  1 1.6606 -1.1929e-03 1.3544e-05 -1.1115e-08
11:27:36  48  0.5 4828.5  146 0.1285 8.99 20.02 40.3 3.581e-03 2.325e-04 6.629e-07  1 1.3052 2.5907e-04 1.0841e-05 -9.5718e-09
11:27:37  49  1.4 4830.0  134 0.1472 9.20 20.02 37.8 3.581e-03 2.418e-04 2.117e-06  2 1.1441 4.0165e-04 1.1072e-05 -9.8706e-09
11:27:37  50 -0.9 4830.0  122 0.1492 9.83 20.02 32.0 4.232e-03 1.313e-03 2.329e-06  1 0.9438 1.6950e-03 8.3422e-06 -8.5891e-09
11:27:37  51 -1.0 4828.5  110 0.1297 10.03 20.02 30.8 3.581e-03 1.576e-03 2.234e-06  1 0.6412 1.1276e-03 1.1122e-05 -1.0919e-08
11:27:38  52  2.6 4828.5   98 0.1151 10.42 20.02 25.3 4.232e-03 6.020e-04 8.908e-07  0 0.6194 4.1719e-03 2.3922e-06 -4.9989e-09
11:27:38  53  4.2 4828.5   86 0.1070 10.03 20.02 21.8 3.581e-03 3.820e-04 1.941e-06  3 1.1675 -2.7006e-03 1.6272e-05 -1.2659e-08
11:27:38  54  4.2 4828.5   74 0.1234 10.03 20.02 19.2 4.232e-03 1.060e-04 1.408e-06  2 0.7099 1.0471e-03 8.6085e-06 -8.1296e-09
11:27:39  55 -1.0 4828.5   62 0.0961 9.73 20.02 20.6 5.534e-03 3.216e-04 1.030e-06  1 0.7526 1.1768e-03 7.0605e-06 -6.4960e-09
11:27:39  56  4.5 4827.0   50 0.1006 9.94 20.02 21.0 3.581e-03 6.748e-05 1.228e-06  1 1.0342 -6.6987e-04 1.0876e-05 -8.6872e-09
11:27:39  57 -0.9 4828.5   38 0.1299 9.93 20.02 28.8 4.883e-03 1.980e-04 7.717e-07  1 1.0831 -1.6552e-03 1.4801e-05 -1.1866e-08
11:27:40  58  5.0 4828.5   26 0.1206 10.33 20.02 28.2 4.232e-03 2.266e-04 1.245e-06  0 1.2597 -1.3161e-03 1.4844e-05 -1.2751e-08
11:27:40  59  5.0 4828.5   14 0.1114 10.42 20.02 32.5 4.232e-03 4.628e-04 8.007e-07  1 1.6883 -3.3341e-03 1.9332e-05 -1.5884e-08
11:27:40  60 -1.1 4828.5    2 0.1342 10.13 20.02 35.8 3.581e-03 5.783e-05 2.955e-06  0 1.2476 -2.8848e-03 2.0433e-05 -1.6647e-08
11:27:41  61 -1.1 4828.5  351 0.1173 9.93 20.02 43.0 3.581e-03 2.981e-04 3.296e-06  0 1.2979 -8.9745e-04 1.5348e-05 -1.3479e-08
11:27:41  62 -0.9 4828.5  339 0.1144 8.99 20.02 41.9 3.581e-03 6.870e-05 4.700e-07  0 1.5569 -2.5473e-03 1.6922e-05 -1.3050e-08
11:27:41  63  1.7 4828.5  326 0.1095 7.79 20.02 52.6 3.581e-03 2.838e-04 6.481e-07  0 1.2478 -3.0924e-04 1.2981e-05 -1.0809e-08
11:27:42  64  0.8 4828.5  314 0.1490 7.40 19.36 51.8 3.581e-03 1.512e-04 3.686e-07  0 1.7834 -8.3044e-04 1.2024e-05 -9.7251e-09
11:27:42  65  2.4 4828.5  302 0.1454 6.97 18.83 56.0 4.883e-03 2.722e-04 1.373e-06  0 2.0940 -2.6417e-03 1.5356e-05 -1.1578e-08
11:27:42  66  2.3 4827.0  290 0.1814 6.98 18.63 55.5 3.581e-03 5.187e-04 1.351e-06  1 1.9484 -5.5433e-04 1.1426e-05 -9.6836e-09
11:27:43  67  4.4 4828.5  278 0.1559 6.97 18.22 56.4 3.906e-03 3.182e-04 1.795e-06  3 2.0253 3.5947e-04 9.0686e-06 -8.4497e-09
11:27:43  68  4.4 4827.0  266 0.1543 6.98 17.92 61.4 3.581e-03 7.384e-04 1.781e-06  4 1.8738 1.0148e-03 9.0456e-06 -8.9962e-09
11:27:43  69  7.8 4827.0  254 0.1283 6.98 18.23 59.2 3.581e-03 2.526e-04 1.107e-06  2 2.2963 7.2979e-04 8.2339e-06 -8.3381e-09
11:27:44  70  8.0 4828.5  242 0.1458 6.97 18.02 64.1 4.883e-03 2.051e-04 2.148e-06  0 2.2739 6.4053e-04 8.5057e-06 -8.4634e-09
11:27:44  71  1.0 4828.5  230 0.1547 6.97 17.97 65.1 3.581e-03 3.647e-04 4.339e-06  0 1.9920 1.5114e-03 7.8406e-06 -8.3747e-09
11:27:44  72  5.3 4830.0  218 0.1443 6.97 17.81 61.6 3.581e-03 3.089e-04 6.469e-07  1 2.0094 -3.2182e-04 1.2092e-05 -1.0797e-08
11:27:45  73  2.5 4828.5  206 0.1282 6.97 18.43 64.3 3.581e-03 1.526e-04 1.497e-06  1 1.8406 -8.7753e-04 1.3599e-05 -1.1460e-08
11:27:45  74  3.8 4828.5  194 0.1086 7.26 18.88 60.3 3.581e-03 1.164e-04 3.030e-07  0 1.2603 2.2639e-03 8.2886e-06 -8.7675e-09
11:27:45  75 -2.0 4827.0  182 0.0997 8.05 19.03 58.4 3.581e-03 3.322e-04 1.093e-06  1 2.0645 -8.5933e-05 1.0099e-05 -9.1470e-09
11:27:46  76  4.9 4828.5  170 0.1571 8.17 19.74 46.9 3.581e-03 6.841e-05 1.265e-06  1 1.2404 1.8301e-03 9.0324e-06 -9.2561e-09
11:27:46  77  4.9 4828.5  158 0.1258 8.65 19.74 45.2 3.581e-03 3.592e-04 2.767e-06  1 1.8734 -1.4190e-03 1.3501e-05 -1.1193e-08
11:27:46  78 -1.0 4828.5  146 0.1299 8.99 19.83 37.9 3.581e-03 2.579e-04 5.959e-07  1 1.1694 1.5543e-04 1.1811e-05 -1.0392e-08
11:27:47  79 -1.0 4828.5  134 0.1407 9.63 20.02 32.5 3.581e-03 2.225e-04 1.829e-06  1 1.3148 1.1779e-04 1.0965e-05 -9.8313e-09
11:27:47  80  1.3 4828.5  122 0.1373 9.93 20.02 30.4 4.232e-03 1.610e-04 8.593e-07  0 1.0855 1.8117e-05 1.2045e-05 -1.0826e-08
11:27:47  81 -1.0 4828.5  110 0.1632 10.33 20.02 26.3 3.581e-03 1.653e-04 1.078e-06  1 1.1128 3.9611e-04 1.0537e-05 -9.8540e-09
11:27:48  82 -1.0 4827.0   98 0.1715 10.52 20.02 22.0 3.581e-03 3.257e-04 5.693e-07  3 0.5277 3.5972e-03 3.9337e-06 -5.8320e-09
11:27:48  83 -1.1 4827.0   86 0.1360 10.23 20.02 19.6 3.581e-03 2.668e-04 9.942e-07  2 0.7257 -2.7787e-04 1.2035e-05 -1.0359e-08
```

Figure 4. Example of listing (--.LST file) of sector statistics for processed spectra.

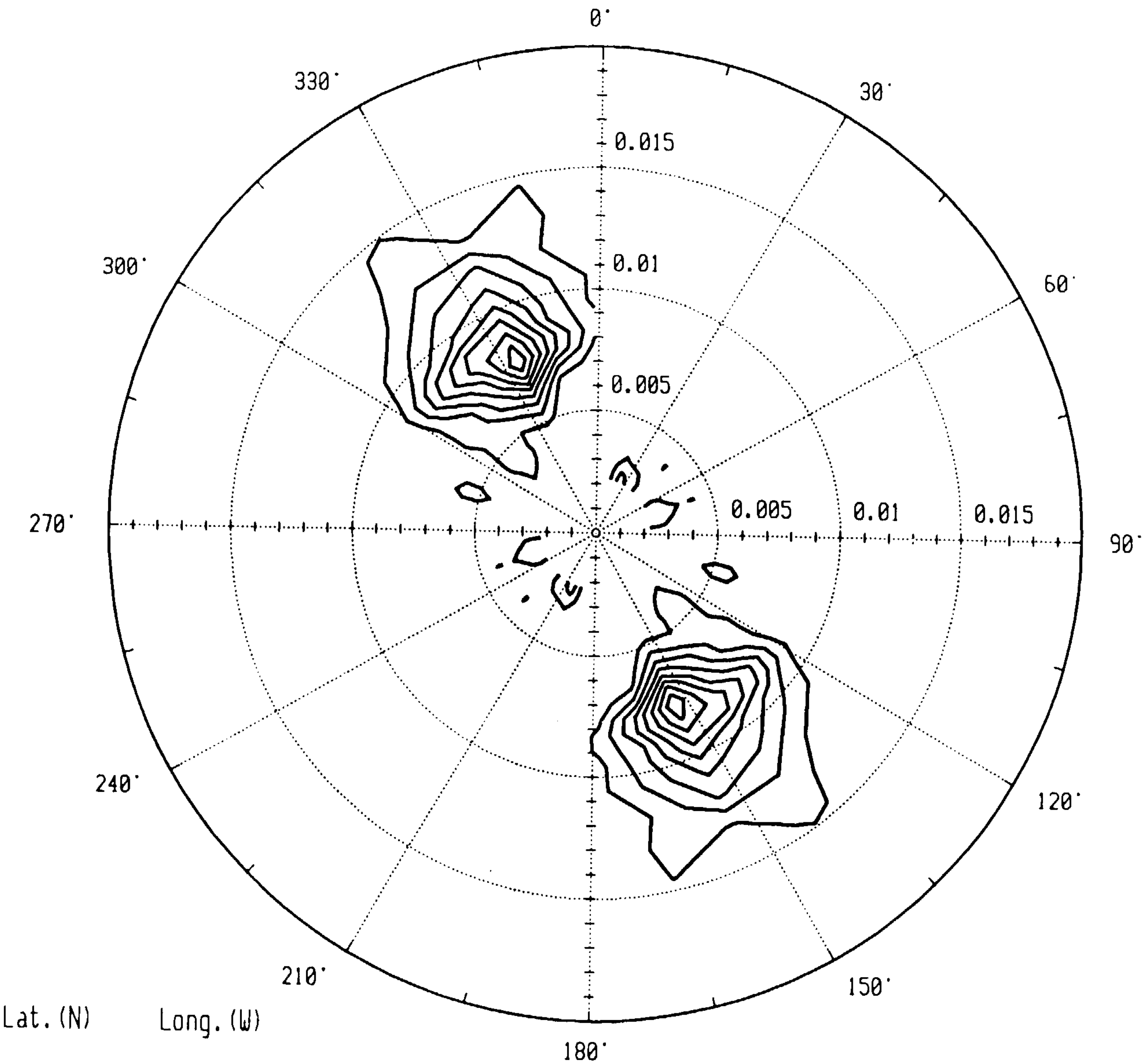
Figures 5-52. Peak-scaled directional slope spectra in polar format contoured in equal (linear) decrements from the peak value down. Wavenumber rings are in cycles per meter, with the innermost ring corresponding to 200 m wavelength, and the outermost ring corresponding to 50 m wavelength. For each file, identified in the lower left data box as a --.srf file, two plots are given, the first for the raw 180° ambiguous spectrum, the second for the folded or symmetrized version of the raw spectrum. The folded spectrum, since it has twice the degrees of freedom of the raw spectrum, appears better behaved.

ROWS SAXON-FPN 11/05/90



Time Lat.(N) Long.(W)
Start 11:27:21
Stop 11:29:00
GndSpeed(m/s): 126 Heading: 44
Rotations: 10 X-axis spacing(m): 12
filename: 112710.srf

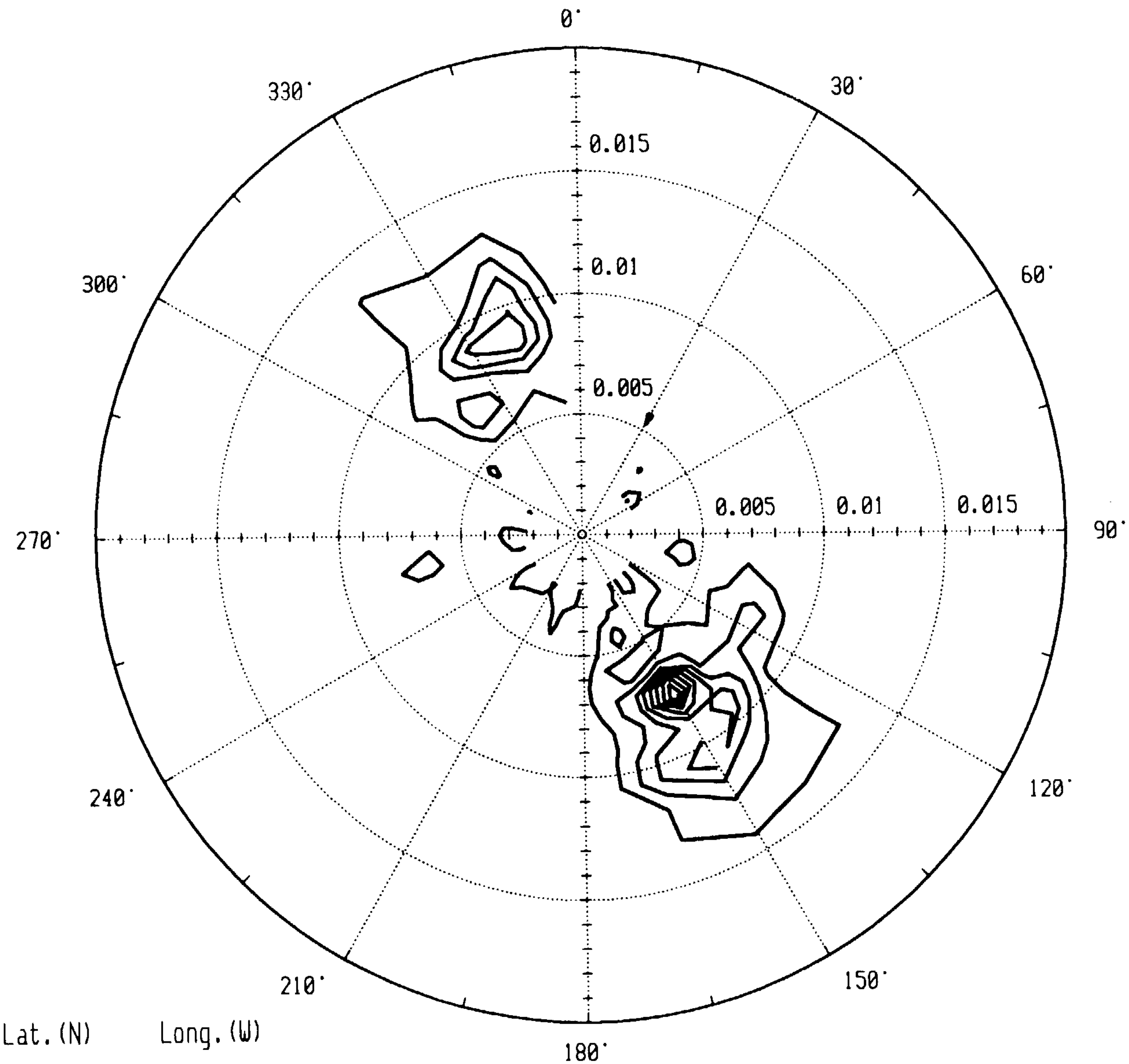
ROWS SAXON-FPN 11/05/90



	Time	Lat.(N)	Long.(W)
Start	11:27:21		
Stop	11:29:00		

GndSpeed(m/s): 126 Heading: 44
Rotations: 10 X-axis spacing(m): 12
filename: 112710.srf

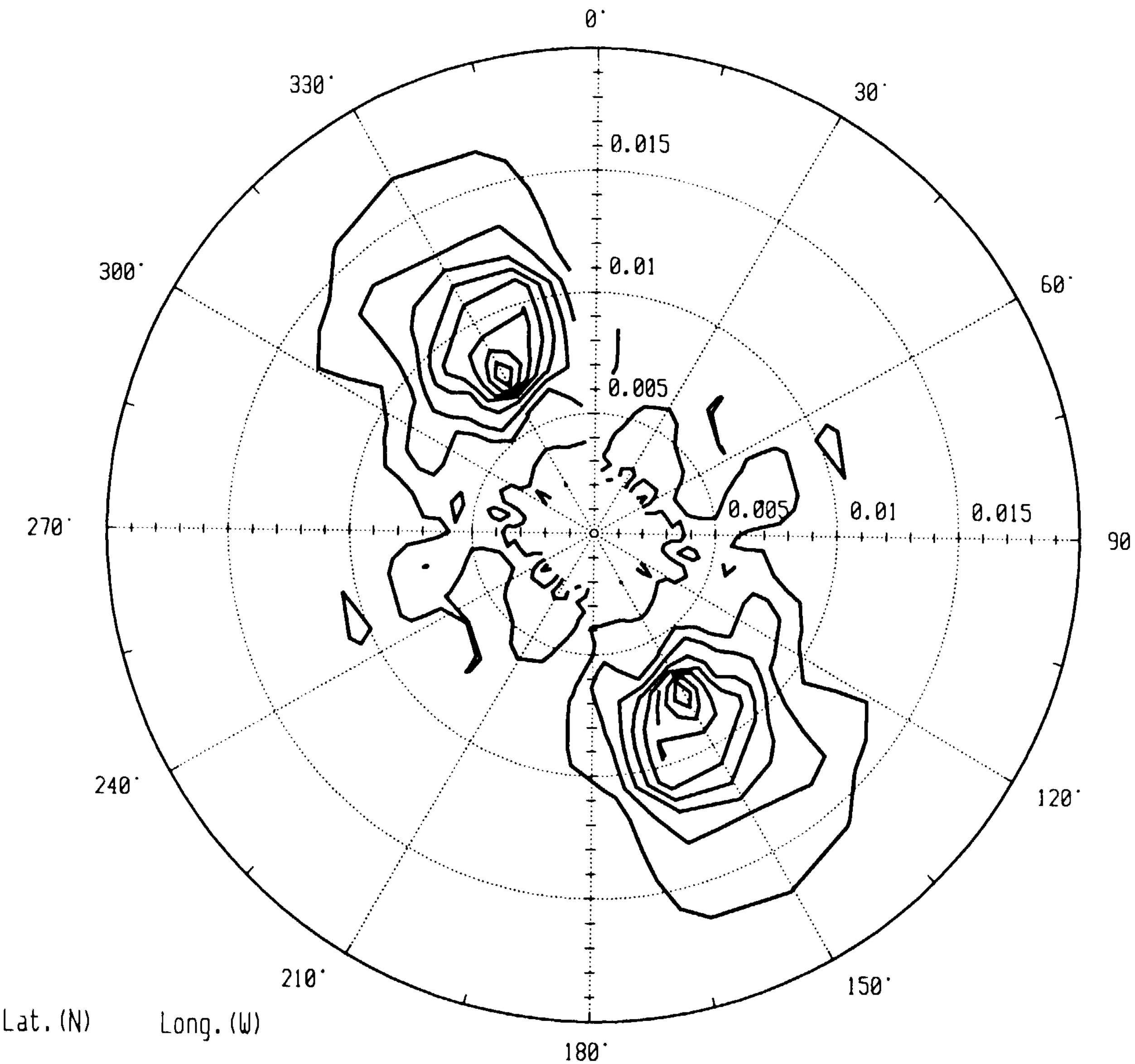
ROWS SAXON-FPN 11/05/90



	Time	Lat.(N)	Long.(W)
Start	11:31:34		
Stop	11:33:14		

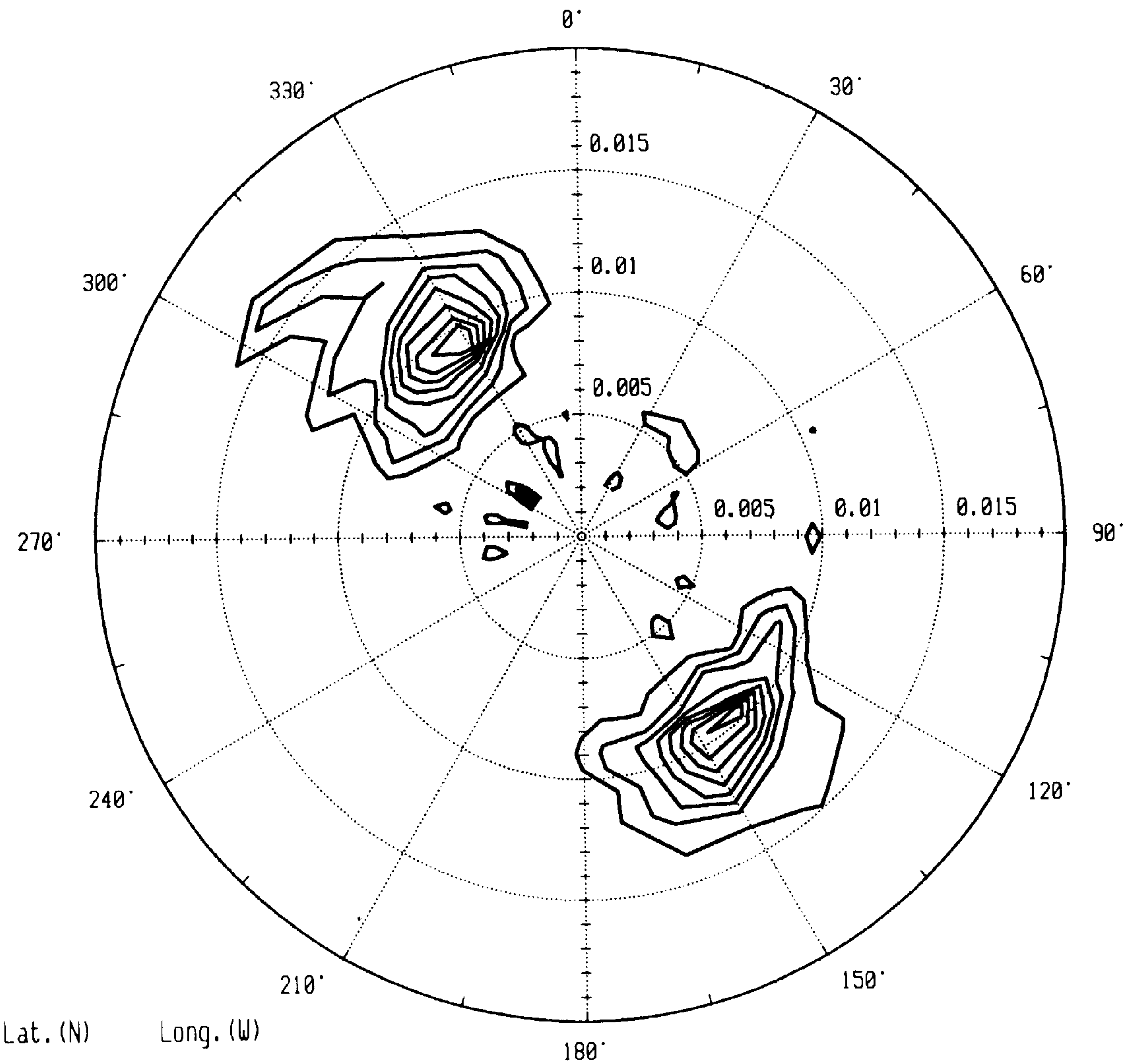
GndSpeed(m/s): 152 Heading: 220
Rotations: 10 X-axis spacing(m): 12
filename: 113131.srf

ROWS SAXON-FPN 11/05/90



Time Lat.(N) Long.(W)
Start 11:31:34
Stop 11:33:14
GndSpeed(m/s): 152 Heading: 220
Rotations: 10 X-axis spacing(m): 12
filename: 113131.srf

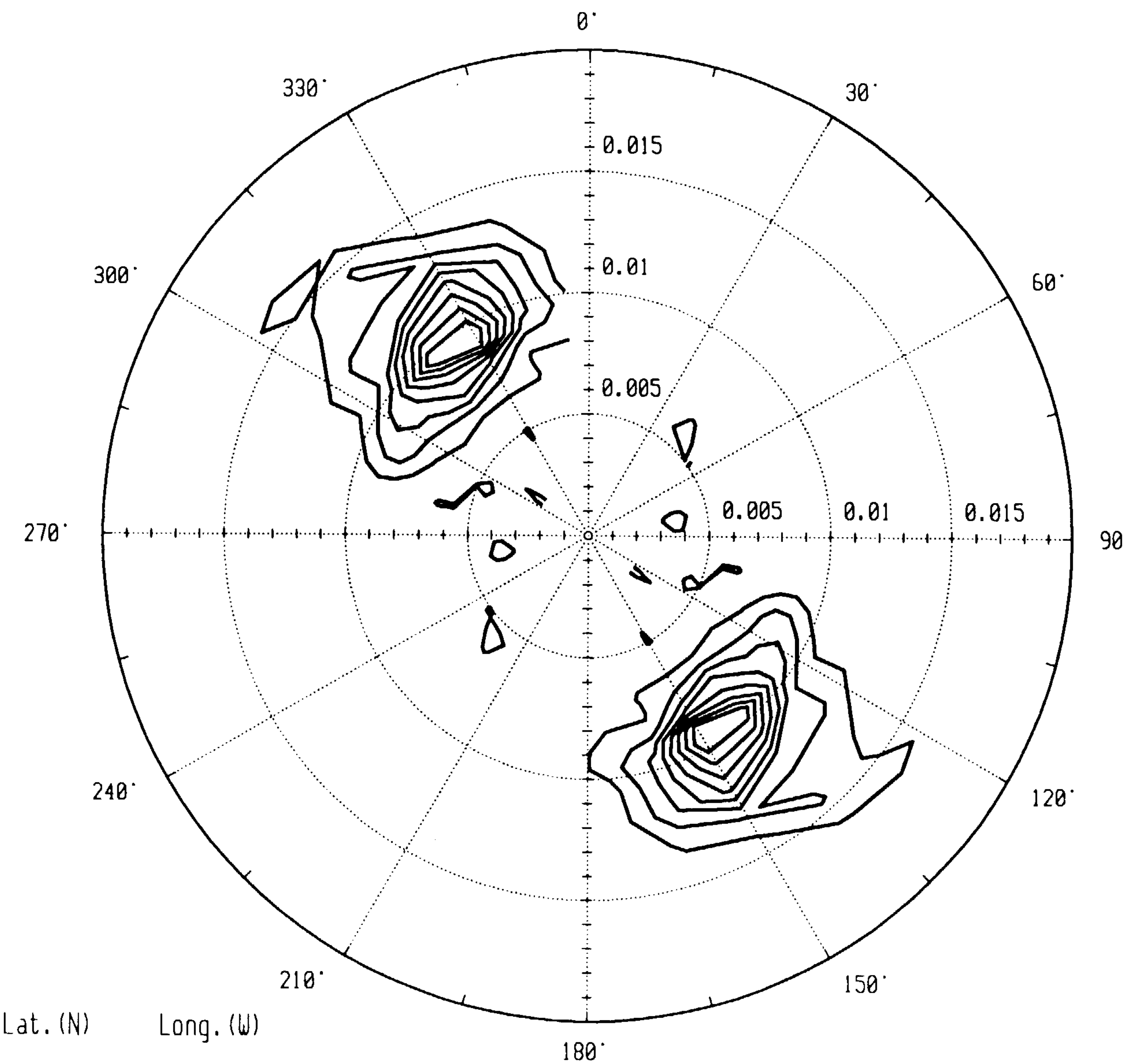
ROWS SAXON-FPN 11/06/90



	Time	Lat.(N)	Long.(W)
Start	14:23:01		
Stop	14:24:40		

GndSpeed(m/s): 158 Heading: 220
Rotations: 10 X-axis spacing(m): 12
filename: 142250.srf

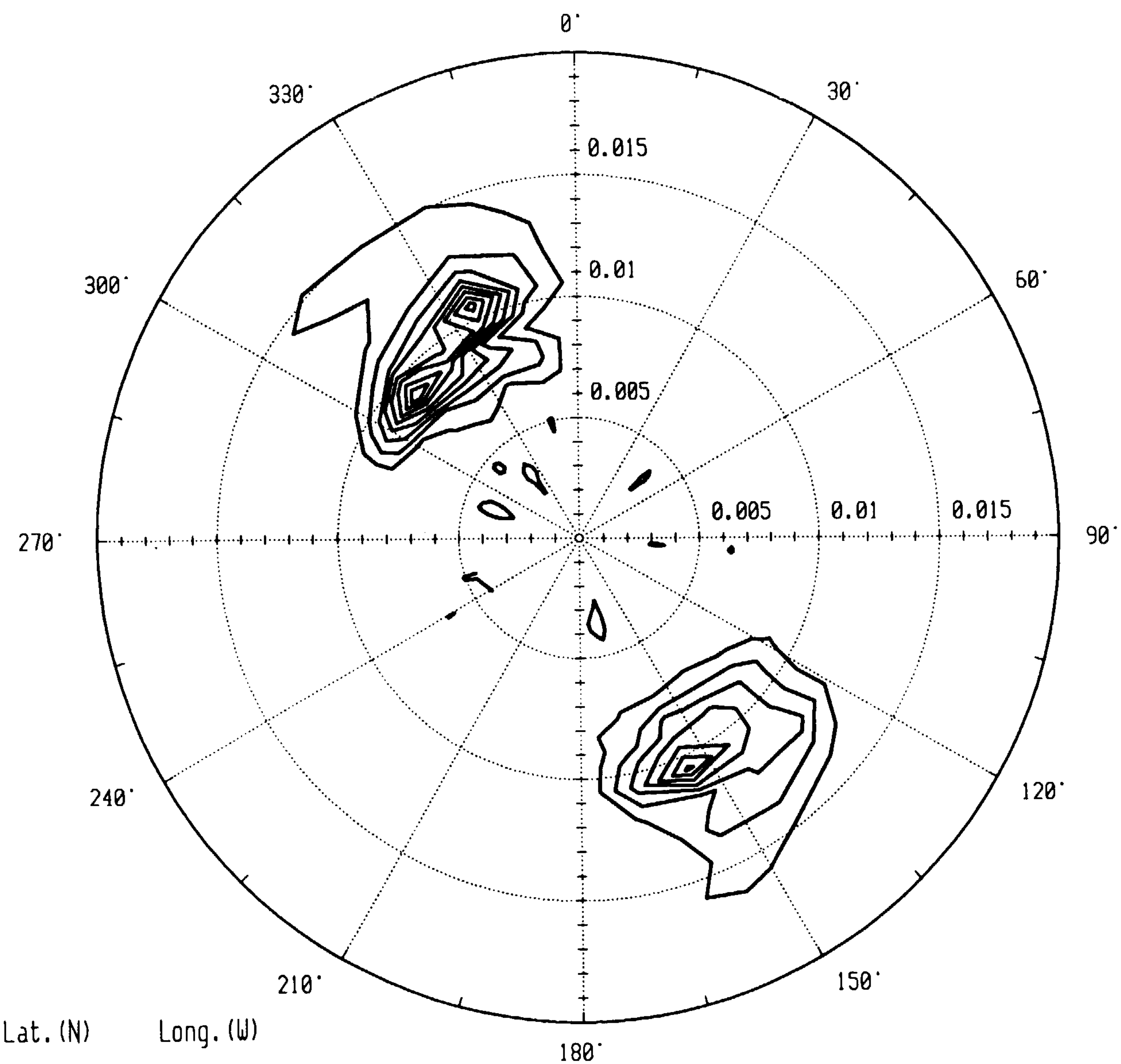
ROWS SAXON-FPN 11/06/90



Time	Lat.(N)	Long.(W)

Start 14:23:01
Stop 14:24:40
GndSpeed(m/s): 158 Heading: 220
Rotations: 10 X-axis spacing(m): 12
filename: 142250.srf

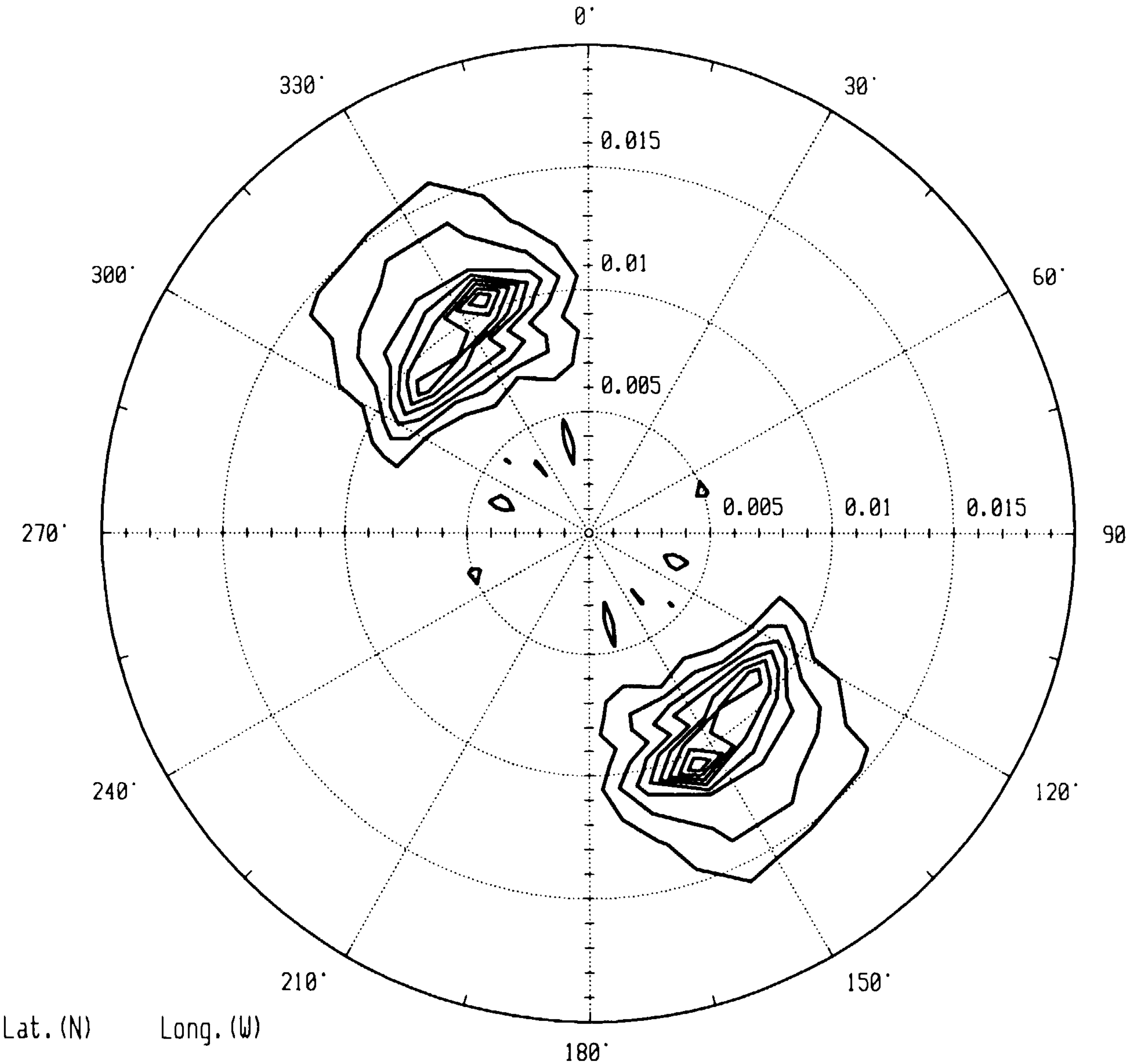
ROWS SAXON-FPN 11/06/90



	Time	Lat. (N)	Long. (W)
Start	14:26:45		
Stop	14:28:24		

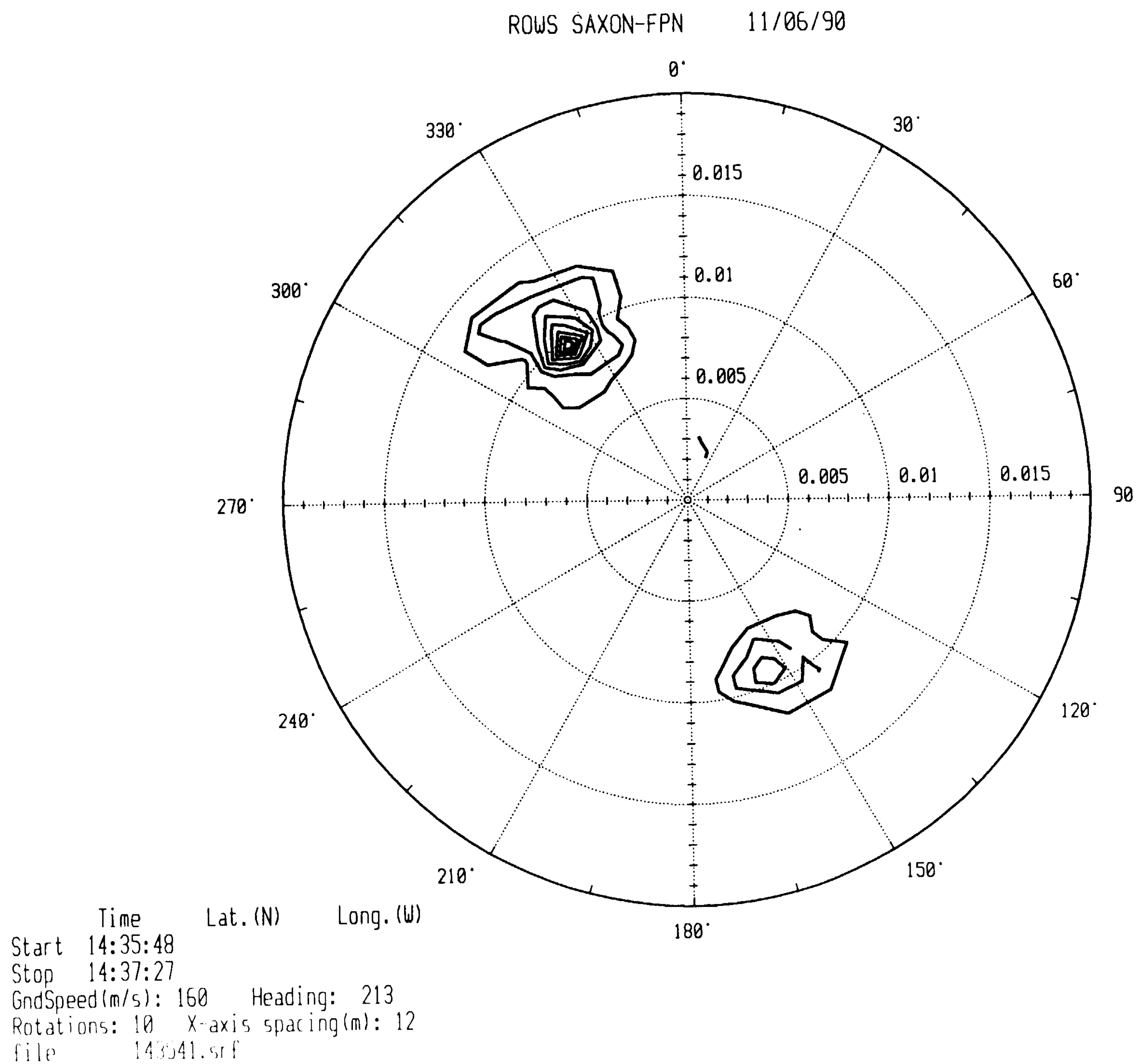
GndSpeed(m/s): 131 Heading: 45
Rotations: 10 X-axis spacing(m): 12
filename: 142641.srf

ROWS SAXON-FPN 11/06/90

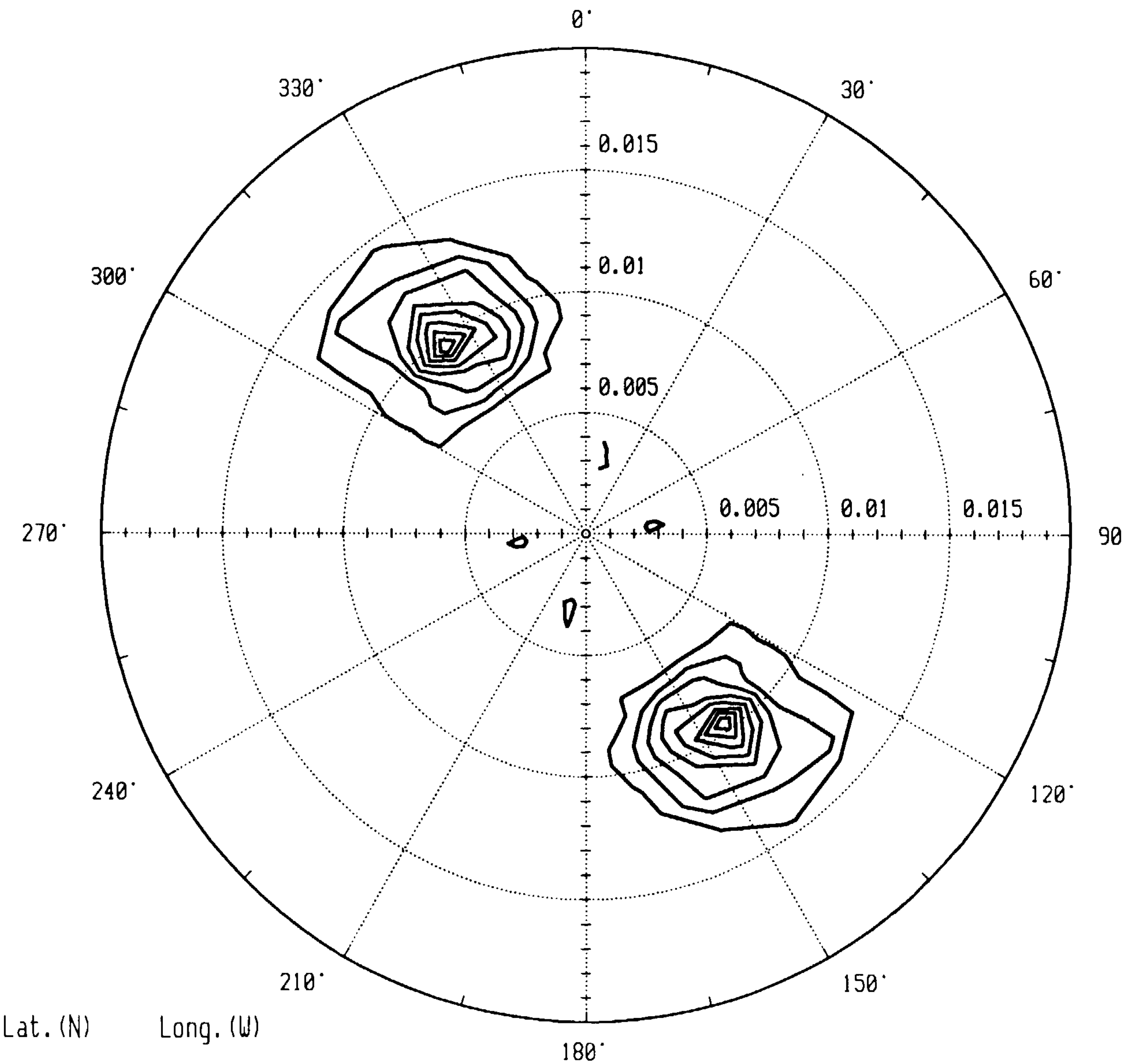


	Time	Lat.(N)	Long.(W)
Start	14:26:45		
Stop	14:28:24		

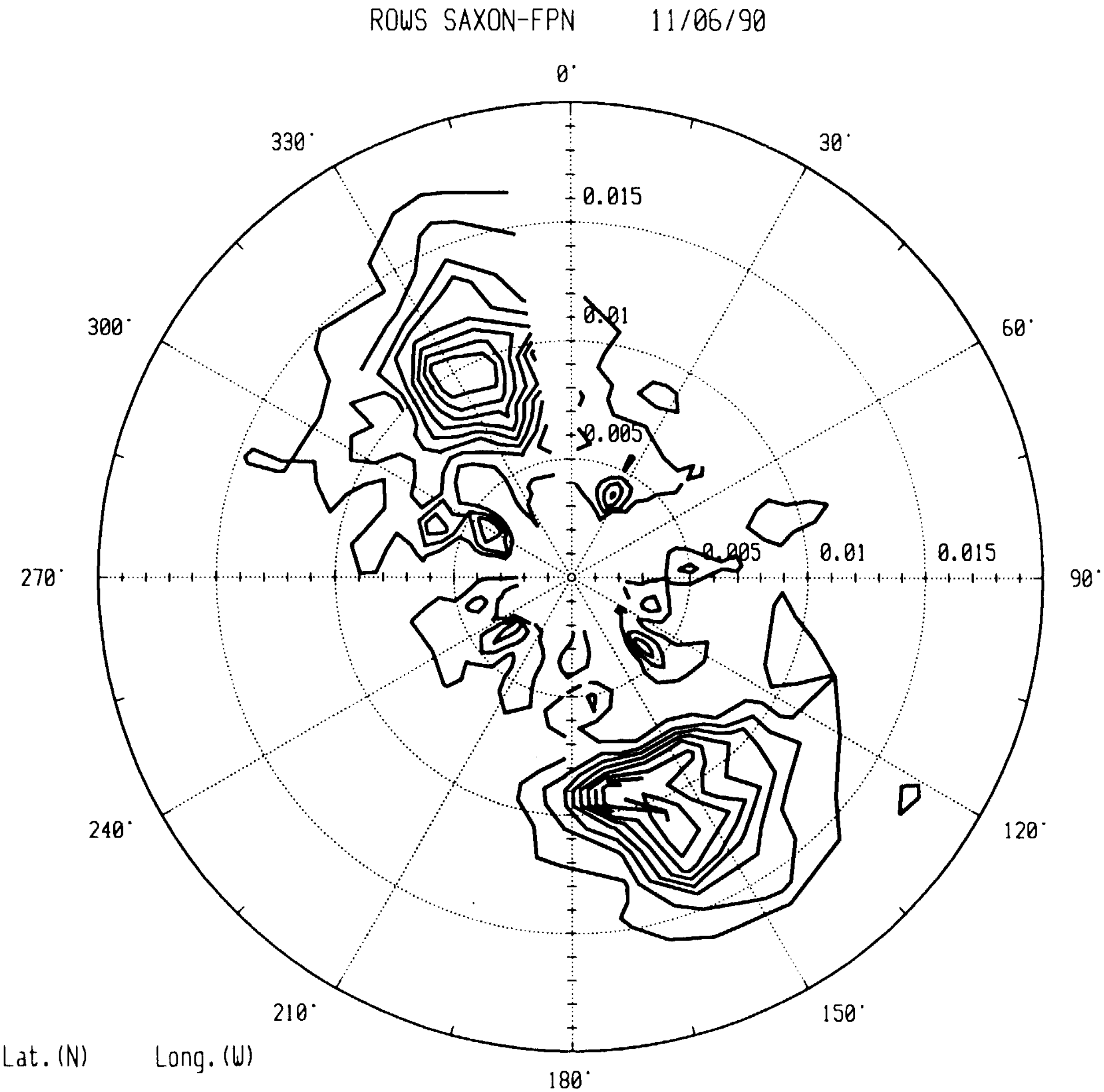
GndSpeed(m/s): 131 Heading: 45
Rotations: 10 X-axis spacing(m): 12
filename: 142641.srf


ROWS SAXON-FPN 11/06/90
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
0.005
0.01
0.015
0.005
0.01
0.015
Time Lat.(N) Long.(W)
Start 14:35:48
Stop 14:37:27
GndSpeed(m/s): 160 Heading: 213
Rotations: 10 X-axis spacing(m): 12
file 143541.srf

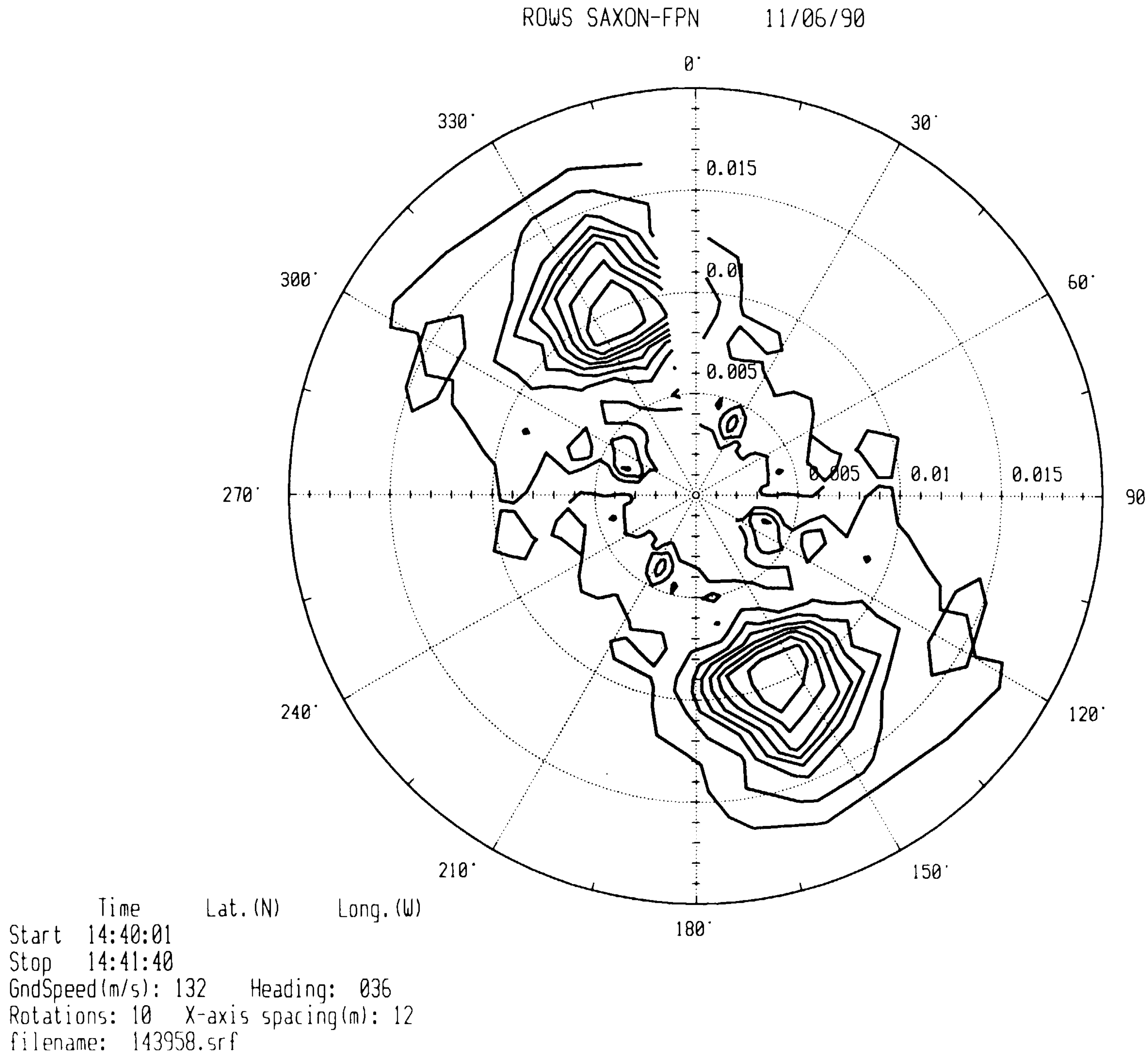
ROWS SAXON-FPN 11/06/90



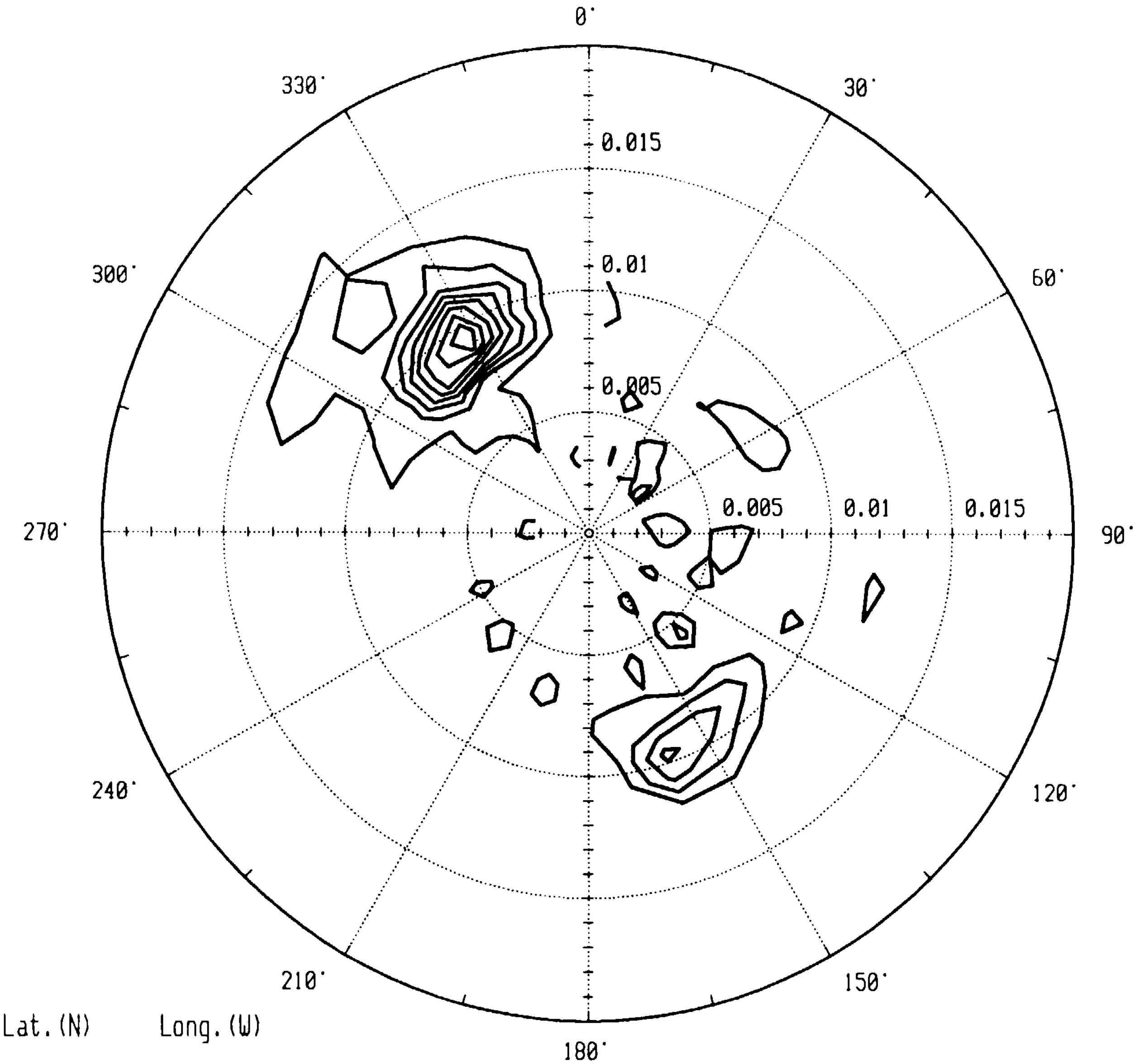
Time Lat.(N) Long.(W)
Start 14:35:48
Stop 14:37:27
GndSpeed(m/s): 160 Heading: 213
Rotations: 10 X-axis spacing(m): 12
filename: 143541.srf



Time Lat.(N) Long.(W)
Start 14:40:01
Stop 14:41:40
GndSpeed(m/s): 132 Heading: 036
Rotations: 10 X-axis spacing(m): 12
filename: 143958.srf

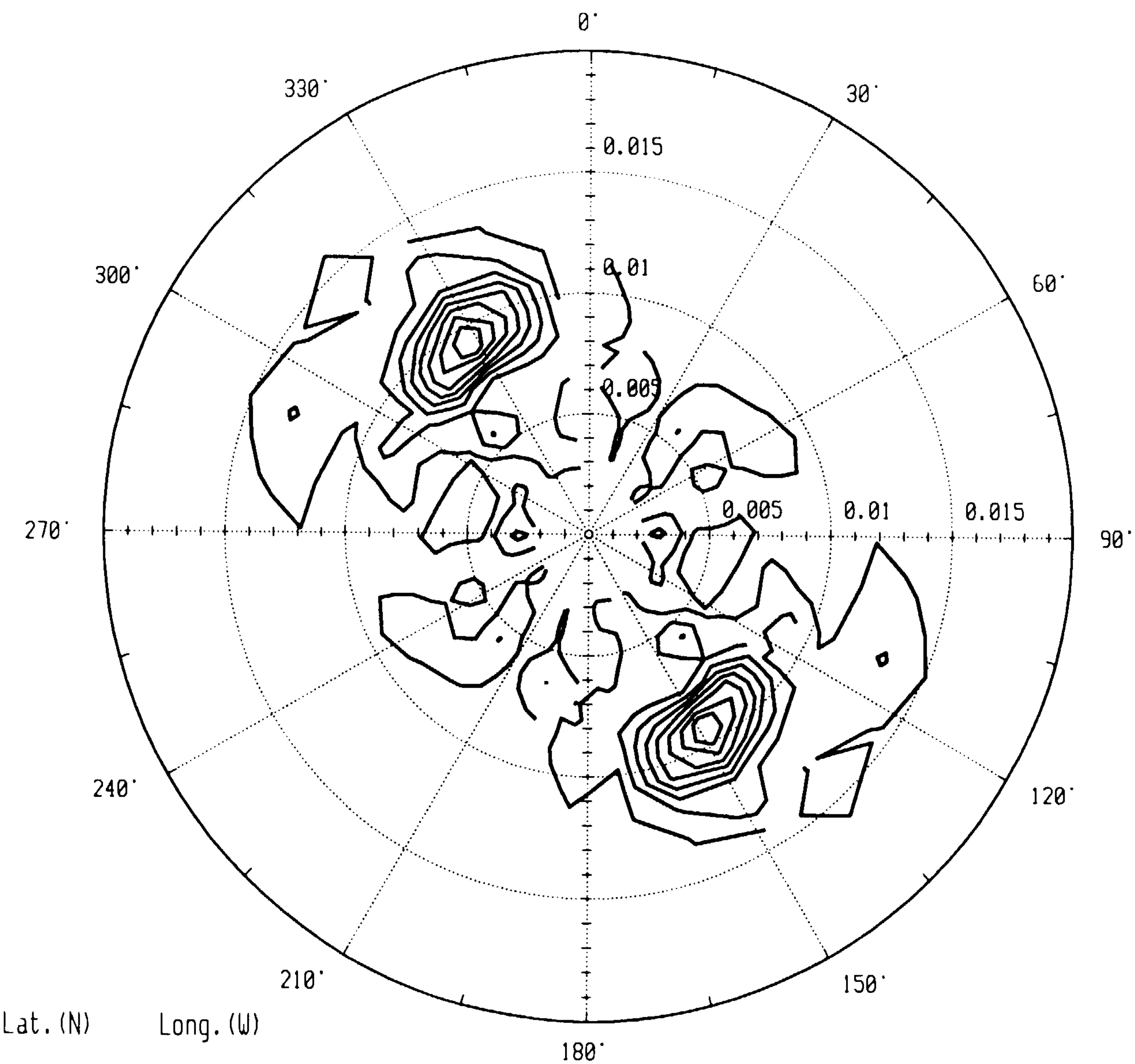

ROWS SAXON-FPN 11/06/90
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
0.005
0.01
0.015
Time Lat.(N) Long.(W)
Start 14:40:01
Stop 14:41:40
GndSpeed(m/s): 132 Heading: 036
Rotations: 10 X-axis spacing(m): 12
filename: 143958.srf

ROWS SAXON-FPN 11/06/90



Time Lat.(N) Long.(W)
Start 14:45:25
Stop 14:47:04
GndSpeed(m/s): 155 Heading: 182
Rotations: 10 X-axis spacing(m): 12
filename: 144516.srf

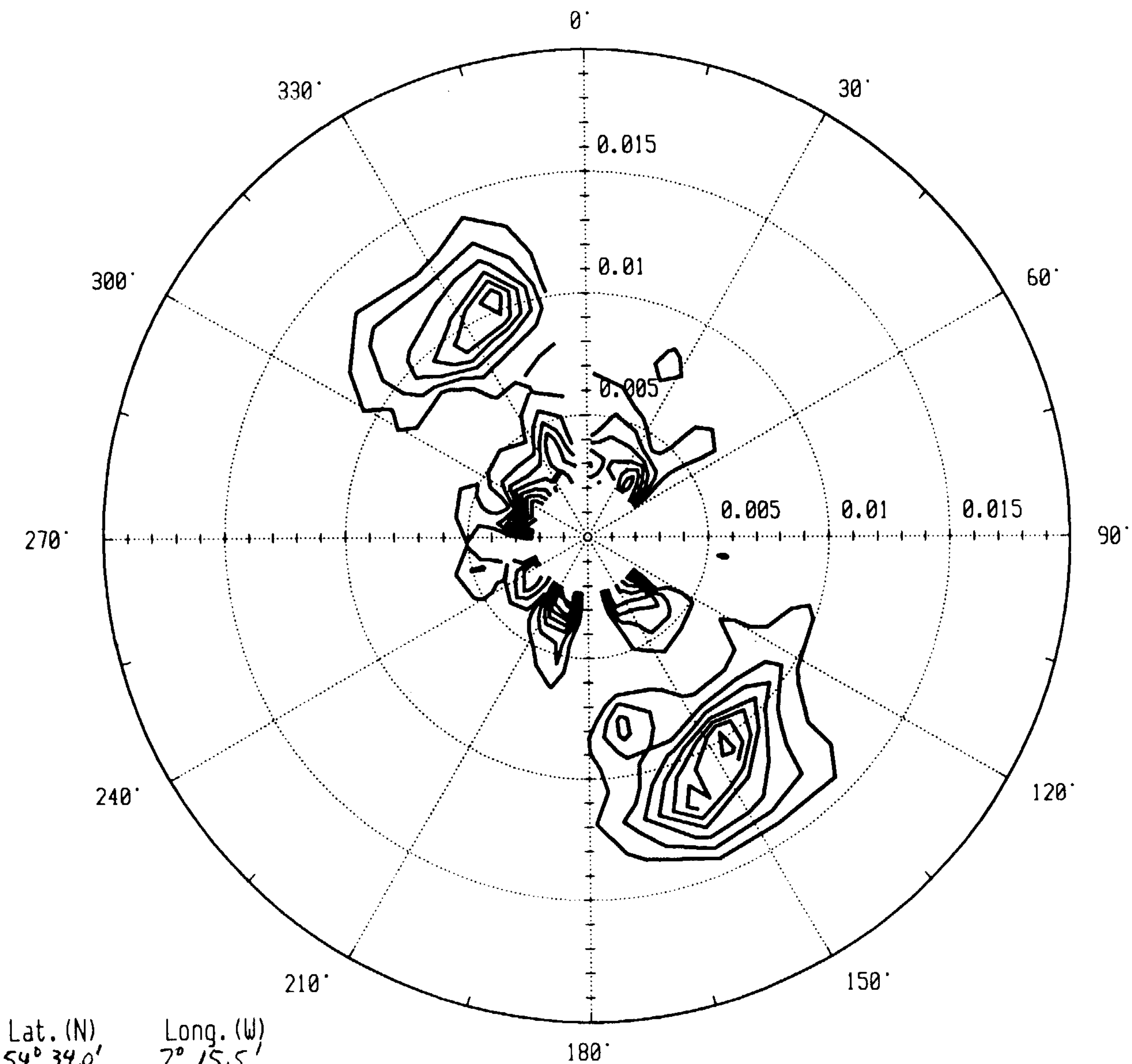
ROWS SAXON-FPN 11/06/90



	Time	Lat.(N)	Long.(W)
Start	14:45:25		
Stop	14:47:04		

GndSpeed(m/s): 155 Heading: 182
Rotations: 10 X-axis spacing(m): 12
filename: 144516.srf

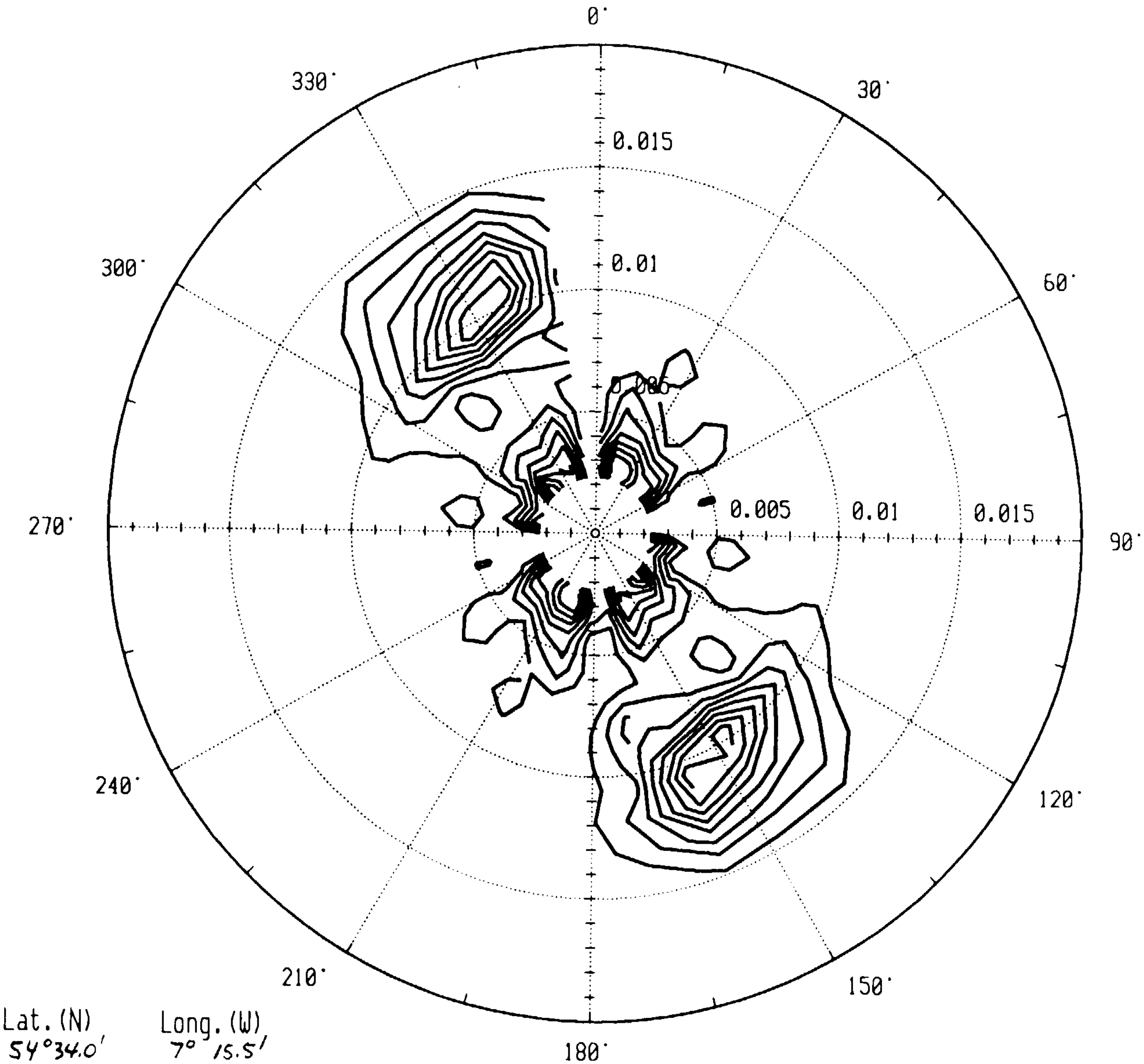
ROWS SAXON-FPN 11/08/90



	Time	Lat. (N)	Long. (W)
Start	10:44:37	54° 34.0'	7° 15.5'
Stop	10:46:17	54° 34.0'	7° 15.0'

GndSpeed(m/s): 123 Heading: 12
Rotations: 10 X-axis spacing(m): 12
filename: 104436.srf

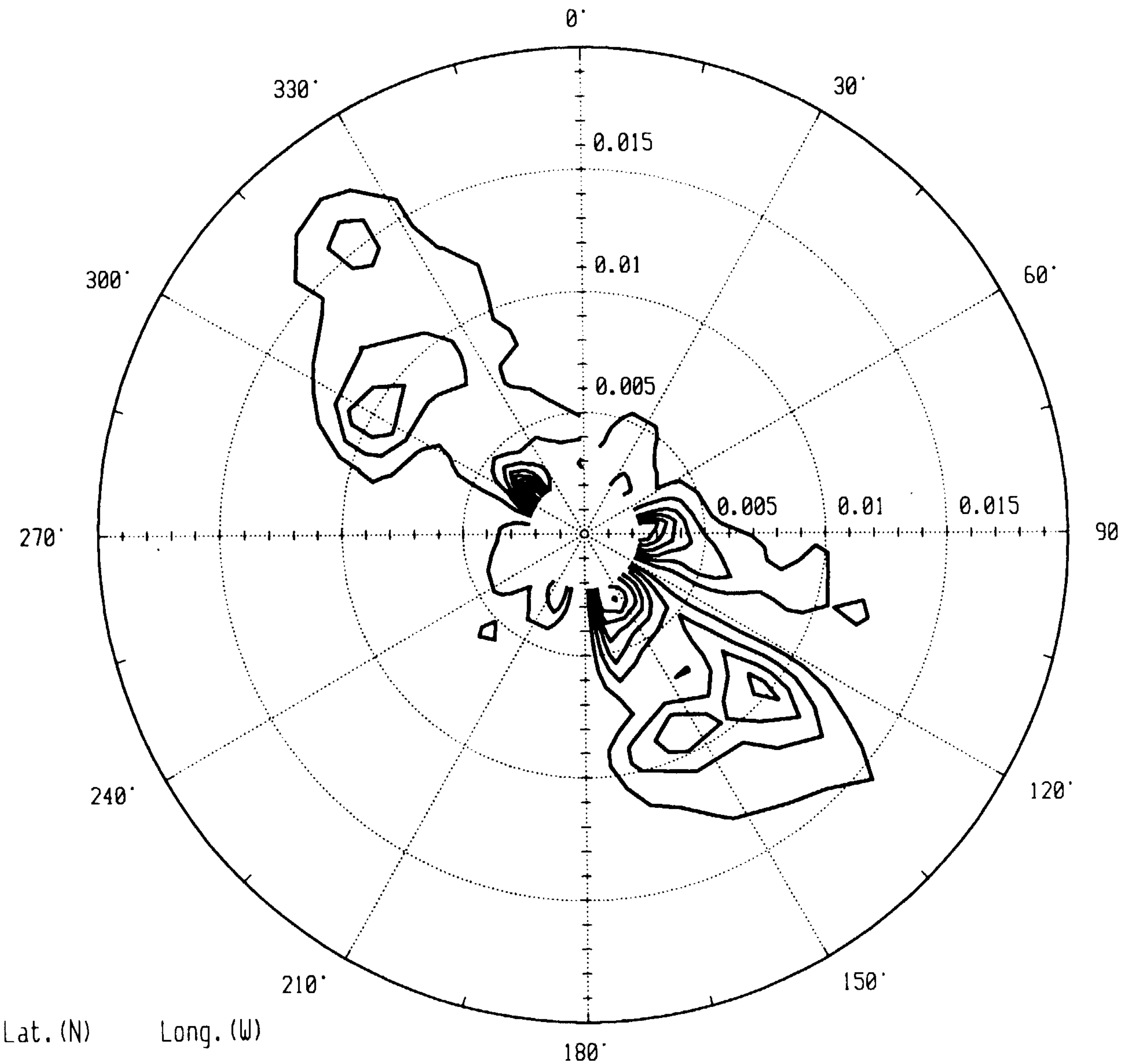
ROWS SAXON-FPN 11/08/90



	Time	Lat. (N)	Long. (W)
Start	10:44:37	54°34.0′	7° 15.5′
Stop	10:46:17	54° 34.0′	7° 15.0′

GndSpeed(m/s): 123 Heading: 12
Rotations: 10 X-axis spacing(m): 12
filename: 104436.srf

ROWS SAXON-FPN 11/08/90



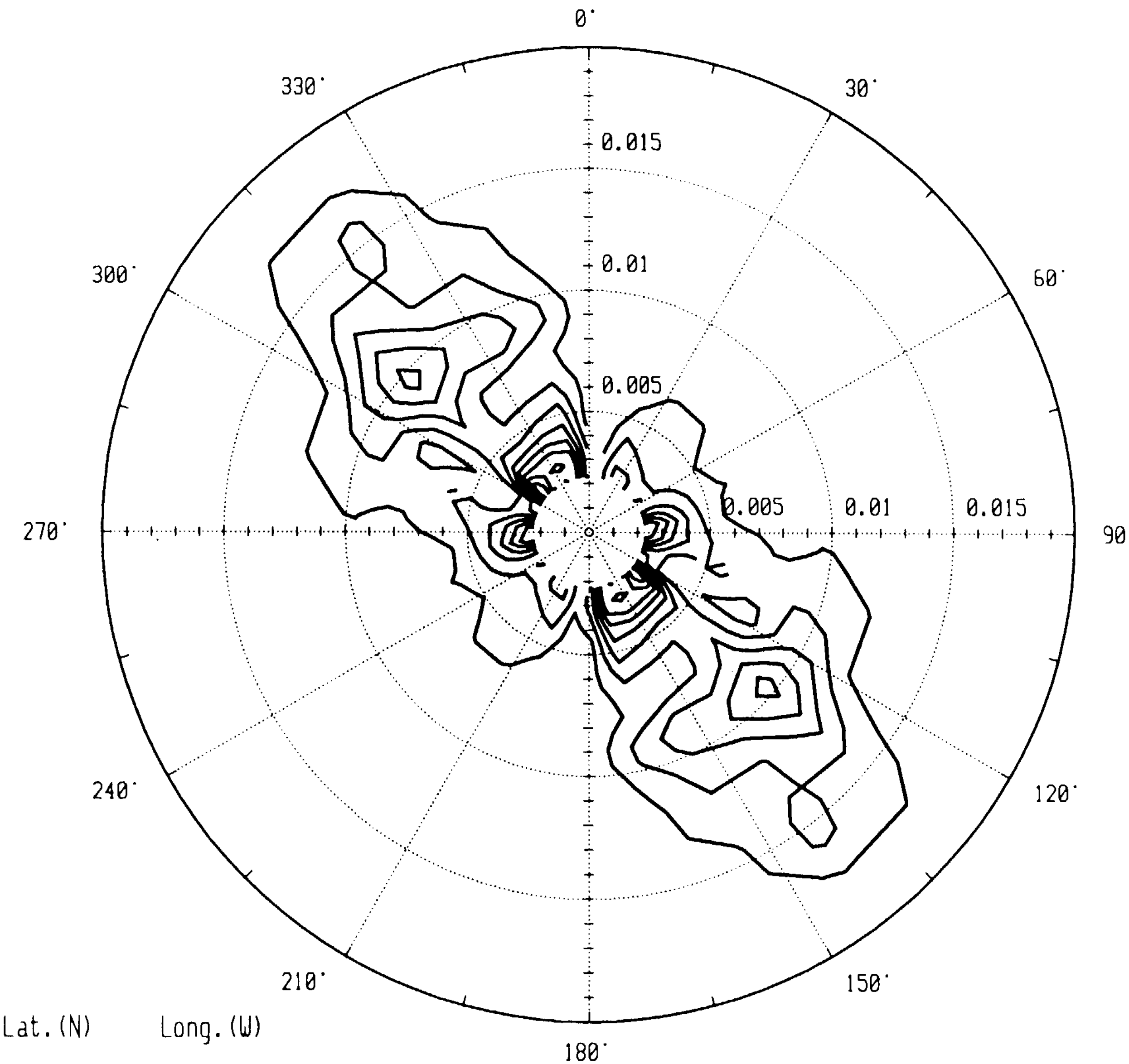
	Time	Lat.(N)	Long.(W)
Start	10:50:44		
Stop	10:52:23		

GndSpeed(m/s): 145 Heading: 188

Rotations: 10 X-axis spacing(m): 12

filename: 105054.srf

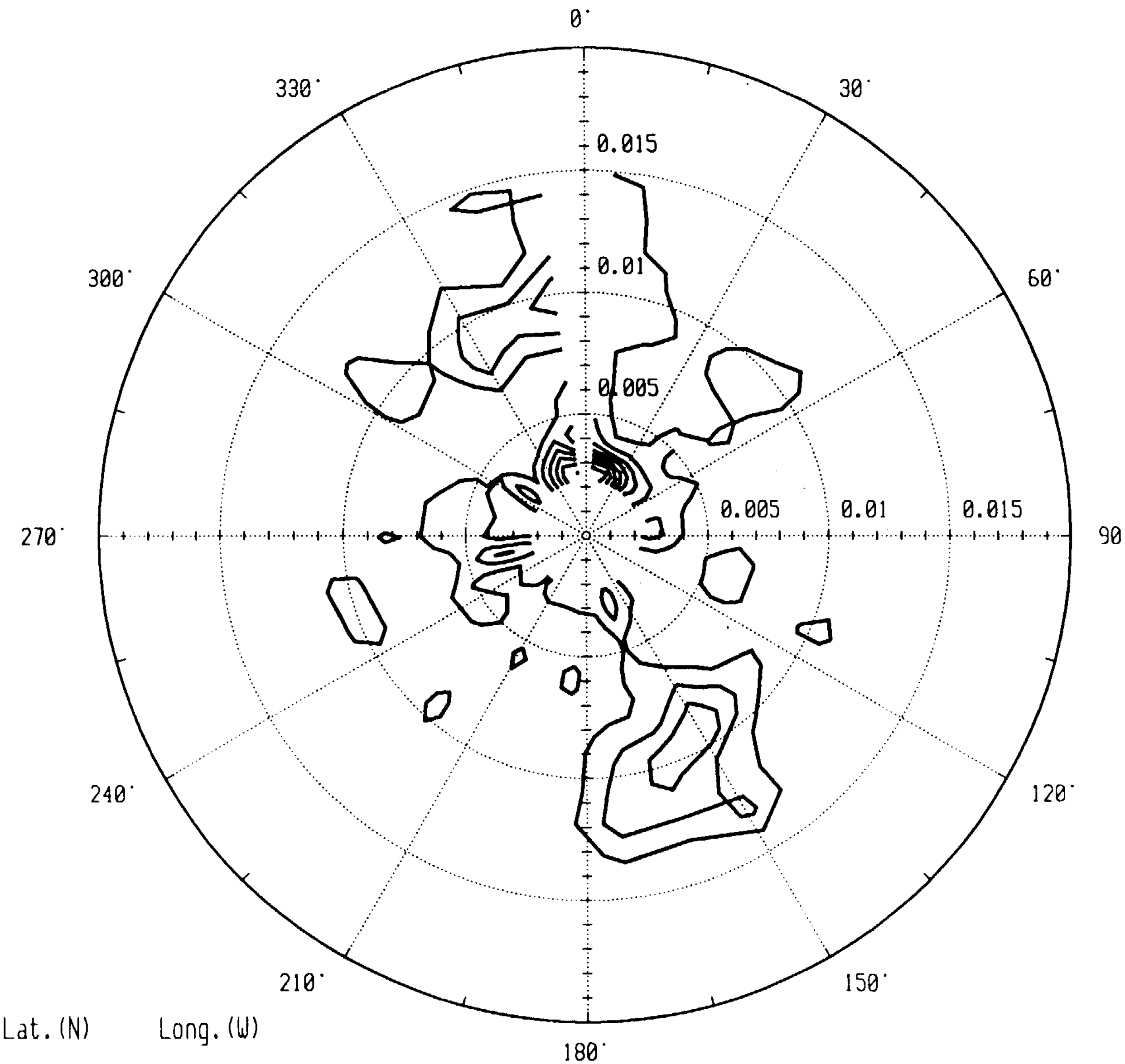
ROWS SAXON-FPN 11/08/90



Time	Lat.(N)	Long.(W)
Start 10:50:44		
Stop 10:52:23		

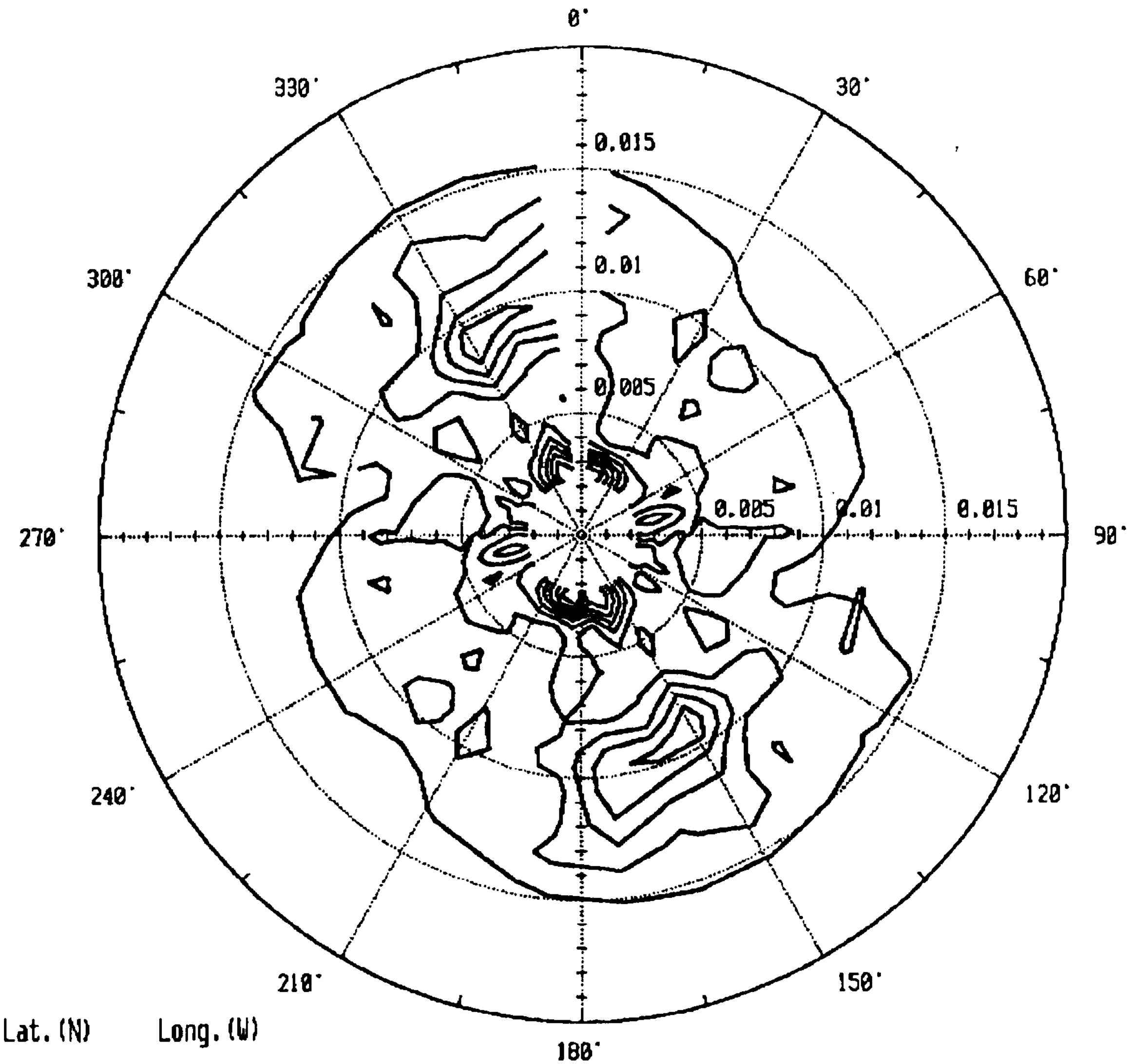
GndSpeed(m/s): 145 Heading: 188
Rotations: 10 X-axis spacing(m): 12
filename: 105054.srf

ROWS SAXON-FPN 11/08/90



Time Lat.(N) Long.(W)
Start 14:44:49
Stop 14:46:29
GndSpeed(m/s): 138 Heading: 351
Rotations: 10 X-axis spacing(m): 12
filename: 144500.srf

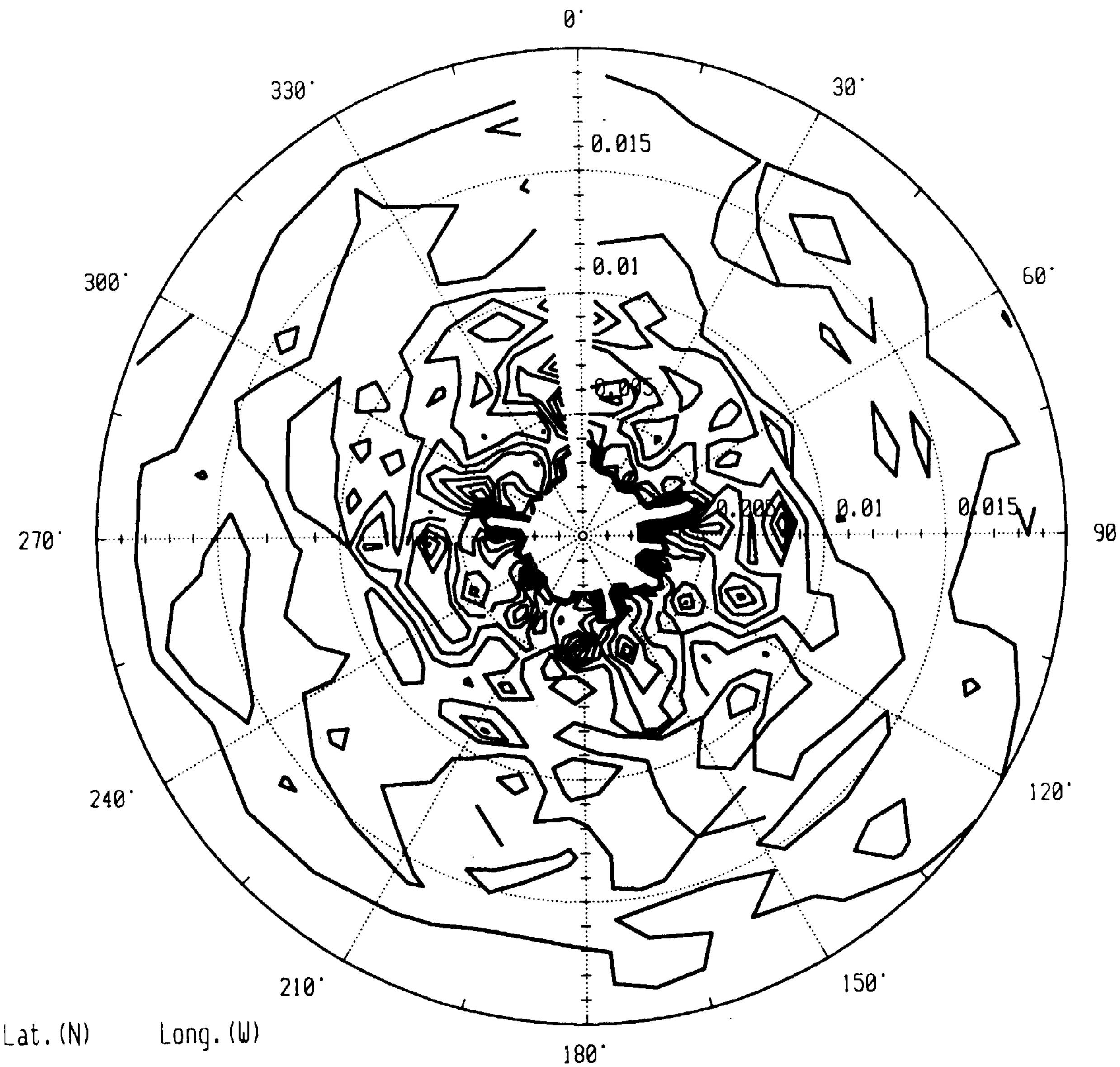
ROWS SAXON-FPN 11/08/90



	Time	Lat.(N)	Long.(W)
Start	14:44:49		
Stop	14:46:29		

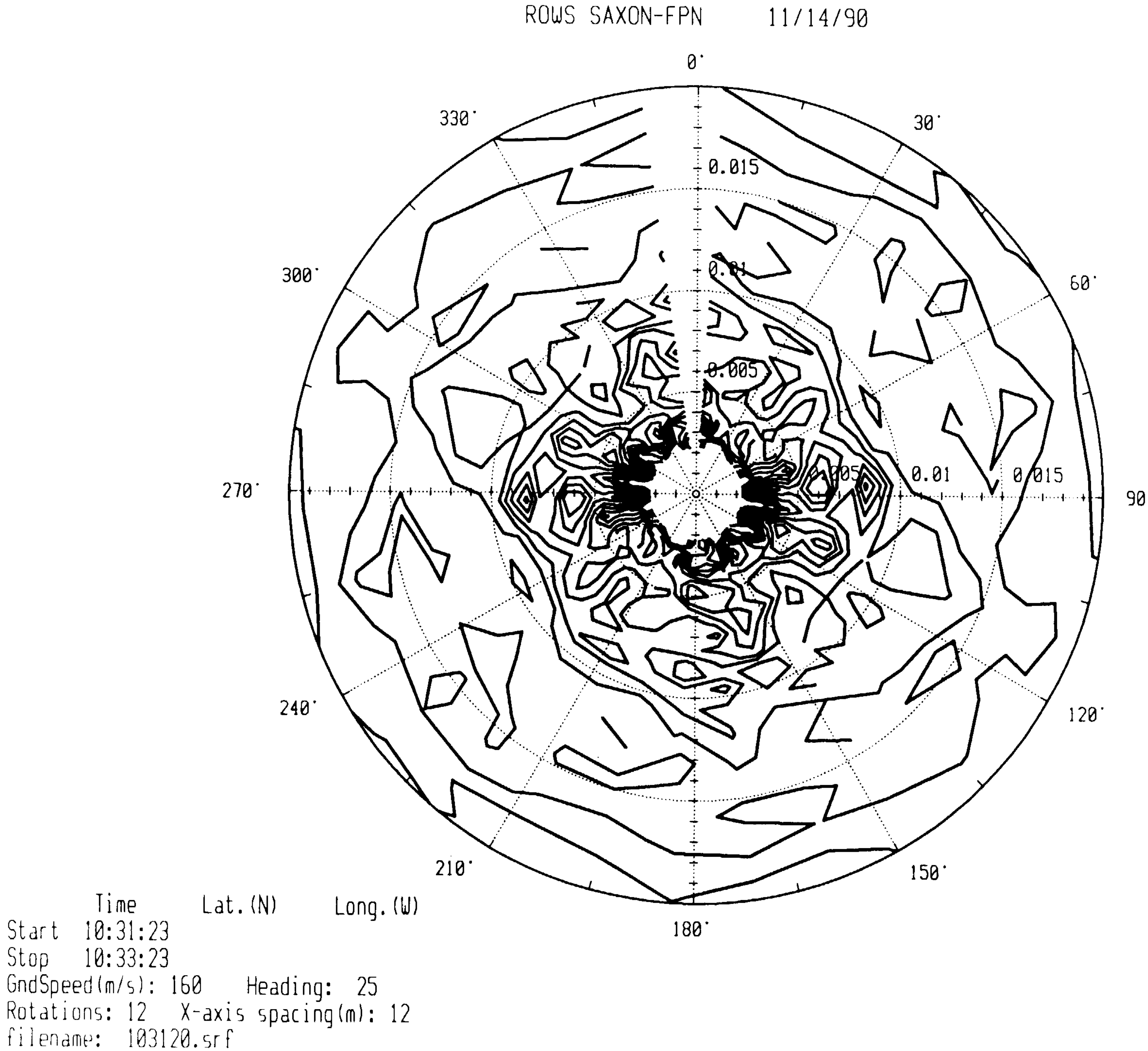
GndSpeed(m/s): 138 Heading: 351
Rotations: 10 X-axis spacing(m): 12
filename: 144500.srf

ROWS SAXON-FPN 11/14/90

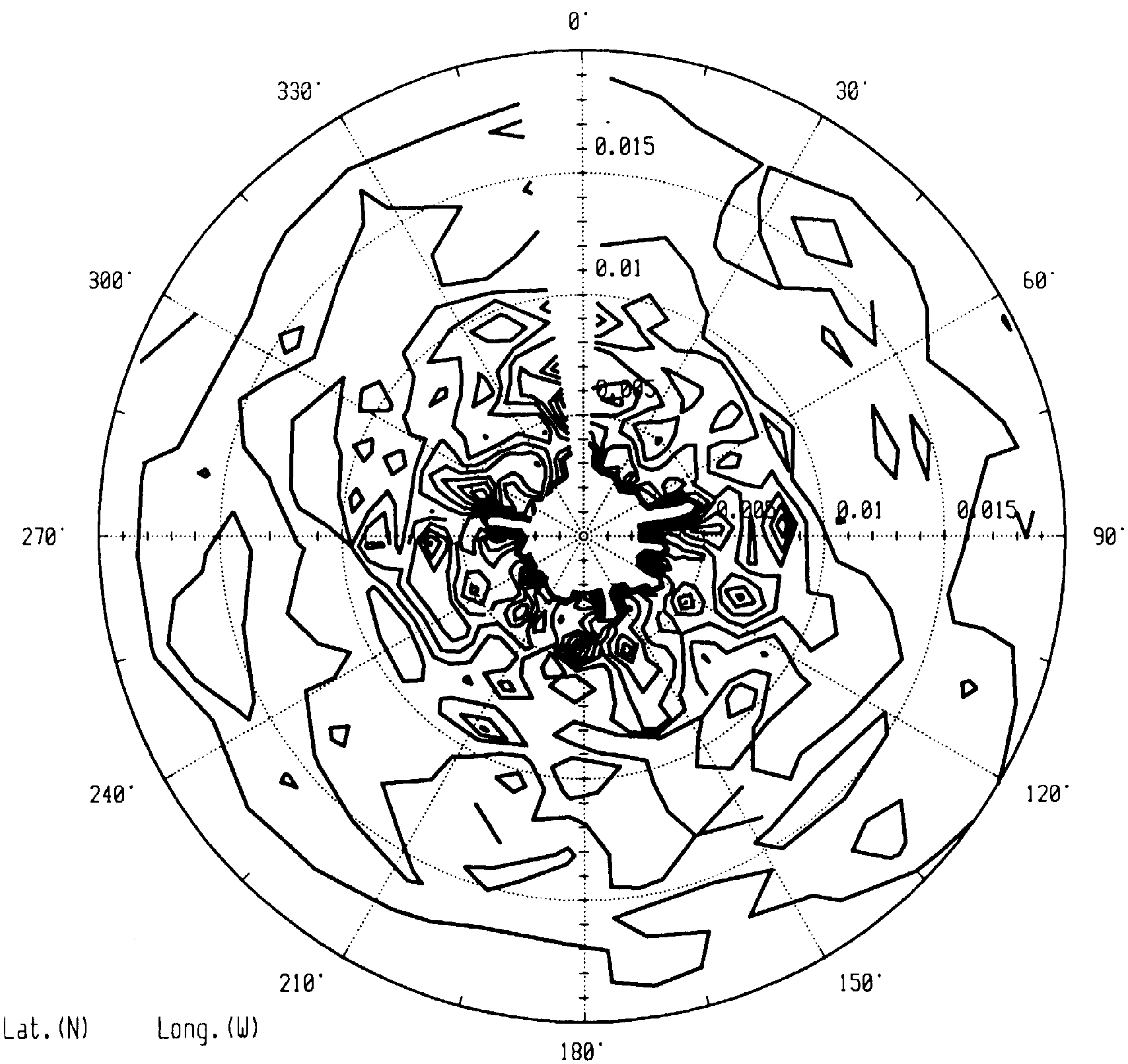


	Time	Lat.(N)	Long.(W)
Start	10:31:23		
Stop	10:33:23		

GndSpeed(m/s): 160 Heading: 25
Rotations: 12 X-axis spacing(m): 12
filename: 103120.srf

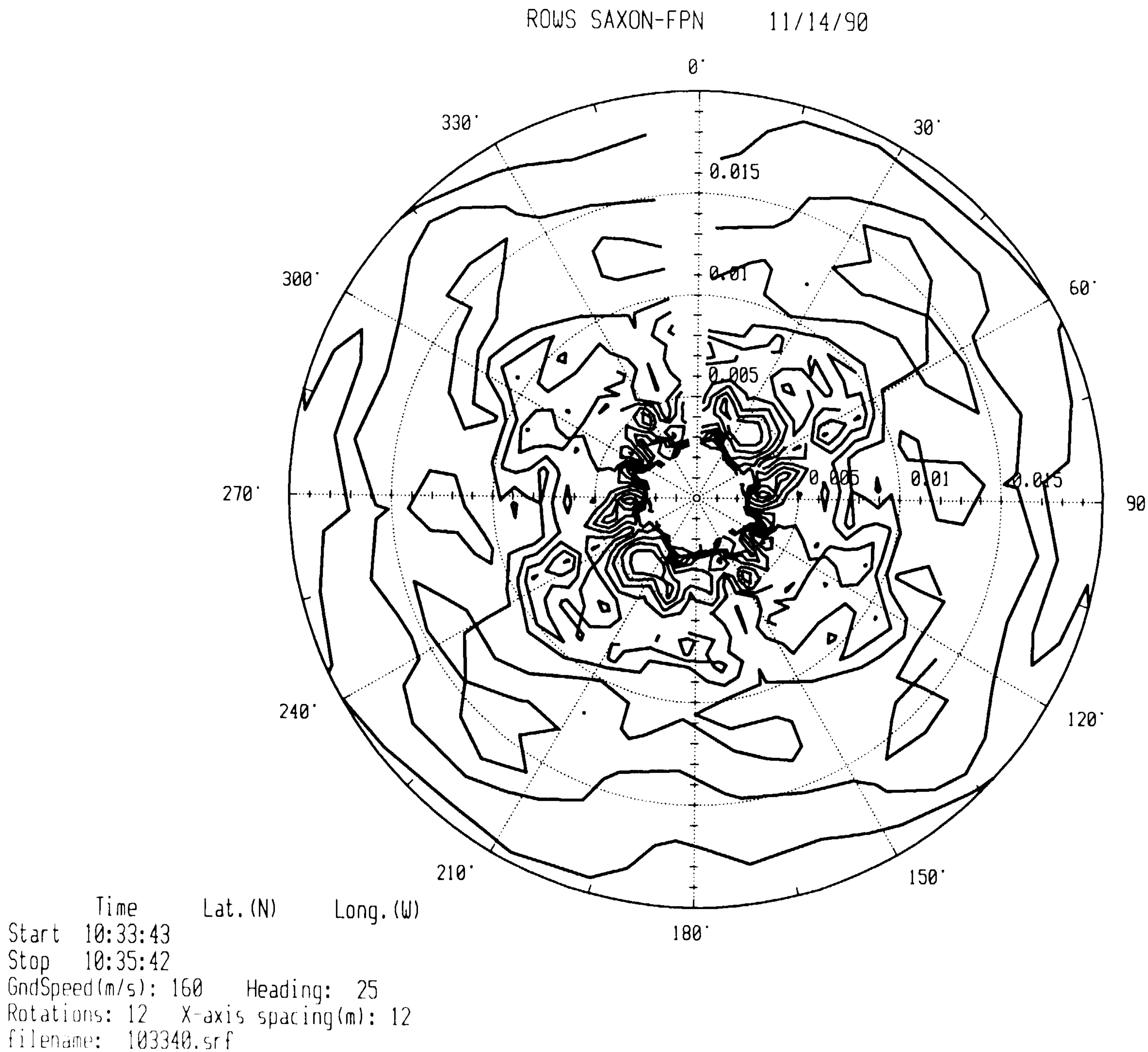

ROWS SAXON-FPN 11/14/90
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
0.015
0.01
0.005
Time Lat.(N) Long.(W)
Start 10:31:23
Stop 10:33:23
GndSpeed(m/s): 160 Heading: 25
Rotations: 12 X-axis spacing(m): 12
filename: 103120.srf

ROWS SAXON-FPN 11/14/90

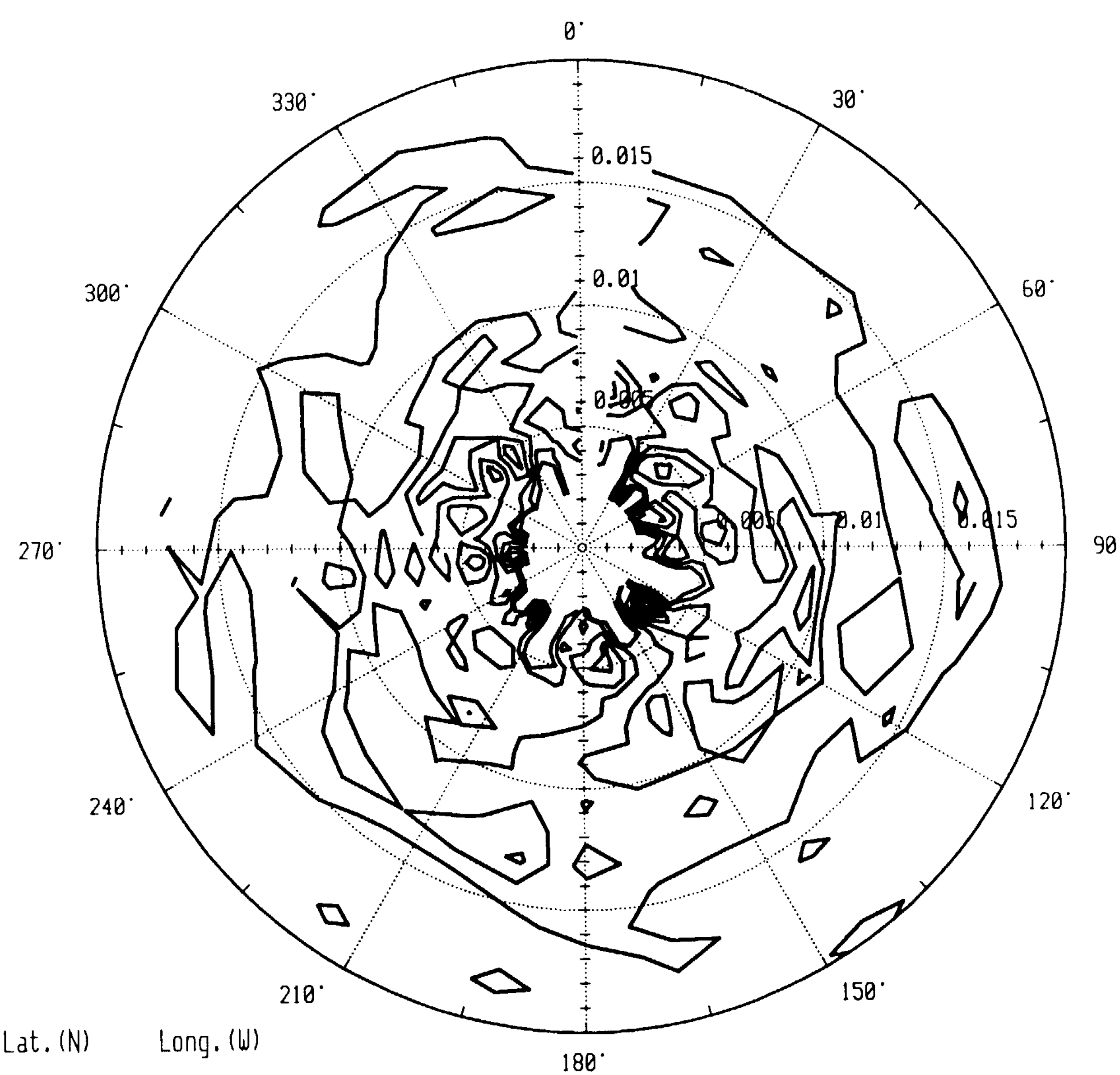


	Time	Lat.(N)	Long.(W)
Start	10:33:43		
Stop	10:35:42		

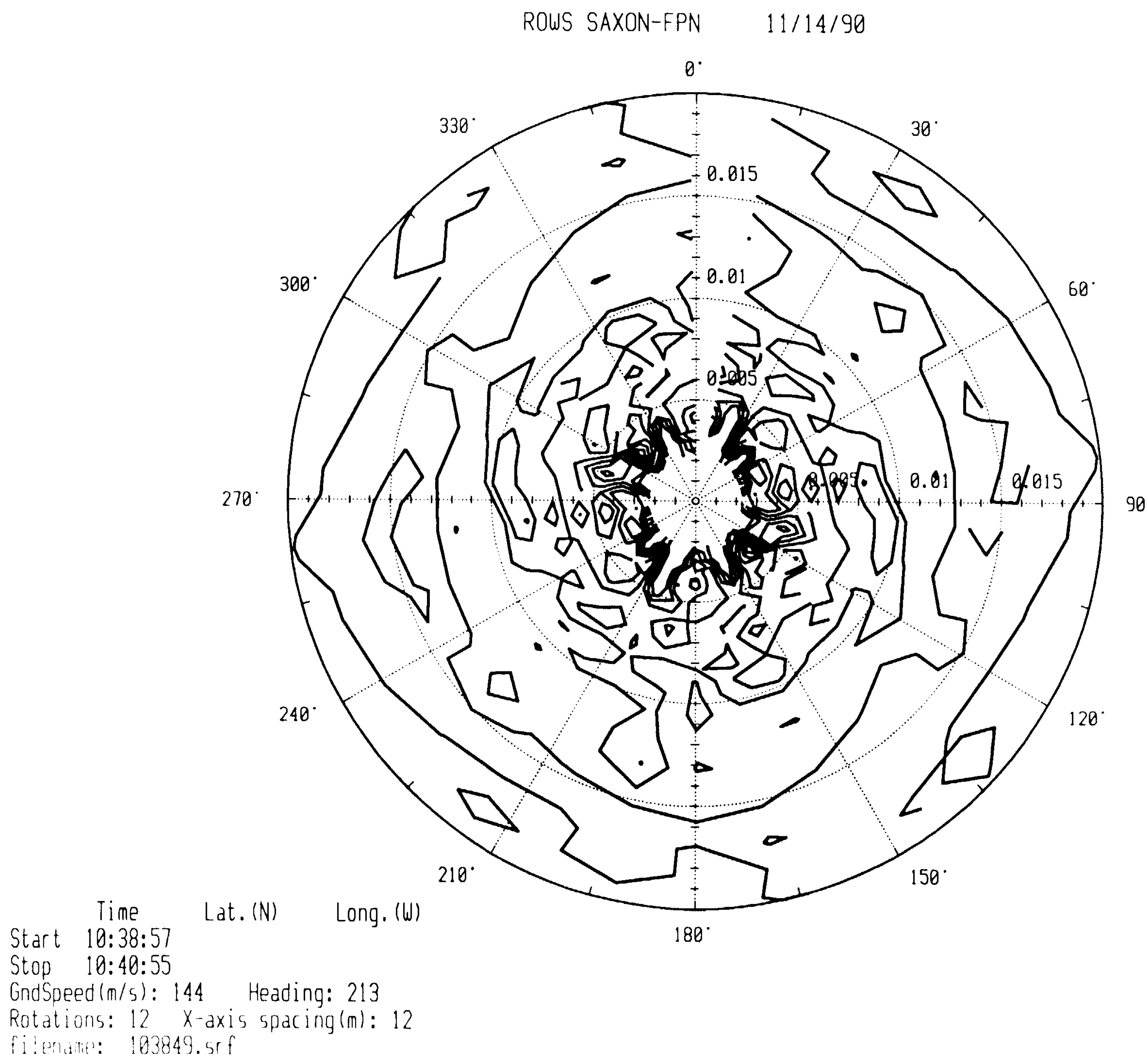
GndSpeed(m/s): 160 Heading: 25
Rotations: 12 X-axis spacing(m): 12
filename: 103340.srf


ROWS SAXON-FPN 11/14/90
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
0.015
0.01
0.005
0.005
0.01
0.015
Time Lat.(N) Long.(W)
Start 10:33:43
Stop 10:35:42
GndSpeed(m/s): 160 Heading: 25
Rotations: 12 X-axis spacing(m): 12
filename: 103340.srf

ROWS SAXON-FPN 11/14/90

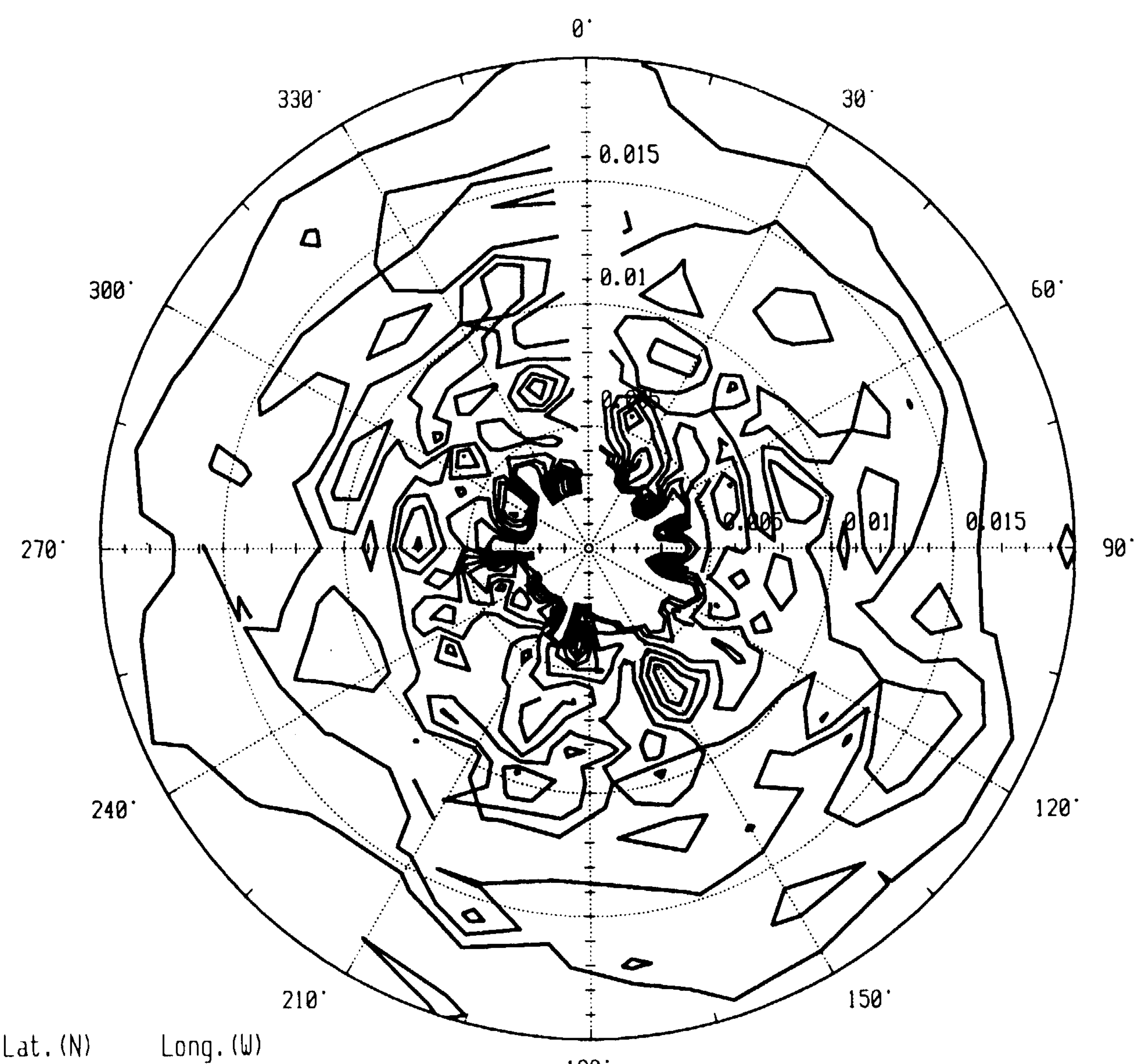


Time Lat.(N) Long.(W)
Start 10:38:57
Stop 10:40:55
GndSpeed(m/s): 144 Heading: 213
Rotations: 12 X-axis spacing(m): 12
filename: 103849.srf



ROWS SAXON-FPN 11/14/90
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
0.015
0.01
0.005
Time Lat.(N) Long.(W)
Start 10:38:57
Stop 10:40:55
GndSpeed(m/s): 144 Heading: 213
Rotations: 12 X-axis spacing(m): 12
filename: 103849.srf

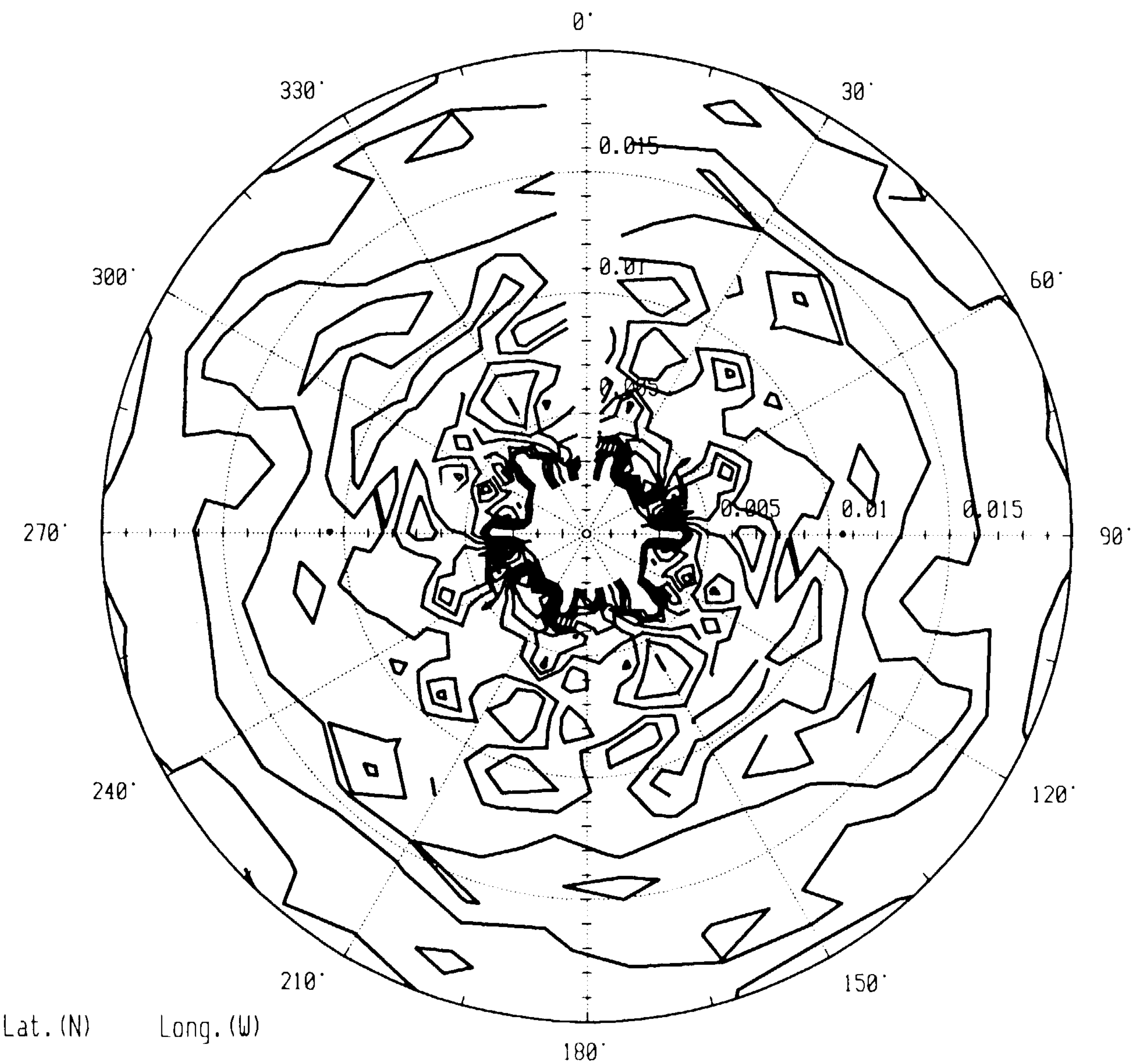
ROWS SAXON-FPN 11/14/90



Time	Lat.(N)	Long.(W)
Start 10:44:40		
Stop 10:46:39		

GndSpeed(m/s): 161 Heading: 40
Rotations: 12 X-axis spacing(m): 12
filename: 104429.srf

ROWS SAXON-FPN 11/14/90



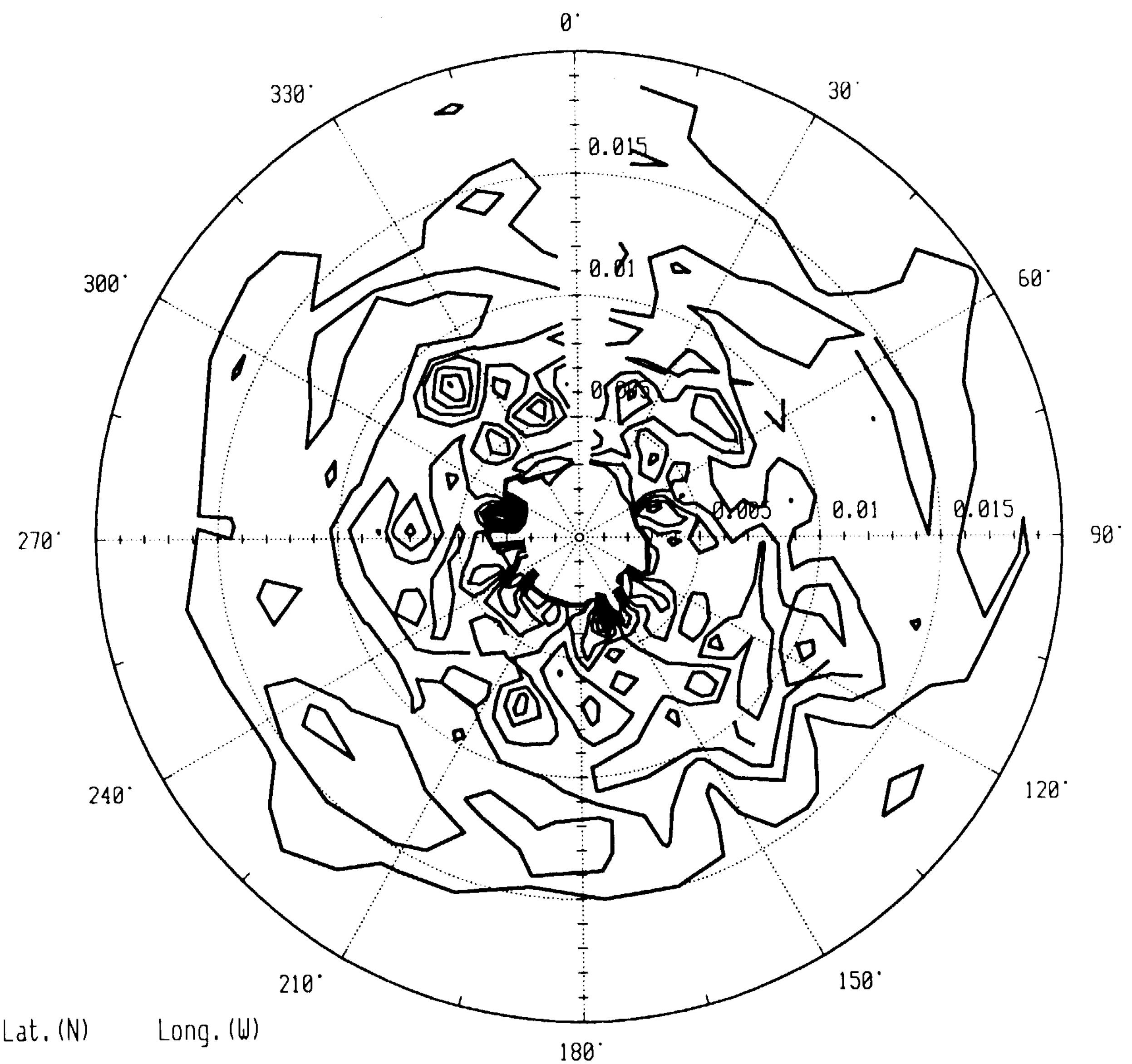
	Time	Lat.(N)	Long.(W)
Start	10:44:40		
Stop	10:46:39		

GndSpeed(m/s): 161 Heading: 40

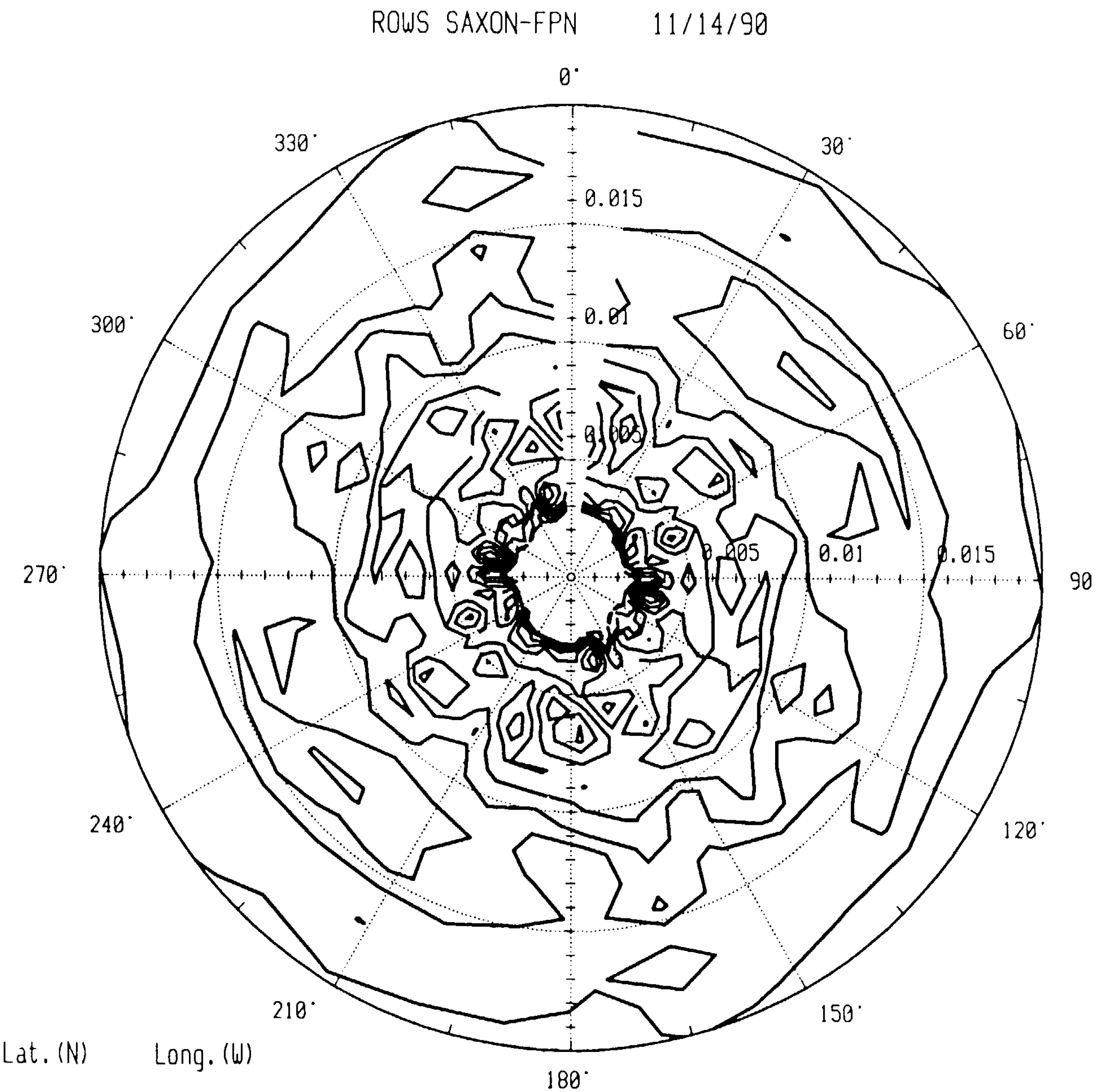
Rotations: 12 X-axis spacing(m): 12

Filename: 104429.sri

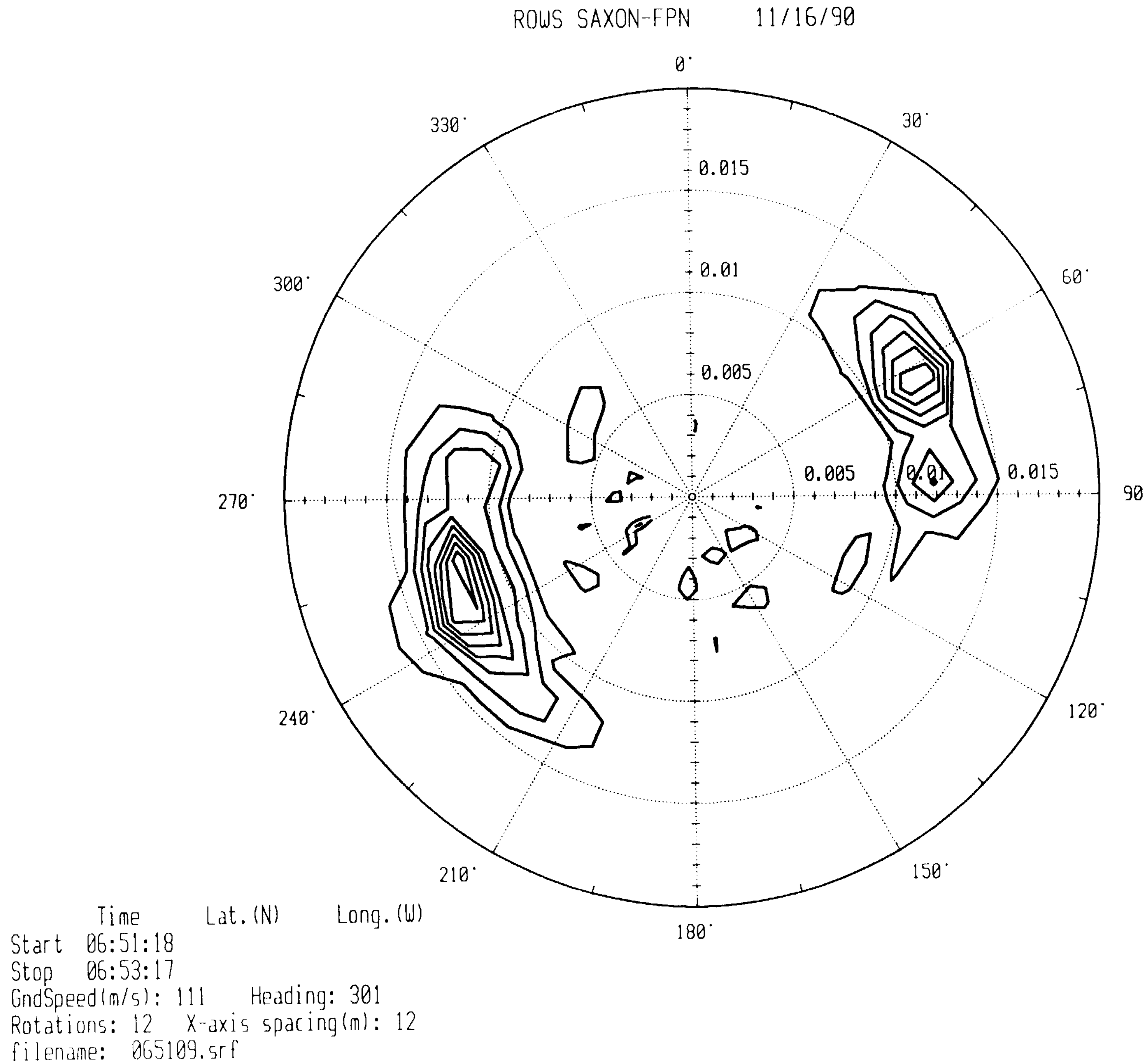
ROWS SAXON-FPN 11/14/90

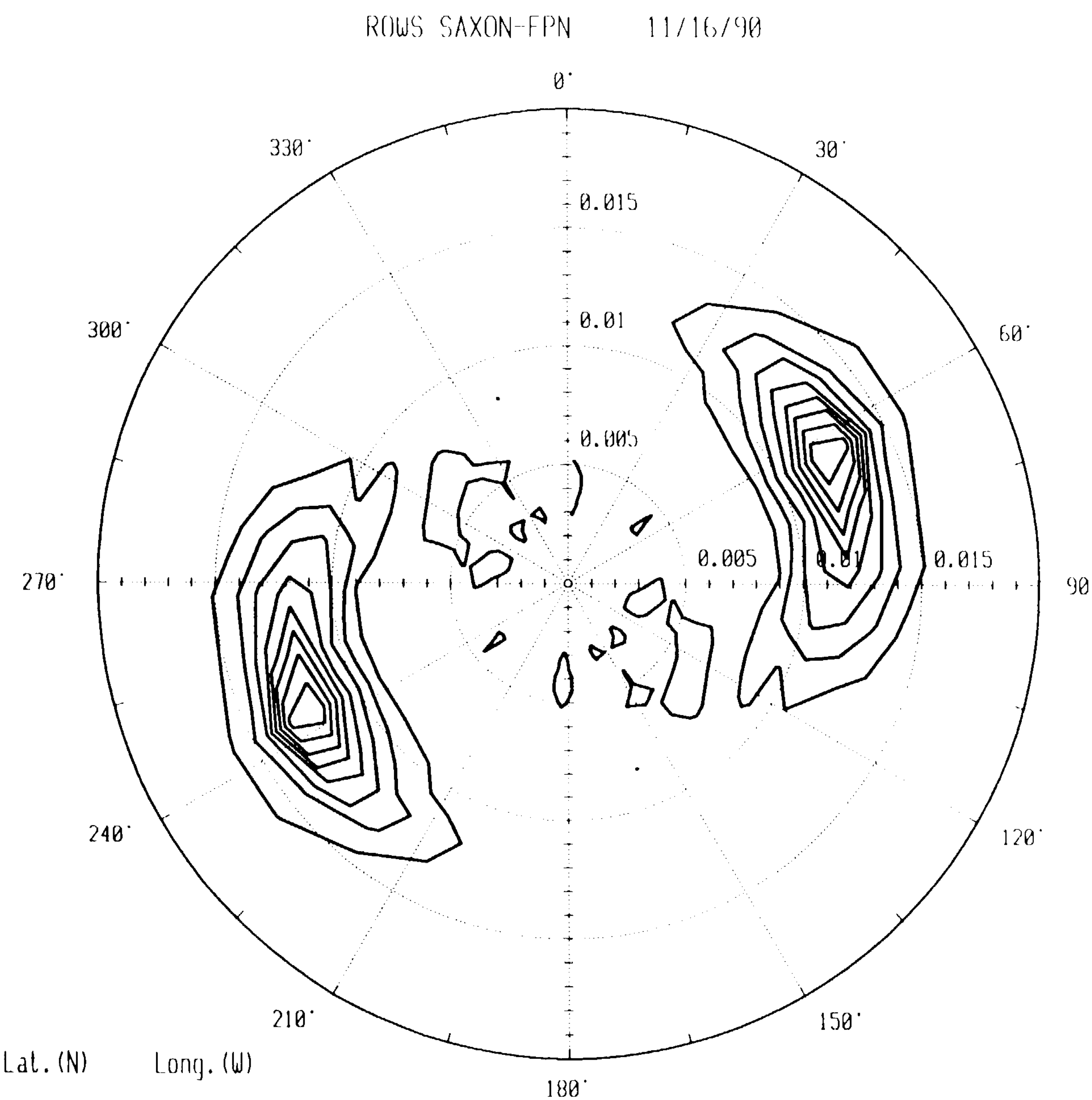


Time Lat.(N) Long.(W)
Start 10:52:53
Stop 10:54:52
GndSpeed(m/s): 145 Heading: 198
Rotations: 12 X-axis spacing(m): 12
filename: 105248.srf

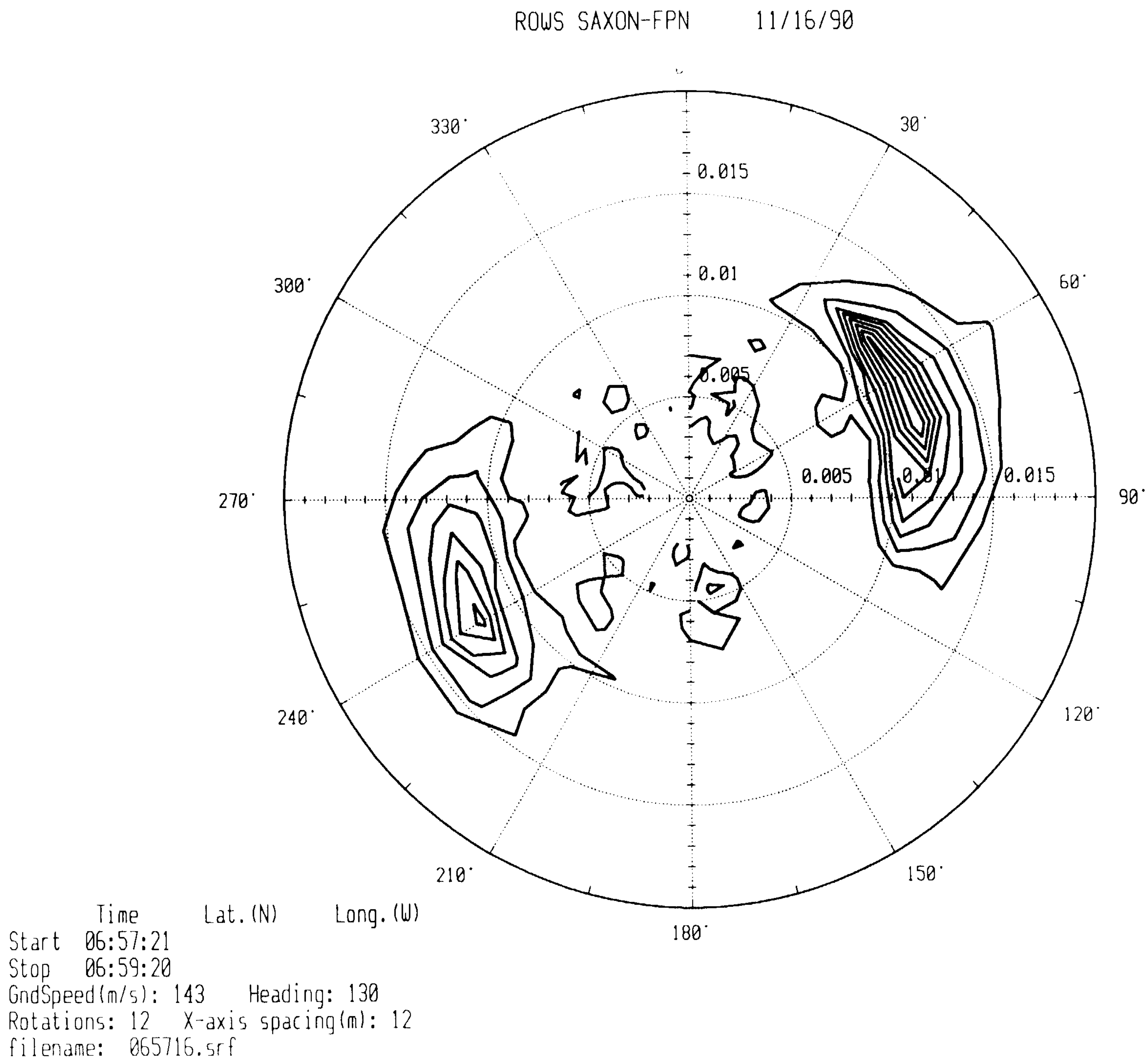


Time Lat.(N) Long.(W)
Start 10:52:53
Stop 10:54:52
GndSpeed(m/s): 145 Heading: 198
Rotations: 12 X-axis spacing(m): 12
filename: 105248.srf

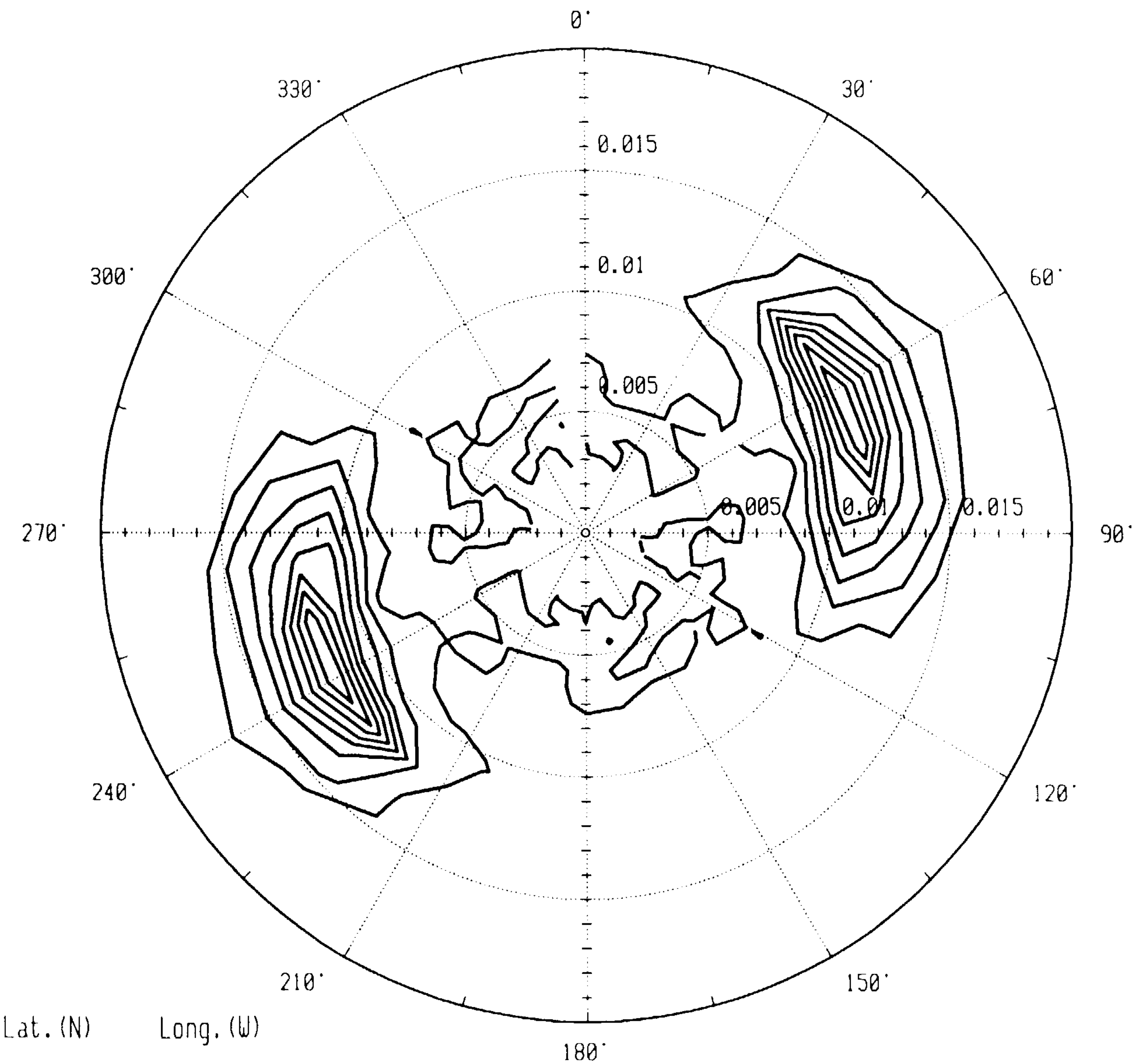

ROWS SAXON-FPN 11/16/90
0˚
30˚
60˚
90˚
120˚
150˚
180˚
210˚
240˚
270˚
300˚
330˚
0.015
0.01
0.005
Time Lat.(N) Long.(W)
Start 06:51:18
Stop 06:53:17
GndSpeed(m/s): 111 Heading: 301
Rotations: 12 X-axis spacing(m): 12
filename: 065109.srf



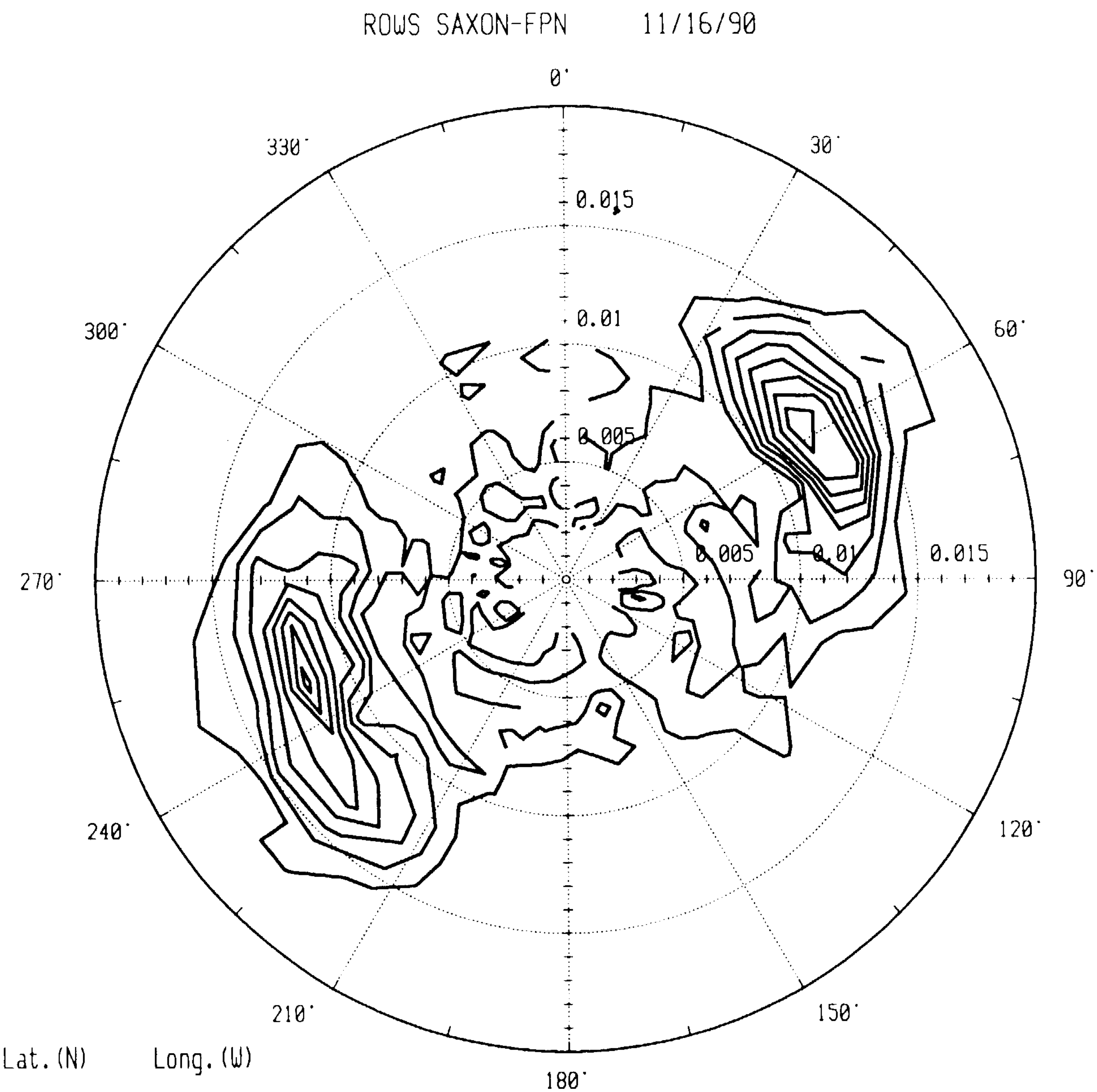
Time Lat.(N) Long.(W)
Start 06:51:18
Stop 06:53:17
GndSpeed(m/s): 111 Heading: 301
Rotations: 12 X-axis spacing(m): 12
filename: 065109.srf


ROWS SAXON-FPN 11/16/90
330°
30°
300°
60°
270°
90°
240°
120°
210°
150°
180°
0.015
0.01
0.005
0.005
0.01
0.015
Time Lat.(N) Long.(W)
Start 06:57:21
Stop 06:59:20
GndSpeed(m/s): 143 Heading: 130
Rotations: 12 X-axis spacing(m): 12
filename: 065716.srf

ROWS SAXON-FPN 11/16/90

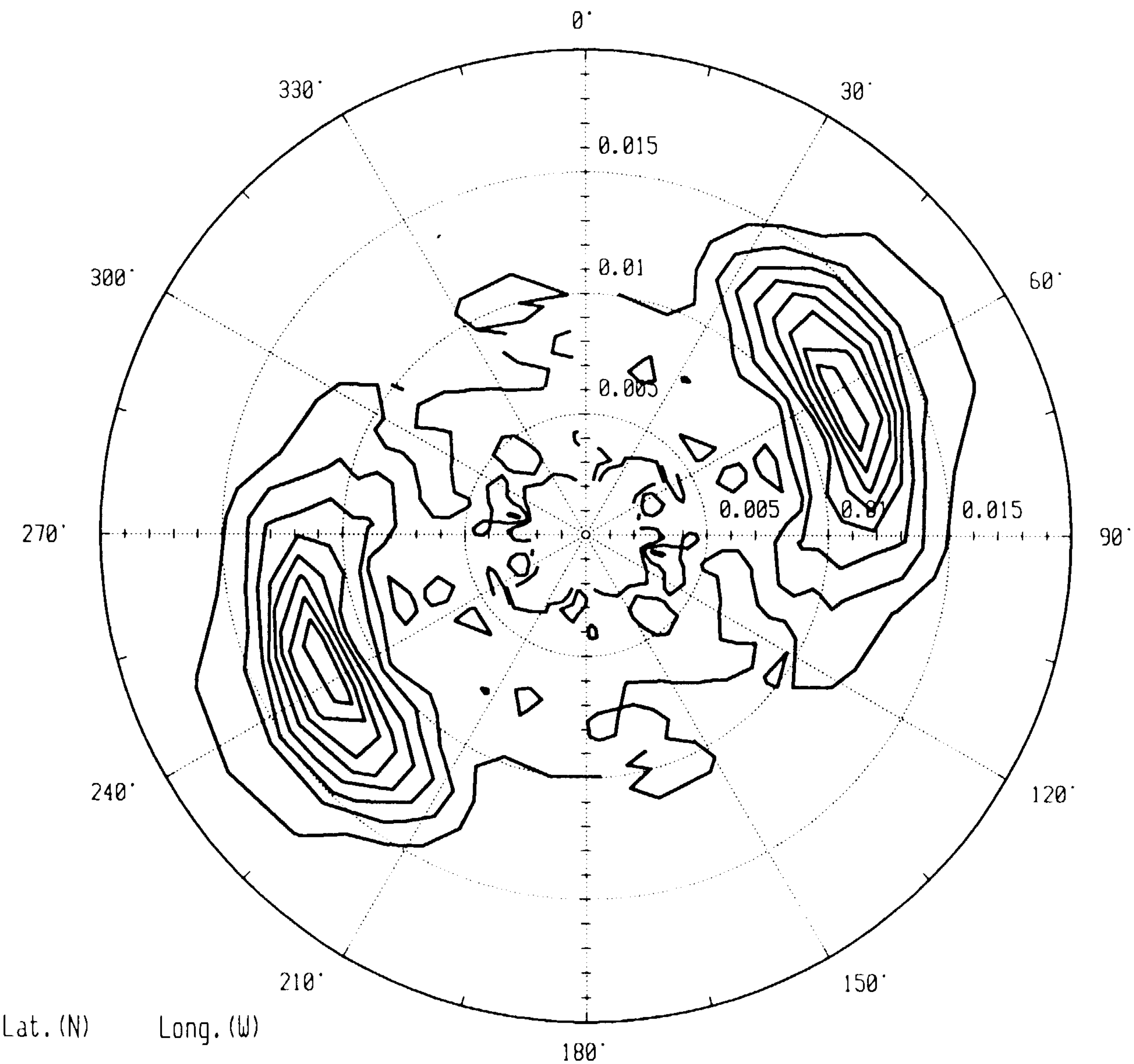


Time Lat.(N) Long.(W)
Start 06:57:21
Stop 06:59:20
GndSpeed(m/s): 143 Heading: 130
Rotations: 12 X-axis spacing(m): 12
filename: 065716.srf



Time Lat.(N) Long.(W)
Start 07:02:45
Stop 07:04:44
GndSpeed(m/s): 143 Heading: 306
Rotations: 12 X-axis spacing(m): 12
filename: 071438.srf

ROWS SAXON-FPN 11/16/90



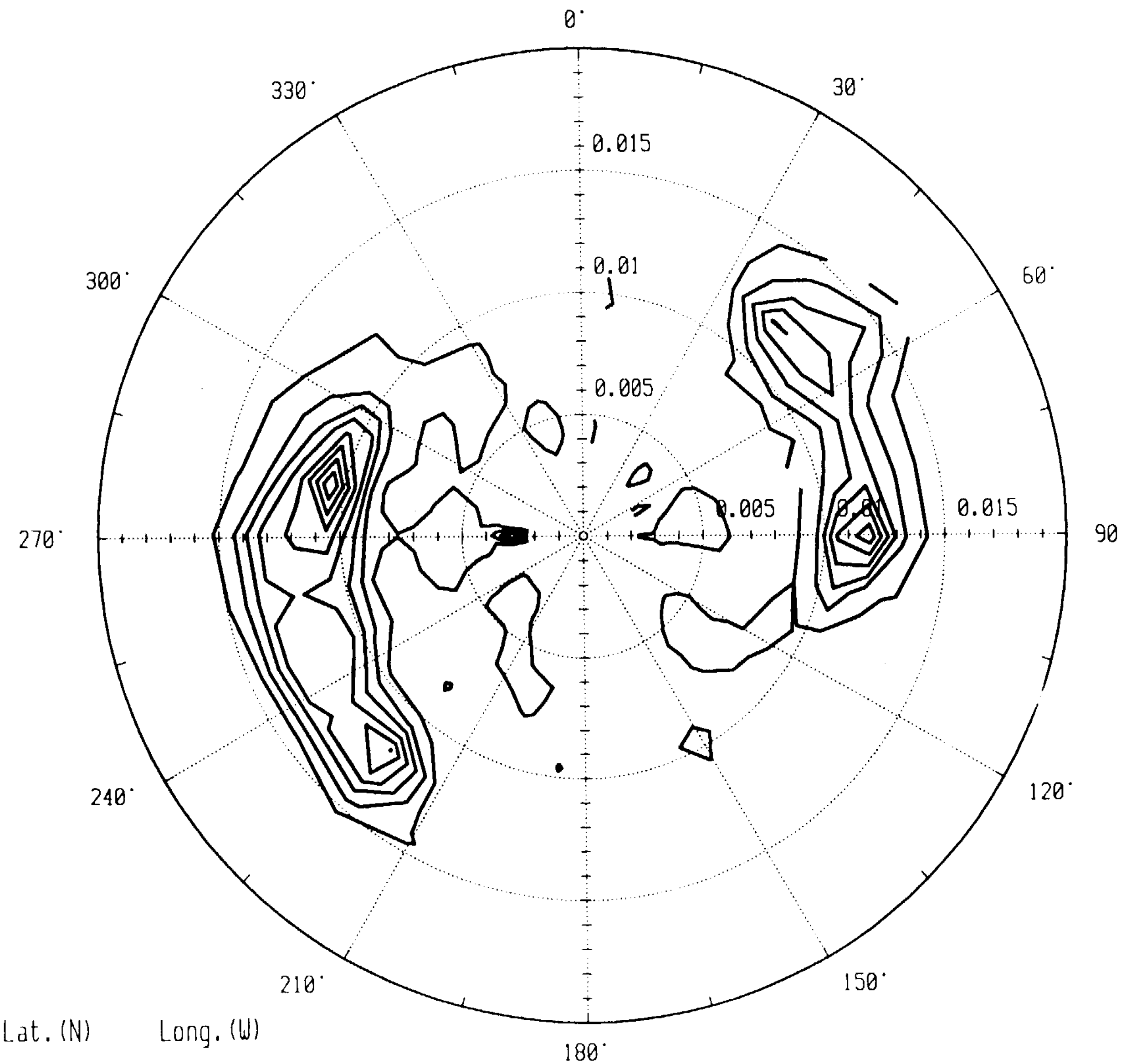
	Time	Lat.(N)	Long.(W)
Start	07:02:45		
Stop	07:04:44		

GndSpeed(m/s): 143 Heading: 306

Rotations: 12 X-axis spacing(m): 12

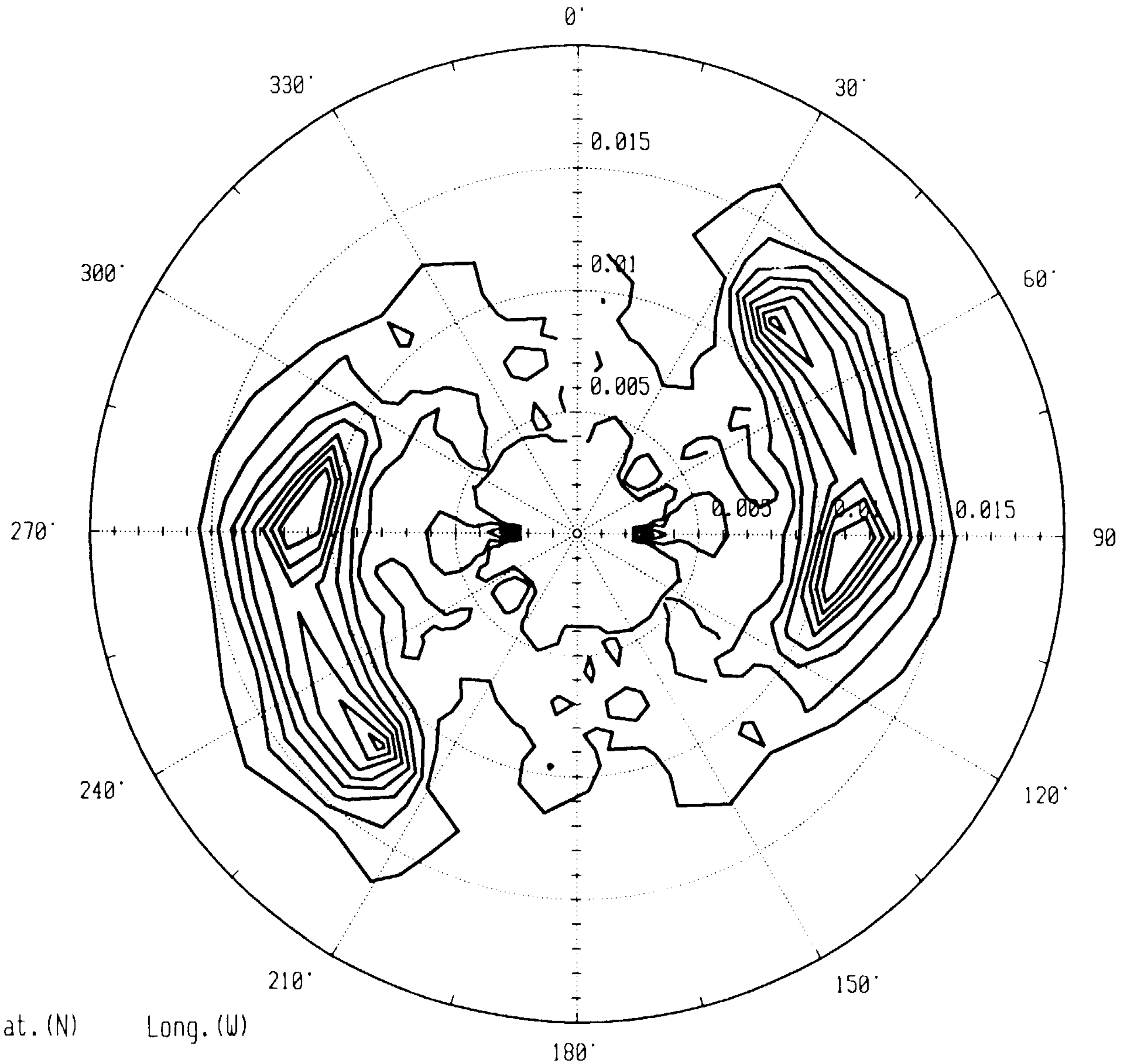
filename: 071438.srf

ROWS SAXON-FPN 11/16/90



Time Lat.(N) Long.(W)
Start 09:46:54
Stop 09:48:53
GndSpeed(m/s): 118 Heading: 280
Rotations: 12 X-axis spacing(m): 12
filename: 094634.srf

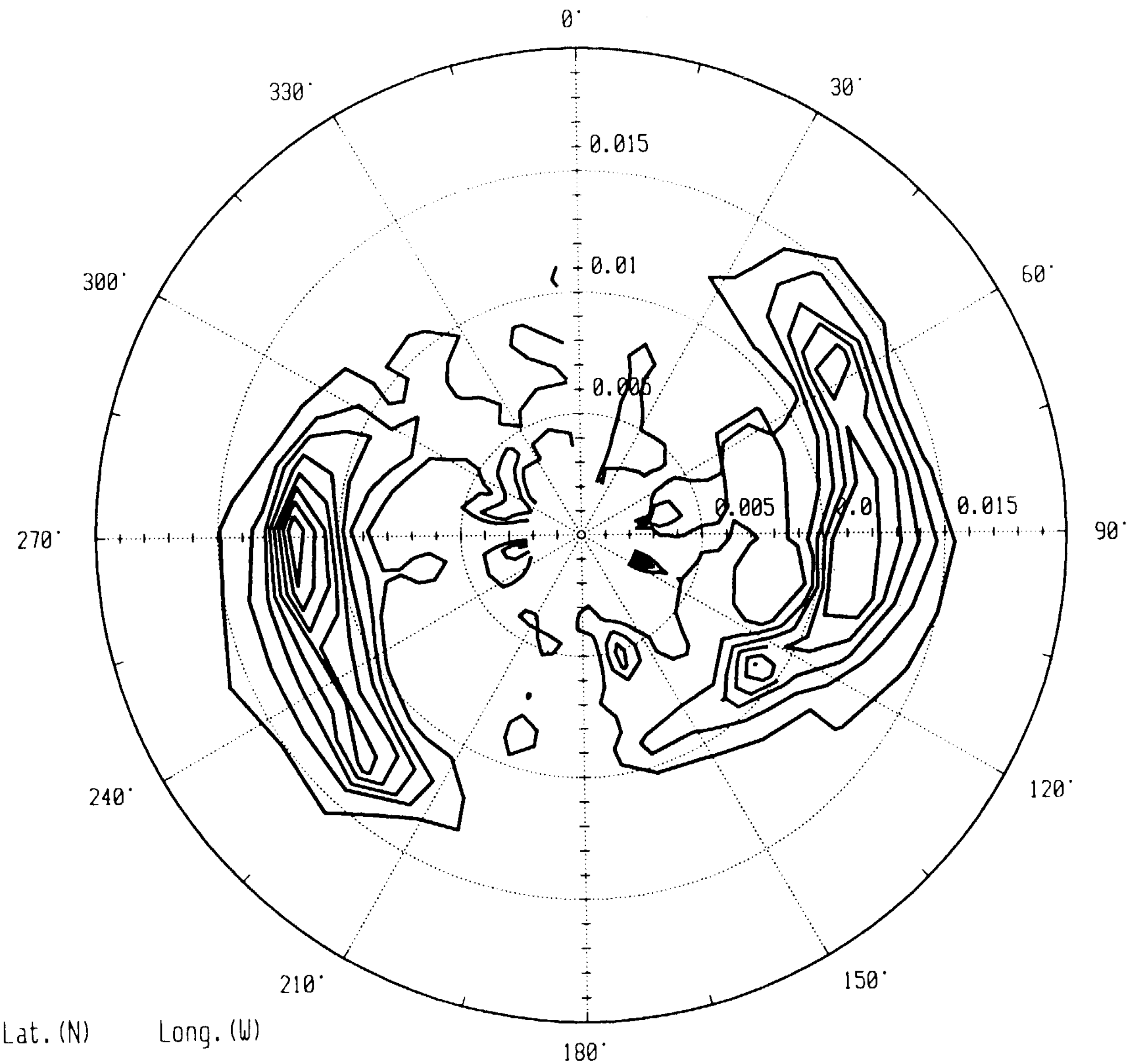
ROWS SAXON-FPN 11/16/90



	Time	Lat.(N)	Long.(W)
Start	09:46:54		
Stop	09:48:53		

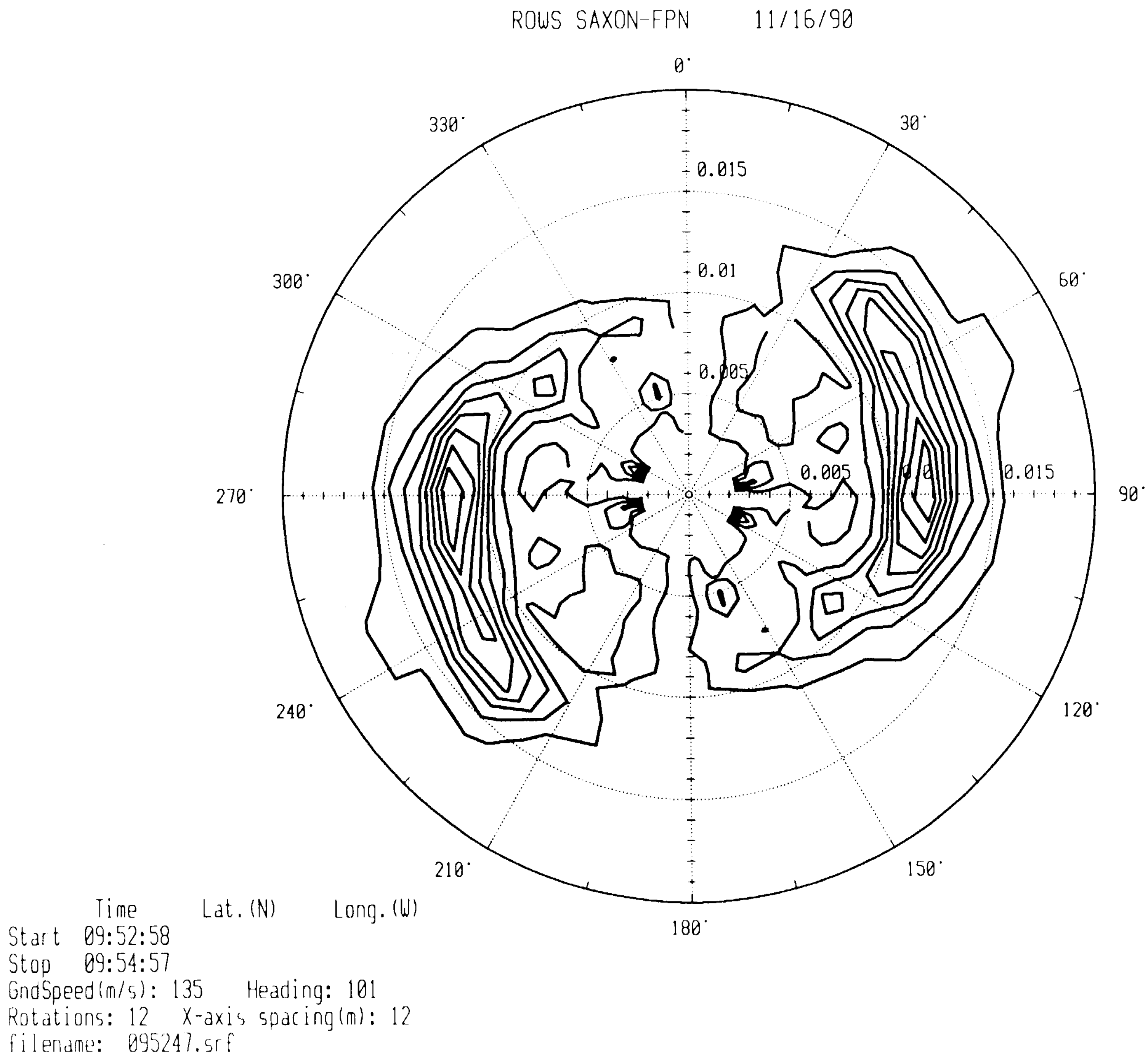
GndSpeed(m/s): 118 Heading: 280
Rotations: 12 X-axis spacing(m): 12
filename: 094634.srf

ROWS SAXON-FPN 11/16/90

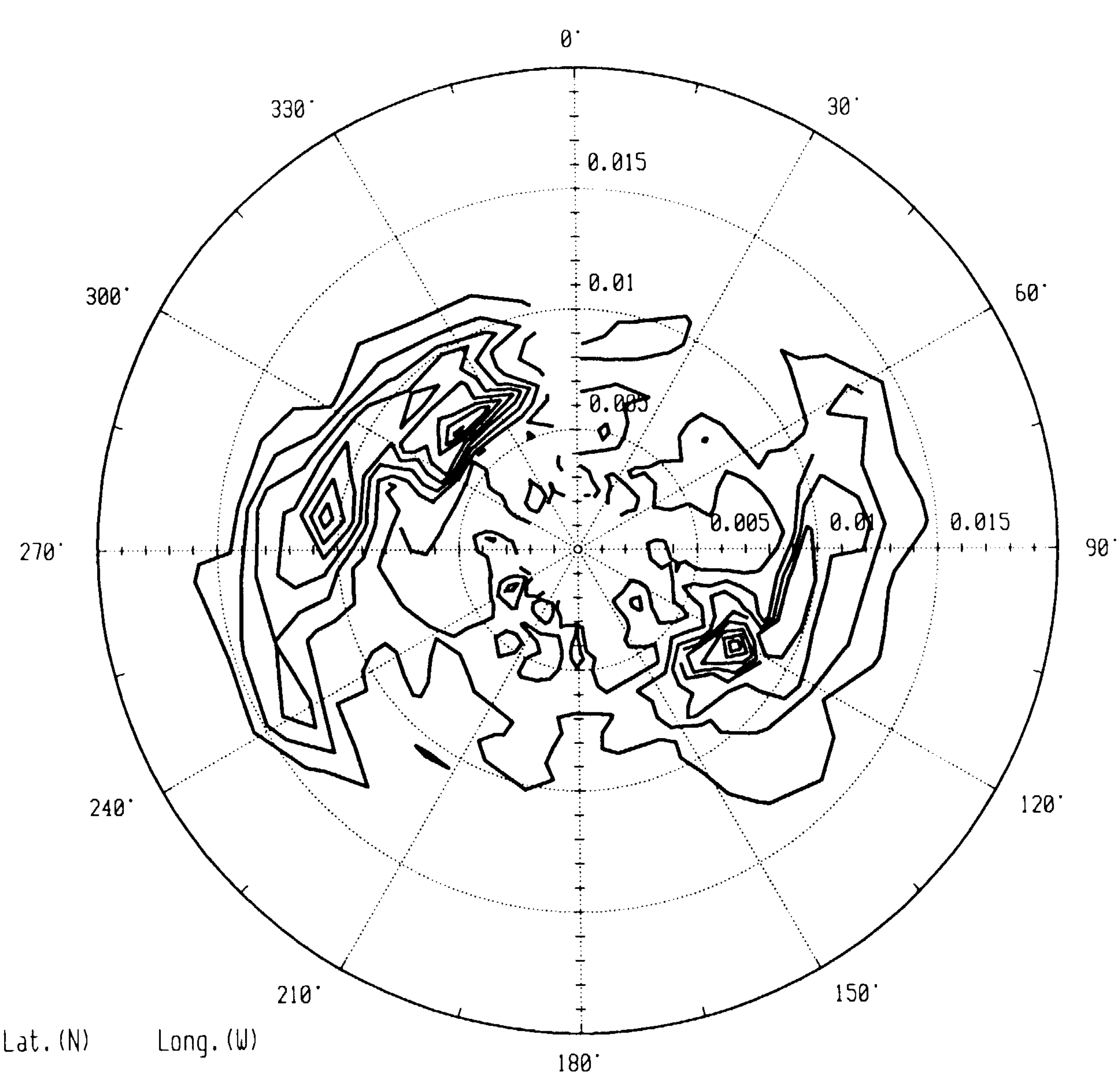


Time	Lat.(N)	Long.(W)
Start 09:52:58		
Stop 09:54:57		

GndSpeed(m/s): 135 Heading: 101
Rotations: 12 X-axis spacing(m): 12
filename: 095247.srf

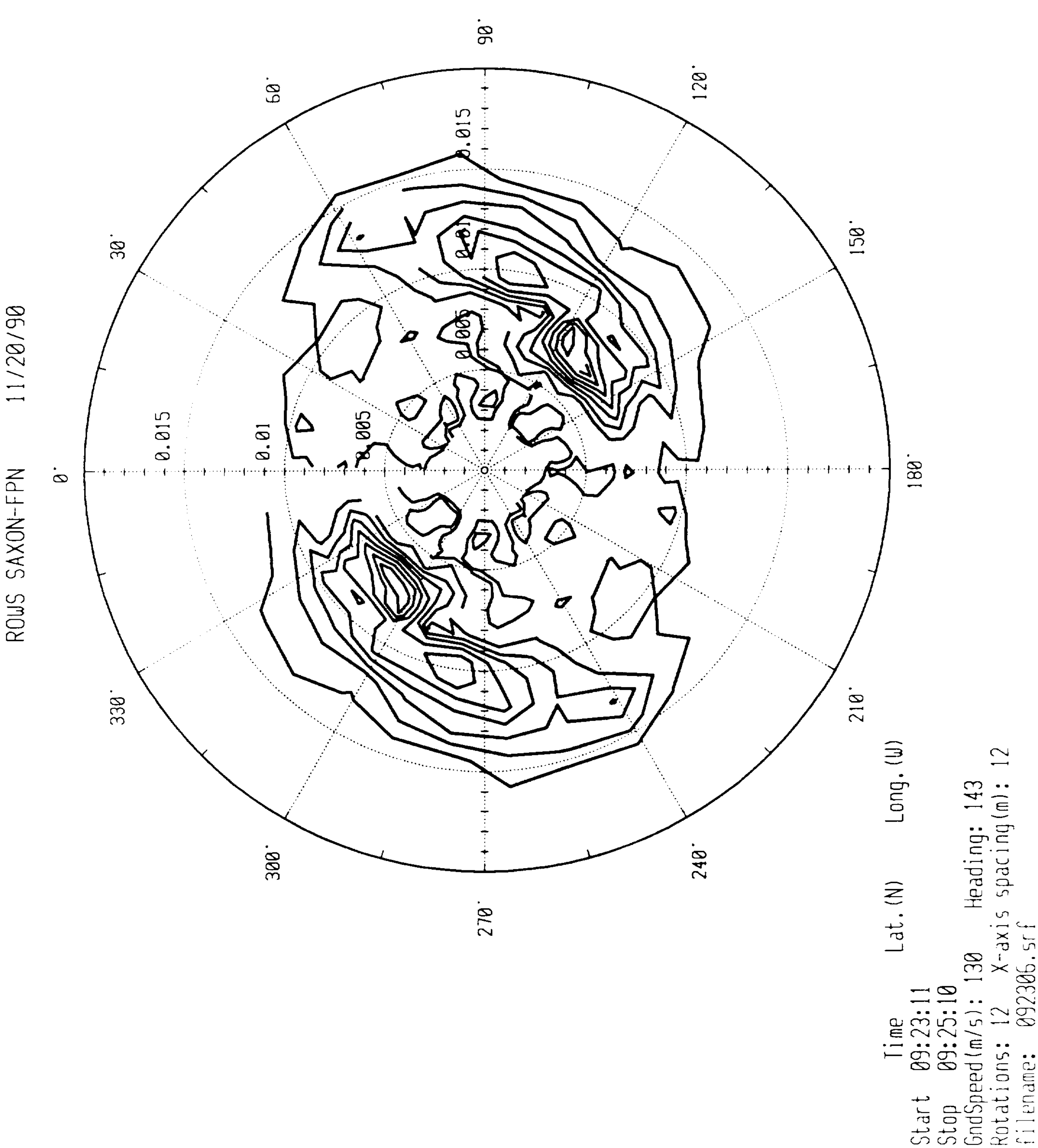

ROWS SAXON-FPN 11/16/90
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
0.015
0.01
0.005
Time Lat.(N) Long.(W)
Start 09:52:58
Stop 09:54:57
GndSpeed(m/s): 135 Heading: 101
Rotations: 12 X-axis spacing(m): 12
filename: 095247.srf

ROWS SAXON-FPN   11/20/90

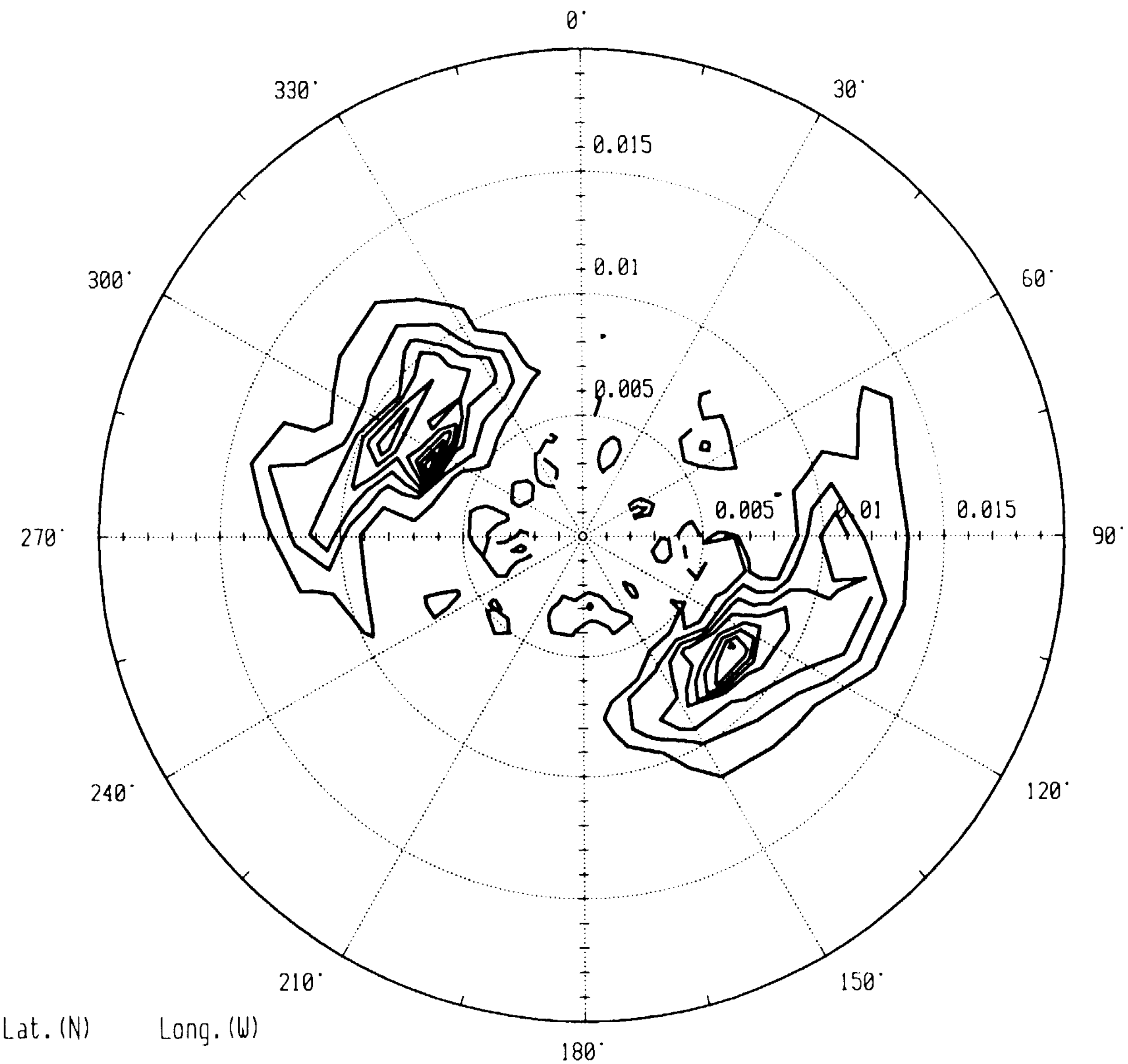


	Time	Lat.(N)	Long.(W)
Start	09:23:11		
Stop	09:25:10		

GndSpeed(m/s): 130   Heading: 143
Rotations: 12   X-axis spacing(m): 12
filename: 092306.srf

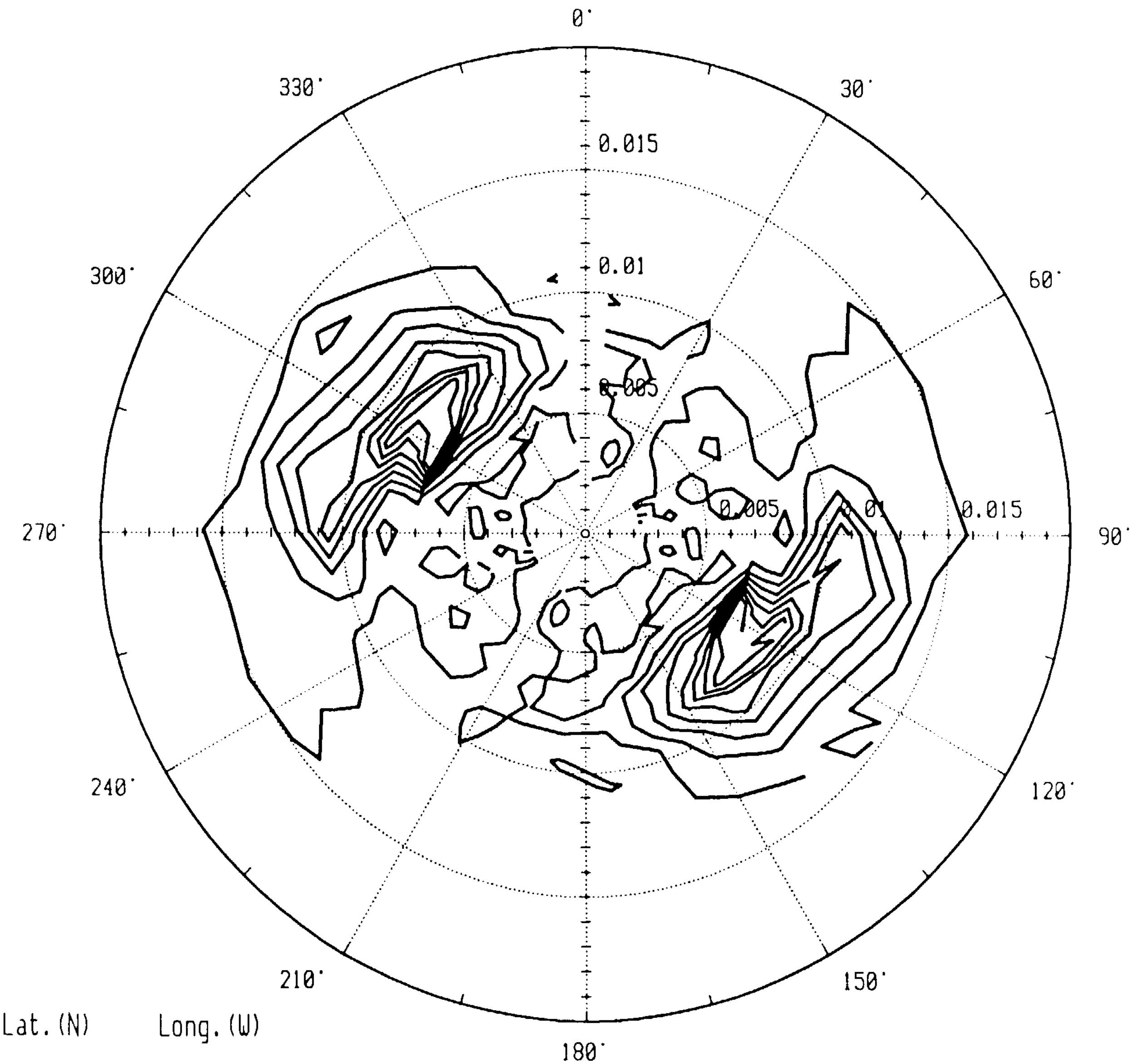

ROWS SAXON-FPN 11/20/90
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
0.015
0.01
0.005
Lat.(N) Long.(W)
Time
Start 09:23:11
Stop 09:25:10
GndSpeed(m/s): 130 Heading: 143
Rotations: 12 X-axis spacing(m): 12
filename: 092306.srf

ROWS SAXON-FPN 11/20/90



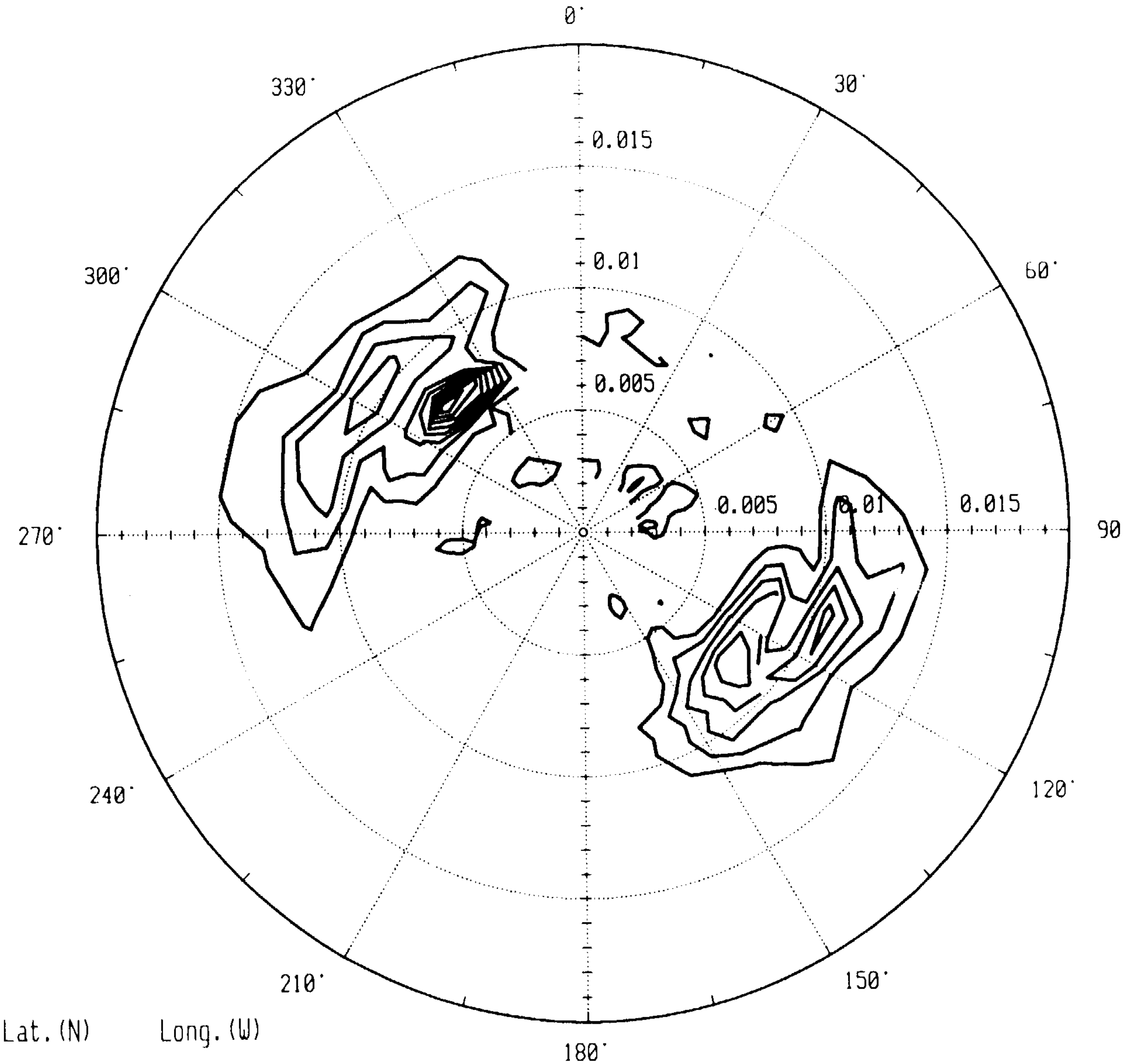
Time Lat.(N) Long.(W)
Start 09:30:14
Stop 09:32:13
GndSpeed(m/s): 130 Heading: 352
Rotations: 12 X-axis spacing(m): 12
filename: 093003.srf

ROWS SAXON-FPN 11/20/90



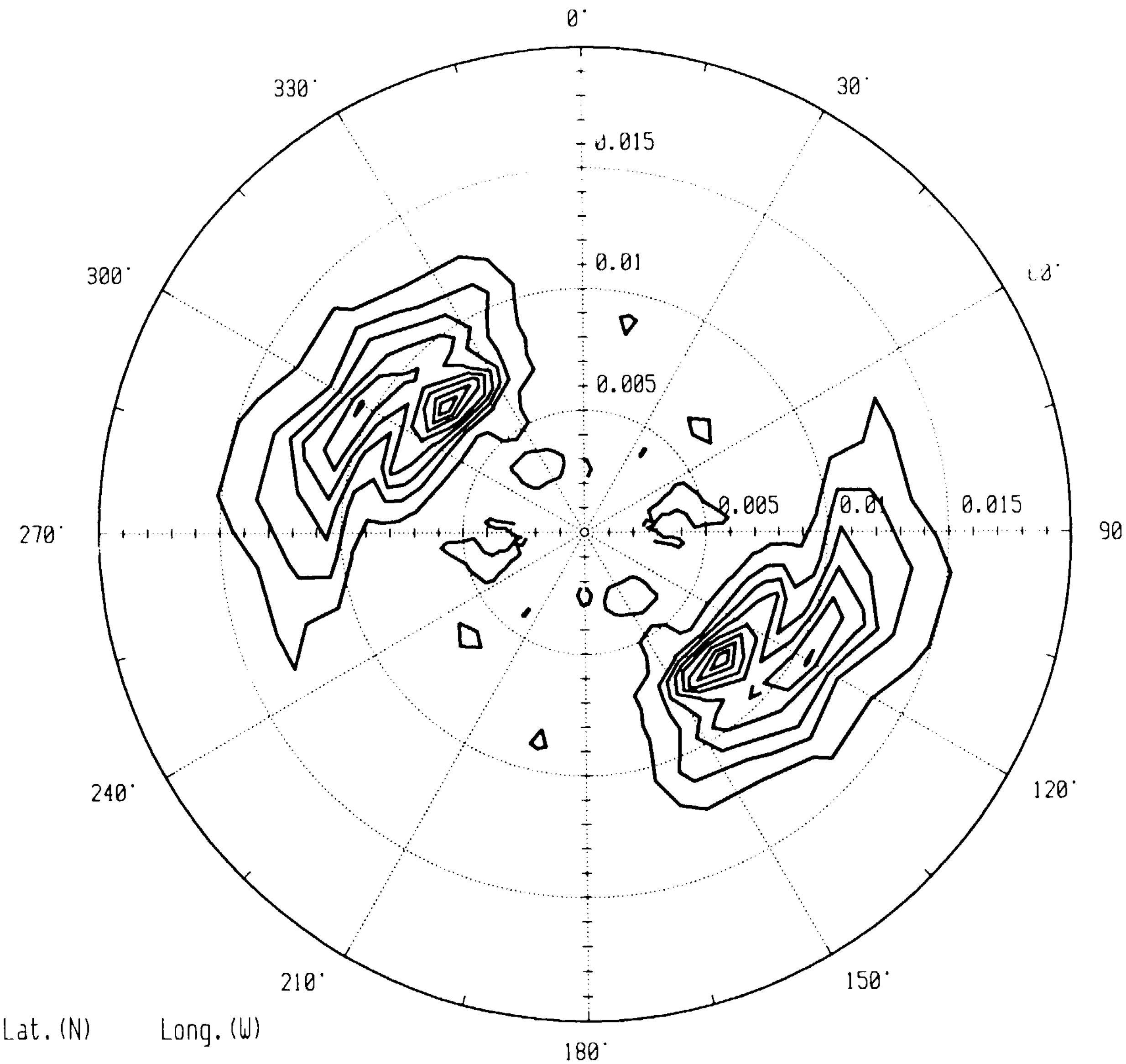

```
       Time      Lat.(N)     Long.(W)
Start  09:30:14
Stop   09:32:13
GndSpeed(m/s): 130    Heading: 352
Rotations: 12   X-axis spacing(m): 12
filename:  093003.srf
```

ROWS SAXON-FPN 11/20/90

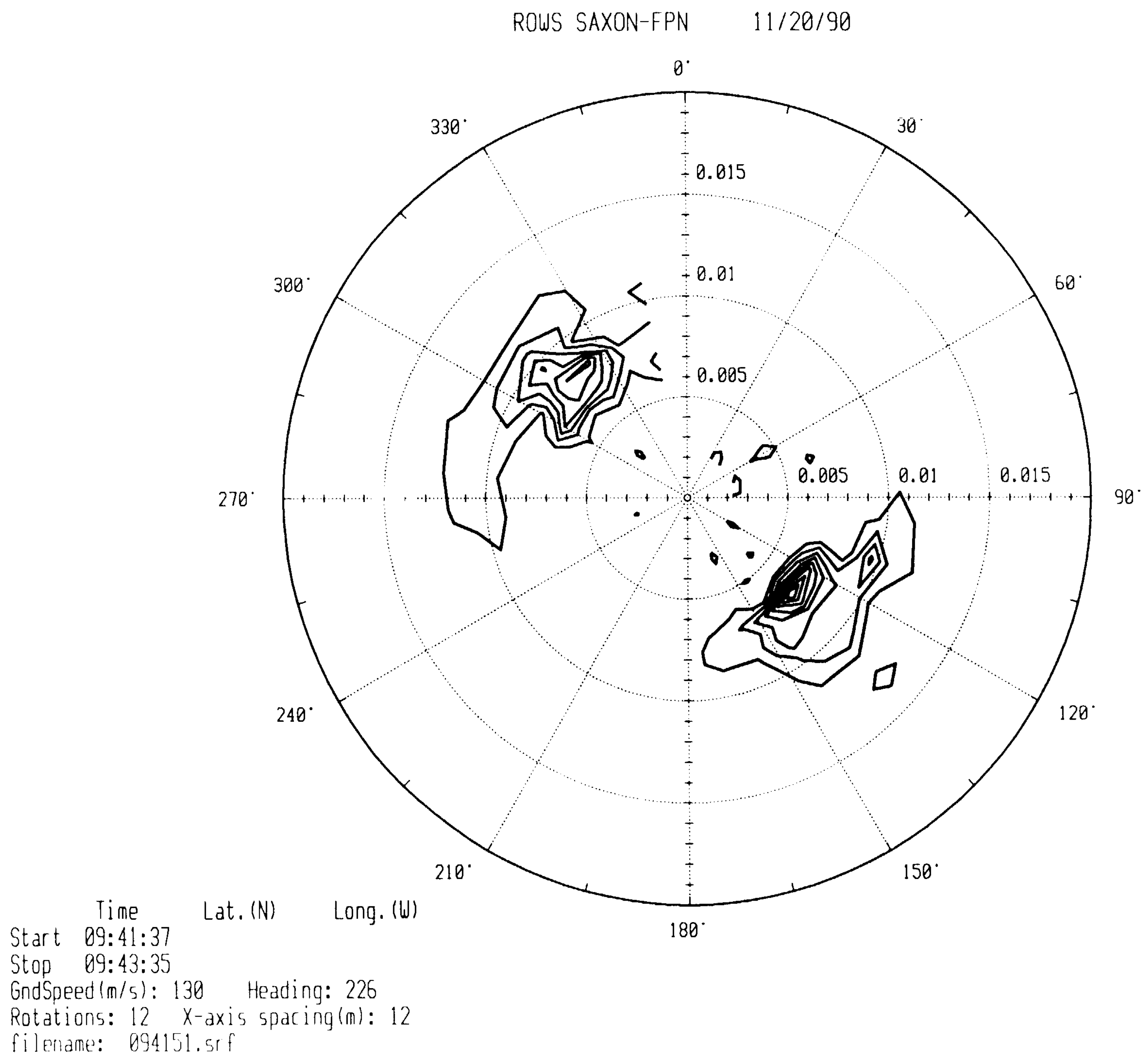


Time Lat.(N) Long.(W)
Start 09:39:17
Stop 09:41:16
GndSpeed(m/s): 130 Heading: 226
Rotations: 12 X-axis spacing(m): 12
filename: 093951.srf

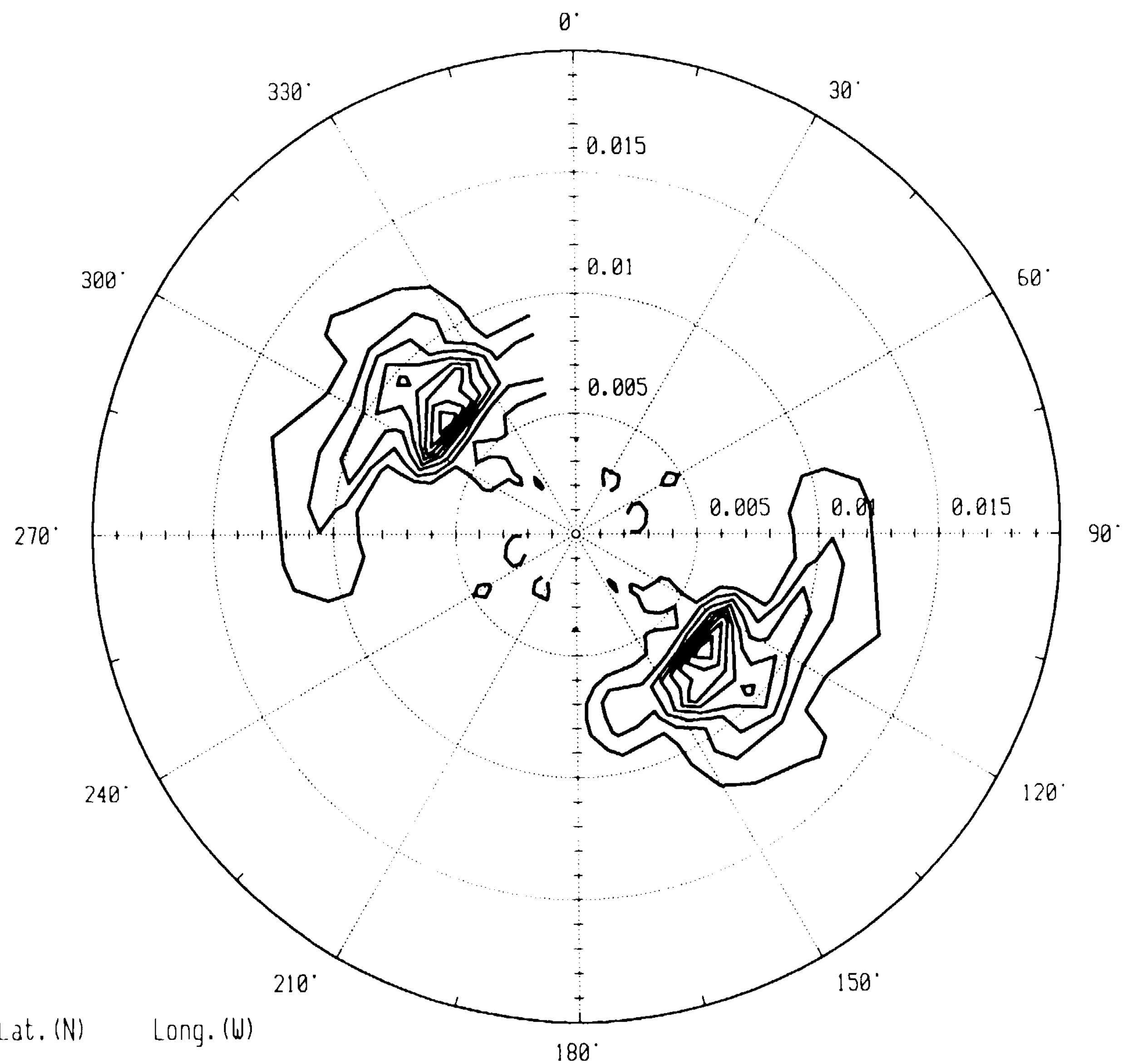
ROWS SAXON-FPN 11/20/90



Time Lat.(N) Long.(W)
Start 09:39:17
Stop 09:41:16
GndSpeed(m/s): 130 Heading: 226
Rotations: 12 X-axis spacing(m): 12
filename: 093951.srf


ROWS SAXON-FPN 11/20/90
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
0.005
0.01
0.015
Time Lat.(N) Long.(W)
Start 09:41:37
Stop 09:43:35
GndSpeed(m/s): 130 Heading: 226
Rotations: 12 X-axis spacing(m): 12
filename: 094151.srf

ROWS SAXON-FPN 11/20/90



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F. Jackson, D. Vandemark, S. Bailey, C. Vaughn, D. Hines,
J. Ward, K. Stewart, and B. Chapron

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Laboratory for Hydrospheric Processes
Goddard Space Flight Center
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High-resolution directional wave spectra obtained with the NASA Ku-band radar ocean wave spectrometer (ROWS) on the Naval Research Laboratory P-3 aircraft during SAXON-FPN (SAR and X-Band Ocean Nonlinearities Experiment-Forschungsplattform Nordsee) experiments in the North Sea in November 1990 are presented. This experiment was the first in which the ROWS was operated with its new pc-based high-speed digital data acquisition system.

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