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Atlas of Wide-Field-of-View Outgoing Longwave Radiation Derived From Nimbus 6 Earth Radiation Budget Data Set—July 1975 to June 1978

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National Aeronautics and Space Administration

Scientific and Technical Information Office

Introduction

For the past 20 years radiometers aboard orbiting satellites have provided the most comprehensive sets of radiation measurements of the outgoing longwave radiation (OLR) of the Earth on both a regional and a global scale. Beginning in 1975 the third generation of satellite experiments for measuring the radiation budget began. This new series of experiments was referred to as the Earth radiation budget (ERB) experiment (Smith et al. 1977 and Jacobowitz et al. 1979).

The first ERB experiment was launched into a nearly circular Sun-synchronous Earth orbit aboard the Nimbus 6 satellite on June 12, 1975. The ERB instrument package included two Earth-viewing wide-field-of-view (WFOV) radiometers, one of which measured total irradiance and the other of which measured shortwave (SW) irradiance. The difference between the two (Total – SW) is the OLR. These WFOV radiometers viewed the entire Earth's disk from the Nimbus 6 satellite, which had an altitude of 1100 km and Equator crossing times near 12:00 a.m. (noon) and 12:00 p.m. (midnight). The SW channel had a spectral range of 0.2 to 3.8 μm, and the total channel measured the irradiance from 0.2 to 50+μm. The first data were taken by Nimbus 6 on July 2, 1975. Nimbus 6 continued to collect usable Earth radiation data through June 1978 for a continuous 3-year data set.

This paper is an atlas of monthly averaged OLR results estimated at the top of the atmosphere (denoted by TOA and defined herein to be an altitude of 30 km) for the 3 years of Nimbus 6 operation spanning the time period from July 1975 to June 1978. Jacobowitz et al. (1979) analyzed and published some results of the first 18 months of ERB measurements from the Nimbus 6 WFOV data set. They used the inverse square approximation (geometric shape factor) to determine the radiant exitance at the TOA. No formal publication of the ERB WFOV results of OLR from January 1977 to June 1978 has been released.

The purpose of this atlas is to document all the WFOV OLR results from the 3 years of Nimbus 6 operation in a form that allows analysis of the radiation field of the Earth. The results contained in this atlas were derived with a deconvolution (i.e., a resolution enhancement) technique which represented the WFOV monthly averaged OLR as an expansion of spherical harmonic coefficients (Smith and Green 1981). Tables of these coefficients along with monthly averaged contour maps of OLR results for 3 years are included. Contour maps and spherical harmonic coefficients for the first year of the Nimbus 6 ERB experiment WFOV results have previously been documented (Bess, Green, and Smith 1980). However, the results for the first year in this atlas show some improvement over earlier results because of the use of a correction for degradation of the SW channel.

The results documented in this atlas are important for a number of reasons. One relates to the data, which are both broadband and WFOV data. Because the measurements are broadband, the ERB radiometers offer some significant advantages over the instruments aboard NOAA operational-type polar orbiting satellites, which measure upwelling radiation in the narrow spectral regions (0.5 to 0.7 μm in the visible region and 10.5 to 12.5 μm in the infrared region). Winston et al. (1979) published an atlas which documented 4 years of OLR results from the scanning radiometer (SR) on the NOAA operational satellite. Janowiak et al. (1985) also published an atlas of OLR results derived from NOAA operational satellite data which covered the time period from June 1974 to November 1983. The primary disadvantage of measurements made by NOAA operational satellites is that measurements are made in narrow spectral regions which must then be empirically corrected to estimate the broadband OLR. Their big advantage is their very high spatial resolution compared with the WFOV radiometer, which is limited to large scales.

The WFOV instrument is also well suited for measuring large-scale features since its field of view is such that the instrument measures all incident radiation from horizon to horizon. Herein lies one of its advantages since the measured radiation is integrated over a broad variation of angles, and thus is less sensitive to directional models than are data measured with narrow-field-of-view radiometers.

In regards to stability of instruments, scanning radiometers and fixed-WFOV radiometers tend to be very stable over time in the infrared region of the spectrum, but they experience degradation in the shortwave region. However, because of their mechanical simplicity, fixed-WFOV radiometers typically have greater longevity than do scanning radiometers. For instance, the fixed-WFOV radiometer on Nimbus 6 operated uninterrupted for 3 years, and the Nimbus 7 fixed-WFOV radiometer has been operational for over 7 years.

In addition to the data being broadband and WFOV, the method of representing the data using spherical harmonics is important. The spherical harmonic coefficient data set for each month represents a condensation of the OLR field. Some of these coefficients have a physical interpretation attached to them. These coefficients may be analyzed individually or in combination to study different aspects

of the radiation field. The results from Nimbus 6 also represent the beginning of a long-term time series of OLR for the ERB WFOV-type instruments. This 3-year data base takes us into the time period of the second ERB WFOV radiometer, which was flown on the Nimbus 7 satellite in November 1978. The Nimbus 7 data are the subject of another atlas of OLR. Nimbus 7 has been operating continuously for 7 years, and when its data are combined with the data base from Nimbus 6, we have a time series of OLR results covering 10 years. This time series data will be very valuable for doing monthly, annual, and interannual studies of OLR.

The authors are grateful to H. Jacobowitz of NOAA for providing the Nimbus 6 data tapes which made this research possible. Also, many thanks to T. P. Charlock, J. J. Buglia, and W. F. Staylor for their many suggestions and to M. A. Woerner for her programming help along the way.

Data Processing and Analysis

The 3 years of ERB WFOV irradiance data from the Nimbus 6 satellite covering the time period from July 1975 to June 1978 were supplied by NOAA. Only the OLR data are documented in this atlas.

The nominal duty cycle of the ERB radiometer was 2 days on and 2 days off. When the radiometer was turned on, measurements were taken at 4-sec intervals along the orbital track. The data tapes supplied by NOAA contain data reduced by averaging four consecutive measurements, resulting in one averaged value every 16 sec.

Because the Nimbus 6 ERB radiometer was constrained to operate on a duty cycle of 2 days on followed by 2 days off, continuous daily measurements were not possible. This sampling strategy tends to change the true radiant exitance. However, the absence of a continuous daily data set did not seriously constrain monthly averaged WFOV data since the data were smoothed in the averaging process over 1 month and over the large spatial area of the WFOV radiometer. Green and Smith (1978) looked at the temporal variation over six duty cycles of 2 days each for 1 month of Nimbus 6 data. Their results showed very little change from one duty cycle to another on a global and zonal scale. Small changes occurred for some regions.

The other inherent sampling bias characteristic of all Sun-synchronous polar orbiting satellites is that they measure OLR at only two local times. For Nimbus 6, 12:00 a.m. (noon) and 12:00 p.m. (midnight) were the equator crossing times. Because of this sampling bias, diurnal variations cannot be studied.

These tapes were processed by taking daily measurements and averaging over 1 month and over 5° increments in latitude that formed an igloo-type grid system of near-equal-area regions. The igloo grid system is symmetrical about the Equator and has 3 grids at the polar regions from 85° to 90° latitude and 72 grids at the equatorial region from 0° to 5° latitude. Figure 1 is a sketch of the igloo grid system for the Northern Hemisphere showing the number of grids in each 5° latitude region. The total number of near-equal-area grids is 827. The igloo grid system is symmetrical about the Equator, giving a total of 1654 grids over the Earth.

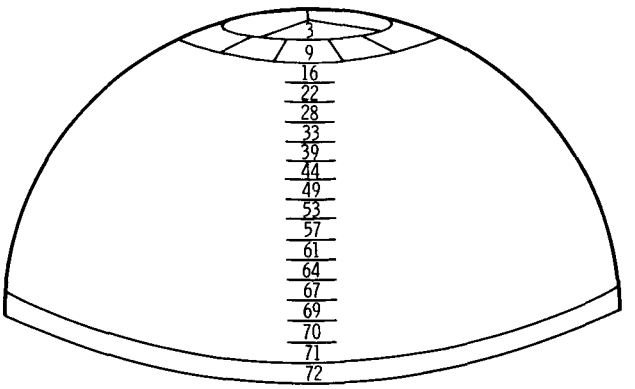

Figure 1. Igloo grid system for near-equal-area grids. Number of grids in each 5° latitude region for one hemisphere is shown.

Some corrections and editing had to be made to the ERB WFOV measurements before they were suitable for data analysis. Sun contamination is a problem which occurs near sunrise and sunset with the WFOV radiometer because the field of view is larger than the Earth's disk. Measurements were eliminated when the solar zenith angle at the nadir (or subsatellite) point was between 99° and 123°. This was the range of angles deleted by investigators when analyzing Nimbus 7 ERB WFOV data (Kyle et al. 1984). When the first year of Nimbus 6 WFOV data was analyzed (Bess, Green, and Smith 1981), solar zenith deletion angles were from 111.5° to 123.5°. However, with the range of solar zenith angles specified by the Nimbus 7 investigators, it was found that another possible source of error in OLR measurements, caused by a thermal transient in SW measurements because of irradiance of the sensor at spacecraft sunset, was eliminated. Other editing had to be performed occasionally because of anomalies in the data that have been well documented (Bess, Green, and Smith 1981).

In addition to the expected editing which had to be made to the WFOV measurements, the Nimbus 6 ERB WFOV radiometer had a systematic error

which caused the WFOV measurements to be low by about 11 percent (Smith et al. 1977). This was the case for both the total and the reflected solar radiation channel. As such, all measurements from the tapes at satellite altitude were increased by 11 percent as a calibration correction.

A correction was also applied to the measurements to account for degradation over time of the SW radiometer. The degradation appears to be strictly a SW radiometer problem, since no measurable degradation occurred during the nighttime portion of the orbit of the total channel radiometer. It seems to be characteristic of SW radiometers to experience degradation over time, not only on ERB satellites, but also on NOAA operational satellites. The degradation, which was confined to the ascending portion of the orbit, caused the OLR to increase in a linear fashion over the 36 months for which Nimbus 6 WFOV measurements are available. The correction for degradation was different for different latitude zones, being generally larger in the tropics and in the middle latitudes. The net result of degradation was to cause the OLR measurements to increase over time at a rate of about 3 to 4 W/m^2 per year.

To account for the degradation, a ratio-to-centered moving average method was used for 5° latitude regions to remove seasonal effects from the data prior to performing any trend analysis (Smith and Williams 1971). This was necessary so that seasonal variation could be removed before removing the trend from the data. Basically, the ratio-to-centered moving average method determines a monthly seasonal index by dividing the original data for a given month by the 12-month centered moving average and taking the average of that month over time. This was done for each of the 12 months of the year. Dividing each value of the original data set by the appropriate seasonal index gives the percentage by which a given monthly average was above or below the average for the year. After the set of data has been adjusted for seasonal variation, the resulting data give a better representation of the trend and the random effects.

After the data were adjusted for seasonal variations, linear least-squares procedures were applied to the data to determine the slope of the trend line for the time series in each latitude region. The slope gives the rate of degradation in watts per square meter per month in the OLR and is used to determine the correction in OLR for a given month and latitude region. Figure 2 shows these results as a plot of the rate of degradation per month against latitude. The rate is greatest from 60°S to 30°N latitude and peaks between the Equator and 30°N latitude. The rate of degradation drops off at the higher latitudes.

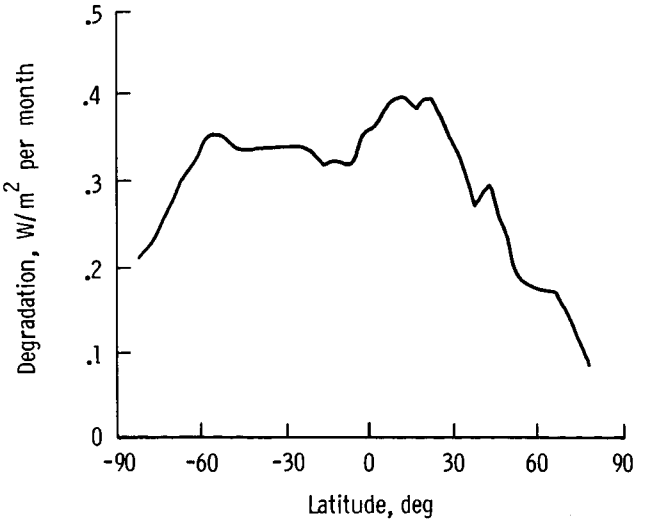

Figure 2. Degradation of shortwave spectral region per month.

After the measurement data were corrected for errors and were time- and space-averaged to obtain regional monthly averages, a deconvolution (resolution enhancement) technique was applied to represent the radiant exitance at the TOA by a truncated series of spherical harmonics. The deconvolution technique takes advantage of the fact that spherical harmonics are the eigenfunctions of the measurements operator and reduces the radiant exitance field from satellite altitude to TOA by dividing by the appropriate eigenvalues. All the results in this atlas are based on this deconvolution technique (Smith and Green 1981 and Bess, Green, and Smith 1981).

The governing equation from which the monthly spherical harmonic coefficients were produced is

$$M(\theta,\phi,t) = \sum_{n=0}^{N}\sum_{m=0}^{n} N_n^m P_n^m(\cos\theta)\left[C_n^m(t)\cos(m\phi) + S_n^m(t)\sin(m\phi)\right]$$

where $M(\theta,\phi,t)$ is the measurement at the TOA, θ is the colatitude, ϕ is the longitude, t is the time, and P_n^m is the associated Legendre polynomial of degree n and order m. The terms $C_n^m(t)$ and $S_n^m(t)$ are the even and odd real spherical harmonic coefficients, and the normalizing factor is

$$N_n^m = \left[(2n+1)(n-m)!\,(2-\delta_0^m)\,/(n+m)!\right]^{1/2}$$

where δ_0^m is the Kronecker delta function.

Discussion of Results

Included in this atlas are spherical harmonic coefficients and associated global contour maps of

36 months of Nimbus 6 ERB WFOV outgoing longwave radiation results. It is not the intent in this atlas to do an in-depth analysis of the data but rather to compile and document the spherical harmonic coefficients and the associated contour maps which can then be used to do many kinds of valuable analysis.

Each table in this atlas contains a set of spherical harmonic coefficients for 1 month of mean values. Results are for a spherical harmonic expansion truncated to the 12th degree. For such a 12th-degree expansion, 169 coefficients are required to specify the radiation field. The coefficients above the stair-step line are the 78 sine terms. With the exception of the first column, the coefficients below the stair-step line are the 78 cosine terms. The first column contains the 13 zonal terms. The sine and cosine terms represent the nonaxisymmetric terms and give a measure of longitudinal variation. The format of the tables makes it very easy to pick off any coefficient. The superscript m is the longitudinal wave number or order and n represents the degree of the spherical harmonic. Thus, in the first column, which represents the zonal terms, m is 0 and n ranges from 0 to 12. Physical interpretations can be associated with some of the zonal terms. Thus, C_0^0 is the global average, C_1^0 is a measure of hemispherical or pole-to-pole difference, and C_2^0 is a measure of Equator-to-pole gradient. It has been shown that over 80 percent of the degree variance is in the zonal terms (Smith and Bess 1983). This variance is because at large scales, Earth-emitted radiation is strongly dependent on latitude.

The monthly averaged spherical harmonic data sets can be used in a variety of ways to study the OLR on regional, zonal, and global scales in the spatial domain and on monthly, annual, and interannual scales in the time domain. One application is to model the global radiation field. The advantage of such models is that they can represent large data sets with relatively few parameters. Another advantage of a spherical harmonic representation is that it provides a mathematical structure that permits one to study separately the latitudinal variations using the zonal coefficients and the longitudinal variations and wave properties using tesseral coefficients. In short, spherical harmonic representation allows the radiation field to be broken into its component parts, which can then be studied separately or in various combinations. For example, the coefficients are well suited for time series analysis, spatial spectra studies, and parameterization studies (Smith and Bess 1983 and Short et al. 1984).

In this atlas each spherical harmonic coefficient set has a companion monthly averaged global contour map of OLR. The OLR less than 240 W/m^2 is shown as dotted contour lines. The contour interval is 10 W/m^2, and highs and lows are shown. These contour maps give a "quick look" of how the OLR is varying over monthly, annual, and interannual time scales. With their associated sets of harmonic coefficients, they form a valuable data set for studying many different aspects of our changing climate.

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July 7, 1987

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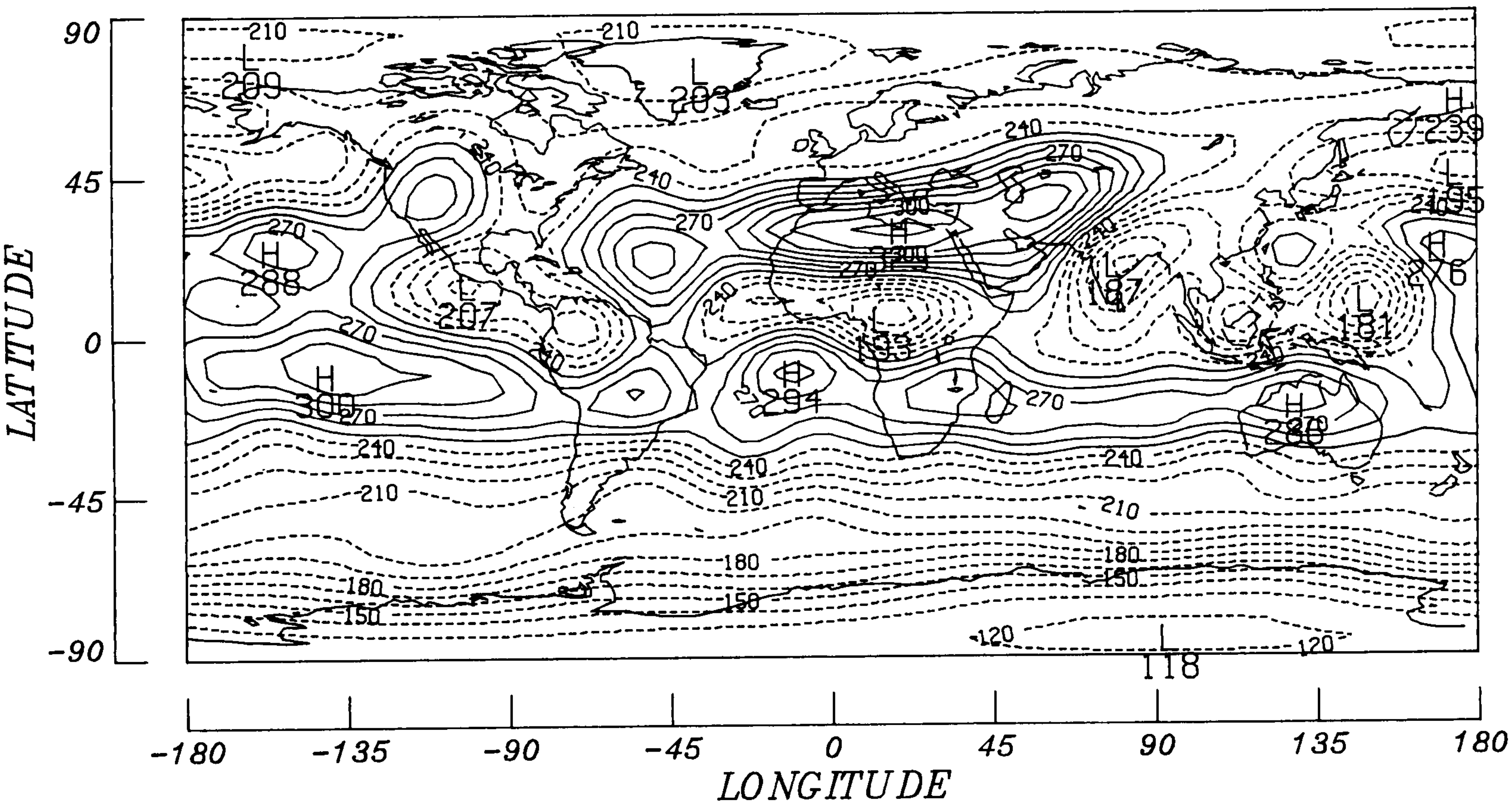
July 1975

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	237.288	.992	.071	.014	-.941	-.360	.004	.154	-.689	-1.180	-.084	-.087	-.889	12
1	11.999	2.881	-.179	-1.381	.529	-.830	-.457	.058	.262	1.169	.212	.487	.647	11
2	-21.683	4.768	3.971	-1.415	.865	.212	-.989	.610	.052	1.656	1.114	1.541	1.164	10
3	8.642	1.880	2.702	-1.029	.053	-.174	.516	1.223	-.293	-.234	.938	.350	-.309	9
4	-8.517	-.396	-1.735	-2.306	-3.130	-1.577	1.568	.879	-.130	-1.939	-.842	-1.522	-.153	8
5	-4.318	-4.967	-3.712	.355	-2.318	-1.305	-.341	-.431	-.372	-1.466	-1.736	-2.055	-.106	7
6	4.239	-2.523	-1.970	2.300	-.299	-.350	1.981	-.641	.151	-1.269	.637	.816	.666	6
7	7.102	1.594	.348	.349	.496	.458	2.202	.807	-1.255	.924	2.559	.728	-3.509	5
8	-5.064	.810	2.092	-1.766	1.543	.496	.843	1.190	2.616	.475	-.655	.653	3.300	4
9	-3.660	.423	3.135	.037	.135	-.475	.411	-.026	.080	-.427	-1.602	3.232	3.776	3
10	.362	.199	1.529	1.392	-.290	-.470	-.220	.988	-1.477	.344	-1.055	5.336	-.320	2
11	.922	.164	-2.598	.070	-.109	-.499	.378	.490	-1.436	-.466	-.365	.364	-2.734	1
12	1.319	.179	-1.954	-1.091	.937	.163	.350	.239	-.558	.179	-.476	.449	-.023	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

July 1975



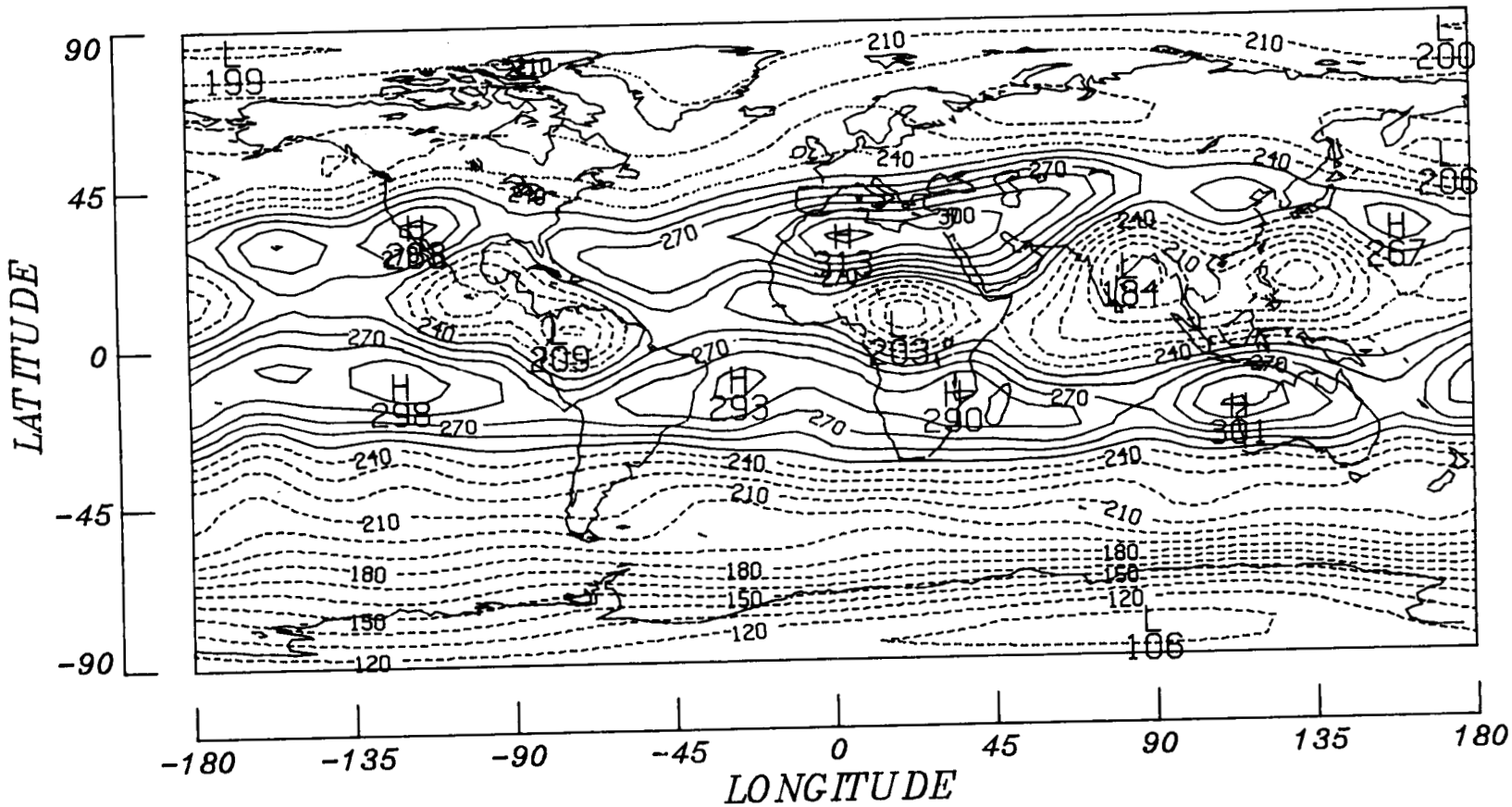
August 1975

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	238.108	.372	-.120	-.277	.199	-.308	.372	-.272	.095	-.471	-.097	.113	-.407	12
1	11.037	3.588	.905	-.240	.154	-.090	-.569	.387	.770	1.343	.316	-.428	.329	11
2	-33.791	3.636	4.450	.276	-.251	.614	-.323	.614	-.494	.984	.613	1.313	2.238	10
3	10.850	1.178	2.628	1.044	-.535	.740	.513	.979	-.792	-.111	.384	.298	-.119	9
4	-9.433	-1.079	-2.427	-1.036	-2.974	.095	.045	-.520	-.890	-1.133	-.268	-.390	.214	8
5	-5.620	-3.463	-2.794	.214	-1.455	-1.764	.386	-1.088	.033	-.134	-1.788	-.203	-.670	7
6	4.271	-.246	-.164	2.167	.358	1.027	1.085	-1.229	.357	.368	.433	-.410	-1.181	6
7	9.232	1.941	.423	.892	.759	.589	.402	1.630	-1.041	-.227	2.827	-.813	-3.647	5
8	-3.106	-.368	1.701	-1.204	.795	-.934	.848	1.777	.515	.034	-.195	.443	3.982	4
9	-3.919	-.941	1.116	-1.333	-.037	-.004	.221	.247	-.943	.966	-1.360	2.852	4.656	3
10	-.977	.107	.826	.887	-.064	.760	-.258	-.320	-1.117	1.245	.015	3.420	-1.146	2
11	-.667	.428	-1.717	1.028	.388	-.209	.049	.069	-.918	-.192	-.305	.077	-2.976	1
12	.793	1.535	-1.667	-.398	.468	-.041	.502	-.143	.196	.467	.933	.296	.450	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

August 1975


90
45
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-90
LATITUDE
-180
-135
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45
90
135
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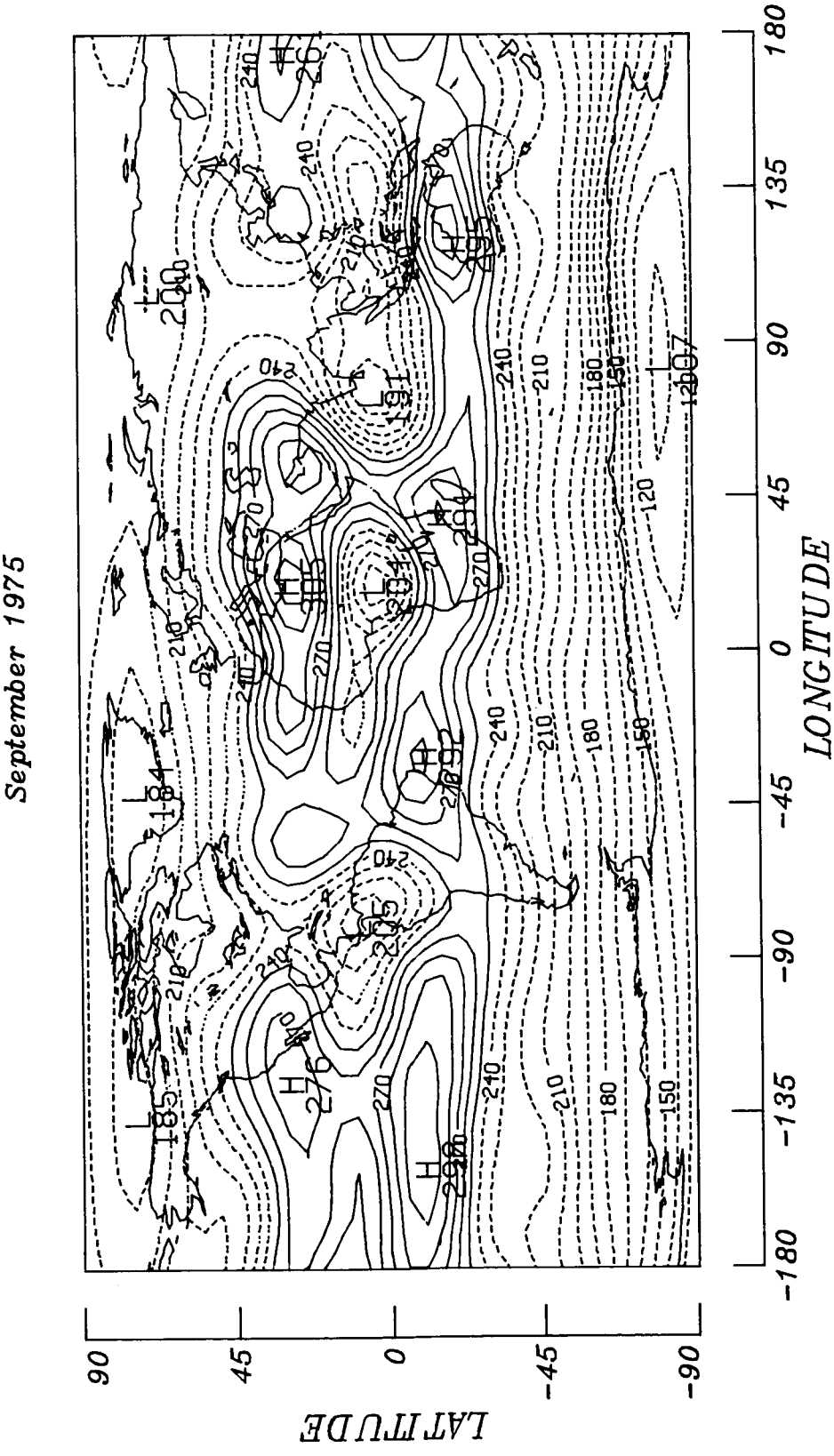
LONGITUDE
199
200
206
184
267
209
203
298
293
290
301
106
210
240
270
300
180
150
120

September 1975

C_n^m (lower left, labelled by the left-hand column n and the bottom row m); S_n^m (upper right, labelled by the top row m and the right-hand column n)

		12	11	10	9	8	7	6	5	4	3	2	1	m / n
0	234.813	-.079	-.356	.124	-.126	-.314	-.143	.729	-.981	-.890	.708	-.131	.011	12
1	8.385	1.479	-.067	-.239	.094	-.548	.075	-.308	-.034	.287	.023	-.551	.573	11
2	-25.656	3.031	4.598	.705	.013	-.498	-.192	-.749	.589	1.002	-.059	-.001	1.848	10
3	6.632	.654	2.039	.731	.287	-.017	.774	.881	.215	.278	.945	.040	-2.088	9
4	-9.171	-.413	-2.607	-.526	-4.621	-.521	-.184	.790	-.380	-1.058	.132	.310	.514	8
5	-3.711	-3.084	-1.959	.391	-1.697	-2.868	.104	.269	.855	-.504	-1.488	-.163	1.676	7
6	4.619	.042	.979	1.940	.297	.214	1.696	-.423	.483	.490	.634	-.076	1.234	6
7	6.958	1.496	-.601	-.341	-.531	1.022	1.768	1.631	-1.427	-.962	2.323	-.050	-3.793	5
8	-3.281	-.598	-.221	-.956	-.433	-.915	.673	.482	1.319	-1.530	-.231	-.050	2.568	4
9	-3.258	-.549	1.231	.321	.062	-.910	-.142	-1.192	-.060	.328	-.517	3.357	2.971	3
10	1.336	.405	1.058	.767	-.154	-.028	-.260	-.550	-1.744	-.643	-.938	4.916	-.299	2
11	1.452	-.230	-1.416	-.681	.268	.297	.321	.071	-.172	-.929	-.648	.011	-2.563	1
12	.722	.434	-.360	-.374	1.074	.002	.175	.010	-.119	-.306	-.596	.165	.617	
n / m	0	1	2	3	4	5	6	7	8	9	10	11	12	



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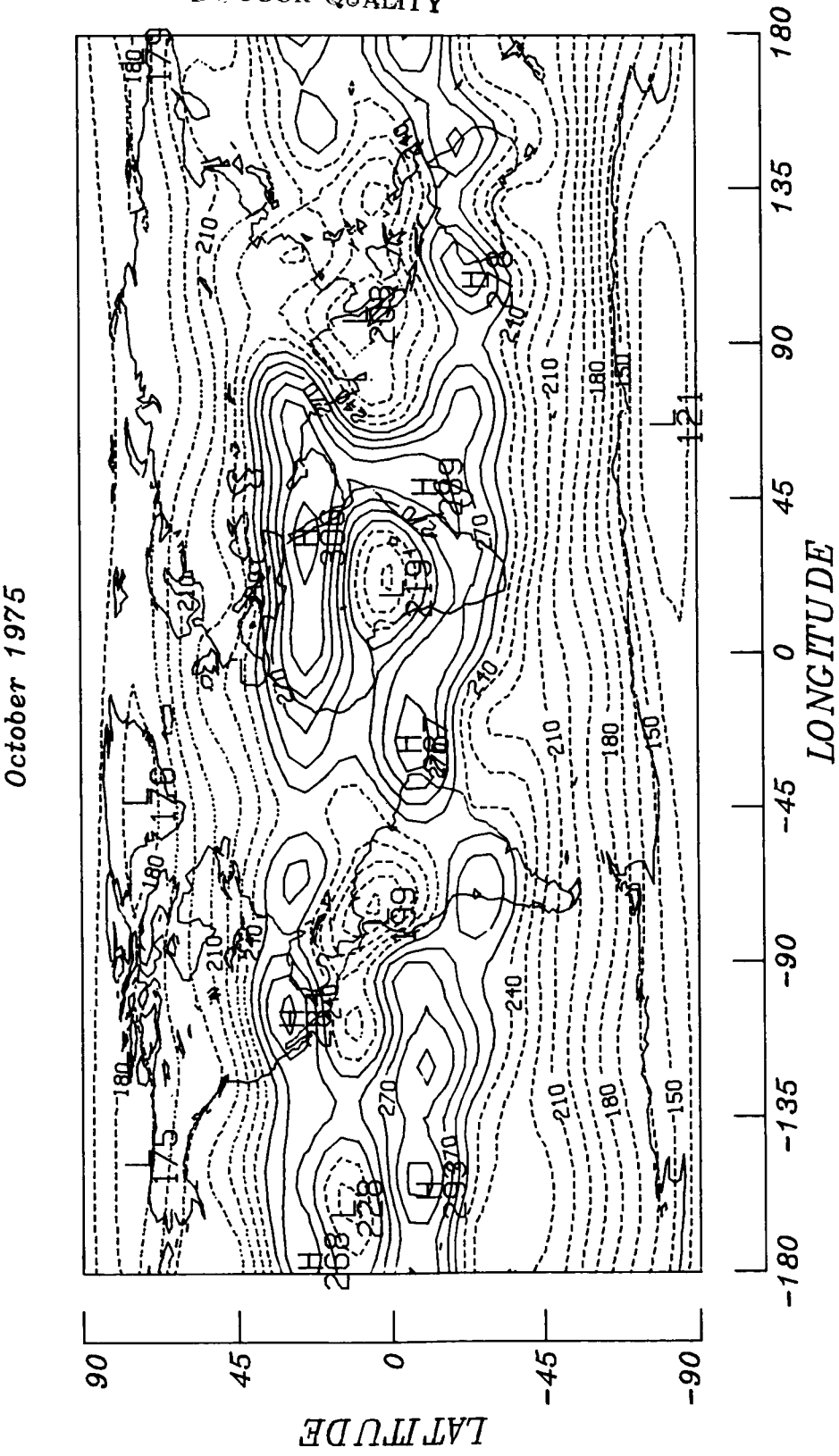
October 1975

C_n^m (lower left, rows n = 0–12, columns m = 0–12) and S_n^m (upper right, rows n = 12–1, columns m = 12–1)

$n \backslash m$		12	11	10	9	8	7	6	5	4	3	2	1	$m \backslash n$
0	232.344	-.610	-.328	.762	.495	-.262	.141	-.254	-.211	-.083	.353	-.561	-.232	12
1	4.817	3.264	.329	.612	-.849	-.758	.323	-.796	.431	-.544	-.534	-.399	1.086	11
2	-27.181	2.923	3.161	1.098	-.228	-.351	-.027	-.746	.967	.674	-.145	.797	1.356	10
3	3.705	-.161	2.534	-.321	-.382	-.615	-.500	.399	-1.493	.567	1.581	1.192	-2.199	9
4	-8.253	-1.069	-2.819	-.353	-1.674	.067	.036	.659	-1.167	-.959	1.272	.697	-.531	8
5	-.934	-2.365	-1.675	-.520	.244	-.886	1.118	.059	1.423	.147	-2.301	-.860	1.198	7
6	4.716	.870	2.974	1.136	1.152	.304	1.532	-1.200	-.745	2.342	-.043	-.788	1.848	6
7	4.982	1.945	.454	.070	1.041	1.368	.746	1.662	-2.127	-1.256	1.521	-.591	-2.703	5
8	-2.472	-.652	.323	-.243	.158	-.260	-.042	-.531	.299	-3.518	-.047	-2.093	1.243	4
9	-3.487	-.825	.761	.344	-.771	-.737	-.322	.043	.460	.197	.744	2.596	.778	3
10	.726	.575	-.716	.026	-.271	.269	-.719	-.163	-2.041	-.806	-.205	6.574	.368	2
11	2.227	-.266	-1.696	-.685	.094	.652	-.088	.961	-.073	.442	-.299	-.369	-1.240	1
12	1.500	.696	.259	.198	.980	-.664	.068	.292	.297	.388	1.598	.399	1.284	
$n \backslash m$	0	1	2	3	4	5	6	7	8	9	10	11	12	

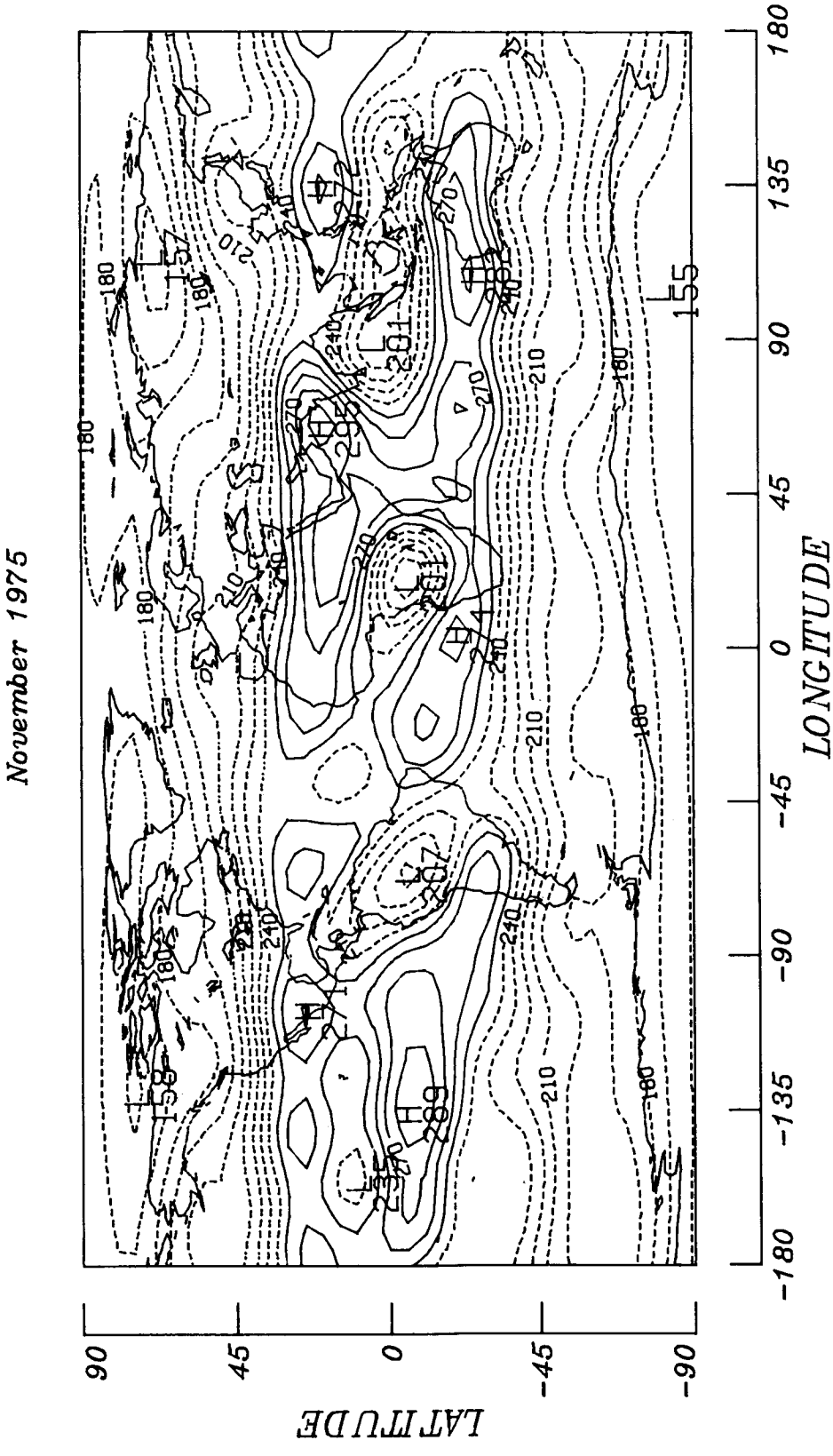


November 1975

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	239.218	.905	-.181	.284	.583	-.395	.271	.387	-1.016	-.278	1.134	-.682	-.030	12
1	-.590	1.425	.564	-.381	.012	.141	-.014	-.046	.070	-.803	-.763	-1.033	2.237	11
2	-26.915	2.039	.677	.229	-.064	-.312	-.141	.027	.247	.149	-1.305	1.051	2.003	10
3	-.418	-.180	2.423	.155	-.238	-.904	-.416	-.253	-.464	1.375	1.166	1.615	-3.166	9
4	-4.341	.351	.054	-1.235	-1.443	-.712	-.258	.472	-1.588	-.751	2.178	.029	-1.394	8
5	.612	-.742	-.327	-.186	-.868	-.210	.291	.958	1.029	-.926	-.699	-.260	2.152	7
6	6.611	.432	2.889	1.352	.800	-.289	1.528	-.060	.321	1.965	-.814	1.589	1.835	6
7	.693	1.598	.988	-.632	.027	1.662	.839	.321	-3.280	.087	.568	-.778	-2.143	5
8	-4.864	-.790	-.750	-1.321	-1.022	.193	.119	-.478	.625	-2.832	.867	-3.546	.796	4
9	.141	-.721	-.380	.687	-.120	-1.059	-.439	-.318	-.195	-.471	.809	.688	.585	3
10	1.025	1.195	.074	.205	.898	.086	-.251	-.408	-1.043	-1.174	.185	4.205	-.718	2
11	1.477	-.009	-.852	-1.628	.031	.579	.188	.746	1.423	-.536	.164	.676	-.540	1
12	.931	-.558	.301	.113	.853	.329	-.004	.041	.541	.765	.716	-.095	-.615	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

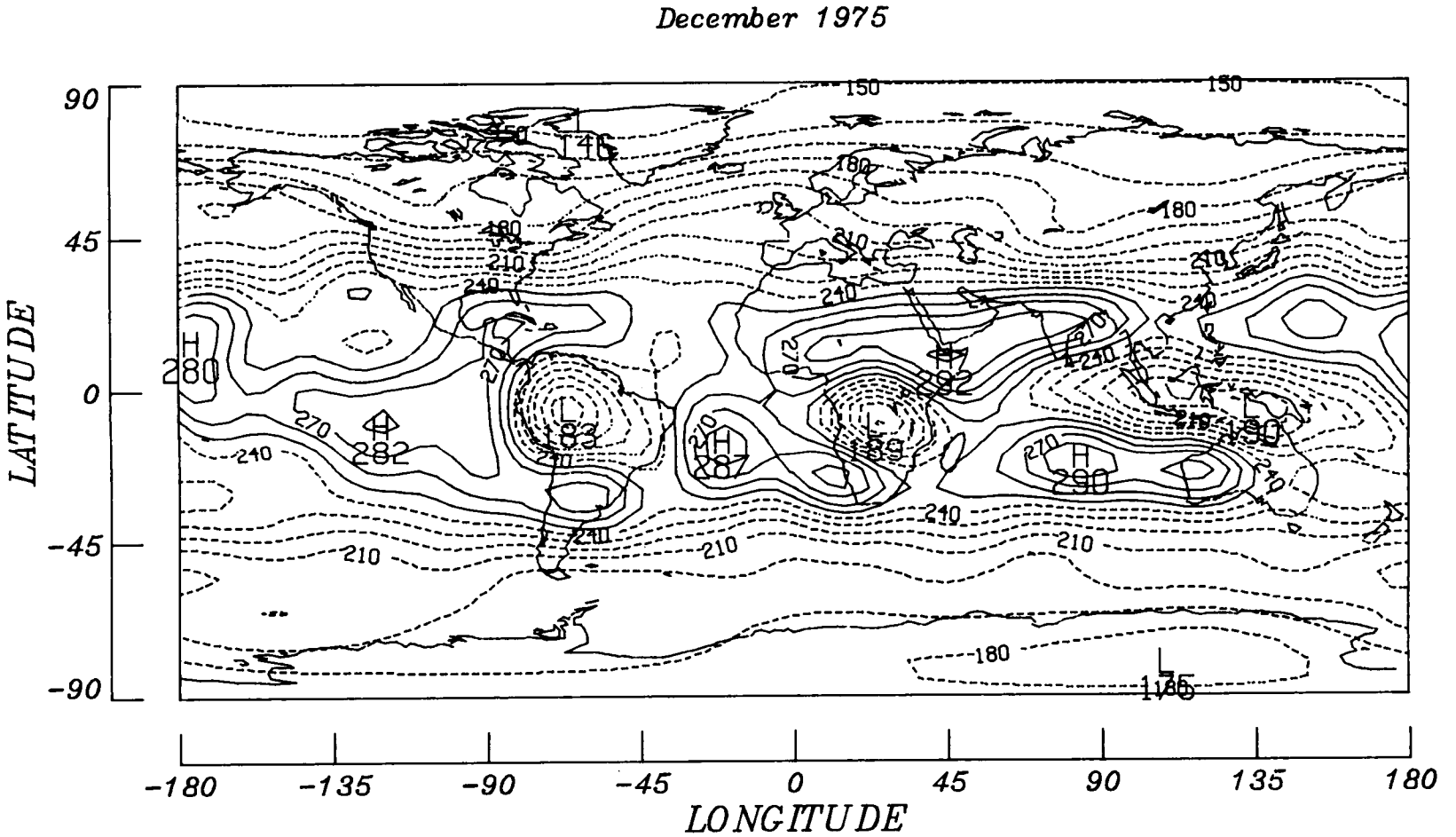


December 1975

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	228.456	.993	-.507	.652	-.725	.267	.512	-.017	-.459	.190	1.103	-.329	-.505	12
1	-5.857	1.806	.370	-.547	-.278	.600	.257	.142	-.265	-.770	.422	-.397	1.239	11
2	-26.456	.511	.864	1.426	-.558	.235	-.030	-.184	.472	.013	-1.158	.853	1.895	10
3	-2.987	-.133	3.135	.178	-.481	.110	-.436	-.525	-.971	2.003	-.386	.647	-2.672	9
4	-4.031	1.400	.066	-2.335	2.646	.386	-.733	-.063	-.836	-1.074	2.332	-1.017	-.913	8
5	2.156	-.865	.274	-.219	-1.592	-.403	.699	.323	1.853	-2.162	-.769	-.580	2.314	7
6	6.509	.396	3.382	2.835	-1.006	.530	.376	.281	.647	1.986	-3.325	3.274	2.309	6
7	-3.762	.507	.817	-.066	.389	.595	-.622	.179	-2.422	.061	.767	.153	-1.825	5
8	-4.884	-1.362	-1.899	-1.847	-1.224	-.355	.012	-.050	1.777	-3.928	2.213	-4.053	-.294	4
9	2.217	-.372	-1.043	.240	.276	-.938	-.241	-.653	.493	.274	-.199	.199	.771	3
10	.236	1.166	.615	-.276	1.545	.243	-.095	.096	-1.139	-.451	-.778	4.324	1.046	2
11	-.086	.321	-.040	-.610	.507	.684	.619	1.188	.405	-.226	.702	-.779	-1.602	1
12	.866	-.579	-.333	1.217	-.159	.146	-.242	-.180	.545	.476	-.905	.229	.514	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m


December 1975
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LATITUDE
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LONGITUDE
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283
287
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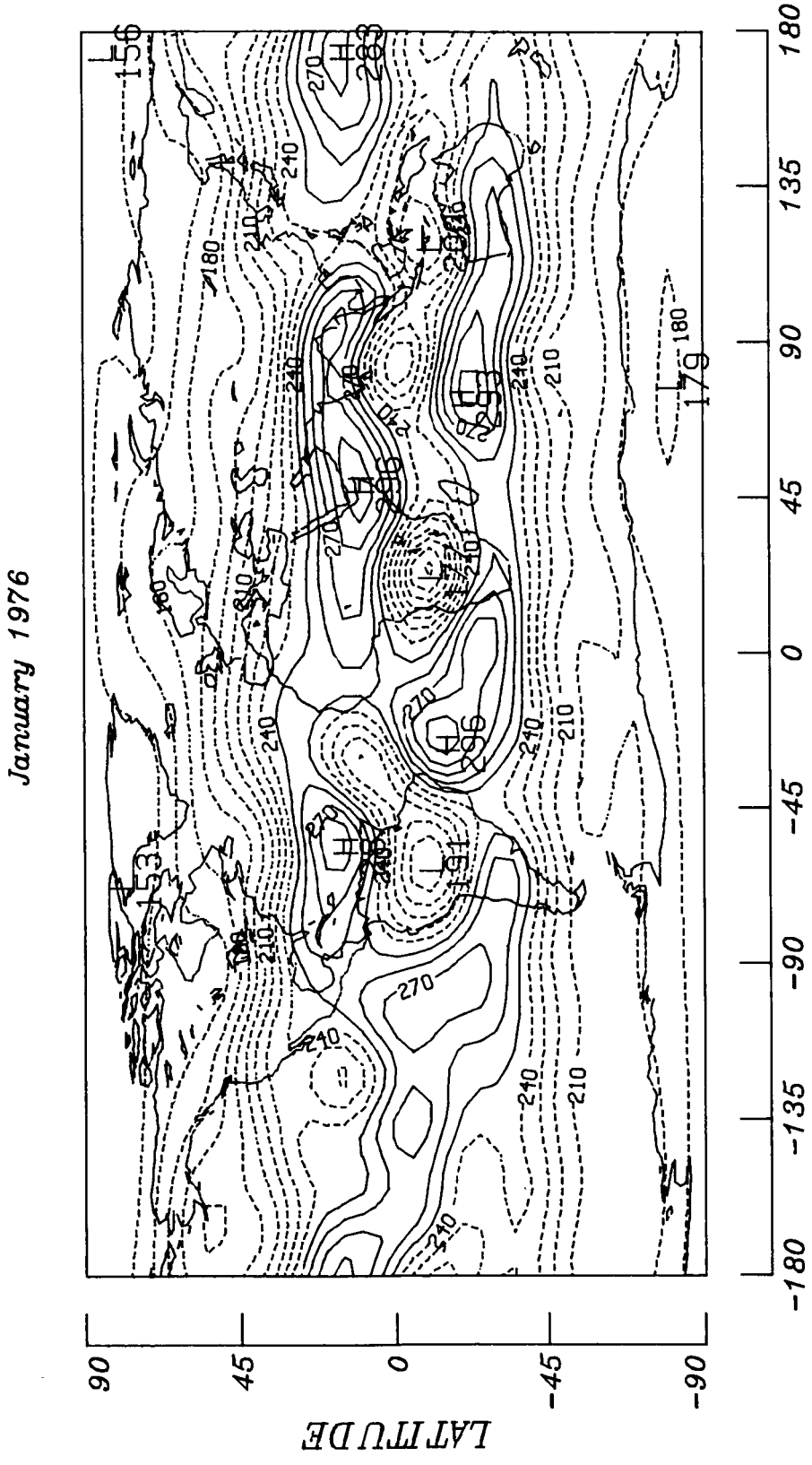
292
290
1190
1185

January 1976

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	229.241	1.045	-1.096	-.363	.657	.149	-.182	.725	-.532	.498	1.686	.021	-.763	12
1	-7.792	1.423	.504	-.615	.639	.304	.046	.059	.902	-.624	1.055	.211	.987	11
2	-25.398	.420	.439	.226	-.500	-.480	.402	-1.117	.992	-.169	-1.250	.545	2.495	10
3	-2.658	.033	2.506	.387	-.130	-.565	.335	-.046	-1.048	2.757	-.805	.182	-1.720	9
4	-4.411	1.151	.959	-3.435	2.405	-.005	-.146	.392	-1.591	.249	2.032	-1.107	-2.234	8
5	4.094	-1.940	.266	.843	-.925	.442	-.002	-.101	.917	-3.502	-.591	-.263	1.113	7
6	6.970	-.457	2.145	3.361	.088	-.481	-.233	-1.447	2.007	.610	-3.357	3.032	2.989	6
7	-4.547	1.960	.039	.048	.394	.935	.890	1.983	-2.180	1.802	.603	.798	-1.697	5
8	-3.423	-.443	-1.392	-2.230	-1.263	-.050	.301	.577	.735	-3.492	1.664	-2.293	-.472	4
9	2.868	-.916	-.083	-1.847	.372	-1.116	-1.035	-1.556	.397	-.794	-.594	-.022	.764	3
10	-.569	1.129	1.059	.010	1.449	-.017	.630	-1.191	-.153	-.838	.008	2.327	.867	2
11	-.365	.460	-.327	1.184	-.260	.610	1.041	.393	.198	.166	-.207	.785	-.438	1
12	.670	-.246	.064	.620	-.243	-.076	-.429	.319	-1.271	.950	.044	-.599	-1.017	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m



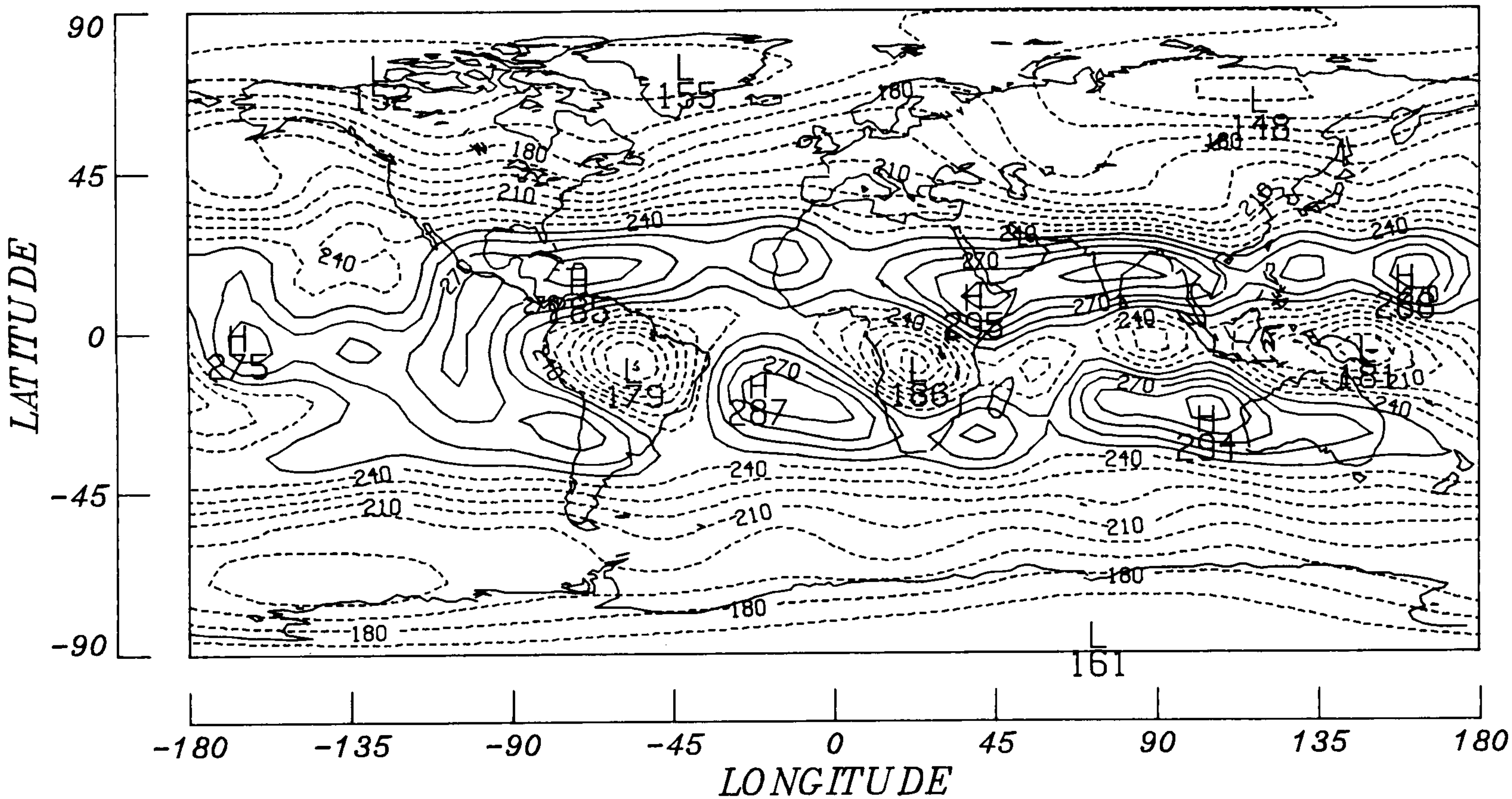
February 1976

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	228.866	.432	-.982	.264	-.195	-.233	.380	.438	-.993	.541	1.261	-.666	-.630	12
1	-7.654	1.631	.472	-.708	.293	.309	.769	-.756	.684	-.490	.638	-.805	1.566	11
2	-27.106	.770	-2.145	.565	-.081	-.768	.342	.179	.800	-.323	-1.412	1.690	2.222	10
3	-1.834	.191	2.212	1.724	-.060	-1.088	-.028	-.618	-.697	1.783	-.032	.558	-2.397	9
4	-5.174	.513	3.092	-2.380	2.734	-.693	.300	-.078	-1.244	.661	2.341	-1.561	-1.218	8
5	6.006	-1.058	.430	.391	-1.250	-1.305	-.818	1.035	1.631	-1.037	-1.104	-.444	.961	7
6	7.116	.547	1.669	4.315	-1.007	-.241	-.816	-1.750	1.207	1.285	-2.758	3.733	2.542	6
7	-4.920	1.718	-.067	-.647	1.231	1.352	-.053	.394	-3.607	.134	1.493	2.020	-.913	5
8	-4.145	.233	-1.207	-2.016	-.540	-.218	-.191	-.225	-.065	-2.363	1.514	-2.953	.196	4
9	3.765	-1.528	.408	-.163	-.207	-1.434	-.268	-.451	.195	.803	-1.219	-.467	-.141	3
10	1.711	.975	1.227	-.561	1.591	.095	.174	-.693	.111	-.557	.643	2.891	-.317	2
11	.761	.080	-1.022	-.105	.395	.832	-.149	-.135	.431	-.055	-1.492	1.194	-1.559	1
12	-.410	-.745	-.772	.144	-.953	-.012	-.529	.255	.704	.271	-.257	.266	-1.736	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

February 1976



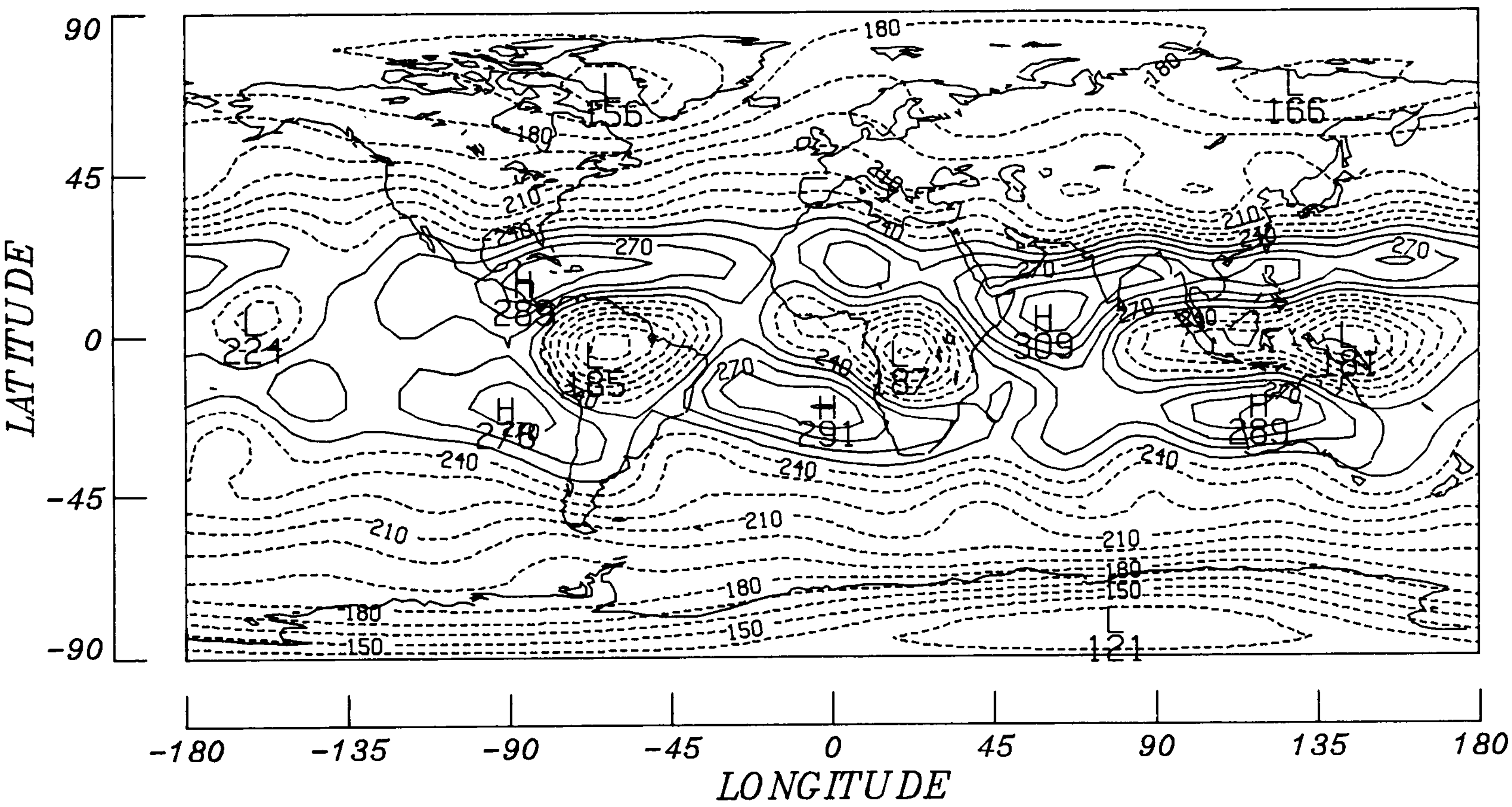
March 1976

C_n^m

	0	12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	230.517	1.505	-.271	-.094	.513	.402	.477	.854	-.275	-.646	.170	-1.189	.411	12
1	-3.810	2.039	.720	.701	.370	-.450	.276	-.498	.614	-.194	.417	.622	.061	11
2	-26.977	1.139	-2.031	.291	.517	-.302	-.293	-.094	.206	.796	-1.120	2.578	2.171	10
3	1.605	-.224	1.027	.521	.752	.619	-.864	-.109	-1.134	.730	.296	.093	-2.007	9
4	-6.030	.595	2.805	-1.480	1.712	.117	-.991	.335	-1.675	-2.027	1.820	-2.353	-1.015	8
5	5.927	-.486	1.260	.952	-.742	-.208	2.252	.588	2.380	-.810	-1.461	-.005	-.529	7
6	5.606	.308	-.277	2.416	-.394	-.471	1.123	-1.202	1.503	2.300	-2.403	4.355	3.420	6
7	-1.987	.199	-1.665	-1.204	.229	2.061	-.115	-.807	-3.495	-.035	1.563	1.079	.253	5
8	-6.691	-.269	.339	-.425	-.180	-.506	-.231	-.119	.736	-3.564	.146	-2.801	1.294	4
9	2.433	.134	1.562	1.172	.127	-.244	-.255	.598	.121	1.101	-1.558	.053	-.675	3
10	4.053	1.388	.793	-.380	1.143	.595	.364	.042	-.858	.609	.263	2.184	-.440	2
11	.215	-.380	-1.049	-.493	.755	-.100	.183	.078	.767	.681	-.492	.011	.017	1
12	-1.571	-.228	-.173	.895	.132	.329	-.271	-.308	-.676	1.108	.239	-.386	.591	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

March 1976



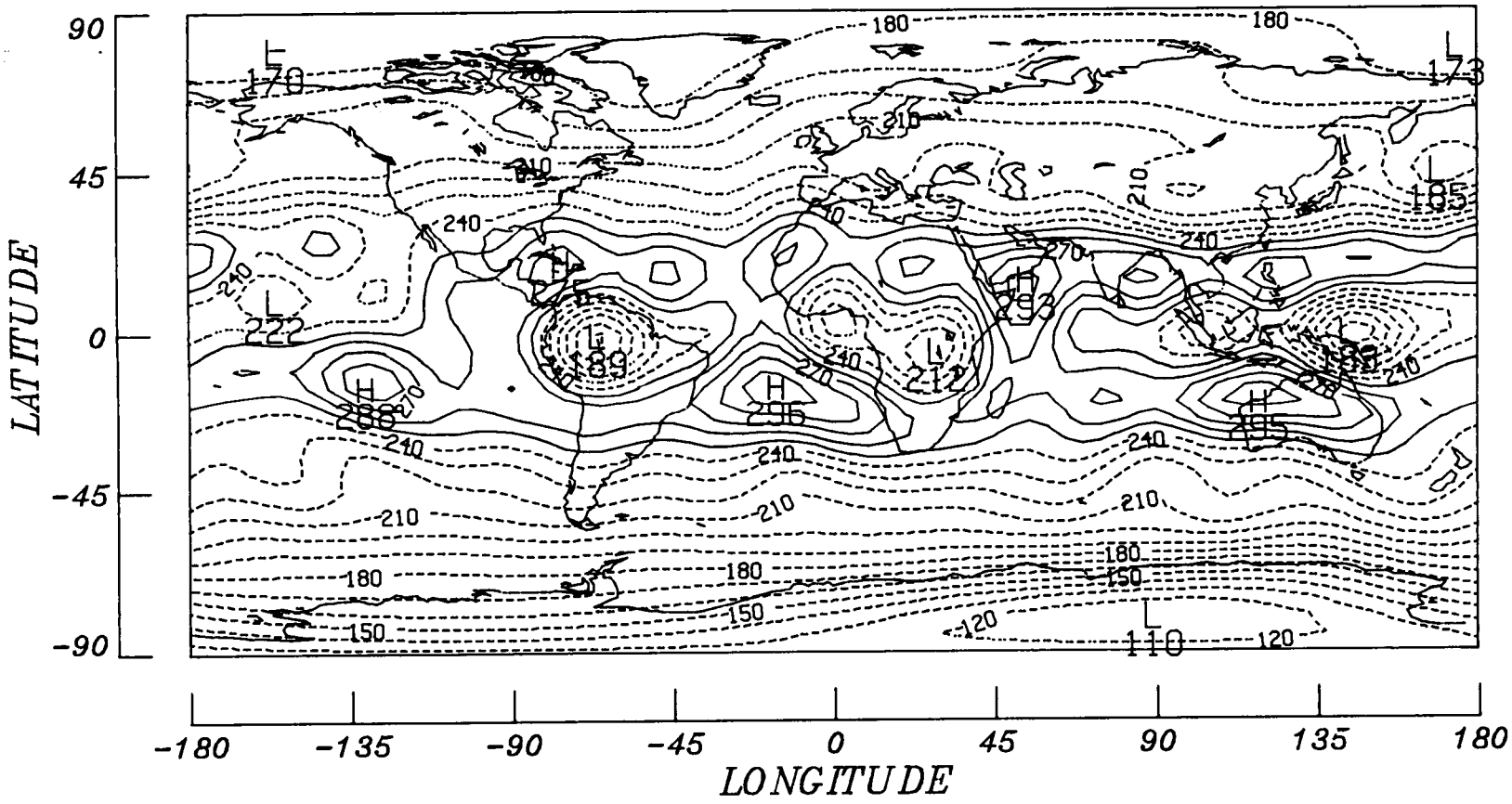
April 1976

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	230.867	.304	-1.393	-.190	-.715	-.042	-.665	-.535	-.239	-.146	.380	-1.001	1.042	12
1	.187	2.912	-.560	-.479	-.582	-.286	.541	.796	.571	-.267	.012	-.807	.886	11
2	-26.335	1.655	-1.543	.386	.171	.162	-.448	.137	.450	-.065	-1.147	1.904	1.399	10
3	5.243	.004	-.762	.888	.241	-.434	-.904	-.349	-.923	.345	.410	1.030	-2.599	9
4	-6.171	.151	1.607	-1.726	.168	-.529	-.439	.343	-1.016	-.652	1.732	-1.859	-.760	8
5	2.636	-.837	-.027	-.612	.148	-1.332	1.467	.461	1.341	-.301	-1.395	-.673	-.112	7
6	3.754	.215	-.736	3.197	-.253	.179	.713	-.637	.060	1.235	-1.715	3.001	3.068	6
7	.298	.485	-.927	-.024	-.001	2.151	-.753	-.809	-3.480	.429	2.294	.697	-.346	5
8	-6.974	-1.095	.496	-.725	.059	.471	-.083	-.067	1.291	-2.549	.764	-.903	1.302	4
9	.069	.014	.810	.683	-.373	-.867	.549	.006	.005	.124	-.967	1.653	-.933	3
10	3.938	1.507	.762	.064	.280	-.240	-.475	-.323	-.923	-.821	-2.002	.994	.189	2
11	.268	-.032	-1.337	-.211	.291	.187	-.287	.479	.596	-.042	-.057	-1.387	.371	1
12	-.932	-.081	-.648	.653	.641	.184	.211	.163	-.432	.292	1.647	-.791	-.594	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

April 1976



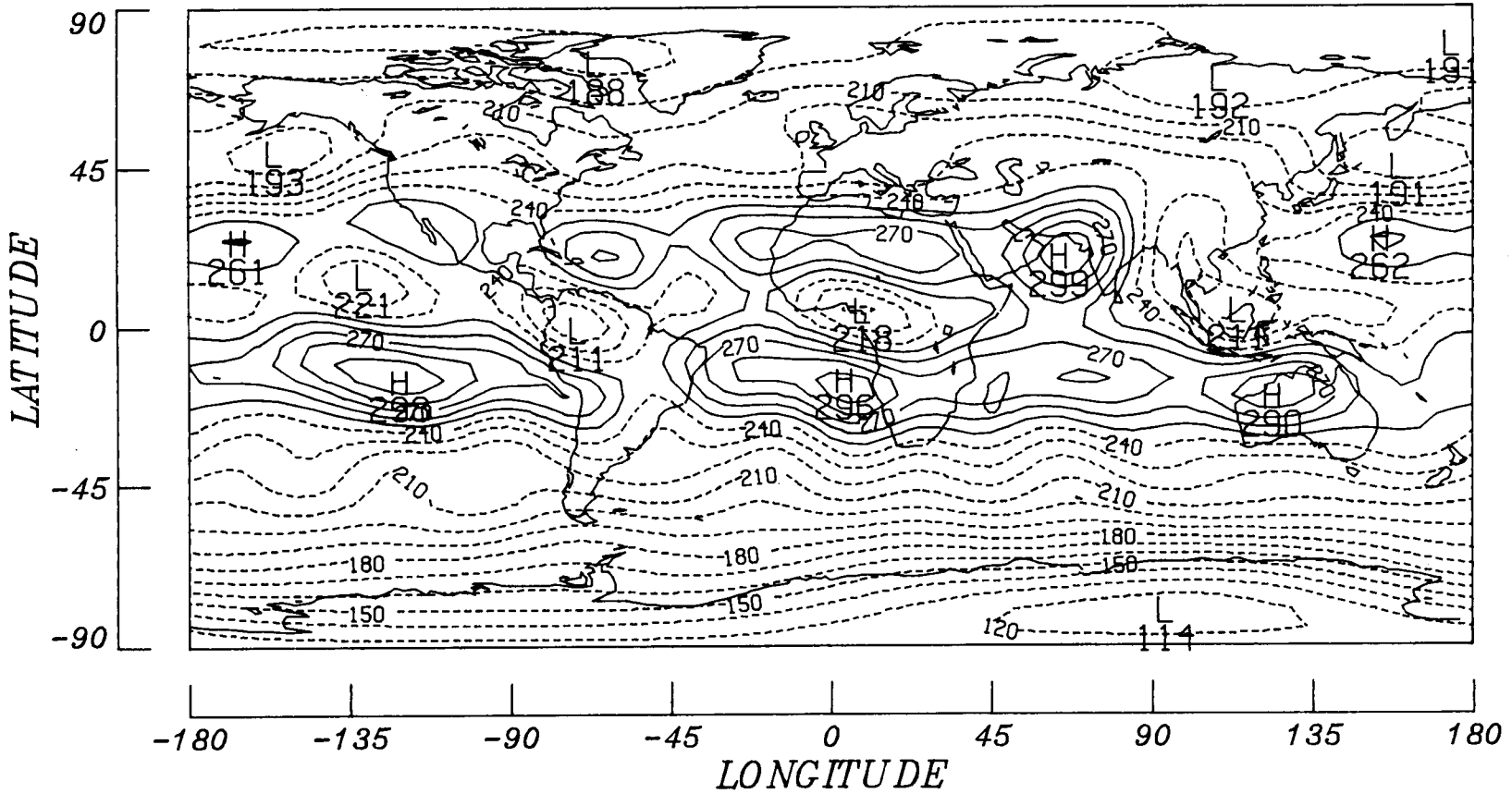
May 1976

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	232.421	.313	-.136	.833	-.551	-.197	-.101	.391	.012	-.834	.088	-.013	.460	12
1	5.371	3.056	.334	-.216	.515	.578	.346	.117	-.540	-.318	-.827	-.104	.585	11
2	-25.911	3.098	.229	-.039	-1.024	.363	.073	-.249	.323	.129	-.273	.234	1.451	10
3	7.265	-.231	-.463	.052	.274	-.688	-.048	-.030	-.217	.707	1.352	.798	-.837	9
4	-5.205	.040	-.536	-2.566	-.528	-.798	.058	.299	-.604	-.617	1.132	-.278	-.502	8
5	-1.378	-1.152	-1.698	.417	.017	.865	.025	1.027	1.025	-.424	-1.316	-.924	-.409	7
6	3.219	.018	.188	3.210	.536	.363	.488	.826	-.629	1.016	-.331	1.135	1.645	6
7	4.354	.559	1.067	-.216	.398	.419	.119	-.700	-1.311	-1.421	1.117	.688	-2.127	5
8	-5.130	-.609	1.660	-1.671	.015	-.405	1.151	.087	-.446	-2.994	-.078	-.916	1.750	4
9	-3.417	-.935	.626	.187	.097	-1.223	.473	-.382	-1.688	-.489	-.417	1.379	-.158	3
10	2.660	.221	.837	.318	.423	-.217	-.904	-.823	-1.007	-.599	.062	3.909	.238	2
11	1.832	1.097	-1.250	-.520	.211	.198	.378	.849	.483	.763	-.320	.190	.945	1
12	-.209	.401	-.824	.551	.019	.521	.692	-.313	1.281	.252	.481	-.144	.191	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

May 1976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L 211
H 298
H 296
L 218
H 299
L 214
H 290
L 192
L 191
H 262
L 193
L 188
L 114
210
240
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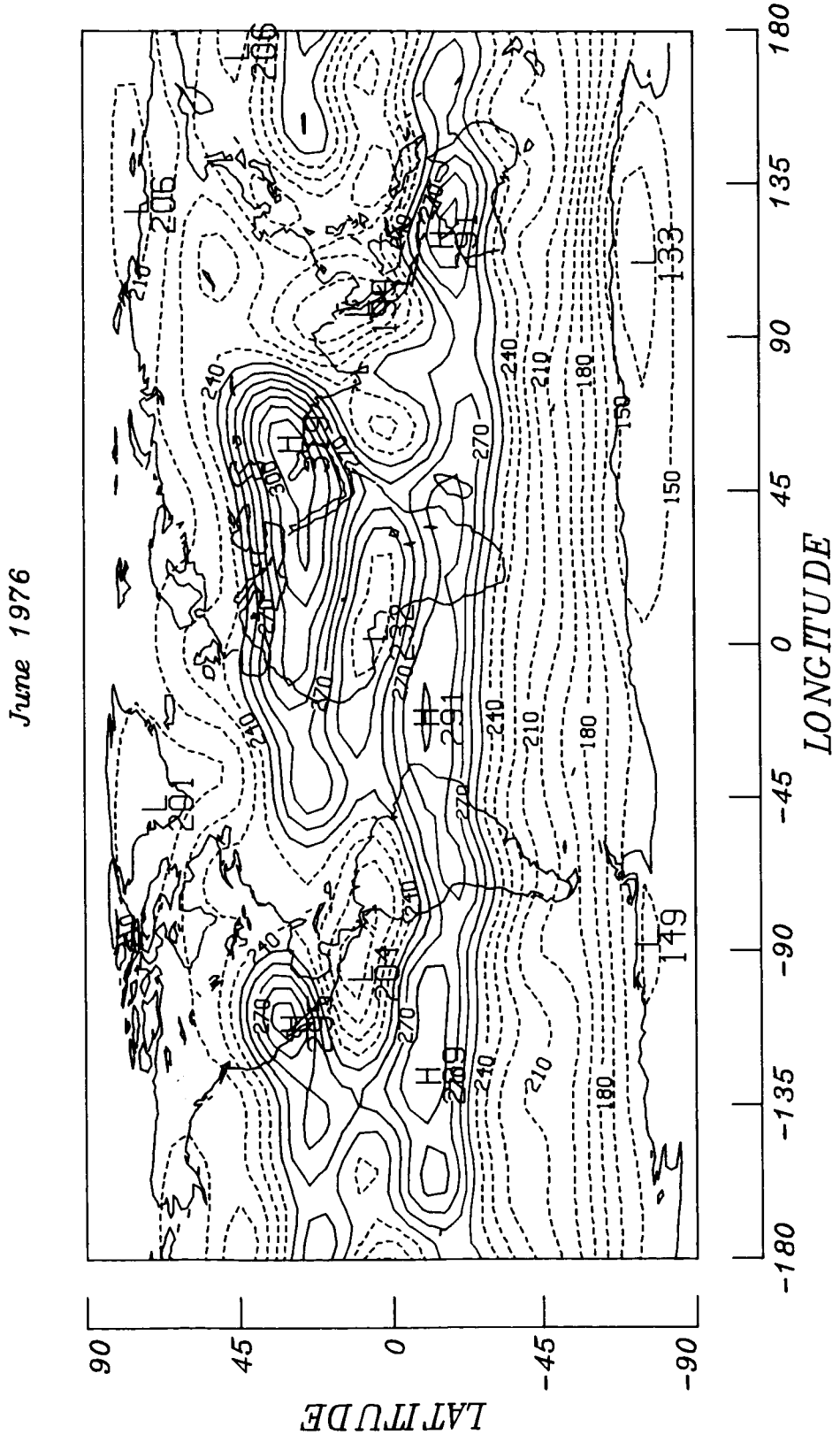
150
120

June 1976

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	235.318	-.755	-.619	-1.146	-.402	-.557	-.353	-.157	.125	-1.316	.276	-.362	-.643	12
1	10.611	5.953	-.087	.257	.194	-1.011	-.394	-.321	.035	-.098	-.669	.218	.449	11
2	-23.397	4.213	2.818	1.416	-1.197	.275	.583	-.067	-.175	1.306	.581	1.453	1.142	10
3	7.726	-1.520	1.719	.280	-.404	.694	.196	.114	-.069	1.465	.926	.903	-.307	9
4	-5.893	-1.114	-1.703	-1.105	-3.661	-.727	.543	.352	-1.002	.020	-.676	.150	-1.834	8
5	-4.173	-2.344	-3.552	-.809	-1.251	-.911	-.101	.260	-.319	-.188	-1.947	-.412	-.008	7
6	6.018	-1.253	-.196	1.817	1.064	-.171	.701	.177	.394	-1.238	-.174	-1.007	1.638	6
7	5.485	1.231	.767	1.384	1.456	.592	.427	.032	-.774	-2.284	2.666	-2.226	-2.585	5
8	-4.331	.376	2.144	-1.005	.932	.049	1.396	.610	-.183	-1.538	.350	.302	1.653	4
9	-4.783	.776	1.285	-.766	.124	.079	.465	.584	-.106	1.408	-.525	5.134	2.261	3
10	2.838	.340	-.496	.907	-.213	.518	.078	1.163	-.991	-.197	-.196	5.697	.128	2
11	.973	-.391	-1.339	-.254	-.074	.444	.349	.399	-1.174	-1.038	.560	-.561	-.447	1
12	.893	.062	.271	.115	.851	-.028	.397	-.696	-.546	.373	1.183	-.986	-.336	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m



July 1976

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	235.405	-1.667	.672	.194	-.152	-.910	.187	.253	.165	-.370	-.033	.493	-1.173	12
1	14.302	6.461	.669	.571	-.492	-.025	.298	.433	.233	1.420	-.604	.284	-.423	11
2	-22.629	4.492	3.012	-1.133	.770	.246	-.671	.730	.718	1.363	-.578	.846	1.505	10
3	9.230	-1.761	2.035	1.024	.939	.859	.232	1.505	-.148	.406	.404	1.748	-.403	9
4	-7.516	-1.053	-1.059	-1.310	-4.622	1.047	.979	.832	-.659	-1.368	1.021	.803	.079	8
5	-4.871	-2.295	-4.292	-1.416	-1.855	-.572	-.776	-1.527	-.507	-.406	-1.226	-2.333	.334	7
6	5.191	-1.394	-1.268	1.706	.054	-.919	.977	.579	-.576	-1.331	-.434	-1.949	.507	6
7	6.673	1.087	1.460	2.594	1.012	.241	1.223	.920	-1.872	-.622	2.608	-1.069	-3.387	5
8	-4.204	.751	2.467	-.912	.912	.134	.691	.309	.316	1.712	.423	2.277	3.392	4
9	-4.033	.842	.799	-.607	.709	.108	1.172	-.097	.153	-.604	0.000	3.898	2.350	3
10	.243	-.395	.015	1.104	-.179	.515	-.723	-1.316	-1.119	1.453	-.756	3.062	-.733	2
11	.789	-.718	-2.024	-.305	-.840	.550	-.116	.176	-.278	-.019	-.532	-.900	-1.138	1
12	1.692	.526	-1.125	.071	.612	-.661	-.298	.817	1.235	-.682	.367	-.938	-2.016	
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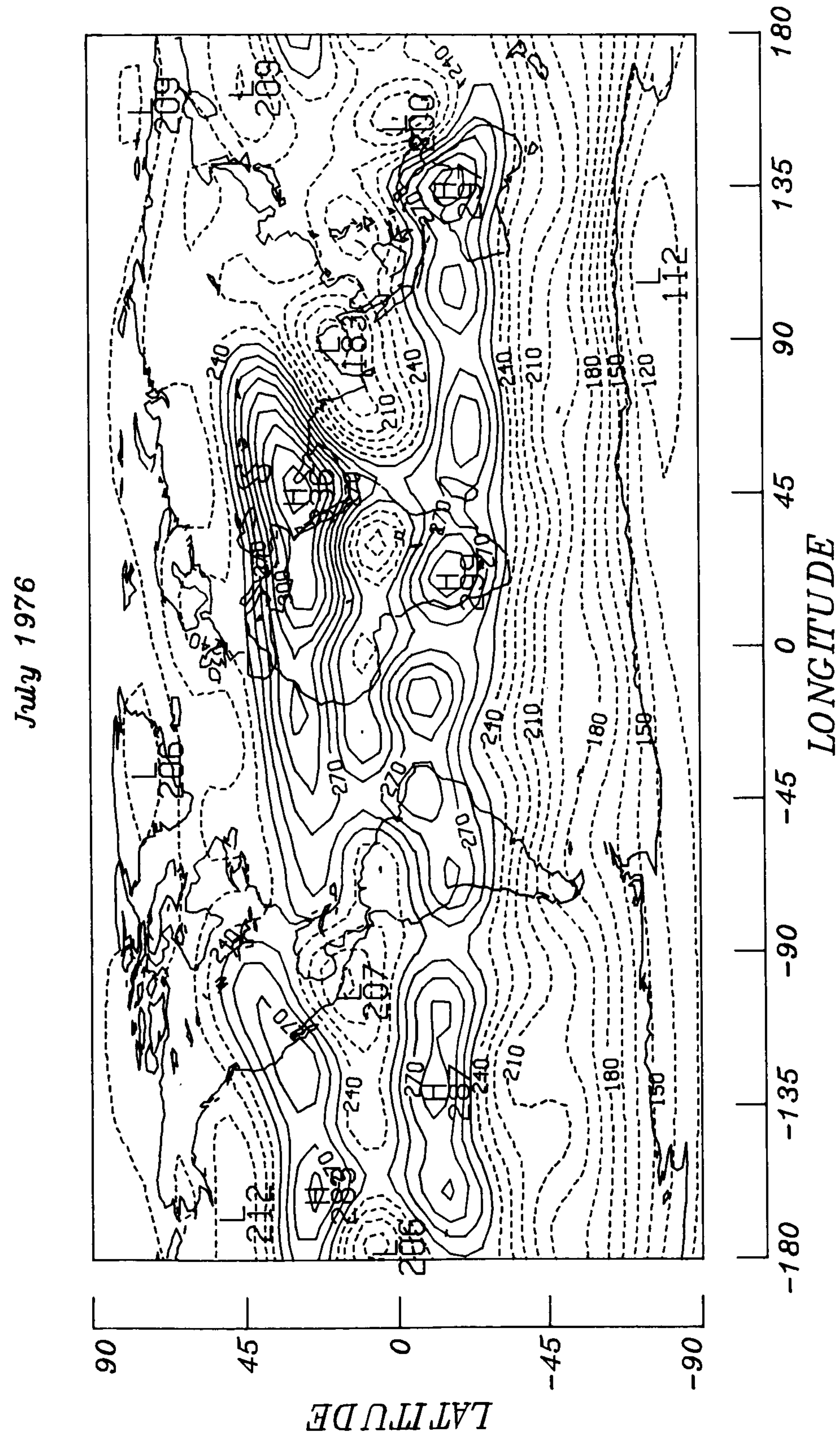
S_n^m


July 1976
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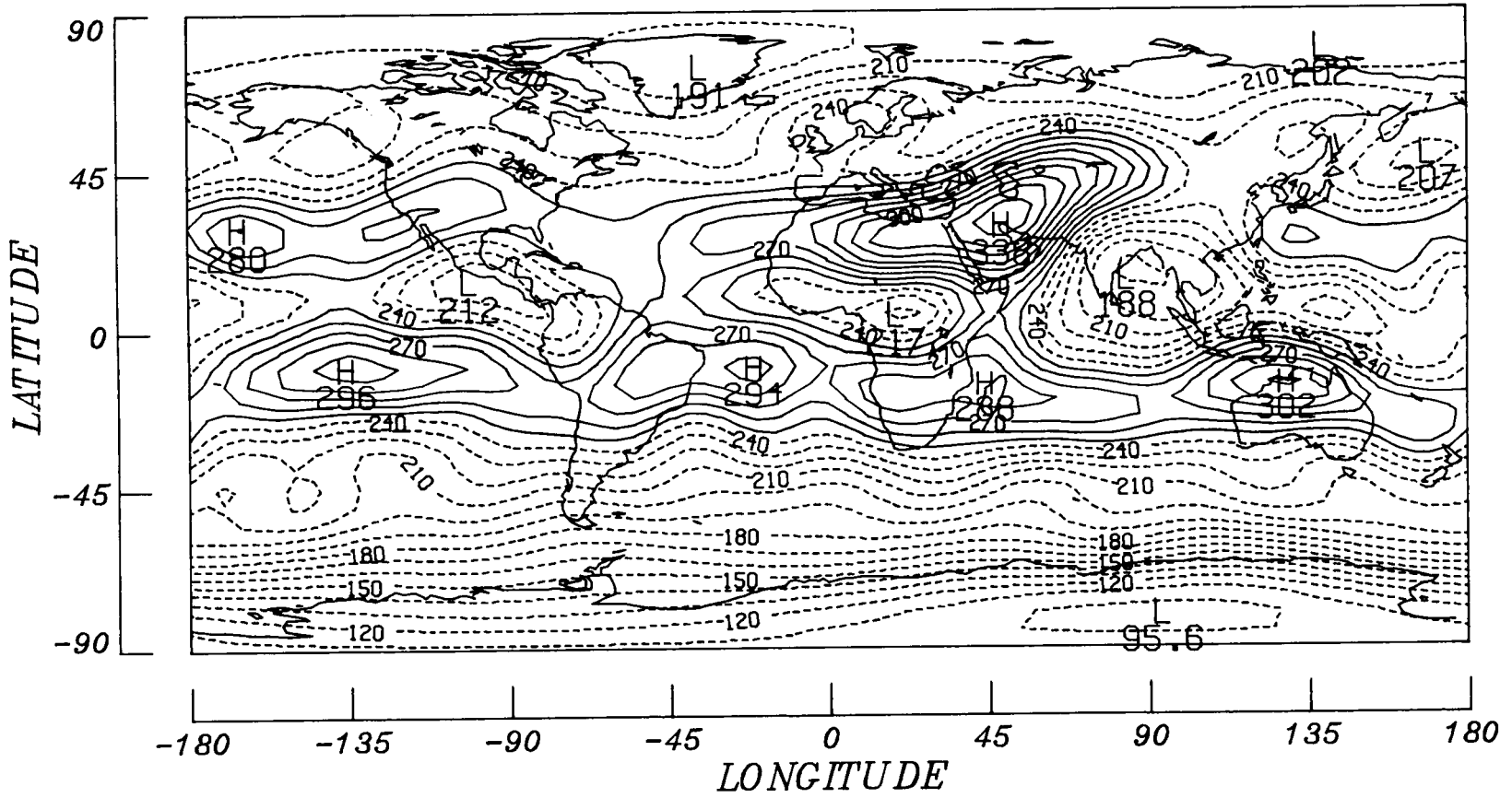
August 1976

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	235.298	.111	-.771	-.363	-.204	-1.324	.101	1.025	-.392	-.453	-.221	-.111	-.230	12
1	12.873	4.992	.167	.028	.494	.906	.083	-.054	.207	1.428	.302	.409	.094	11
2	-24.204	4.121	3.362	.757	.879	.508	-.701	.644	.883	.894	.627	1.290	1.799	10
3	9.144	-1.703	1.819	-.125	.424	1.555	.032	1.524	-.562	-.453	1.608	1.459	-1.731	9
4	-10.261	-.291	-1.704	-1.603	-6.309	-.365	.166	.539	-1.864	-1.295	.998	.046	-.315	8
5	-4.593	-1.928	-4.234	-1.815	-2.171	-.919	.438	-.245	-.829	-.939	-2.288	-1.570	.800	7
6	3.861	-1.101	-.280	1.646	1.624	-.034	1.090	-.481	-1.229	-.207	-.944	-.684	-.158	6
7	7.607	.563	1.556	1.333	.296	.658	1.072	.818	-2.280	-.940	2.256	-.676	-4.278	5
8	-4.651	-.447	3.118	-1.136	.874	.320	.332	.645	.494	.385	1.230	1.634	2.654	4
9	-3.769	.386	1.126	.652	1.330	-.233	.796	-.619	.212	.194	1.462	4.150	3.321	3
10	1.042	-.322	.034	2.334	-.453	1.065	.156	.004	-.663	.870	-1.030	3.328	.238	2
11	.699	-.250	-1.553	-.470	-1.006	1.295	.375	.415	.211	-.370	-.244	-.158	-1.204	1
12	.958	.372	-1.293	-.777	.879	-.101	-.247	.390	.409	-.162	-.806	.545	-.465	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

August 1976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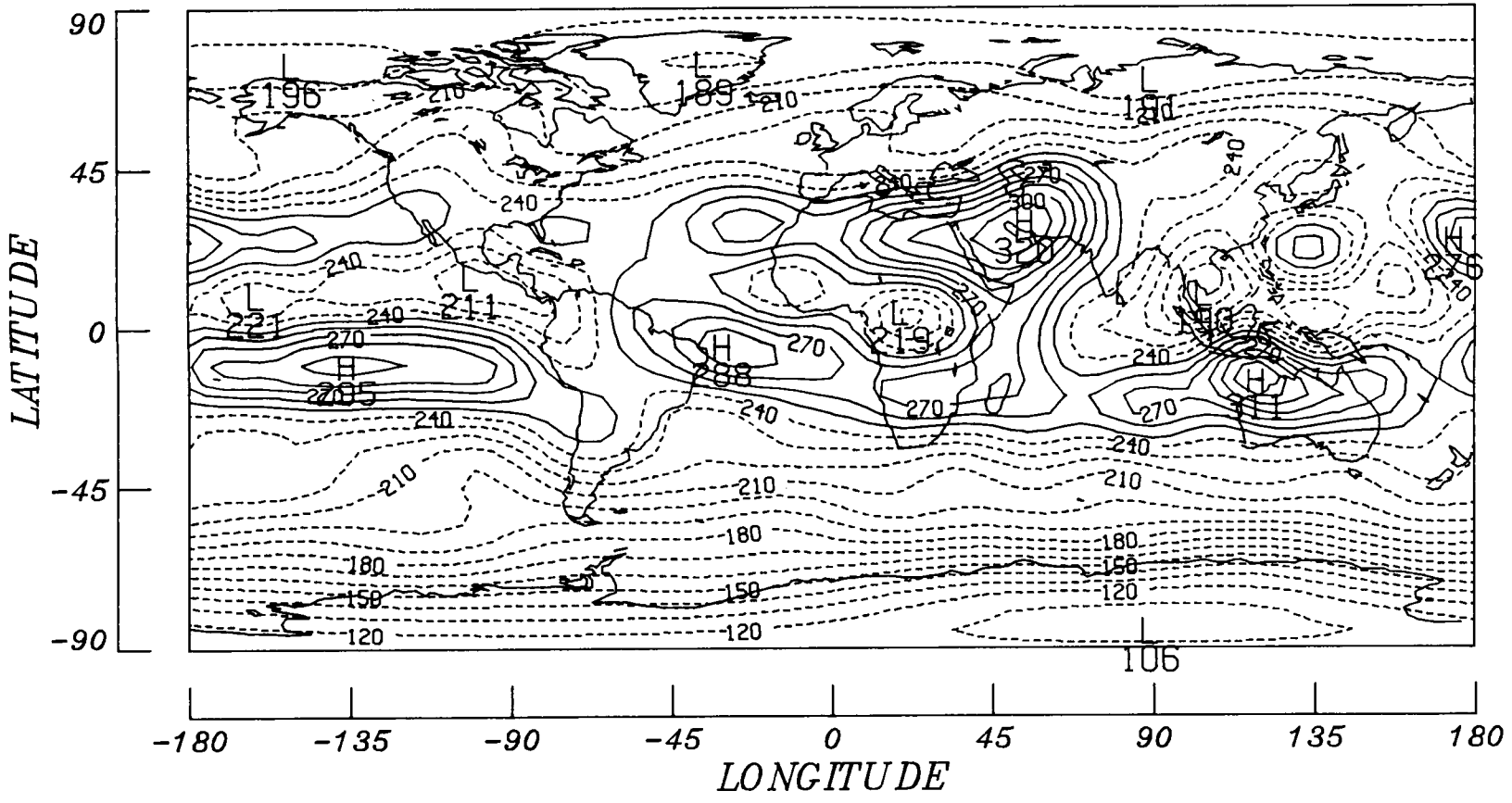
September 1976

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	232.378	-.078	.684	-1.090	-.533	.364	-.259	1.034	-1.159	-.814	.842	-.249	-.342	12
1	9.233	3.384	-.215	-.878	1.003	.325	.782	.071	-.362	.885	-.338	.145	1.124	11
2	-25.436	4.782	2.091	1.273	1.052	.371	.543	-.876	.651	1.082	-.038	.047	1.371	10
3	6.942	-1.413	.741	-1.242	.652	.441	-.035	-.449	.380	.442	2.122	1.320	-2.541	9
4	-7.688	-2.646	-1.042	-3.139	-3.440	-.161	.079	-.191	-.862	-1.782	.383	.911	-.521	8
5	-2.447	-1.237	-2.857	-.825	-1.467	-1.245	.197	.754	.374	-.890	-1.726	-1.371	1.250	7
6	2.513	1.055	.101	4.003	.371	-.628	1.927	.043	-.751	.340	-.234	-.274	.823	6
7	6.809	.652	.537	1.198	.451	.998	.987	.067	-2.463	-1.792	1.324	-1.420	-4.075	5
8	-3.467	-1.096	.742	-1.169	.176	-1.120	.165	-.919	.914	-.772	.182	-.160	1.671	4
9	-4.003	.863	1.623	.773	-.085	-1.054	-.500	-1.133	.865	.300	-.098	3.452	1.246	3
10	1.277	.835	.364	1.106	-.013	.963	.530	.452	-.322	-.543	.004	4.020	.867	2
11	2.149	-.927	-1.460	-.780	-.224	.081	.007	1.571	-.651	-.792	.335	-.870	1.219	1
12	.842	-.725	-.313	-.713	.350	-.345	-.317	.628	-.767	-.219	-.365	-.274	1.049	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

September 1976

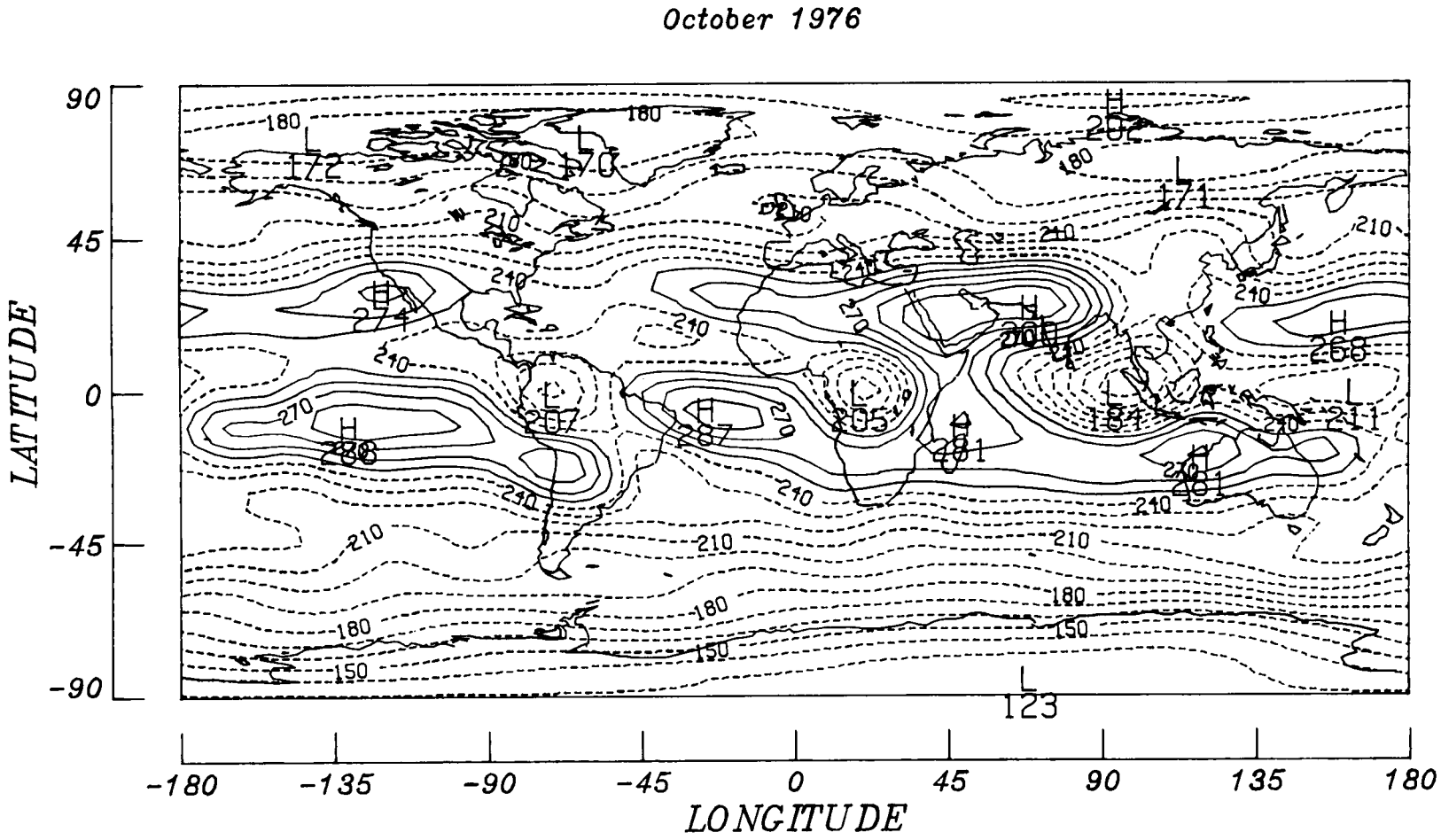


October 1976

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	228.332	.400	.173	-.004	-.425	-.224	-.368	-.262	-.910	-1.218	.857	-.111	.352	12
1	4.233	1.951	.097	-.357	.463	-.225	1.003	-.119	.594	-1.079	-1.444	-1.139	1.701	11
2	-26.503	1.832	.452	1.313	.039	-.135	.316	.254	.755	1.034	-.584	.826	1.218	10
3	2.531	-1.617	1.009	.924	-.206	-.570	-.115	-.275	-1.395	1.418	1.884	1.533	-2.078	9
4	-6.610	.782	-.594	-1.220	-3.098	-.588	.143	-.221	-.962	-.914	1.355	.620	-.211	8
5	-.102	-.659	-1.593	-.447	-1.212	.179	-.167	.388	2.090	-.008	-1.152	-.642	2.716	7
6	5.029	.306	2.357	2.147	1.751	-.397	1.425	-.615	.066	1.352	-.622	.118	2.325	6
7	5.369	.806	1.404	1.236	.447	.474	-.367	.178	-3.145	-1.767	.525	-.847	-3.891	5
8	-4.227	-.310	-.408	-.838	-.997	-.930	.049	-.616	.482	-2.747	.216	-1.957	.338	4
9	-2.704	.889	.560	-.644	.127	-1.521	.250	-1.106	.681	1.177	.677	2.638	.744	3
10	2.143	.348	.140	.243	.917	.161	.011	-.337	-1.101	.204	-.103	4.712	.342	2
11	2.282	-1.799	-1.666	-.359	.715	1.101	.005	.472	-.430	.111	.256	.020	-.074	1
12	.564	-.065	-.026	.173	-.354	-.088	-.973	.064	.634	.467	-.221	-.342	.106	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m


October 1976
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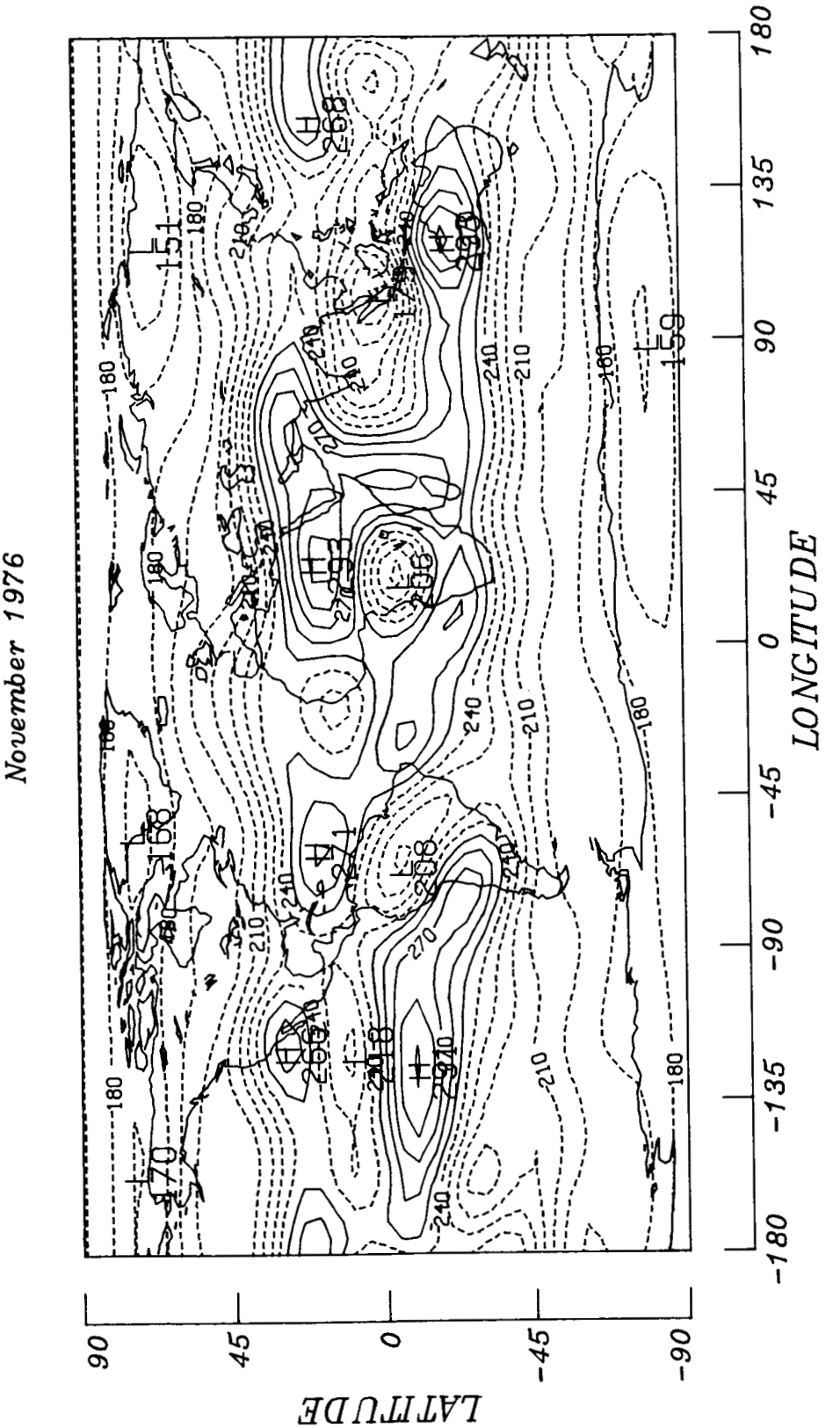
November 1976

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	225.878	.250	-.234	-.137	-.127	-.143	-.019	-.266	.008	-1.331	.999	-.174	-.406	12
1	-2.621	3.131	-.707	-.404	.353	-.069	-.165	-.060	.483	-.948	-.651	-.812	.645	11
2	-24.607	2.013	1.314	1.438	-.729	-.044	-.071	.236	.789	1.668	-1.275	.713	1.784	10
3	.084	-1.805	2.440	-.693	.413	.224	.236	-1.148	-1.902	2.097	1.430	1.987	-2.078	9
4	-3.624	-.487	-.619	-2.621	-1.895	.842	-.266	-.478	-2.021	-1.208	1.937	-.547	-.049	8
5	.070	.064	-1.472	-.387	-.901	-.358	.325	1.008	1.872	-2.167	-1.607	-1.024	2.519	7
6	6.984	1.366	2.129	3.391	1.476	-.513	1.293	-.765	1.831	.383	-1.295	1.915	.982	6
7	2.296	.668	1.719	.434	.262	.266	-.087	.409	-2.422	-.411	-.100	.498	-4.166	5
8	-4.285	-1.347	-.827	-2.340	-.839	-.360	1.524	.820	.978	-1.691	-.425	-1.910	-.173	4
9	-1.099	.007	-.429	-.103	.540	-.575	.240	-1.435	-.485	.852	2.252	2.108	.675	3
10	1.825	1.912	.179	.217	.212	.244	-.015	-.158	-1.447	-.259	-.043	4.397	-.697	2
11	1.865	-.863	-1.061	-1.005	.151	.675	.416	.222	-.084	-.298	.040	-.408	-1.342	1
12	1.127	-.865	.618	.606	.305	-.508	-.645	-.211	.376	1.193	.428	.096	.885	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

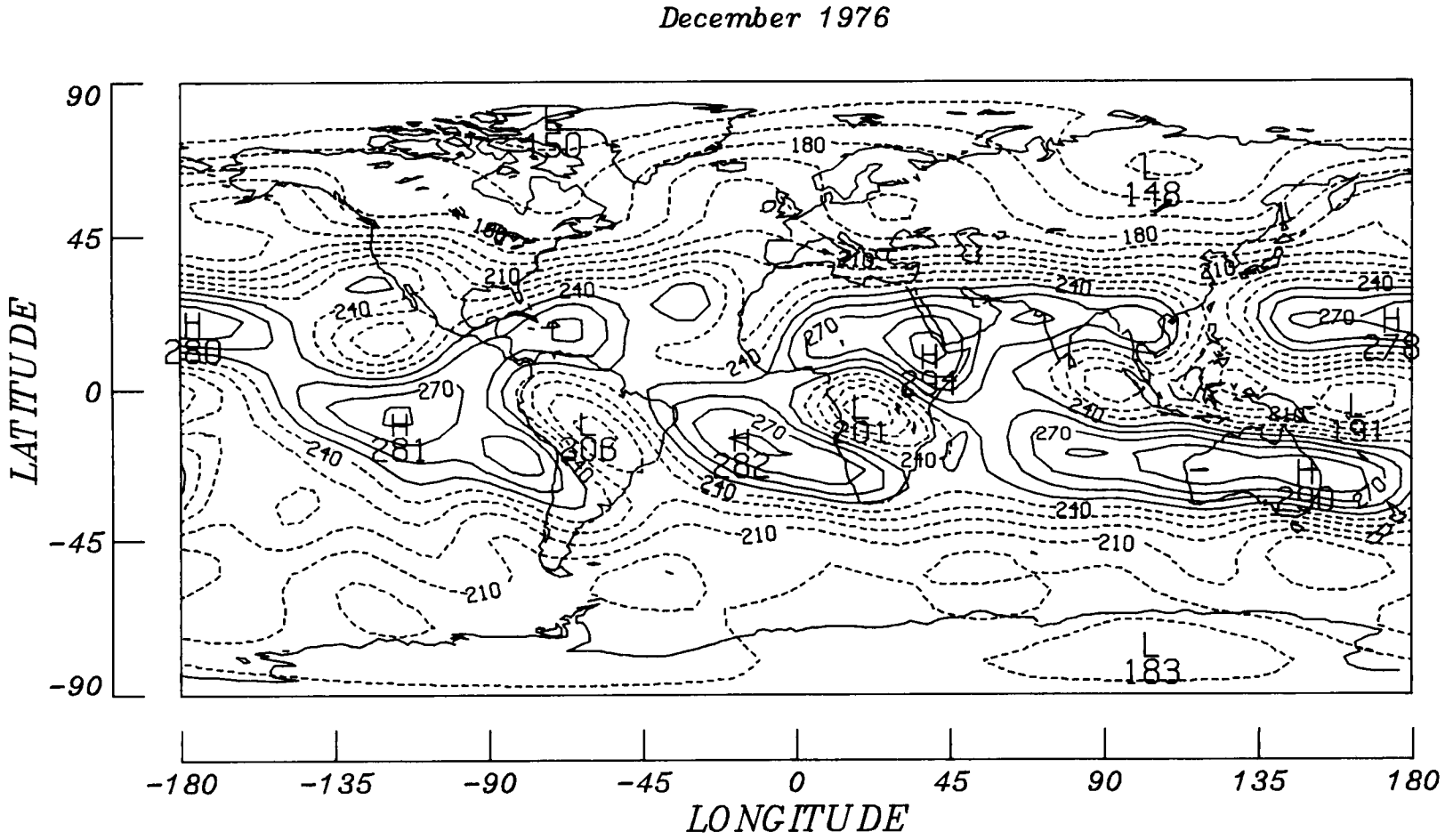


December 1976

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	226.198	.173	.772	.023	-.174	-1.220	.245	.127	.070	-.704	1.292	-.179	.447	12
1	-8.045	2.072	.902	.359	.880	.825	.052	-.523	-1.095	-.857	.085	-.410	.745	11
2	-24.900	1.495	-.868	.663	-.212	.389	.078	-.082	.762	.757	-2.153	1.134	1.569	10
3	-2.309	-2.229	3.208	.751	-.467	.543	-.082	-.276	-1.466	1.875	1.124	1.070	-2.507	9
4	-1.552	.379	2.660	-3.672	.921	.535	-.479	-.214	-1.194	-.707	2.143	-1.899	-.910	8
5	.964	2.326	.135	-.238	-1.677	.226	.227	.527	2.045	-3.934	-2.229	.164	3.605	7
6	7.738	.663	.738	3.694	.541	-.722	-.658	-1.104	1.027	.230	-1.729	3.227	1.277	6
7	-1.728	-.887	1.918	.378	.297	.396	-.893	1.020	-1.195	1.143	.908	-.632	-3.531	5
8	-6.120	.129	.942	-2.221	-1.345	-.083	.626	1.171	.253	-2.093	-.304	-1.800	.420	4
9	.620	.708	-1.426	-1.023	.764	-.962	.365	-1.062	.295	.255	.476	2.110	-.352	3
10	.808	.218	-.260	.180	2.216	.579	.471	-.824	-1.125	-.743	1.451	2.551	-1.278	2
11	-.034	-.290	-.178	-.011	-.712	.504	-.382	.879	.483	-.301	.424	-.197	-.004	1
12	.581	-.883	-.065	1.626	-1.294	-.331	-.495	.817	-.239	.249	.175	.745	-.114	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m


December 1976
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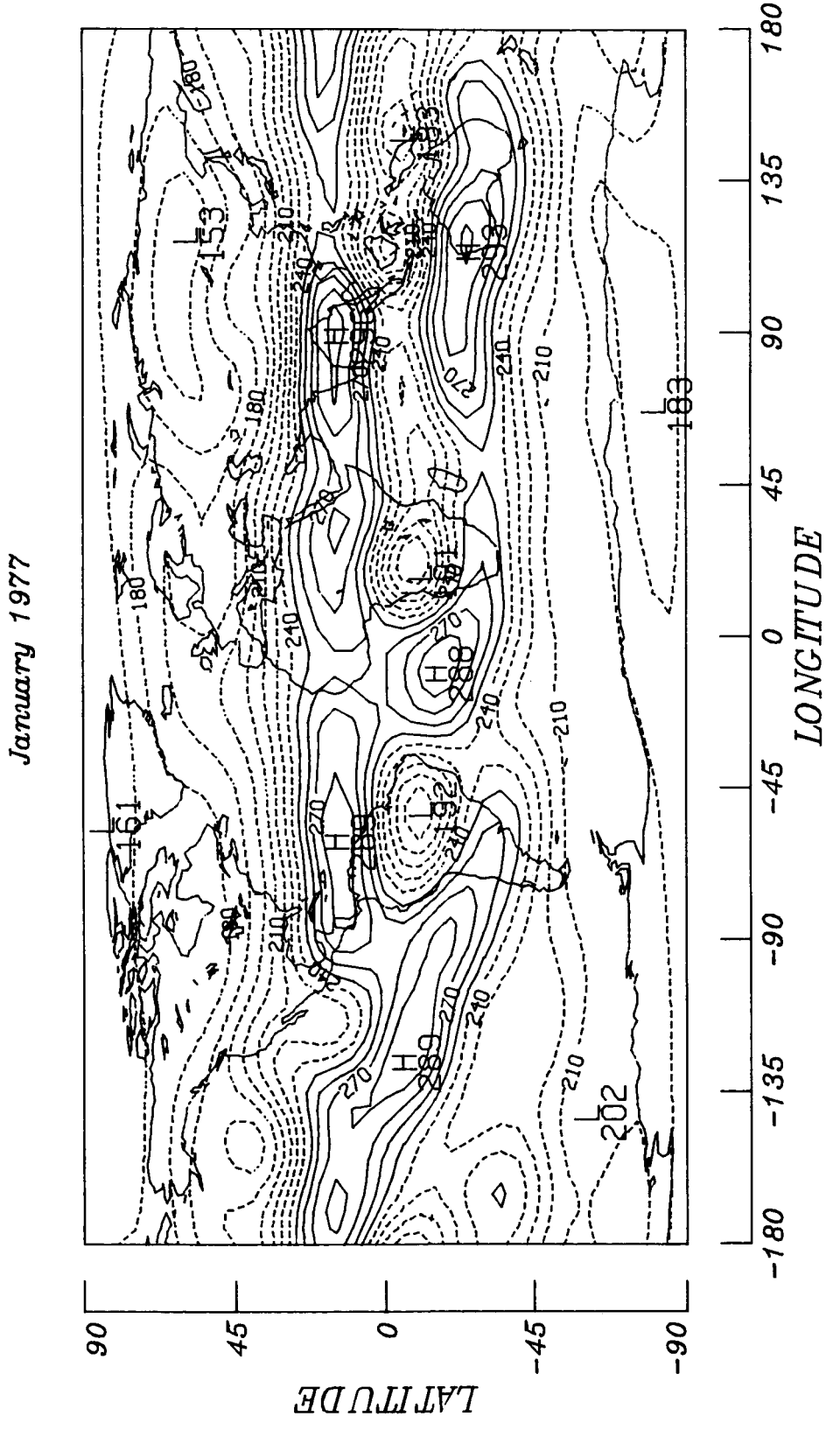
January 1977

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	227.114	.874	.084	.437	-.102	.729	.252	-.399	-.289	.216	.588	-.937	.010	12
1	-9.604	2.240	.150	.105	-.890	.128	-1.041	-.069	-.044	-.721	.962	-.183	.627	11
2	-24.339	1.577	-1.127	.146	-.414	-.018	-.744	.007	.408	.073	-.053	1.134	1.984	10
3	-1.785	-1.403	3.494	1.513	-.146	.526	.289	-1.549	-.435	2.356	-.094	1.040	-1.930	9
4	-.443	.003	3.183	-3.428	2.979	.198	.480	.334	-.714	-.847	.271	-1.555	-1.418	8
5	6.809	.876	-.493	-.740	-1.490	1.140	-.861	.244	1.173	-2.610	-1.648	-1.252	3.626	7
6	7.012	.618	.506	4.304	-.555	-.911	-1.135	-1.781	1.976	1.243	-.304	3.653	2.203	6
7	-6.445	.392	.871	.468	1.715	-.458	-.876	-.440	-1.447	.567	2.632	.198	-4.155	5
8	-5.222	.050	-.141	-3.271	-1.138	-.855	.675	-.475	1.302	-.579	-.939	-2.898	.037	4
9	3.102	-.240	-.423	-.531	-.680	-.429	.451	-.064	.502	.584	-2.193	1.966	.936	3
10	2.113	.870	.976	1.514	1.905	.640	.358	-.254	-.725	-1.366	-.531	2.108	-1.139	2
11	-.751	-1.153	-.780	-.322	-.560	.014	-.345	.365	.081	.355	.037	1.345	-3.056	1
12	-1.276	-.854	-.565	.110	-.583	.126	-.546	.032	.369	.184	-.155	-.014	.032	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m



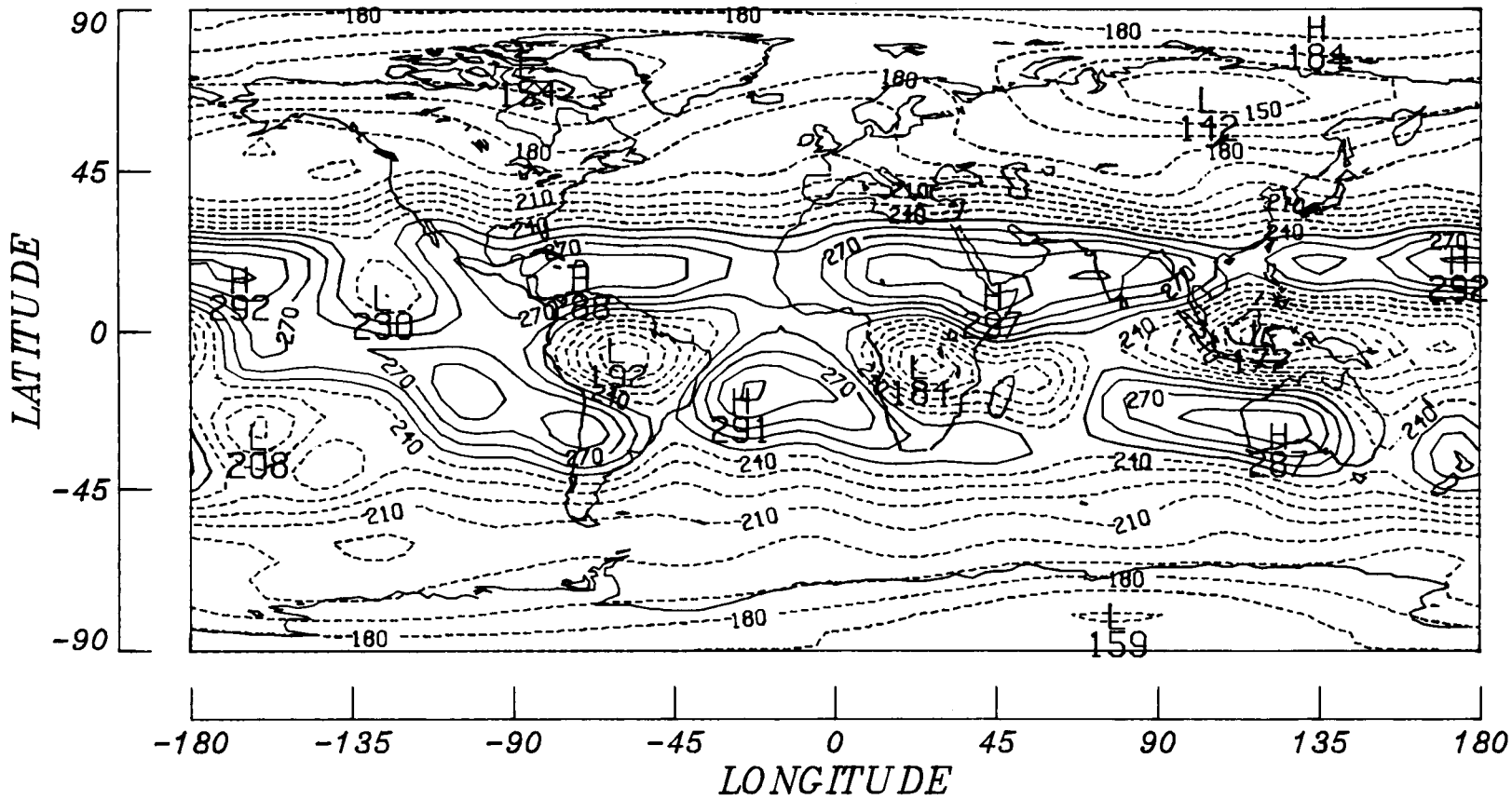
February 1977

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	229.090	.775	-.403	.006	-.574	.241	-.009	1.052	-.055	-.068	.933	-1.057	.058	12
1	-7.489	3.694	.514	-.683	1.598	.540	-.024	-.333	.201	-1.151	1.053	-1.251	.434	11
2	-26.766	1.291	-.258	.382	-.357	-.950	-.244	-.548	.378	.204	-.895	2.001	2.203	10
3	-2.988	-1.272	2.506	.066	1.100	.188	.718	-.192	-.834	1.829	-.408	1.506	-.965	9
4	-4.352	.468	1.405	-3.338	3.778	.116	-.006	-.162	-.703	-.700	1.770	-2.719	-.942	8
5	8.359	.496	-.597	.650	-1.787	.443	-.676	1.232	1.352	-2.294	-1.941	-.213	1.436	7
6	8.126	.372	2.066	4.498	-.874	-.021	-1.254	.407	1.133	1.486	-2.331	4.260	3.070	6
7	-5.255	.823	1.288	-.538	1.136	-.838	.081	.344	-2.751	.925	2.914	-.836	-3.236	5
8	-5.509	-.478	-.468	-2.221	-.649	-.572	1.751	1.027	.656	-1.527	1.096	-3.043	-1.560	4
9	2.743	-.187	1.082	.736	-.295	.486	.147	-1.304	-.544	.852	-1.169	2.187	1.272	3
10	2.971	1.875	.147	.415	1.276	-.126	-.167	.618	-.873	-.127	.284	3.105	.814	2
11	1.483	-1.458	-1.258	.104	.054	-.187	.212	.340	-.467	-.475	-.614	.350	-3.877	1
12	-.199	-1.390	.805	.084	-.814	.336	-.616	.249	.069	1.385	.814	-.207	-.990	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

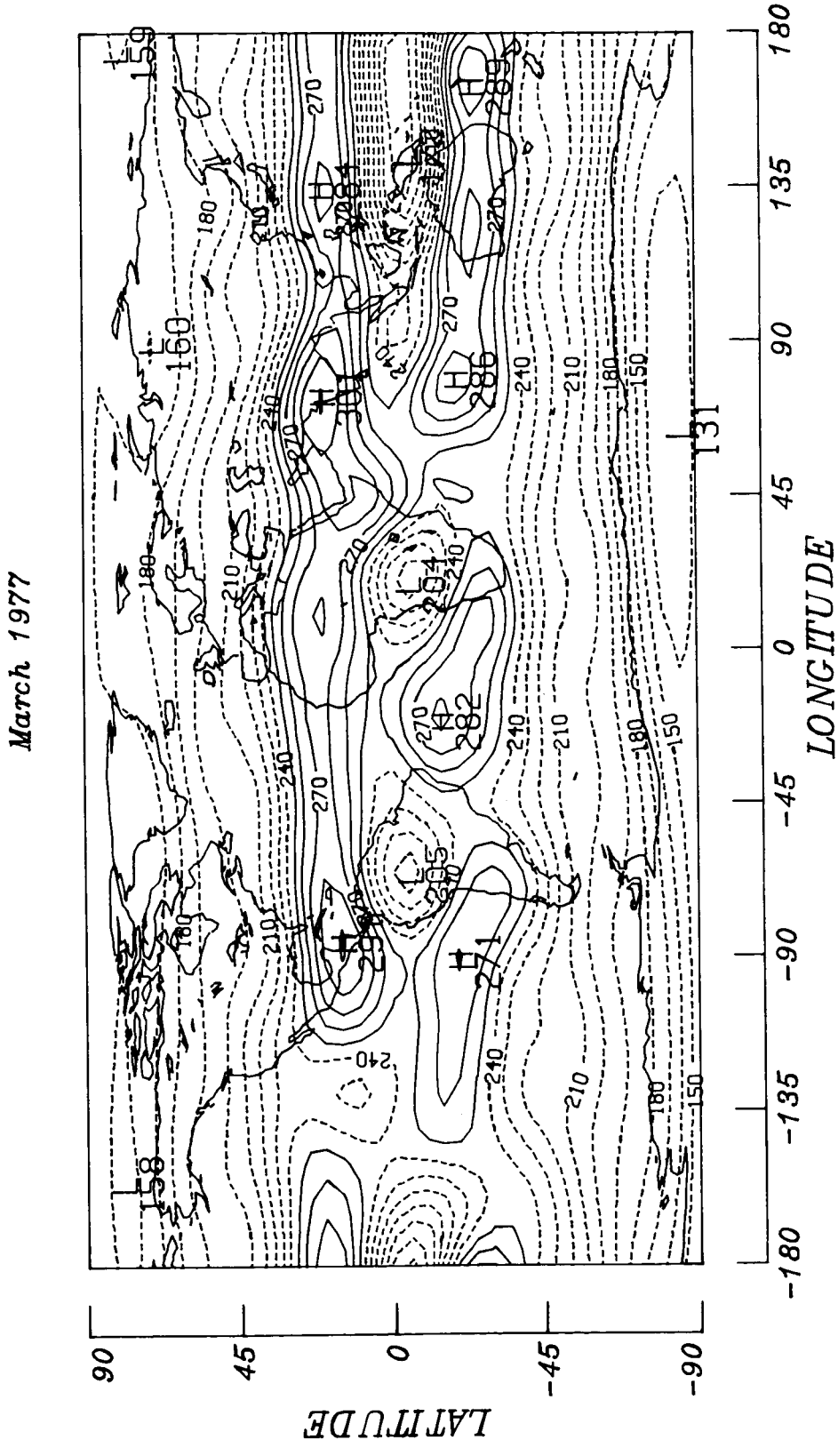
February 1977



March 1977

C_n^m / S_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m / n
0	229.538	.340	-.398	-.048	-.442	.501	.164	.075	-.702	.379	1.254	-.602	.083	12
1	-3.105	4.783	.668	-.084	.803	-.274	-.372	-.588	.409	-.390	-.260	-.418	.053	11
2	-26.379	2.354	-2.519	.285	.079	-.269	.611	-.600	.056	-.582	-1.452	1.739	1.765	10
3	-.643	-2.595	.991	.468	.037	.424	.259	-.901	-.675	1.625	.847	1.226	-1.322	9
4	-8.788	.479	3.605	-1.584	1.829	-.654	-.448	.952	.337	0.000	2.184	-2.229	-.078	8
5	6.268	2.122	-.131	-.832	-.872	.561	.876	1.416	1.437	-1.776	-1.234	-1.445	.898	7
6	7.477	-.933	-1.065	2.600	.944	.024	-.528	-.801	-.693	.741	-2.063	2.990	2.429	6
7	-3.181	-1.120	.437	.413	-.412	1.511	-.010	.509	-2.616	.634	1.801	.682	-3.034	5
8	-7.588	1.119	.715	-1.412	-1.327	-.061	.966	.707	.399	-2.508	.917	-1.874	-.004	4
9	2.520	1.012	-.069	-.091	.577	-.649	.317	-1.332	.013	.648	-1.125	1.753	-.515	3
10	3.526	-.647	.671	-.004	.886	-.485	-.185	.124	-.640	-.225	.398	1.629	.180	2
11	-.002	-.963	.075	.298	-.336	-.269	-.290	.905	-.223	-.214	-.105	-.343	1.094	1
12	-.305	1.384	-.659	.810	-.474	.389	-.347	.386	-.348	.104	.077	.033	-.224	
n / m	0	1	2	3	4	5	6	7	8	9	10	11	12	



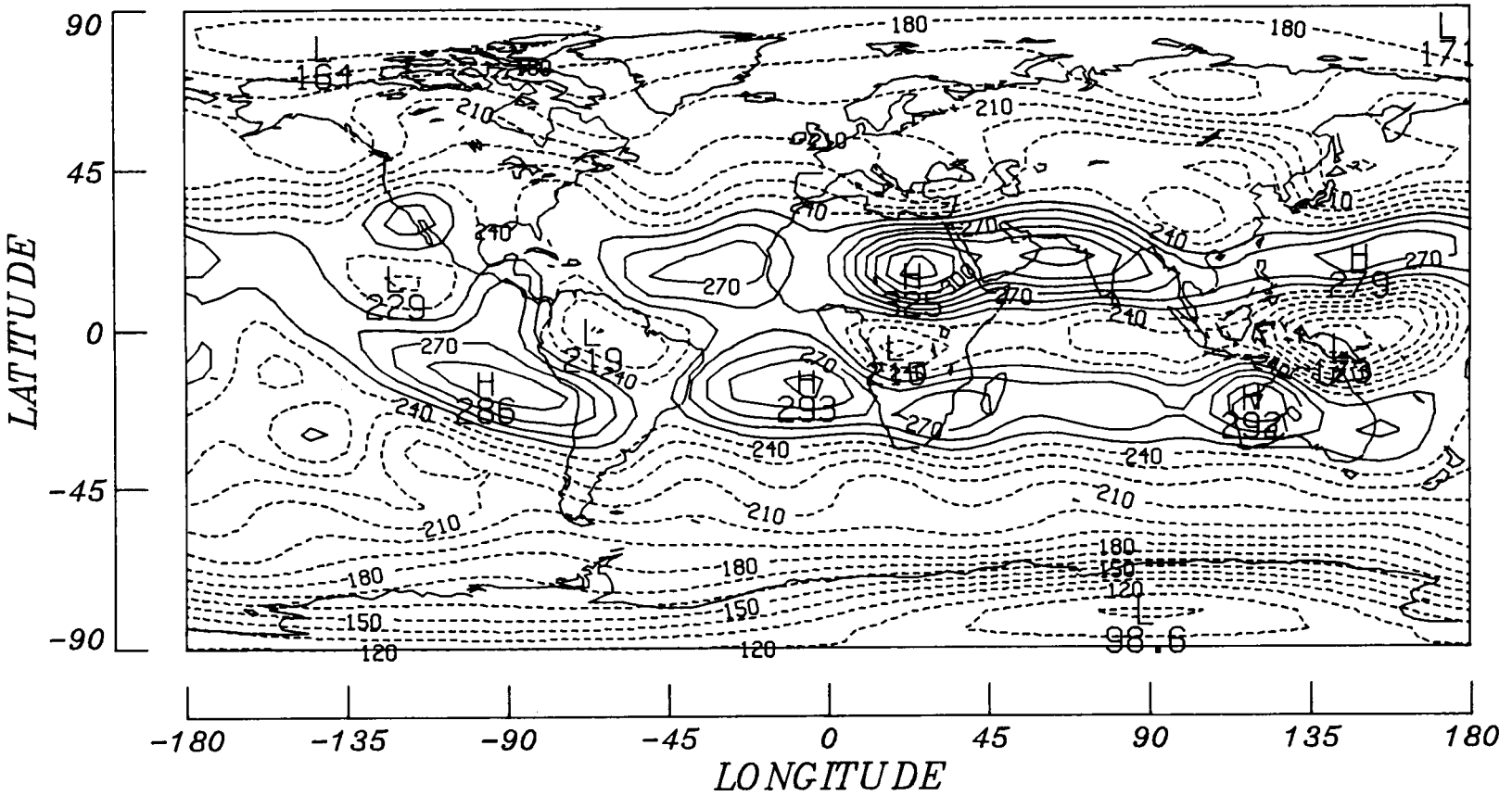
April 1977

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	231.419	.281	.252	.240	.841	.203	.743	.962	.460	-.226	.332	-1.216	1.444	12
1	3.821	5.292	-.416	-.603	.756	.188	-.650	.396	-.033	-2.068	-.614	-.673	1.322	11
2	-26.031	1.757	-.927	.373	-.375	-.863	.117	-.743	.258	-.445	.542	.831	2.422	10
3	2.580	-2.763	-.769	.700	-.624	.655	-.104	-.548	-.478	1.553	1.921	.788	-3.400	9
4	-7.717	1.061	-.362	-1.581	1.882	-.797	.186	-.752	-2.023	-.416	.847	-.513	-1.752	8
5	3.768	.817	-2.986	-1.099	-.926	-1.743	.943	1.821	.431	-1.256	-1.882	-.330	1.463	7
6	4.365	-.297	-.082	1.759	-.671	-.464	.002	-.712	1.036	-.389	-.378	2.217	4.292	6
7	-.655	.901	1.201	1.159	2.442	1.619	-.691	-1.370	-2.556	-.800	1.239	-.882	-4.027	5
8	-7.487	-.356	2.139	-.999	1.163	-.714	.173	-.190	.197	-.500	-.392	-1.552	-.275	4
9	1.385	-1.429	.549	-1.025	-.777	-1.184	2.456	-.627	-.629	-.023	-.483	2.268	.822	3
10	3.246	1.123	.417	-.089	-.127	.677	.985	-.221	-1.267	-.840	-.013	2.886	1.340	2
11	-.483	1.062	-1.197	-.301	-.141	-.564	-1.535	.496	-.535	.547	-.465	-.324	.473	1
12	-.621	-.157	-.372	1.060	-.597	-.150	-.212	.005	.166	1.092	-.224	-.574	.899	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

April 1977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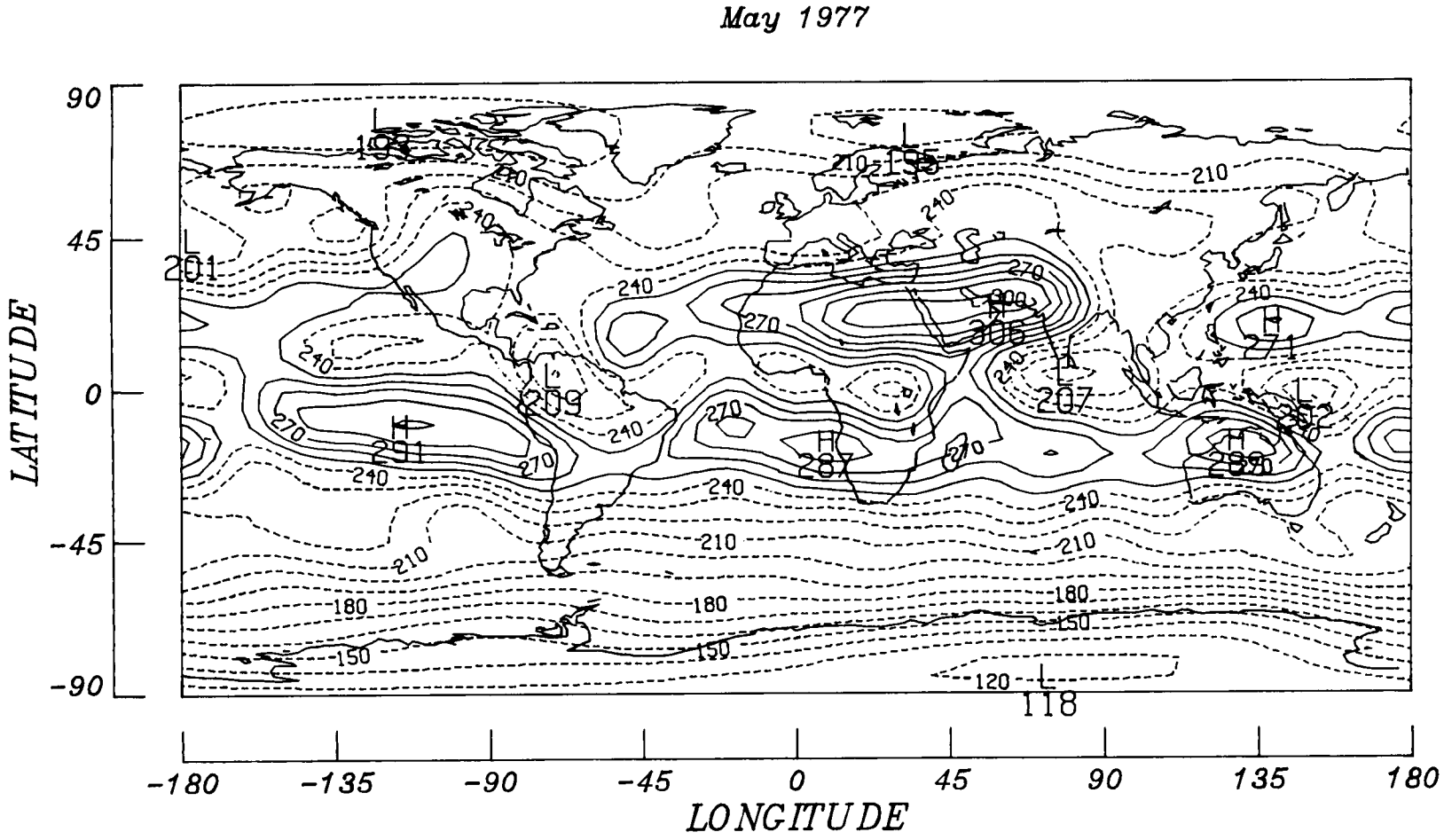
164
98.6

May 1977

C_n^m (lower left, read with bottom and left labels) / S_n^m (upper right, read with top and right labels)

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	232.513	.129	.272	-.287	.740	-.127	-.395	.876	-.836	-.428	.608	-1.378	.618	12
1	8.790	4.180	.856	-.050	-.585	-.750	.186	.500	.068	-1.020	-1.703	-1.714	.861	11
2	-24.000	2.730	1.068	-.169	-.722	.037	.436	-1.089	.145	-.194	-.412	1.015	.714	10
3	6.401	-.175	.544	1.551	.625	-.617	-.033	-.372	-.980	1.386	1.361	1.570	-2.445	9
4	-5.612	-.102	-1.409	-1.576	-1.615	-.520	.234	.641	-1.464	-.547	.093	-.706	-.627	8
5	-.966	-2.488	-3.598	-1.601	-1.262	-.835	1.179	1.074	.828	-.870	-.747	-.946	1.708	7
6	2.796	-.289	.135	1.695	.230	-.188	.988	.402	-.526	-.465	.494	.569	2.083	6
7	3.150	2.143	1.289	1.424	1.534	1.304	-.421	-.332	-2.849	-.749	.656	-.476	-2.927	5
8	-5.756	-.339	2.429	-.880	.179	.146	.093	1.339	.971	-.695	.627	-.107	.048	4
9	-2.504	-.679	.238	-.767	-.458	-.776	.415	-1.027	-.549	-.558	1.879	2.490	1.486	3
10	3.771	-.030	-.431	.780	.380	-.259	-.124	-.685	-.378	-.144	-.650	4.683	1.226	2
11	1.953	-.521	-.795	-.088	-.301	.055	-.614	1.028	-.019	-.338	-.722	-1.261	.850	1
12	-.095	.590	.099	.146	-.159	.666	-.221	1.022	-.871	-.297	1.226	-.112	-.253	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	


May 1977
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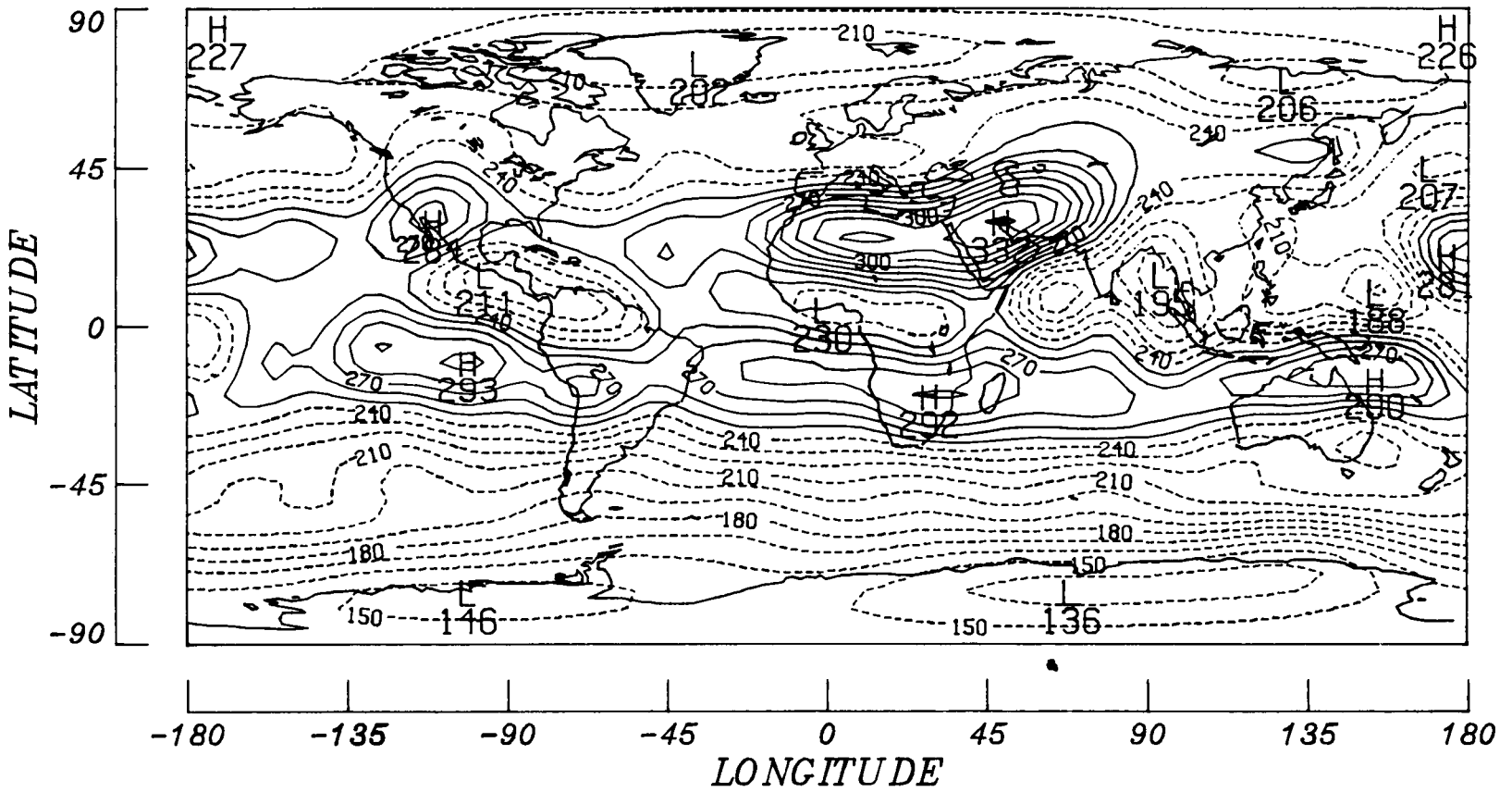
120

June 1977

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	236.132	-1.252	.456	-.703	.125	.377	-.669	-.106	.057	-.766	-.895	-1.490	-.467	12
1	12.479	5.866	1.157	-.600	.647	.253	.086	.529	.711	-.749	-.840	.667	.866	11
2	-22.326	4.127	3.230	.535	-.009	.008	.025	.857	.023	1.578	1.522	1.527	.331	10
3	7.696	-1.291	1.218	.828	.180	.287	.163	.805	-.550	1.519	.861	.928	-.478	9
4	-5.828	-.925	-1.509	-.720	-2.134	-.428	.311	.074	-.678	-1.742	-1.480	1.450	-.323	8
5	-4.785	-3.881	-4.893	-1.469	-1.209	-1.478	-.137	.459	-1.066	-2.714	-1.182	-.307	-.213	7
6	4.813	-.798	-.988	.941	1.114	-1.701	.785	-.062	-.312	-.276	1.492	-1.430	-.480	6
7	5.444	2.976	1.536	1.715	-.323	-.242	2.258	.143	-.627	.336	1.041	-2.502	-3.188	5
8	-4.031	.071	2.742	-.693	-.814	1.428	1.417	.445	.043	-1.126	-.371	1.023	3.185	4
9	-4.792	-.486	.525	-1.066	-.002	.365	0.000	.273	.903	1.099	1.120	4.632	3.908	3
10	2.804	-.915	-.583	.491	.392	-.908	-.769	1.073	-.119	.120	.328	6.197	-.728	2
11	1.458	-1.366	-1.156	-.456	-.125	-.060	-.252	.696	-.926	-.568	.736	-.774	-.779	1
12	1.244	-.078	.176	-.402	1.104	.668	.312	-.800	.382	.190	.831	-1.268	-.994	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m


June 1977
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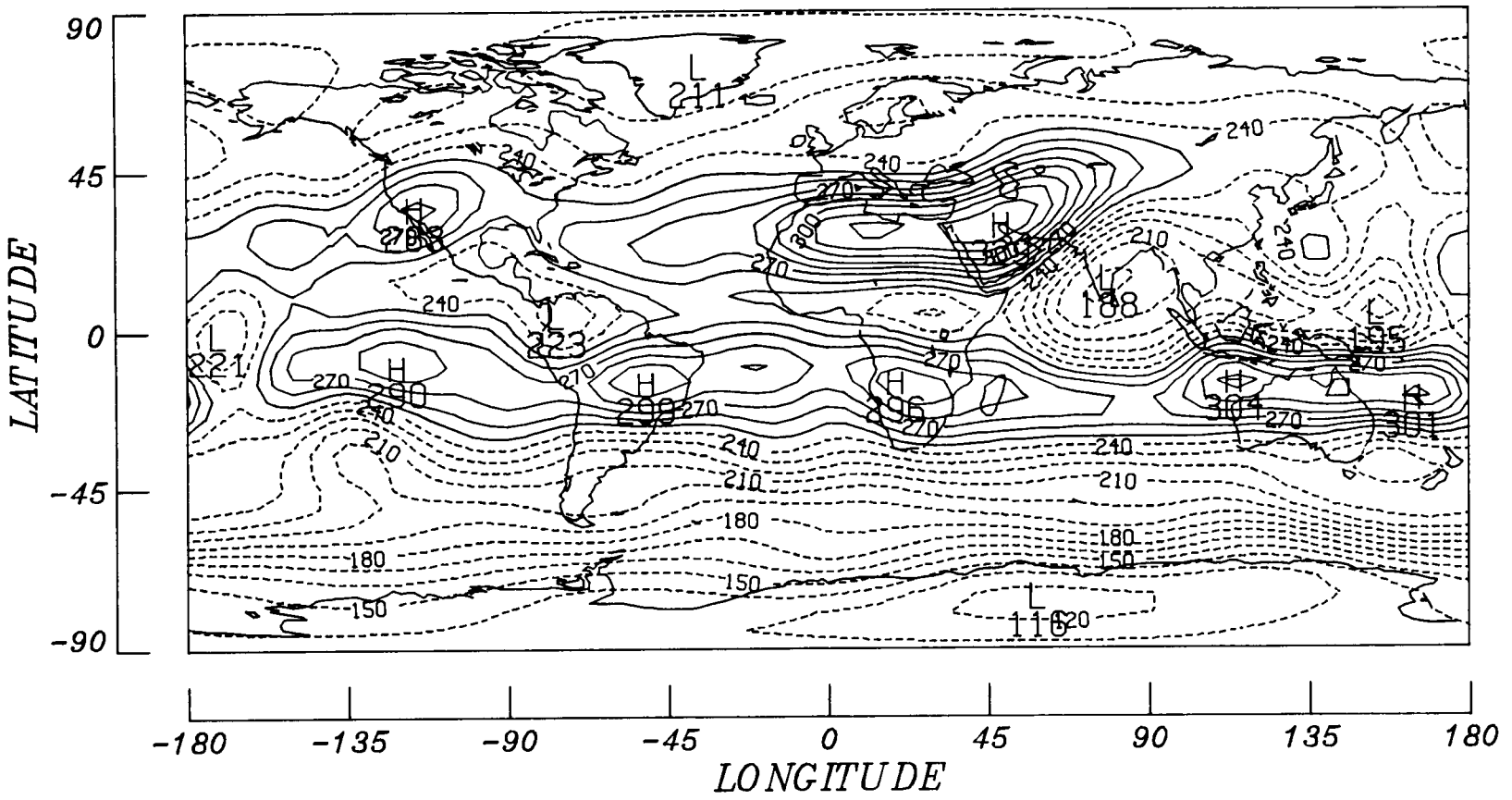
July 1977

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	237.174	-.998	-.146	-.990	-.059	.271	.005	-.008	-.619	.185	.127	-1.218	-.540	12
1	14.767	5.933	1.323	-.082	.365	.476	-.055	.487	.749	1.370	-.602	.086	.617	11
2	-22.458	5.134	4.142	-.838	.635	.321	.808	.275	-1.016	1.007	.604	2.362	.693	10
3	9.865	-1.738	1.755	1.624	.787	1.319	-.608	.070	-.223	.257	1.379	.748	-1.432	9
4	-8.058	-1.094	-1.478	.021	-3.087	-.458	-.697	.954	.558	-1.173	-.287	-.344	-.002	8
5	-5.621	-3.313	-3.989	-1.942	-1.975	-2.313	.688	.220	-1.460	-1.773	-2.045	-.453	.765	7
6	5.093	-1.064	-.421	1.381	.574	.612	1.144	-.916	-1.115	-.872	.424	-.474	-.676	6
7	7.501	1.870	.990	1.031	-.557	.810	1.522	1.158	-.929	.243	1.612	-2.360	-4.173	5
8	-3.994	.255	2.464	-.607	.848	.268	.329	.216	.609	.256	-.182	1.541	4.526	4
9	-4.140	.240	1.345	-.847	1.201	.368	.445	.267	1.220	-.906	2.797	4.698	3.913	3
10	2.606	-1.008	-.218	.959	-.435	-.277	-.278	.592	-.385	-.054	.097	1.776	-.764	2
11	-.037	-2.023	-1.161	1.103	-1.302	.770	-.788	.507	-1.095	-.083	.373	-1.172	-2.212	1
12	.115	.867	-.113	-1.265	.798	.178	-.290	-.089	-.268	.256	.194	.267	.284	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

July 1977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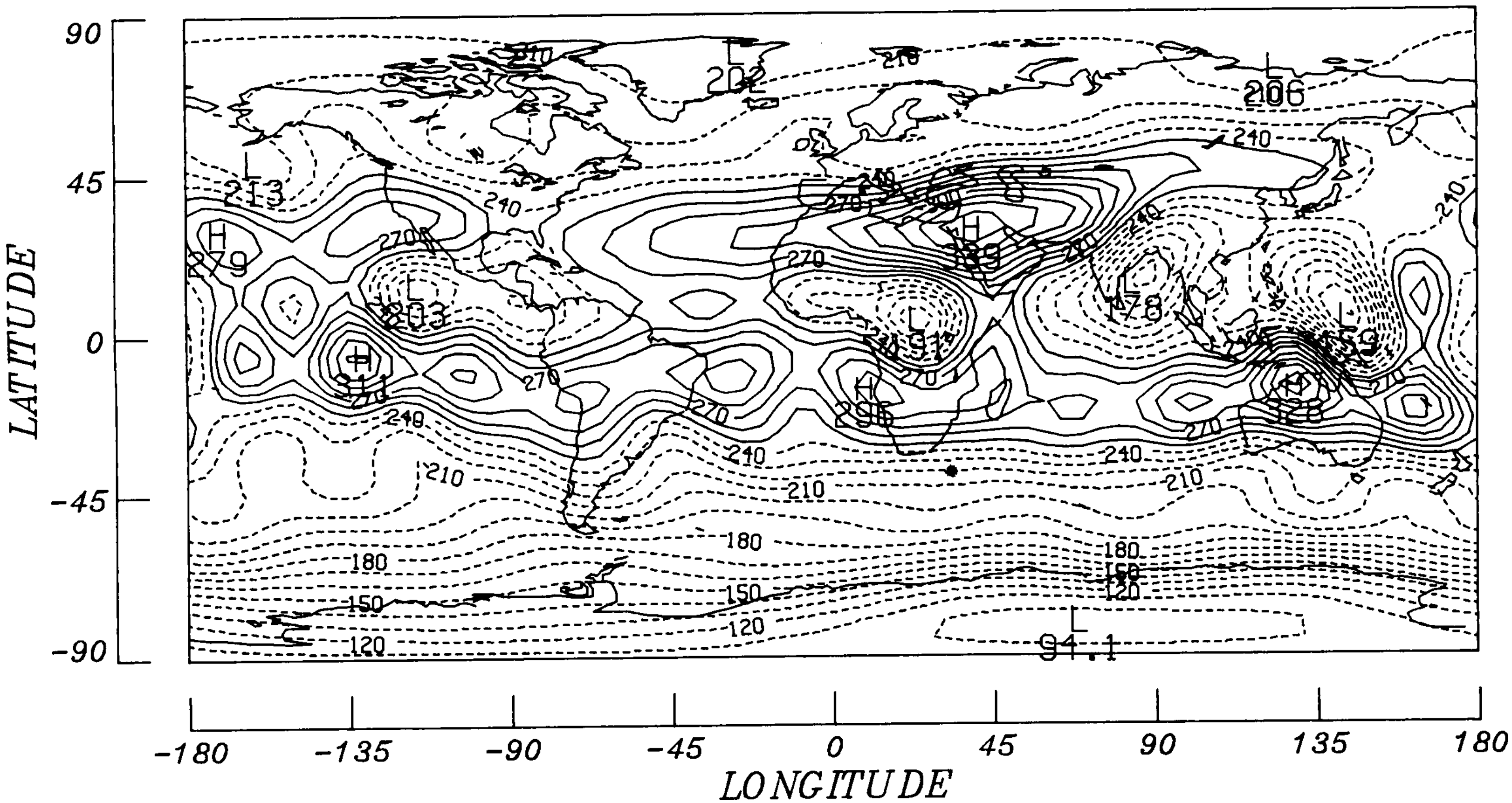
August 1977

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	235.848	1.522	-.260	-.002	.058	-.233	.716	-.181	-.410	-.771	.855	-.876	-.634	12
1	12.993	3.978	.289	.592	-.455	.248	-1.155	-2.413	.708	.792	-.711	-.440	.372	11
2	-24.619	3.973	3.076	2.281	-2.108	.444	-.566	.006	.859	.928	.217	2.120	2.869	10
3	9.969	-1.534	2.200	-1.724	1.007	.001	-.473	1.666	-.107	.135	1.571	2.419	-1.878	9
4	-9.388	-1.492	-.606	-2.329	-3.099	-.880	.378	.409	-.140	-.426	-.241	-.169	.098	8
5	-5.191	-3.167	-4.093	-.918	-2.084	-2.079	2.060	-.765	.770	-.926	-3.408	-.833	.242	7
6	3.658	-.590	-.720	3.222	.105	-1.577	1.835	-3.096	-.912	-.649	.916	-.624	-1.437	6
7	8.741	2.462	1.413	1.779	-.769	.983	1.319	.603	-1.397	-.436	2.075	-2.952	-4.547	5
8	-3.303	1.283	1.992	-1.541	.021	-.010	-.187	1.398	-.013	.041	-1.364	.744	3.495	4
9	-3.618	.242	.558	.030	1.382	.195	.238	-1.478	-.756	1.028	-.241	5.404	3.238	3
10	.113	-1.239	-.092	1.094	.252	.136	1.429	-.850	-.754	.731	-1.906	3.251	-.139	2
11	.209	-1.095	-.875	-.430	-1.258	.072	-.641	-.486	.533	-1.094	.623	3.150	-1.276	1
12	.818	.457	-.710	-.749	.868	.895	-.870	.545	1.131	.623	1.133	-.858	-3.070	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

August 1977



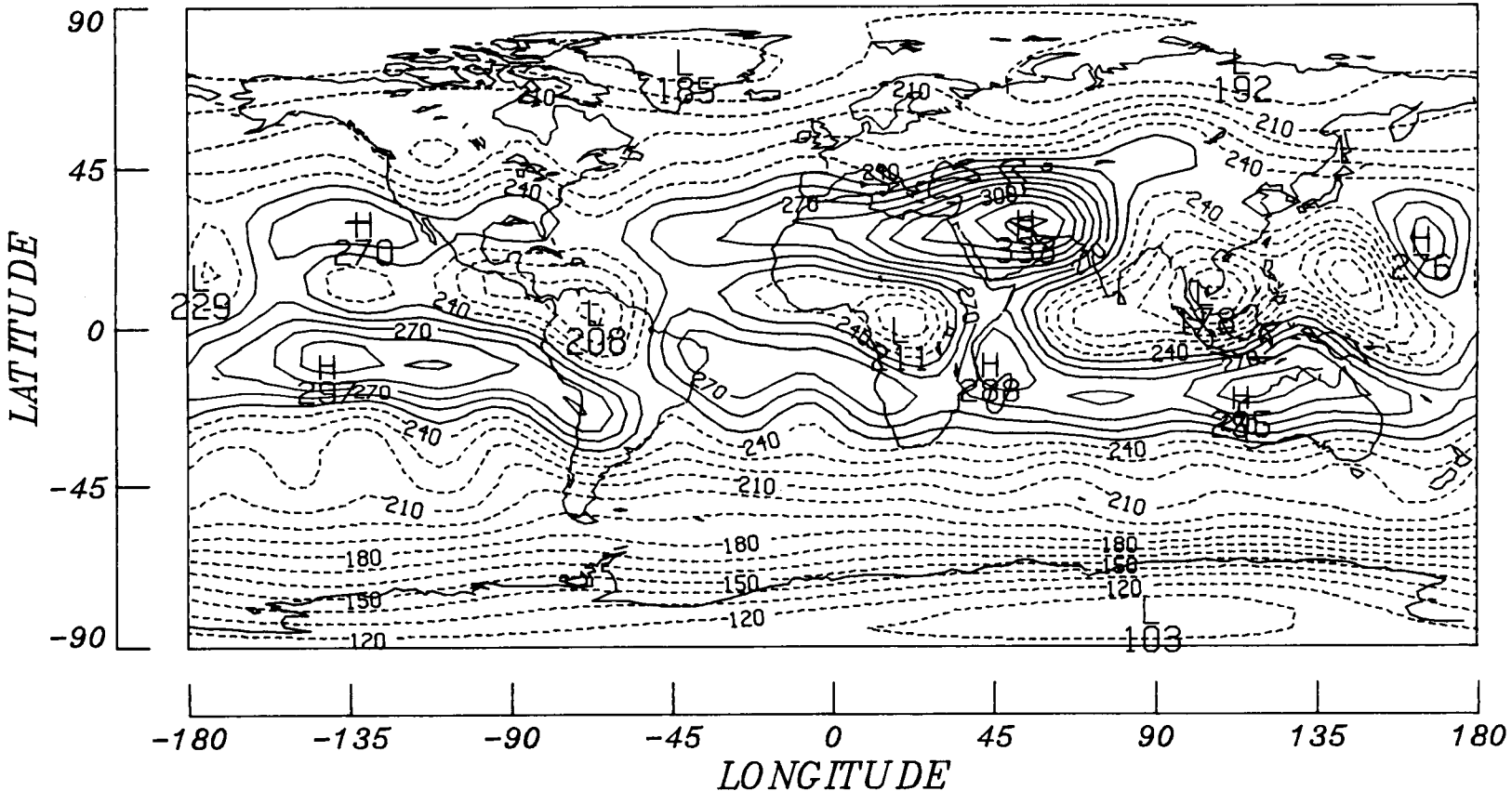
September 1977

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	234.240	.509	.043	.199	-1.488	-.474	-.366	.137	.111	-.207	.896	.373	-.277	12
1	9.496	3.238	.187	-1.199	.208	1.008	-.712	.165	1.418	.099	.433	-.773	.928	11
2	-25.858	4.156	2.313	-.529	-.206	-.457	.530	.053	1.263	.283	.699	.324	1.773	10
3	7.344	-.493	2.453	-.579	2.181	-1.175	1.200	-.454	-.853	.848	.607	1.498	-1.364	9
4	-9.911	-1.862	-.888	-2.724	-3.482	-.753	1.689	-1.109	-1.566	-.074	-.153	.506	.804	8
5	-3.861	-3.013	-2.967	-1.114	-1.620	-1.315	1.064	-.537	1.429	.758	-2.199	-.068	.829	7
6	3.858	1.026	.241	2.405	.983	-.557	.775	-.201	-.200	-.008	-.516	.281	-.704	6
7	7.765	2.173	.867	1.668	.405	1.102	.348	-.021	-3.143	-1.388	1.074	-2.646	-4.614	5
8	-3.467	-.566	.147	-1.385	-.074	.793	.419	.271	1.323	-1.938	-.097	-.739	1.868	4
9	-3.620	-.604	-.244	-.760	1.113	-.386	-.495	-.126	.055	1.426	.220	4.834	2.646	3
10	.891	-.245	.683	1.377	1.208	-.078	-.523	.089	-2.514	.933	-.409	5.509	.736	2
11	1.140	-.321	-.365	.130	.053	.074	-.135	.695	1.049	.074	-1.176	-.104	.530	1
12	1.108	1.079	.268	-.602	-.559	-.095	-.615	-.386	1.699	-.277	-.250	.564	-.339	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

September 1977

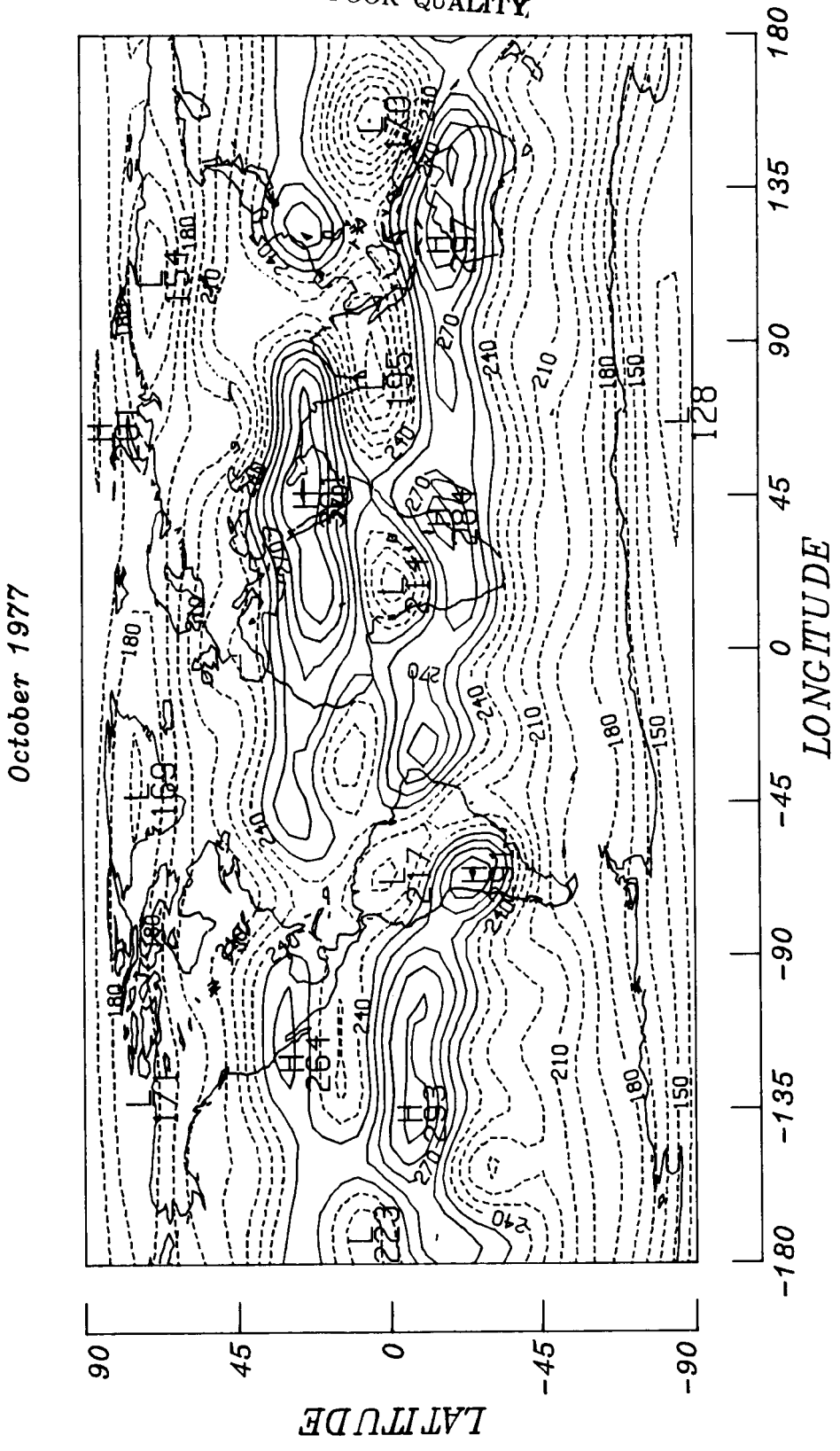


October 1977

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	230.663	-.147	.317	1.916	-.080	.224	-.235	.020	-.774	-.952	1.528	.016	.938	12
1	2.317	2.068	.112	-1.414	-.429	-.323	-.333	-.302	.338	-1.026	-.203	-.562	1.843	11
2	-26.411	3.698	.530	.653	.093	-.159	-.459	-.108	.947	.681	-.545	.545	.893	10
3	3.010	-1.764	1.644	3.211	.900	-1.680	-.669	-.486	-.808	1.903	1.378	.890	-3.140	9
4	-7.425	-.836	.982	.040	-2.550	-.936	1.426	.905	-.334	-.003	.753	-.017	.862	8
5	-2.052	-.546	-1.243	-1.996	-.792	-1.145	.192	1.375	1.882	-.976	-2.340	.327	2.935	7
6	5.906	1.280	.268	1.806	.266	-.423	1.748	.551	-.020	-.362	.335	1.882	.602	6
7	6.129	1.311	.883	1.768	.043	.274	.494	-.818	-3.548	-.144	2.411	-1.802	-4.556	5
8	-4.413	-1.269	.611	-1.278	-.093	-1.026	.470	.809	1.458	.907	-.672	-1.593	.090	4
9	-2.676	-.972	-.373	-1.379	.722	-1.574	-1.115	-.711	.739	-.058	1.050	2.297	1.139	3
10	2.081	.554	.288	.143	1.248	.880	-.513	.009	-1.061	1.048	.534	3.571	-.234	2
11	2.987	-.315	-.312	-.769	-.176	.992	.648	1.065	1.085	-.605	-1.256	-.238	.120	1
12	.997	.458	.182	-.008	-.733	.313	-1.000	.320	1.556	1.320	-.321	-.991	.438	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m



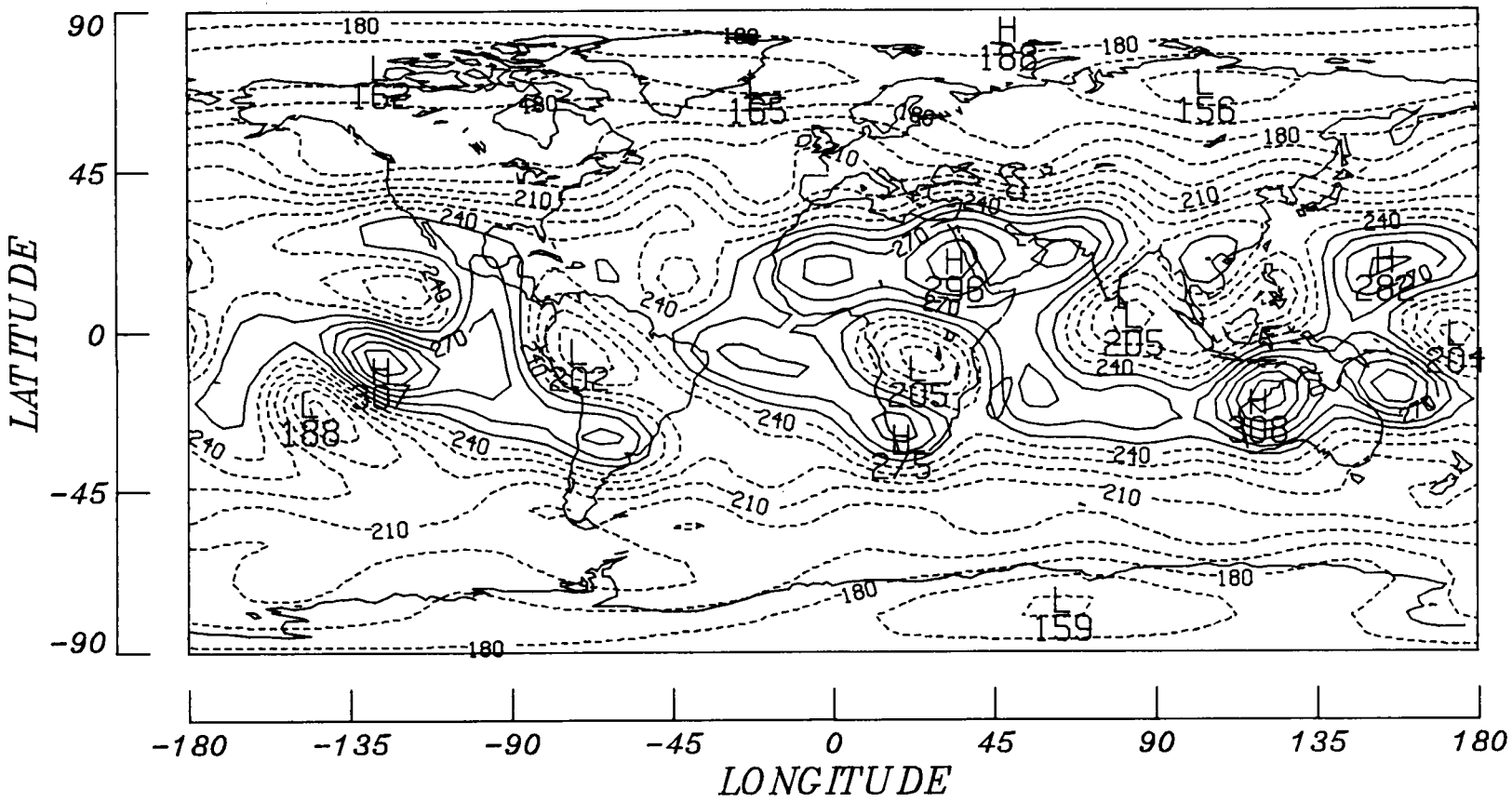
November 1977

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	227.293	-.392	.917	-.268	-.376	-.491	.028	-.931	.002	1.349	1.224	-1.025	-.281	12
1	-3.898	1.406	.172	-.994	.139	.400	-.282	1.021	.165	-1.890	-.880	-.410	1.590	11
2	-25.971	2.471	1.340	1.409	-.707	-1.041	.461	.850	.094	-.766	-.501	.948	1.632	10
3	-1.061	-.365	2.396	1.851	-1.687	-.795	.074	.823	-.690	2.779	2.094	1.432	-2.379	9
4	-2.141	-.970	-.473	-1.349	-.736	.728	.002	1.010	-.535	-.676	.932	-.295	.495	8
5	.911	-.836	-1.348	-1.818	-1.062	.083	-.063	-.981	1.556	-1.889	-2.444	.393	2.241	7
6	5.875	2.256	1.807	1.333	1.595	.202	.372	-.080	.933	2.890	-.969	.694	.820	6
7	1.601	.885	1.367	1.154	-.132	-.248	-1.718	2.358	-2.499	-.363	-.157	-1.899	-3.723	5
8	-3.562	-2.200	-.809	-1.902	-1.782	-.716	1.449	1.175	-.122	-3.700	.171	-.779	.673	4
9	-.677	-.001	-.895	-.410	1.551	.033	1.389	-.944	.424	.196	3.753	2.557	-.820	3
10	1.618	1.693	-.411	1.424	2.107	.528	-.587	-.731	-1.551	-1.629	-1.412	.626	-.191	2
11	1.562	-.715	-.451	-.588	-1.053	.053	-.345	.002	.897	.562	2.428	1.252	1.456	1
12	.945	.378	1.056	-.583	-1.315	.394	.495	.134	.963	2.130	-.116	.391	.484	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

November 1977



December 1977

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	225.817	-2.404	-2.112	-1.077	1.175	.598	.877	.250	-.257	-.233	1.201	-1.141	-.653	12
1	-9.513	.342	1.184	.280	.438	.271	1.027	.613	-.695	-2.210	.528	.059	1.030	11
2	-25.545	1.701	.007	1.515	-.643	.993	-.620	-1.273	.673	.953	-.167	1.110	1.627	10
3	-3.975	-1.240	.749	1.507	-.074	-.820	-.238	-1.288	-.506	3.150	-.129	.410	-2.305	9
4	-2.898	.001	3.143	-.397	1.156	1.237	.810	1.000	-1.509	-.963	.553	-.482	-1.653	8
5	2.167	1.217	1.789	-1.769	-2.382	.870	.294	1.169	.650	-2.403	-.265	-.099	2.280	7
6	7.191	.890	-.082	1.725	.153	-.722	.858	-1.220	1.821	2.591	-.512	1.671	1.538	6
7	-4.058	-.812	.683	1.626	1.961	.067	.333	1.456	-.123	-.113	-.248	-.515	-2.162	5
8	-5.545	-.651	1.036	-1.500	-1.326	-.594	1.665	-.020	.163	-2.027	-.837	-1.182	.727	4
9	.188	1.301	-.887	-1.935	-1.392	-.288	1.146	-.118	-.437	.133	1.525	1.717	-.544	3
10	1.082	.741	.082	.807	2.131	1.034	-.619	.189	-1.668	.134	.382	.247	-1.088	2
11	.116	-1.940	.819	1.248	.152	1.040	-.778	-1.065	-.729	-.943	.620	-.858	-1.140	1
12	-.935	-.156	.924	-.008	-1.283	.094	.126	.594	.668	-.107	1.047	.916	-.455	
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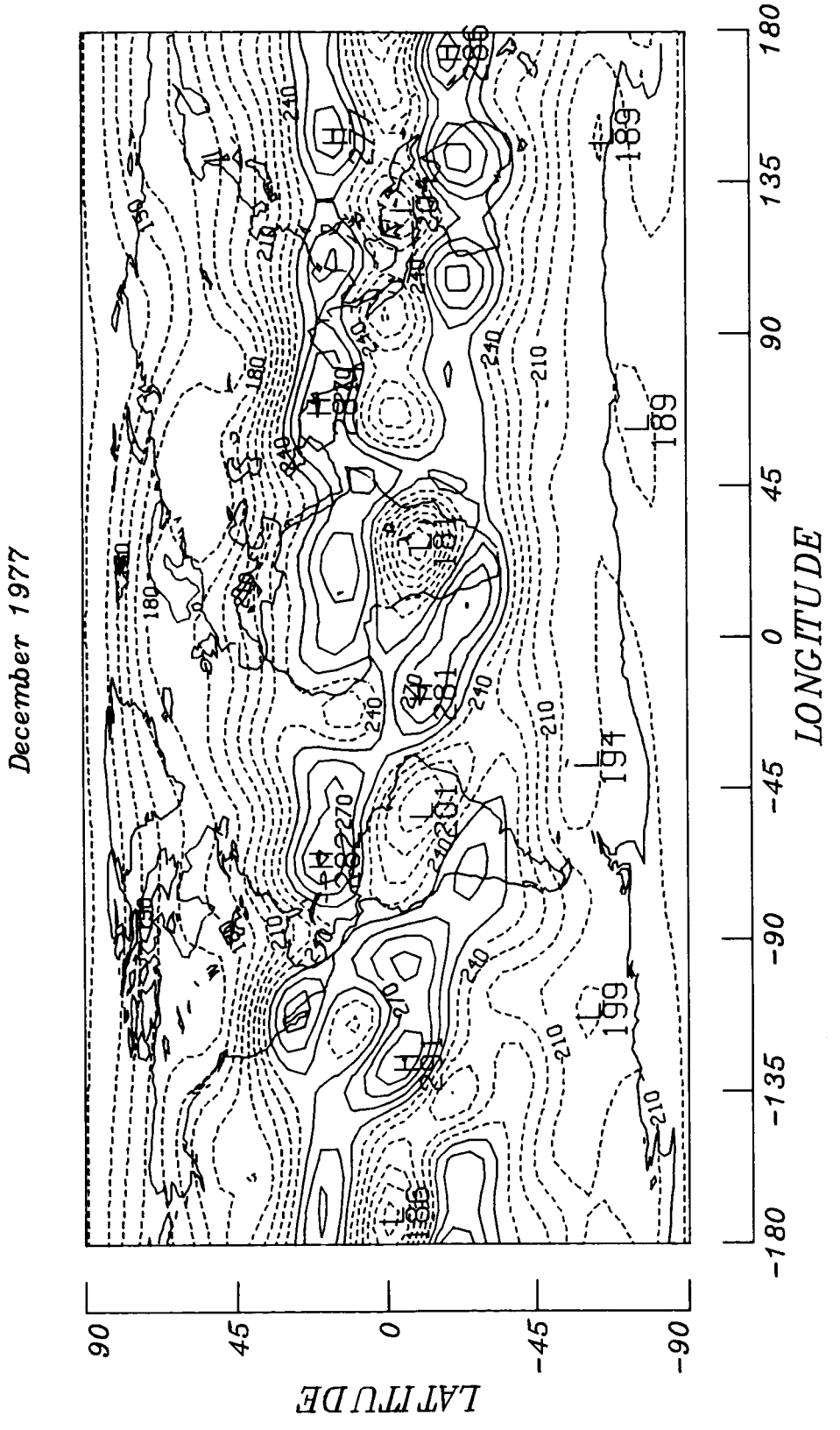

January 1978

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	226.377	.006	1.156	-.772	-.480	.765	-.654	-.556	-.121	.682	1.664	-.482	-.160	12
1	-9.889	3.171	.990	-.053	-.586	-.078	-.160	-.009	.914	-.340	1.729	-.873	1.429	11
2	-24.039	-.310	.413	.995	-1.285	.397	1.493	-.228	.180	-1.021	-1.451	.331	2.603	10
3	-4.319	-2.162	3.221	1.594	1.321	-.743	-.061	-.652	-1.164	2.315	-.786	1.488	-1.863	9
4	-3.961	1.422	2.936	-2.649	1.984	-.022	.224	.867	-.675	-.067	2.941	-.586	-2.113	8
5	5.519	.571	.128	-1.413	-2.447	.688	.366	.760	.912	-2.872	-.626	-.396	2.589	7
6	7.344	-1.795	.232	2.800	-.823	.316	.673	-1.693	.219	.521	-3.188	3.854	3.952	6
7	-6.518	-.369	-.008	1.163	.945	-.275	-.083	.389	-2.913	1.096	.750	1.635	-4.297	5
8	-4.927	.199	-.665	-1.112	-.504	-.269	1.920	-.023	1.567	-1.690	.701	-2.985	-1.862	4
9	1.912	.528	.932	-.972	.067	-.094	.005	-1.022	-.144	1.393	-.663	.947	2.860	3
10	1.186	1.350	.932	-.760	2.219	.118	-1.395	-.778	-.208	-.920	-.184	4.378	1.504	2
11	-.156	-1.081	-.895	.180	.426	-.254	-.118	.201	-.431	-1.516	-.019	-.798	-4.215	1
12	.159	-.343	-.710	.936	-1.350	.293	-.444	.073	-1.242	.985	.091	.879	-.251	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

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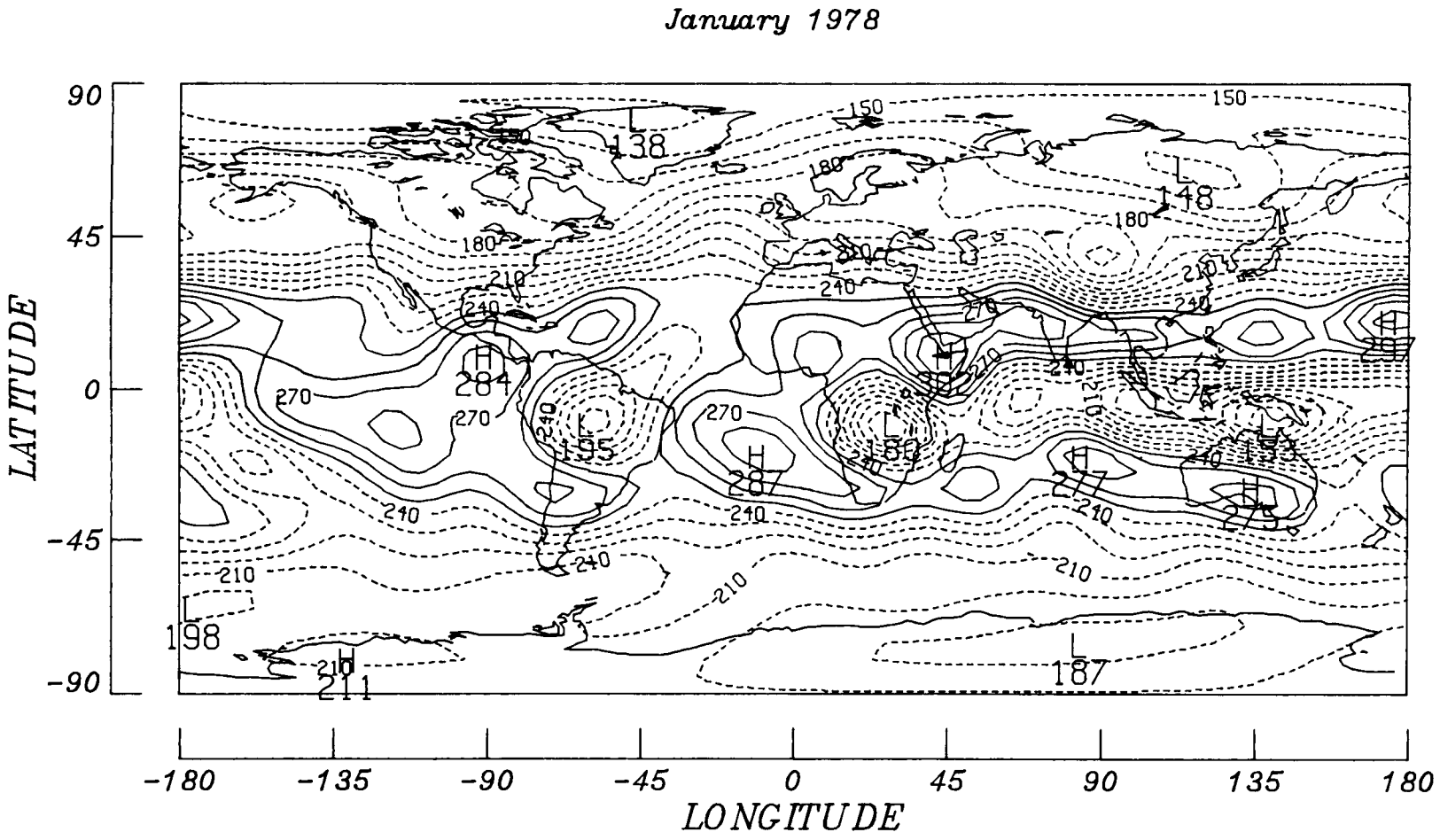
January 1978
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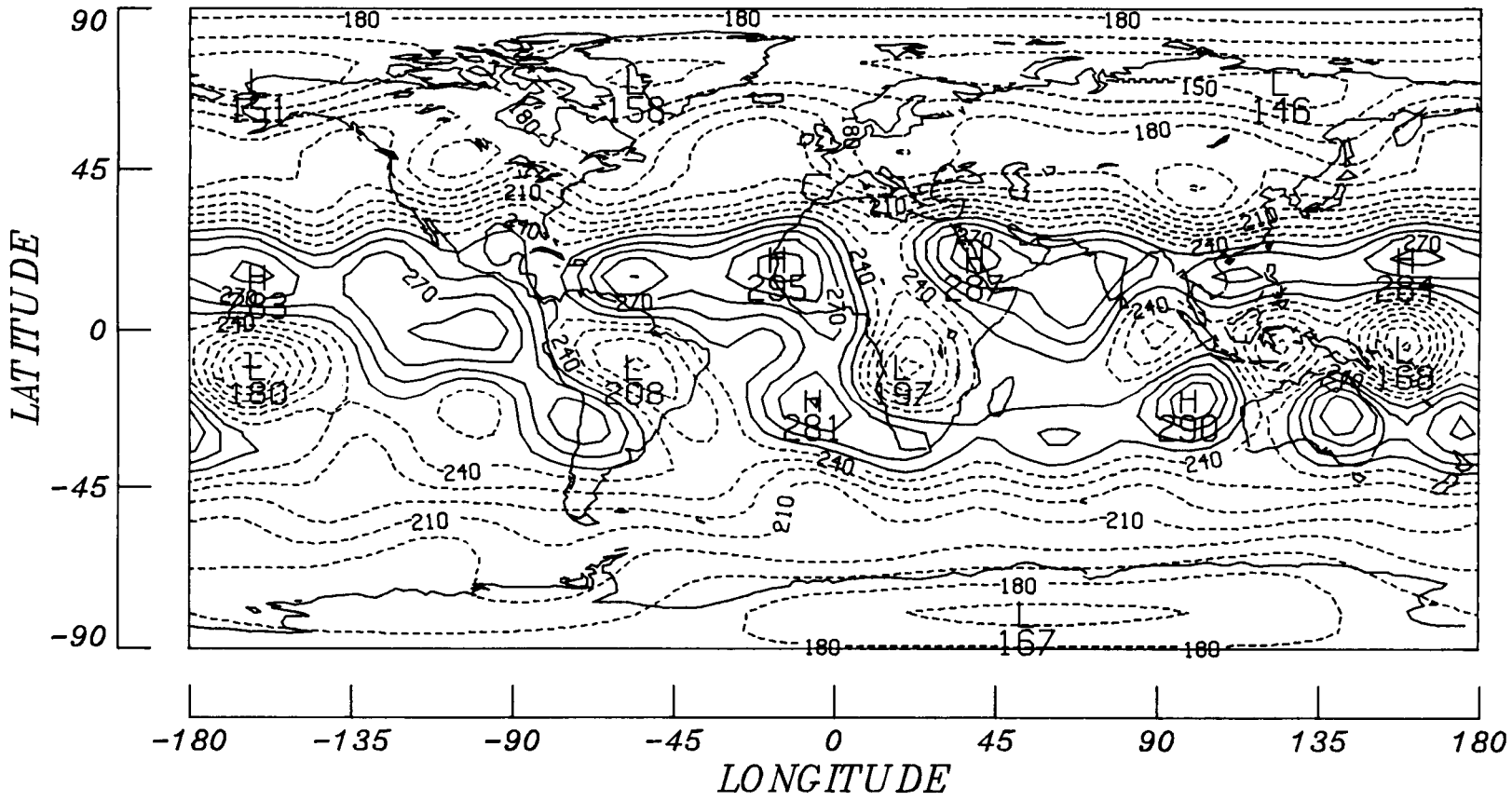
February 1978

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	227.754	-.566	-.435	-.495	-.591	.398	-.397	-2.001	.139	-.379	.042	-1.345	.631	12
1	-8.548	2.080	2.100	1.263	-.191	.146	1.626	-.185	.570	-1.225	1.759	-.583	.616	11
2	-25.666	.624	-1.121	-.841	-1.539	-.646	.160	1.209	.189	-.367	.946	1.854	.755	10
3	-2.463	-1.699	2.218	.925	-1.158	-1.869	-.875	-1.619	-.998	.885	-.256	.584	-2.111	9
4	-3.202	.484	2.873	-.964	1.277	.477	.104	-.963	-.546	-.643	-.764	-1.564	-.049	8
5	7.670	1.278	-1.148	-2.138	-2.142	.022	-1.394	1.025	.841	-1.566	-1.994	-.067	1.625	7
6	5.824	-.390	-1.943	2.190	-.012	-1.166	2.350	-1.849	-1.172	.916	.111	2.032	.256	6
7	-5.786	-.800	1.001	1.305	1.337	.747	-.287	.151	-2.327	-1.124	1.087	-.149	-3.232	5
8	-4.411	1.123	1.009	-1.233	-.519	.268	-.691	-.015	2.047	-4.017	-1.855	-1.122	.785	4
9	2.865	.464	-1.099	.051	-.190	-.841	-.399	-.837	-1.150	-.842	-.692	1.369	-.103	3
10	2.516	-.420	.099	.862	.166	.589	.219	-.766	-.517	1.794	2.396	1.066	-1.602	2
11	1.328	-1.254	.272	-.344	.023	-.199	.527	-.433	1.404	.264	-1.878	.390	-2.148	1
12	1.314	.334	-.702	.375	1.188	-1.604	-.293	.307	.142	.981	-.650	.653	.382	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

February 1978



March 1978

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		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	229.350	1.015	-.499	-.595	-.474	1.105	-.763	-.325	-.814	.488	1.159	-1.029	.596	12
1	-5.095	1.322	.238	.182	-.522	.130	.673	.074	.945	-1.154	.119	-.799	.270	11
2	-26.787	2.121	.398	.820	-.163	1.289	.823	.604	.675	-.449	-.203	1.362	2.464	10
3	.933	.621	1.045	.795	.803	-.735	.368	-.257	-1.892	1.928	.545	1.344	-2.163	9
4	-5.891	-.285	1.922	-.413	.361	-1.228	-.371	-.632	-.777	-.611	.317	-.689	-1.890	8
5	6.176	-2.445	1.357	-1.911	-1.142	1.185	-1.165	1.170	.394	-3.097	-1.817	-.681	1.154	7
6	5.088	.512	.546	1.873	.125	-.301	1.217	.104	-1.292	1.815	-.737	1.670	3.578	6
7	-2.844	1.038	-1.315	.376	.334	.971	-.556	1.933	-1.824	.841	1.175	.277	-3.432	5
8	-6.469	-.409	1.814	-.937	-.088	1.179	.862	-.649	-.950	-2.248	-.440	-.351	-.877	4
9	2.617	.787	1.884	-1.635	-.517	-.229	.071	-.905	-.396	1.559	-.503	2.392	1.438	3
10	2.626	.288	-.072	.231	1.173	-.275	.271	-.403	.766	-.067	.703	1.921	1.024	2
11	.307	-1.315	-.311	.389	.378	-.340	-.167	-1.396	1.255	.612	2.604	.733	-3.574	1
12	-.635	.133	.366	.759	-.177	1.062	.399	.446	.067	-.432	.068	1.311	.293	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

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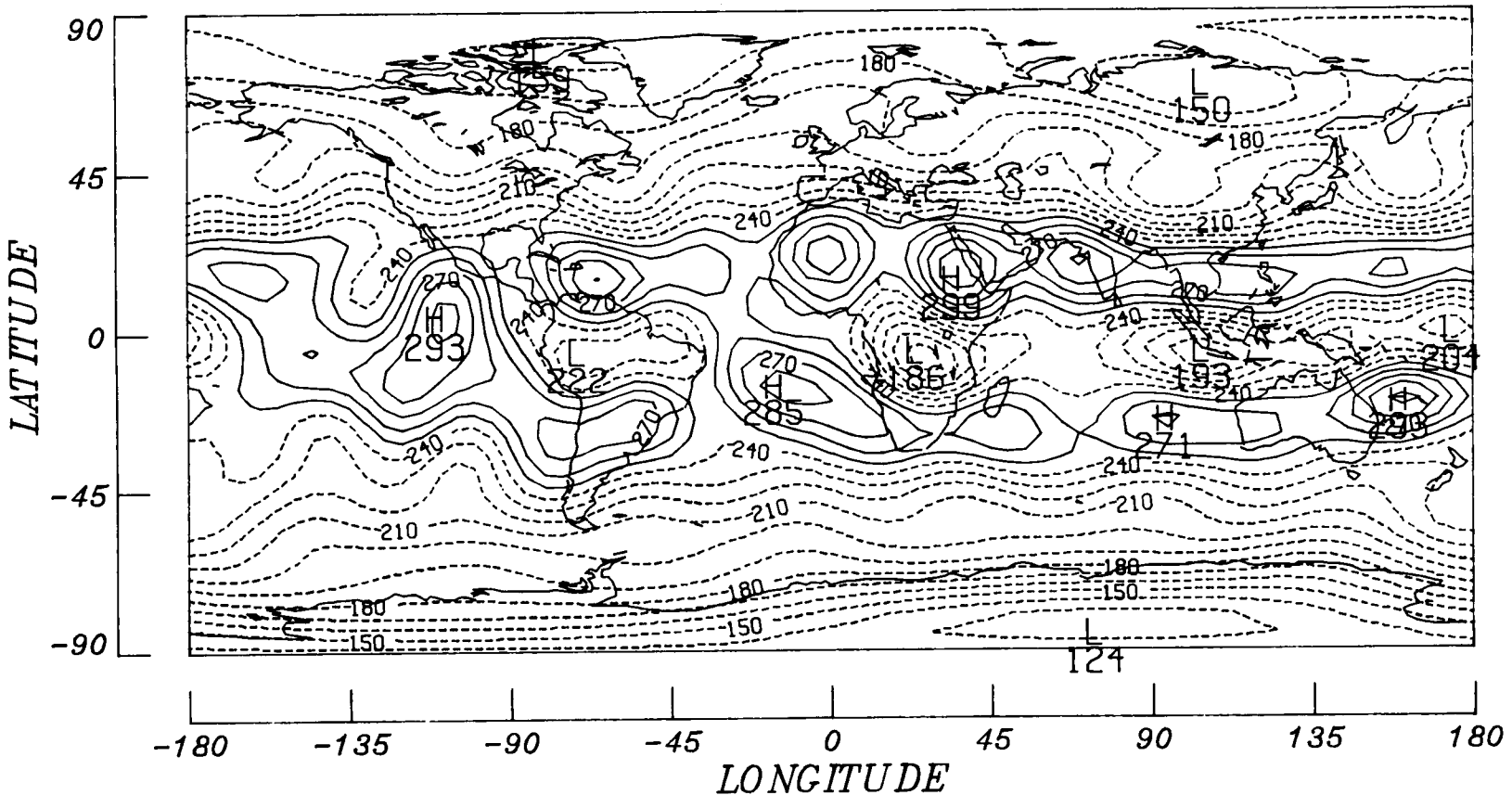
March 1978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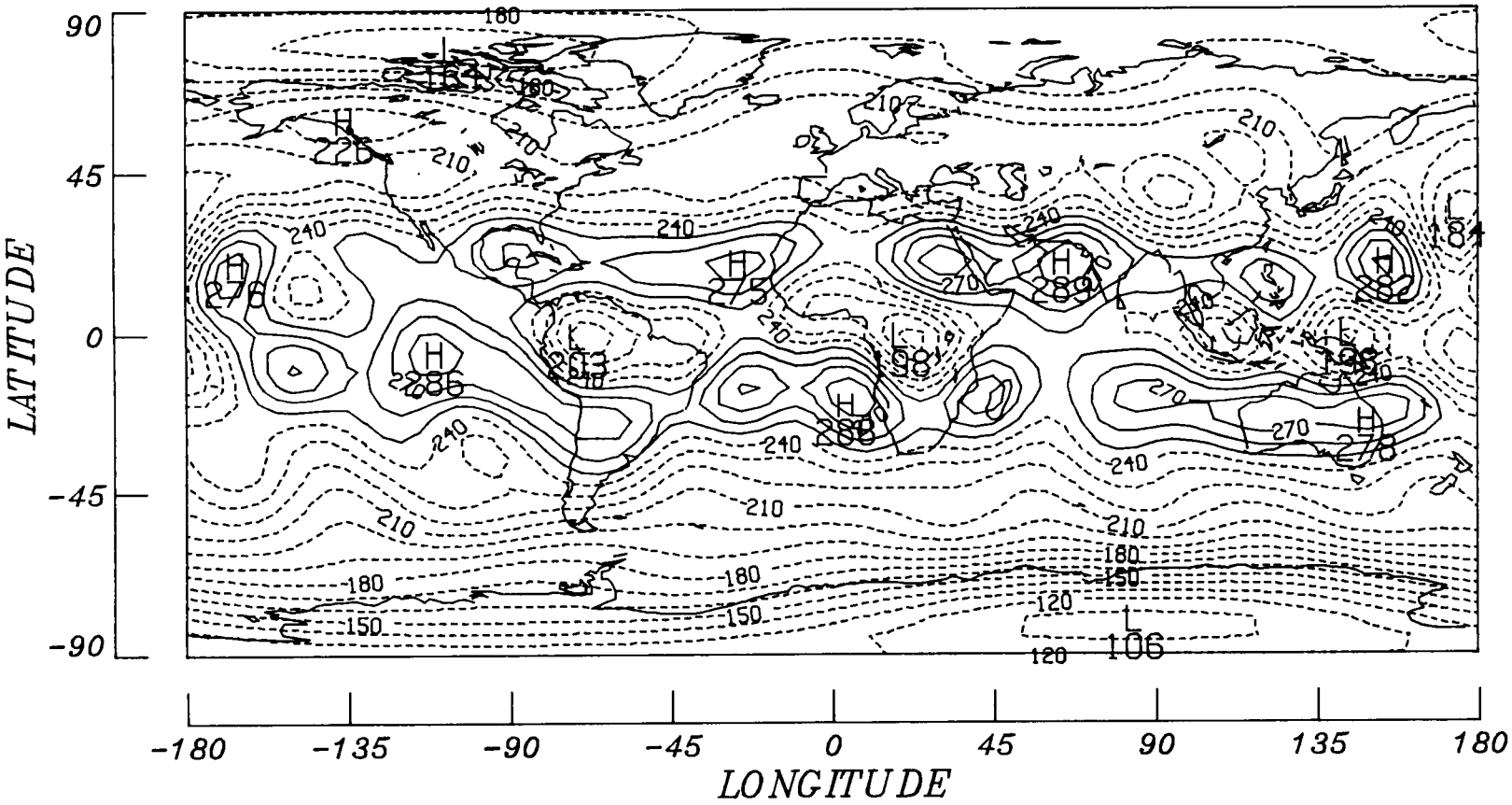
April 1978

C_n^m

		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	229.763	2.127	-1.505	1.044	-.311	-.747	.639	-.458	-.718	-.057	.775	-1.167	.402	12
1	1.558	1.378	.143	-.028	-1.791	-.723	-.016	-.341	.500	-.145	-.690	-1.588	.864	11
2	-24.510	1.917	-2.710	1.318	-2.823	.758	1.488	.650	.832	.234	-.392	.616	2.511	10
3	6.358	-.225	-.058	1.351	-.158	.462	-.707	-1.161	-.858	.877	.883	1.699	-1.800	9
4	-6.651	.367	1.310	-1.282	-.696	.038	.572	.045	-.233	-.962	.328	-1.037	-.182	8
5	2.700	-1.613	.139	-.509	-1.356	.474	-.646	.750	1.197	-.165	-1.530	-.668	.267	7
6	2.444	-1.004	.361	2.531	.094	-.685	-1.338	.696	-1.184	1.848	-.920	2.692	2.292	6
7	-.841	1.705	-.210	.713	.189	1.605	-.714	.940	-2.551	-.968	1.608	-.046	-1.756	5
8	-7.203	1.023	1.092	-.772	1.130	1.220	-.407	-.504	-1.159	-1.981	-.085	-1.804	1.333	4
9	-.213	-.980	-.165	.153	-.472	-.930	-.658	-.505	-1.365	2.204	-.524	1.444	-.107	3
10	3.681	-.411	.530	1.266	-.229	-1.028	.656	1.104	-1.525	-.476	-1.621	1.916	.274	2
11	1.279	.868	.300	.648	.580	-.724	1.306	.245	.135	.514	-.486	.529	-1.242	1
12	-.108	.657	.160	.172	-.079	.379	-.804	-.753	-.120	.257	.111	.738	.400	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

April 1978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May 1978

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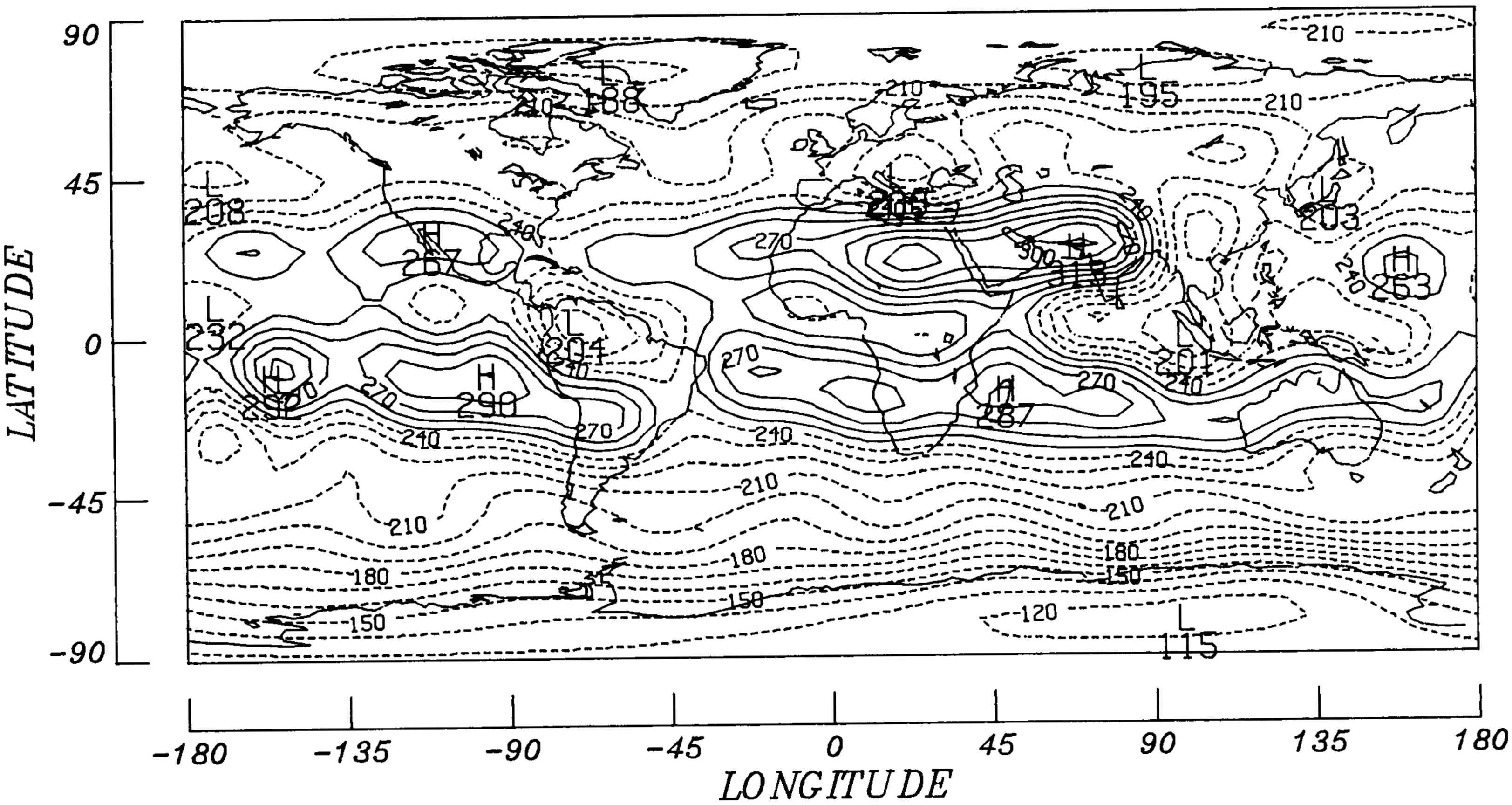
		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	232.164	-.889	-.816	.436	.068	.289	.406	.124	-1.462	-.180	.685	-.348	-.147	12
1	9.333	4.403	1.246	.909	.182	-.573	.117	-2.017	.873	-.429	-1.004	-1.517	.746	11
2	-24.362	2.195	1.161	.624	-1.142	-.849	-.479	-.521	.580	-.114	.166	.635	1.257	10
3	6.682	-1.045	1.352	.339	.989	-.035	.014	-.360	-1.124	1.655	1.499	1.937	-1.541	9
4	-5.428	-.192	-2.796	-1.127	-.993	-1.180	.413	.524	-1.869	-.163	.459	.566	-.756	8
5	-.665	-2.798	-2.530	-1.243	-.705	.220	1.217	.908	1.413	-.551	-1.096	-.874	1.032	7
6	2.771	-.167	2.532	1.229	.800	-.560	-.228	.724	.008	-.387	.036	.261	2.213	6
7	2.987	2.653	.658	1.580	.896	1.183	.127	.035	-1.827	-1.781	-.906	-.495	-3.447	5
8	-6.257	-.247	-.038	-.351	-.341	.885	1.375	-.647	-.562	-2.572	-.514	-1.124	1.471	4
9	-2.711	-1.516	1.143	-.782	-.083	-1.104	.400	-.100	-.009	.695	1.825	2.985	1.556	3
10	3.702	-.273	.884	-.008	.276	-.425	.577	.052	-1.707	.259	-1.389	5.734	.108	2
11	2.074	-.261	-.655	-.113	-.118	1.057	.239	.394	.221	.469	-.629	-.531	.250	1
12	1.147	.435	.347	.252	.365	.514	-.102	.930	.426	.360	-.294	.202	.758	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

May 1978



June 1978

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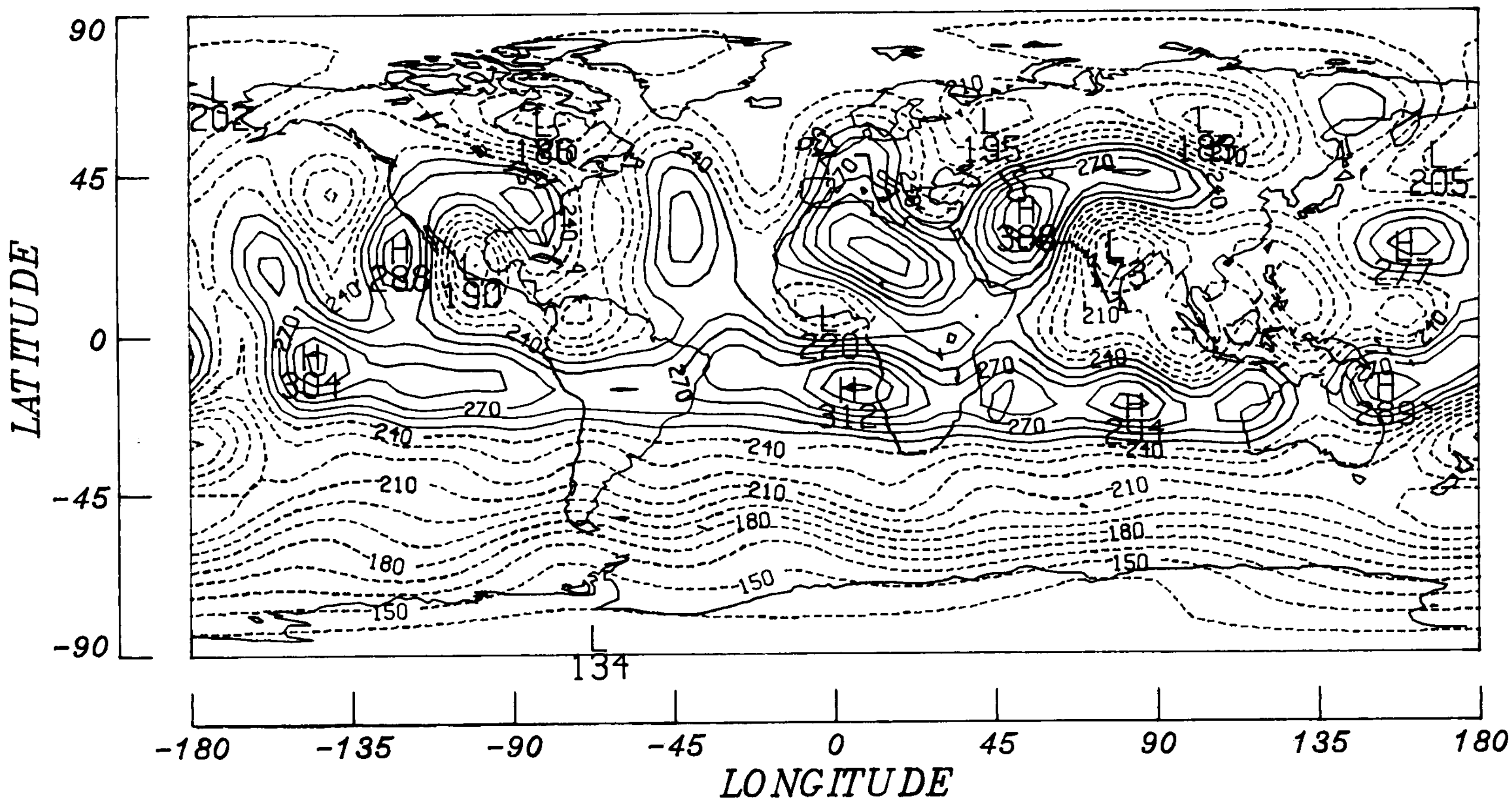
		12	11	10	9	8	7	6	5	4	3	2	1	m/n
0	232.714	-.937	.533	-1.752	1.050	.016	-.701	1.691	.395	-.578	.027	-.267	-1.495	12
1	10.886	5.075	.856	-2.617	.169	.927	.312	1.747	2.636	-.465	-.158	.080	.651	11
2	-22.195	1.145	4.619	-.313	-.235	3.173	.698	2.634	.546	-.398	1.333	-.631	1.991	10
3	9.144	-1.431	3.057	1.434	1.010	3.741	.510	.795	-.079	.981	1.858	-.693	-.523	9
4	-4.984	1.684	-1.921	-1.654	-2.391	1.344	-.278	1.359	-.078	-.939	-1.409	-.622	-.197	8
5	-4.524	-4.020	-4.568	.088	-.694	-.977	2.572	.339	.262	-2.400	-.848	-.377	1.372	7
6	3.008	-.666	2.345	1.817	.918	-1.862	-.430	-.997	-.222	-.586	-.860	.338	-.344	6
7	6.198	1.400	1.584	-.009	1.385	1.184	1.420	1.727	1.281	-.044	1.637	-1.356	-2.612	5
8	-1.270	-.560	2.125	.887	.459	1.862	.753	.530	-.450	-1.643	.844	-1.303	1.699	4
9	-2.525	-.104	2.295	.815	-1.132	-.433	.722	2.615	.289	.883	1.513	1.738	3.162	3
10	2.683	.760	-1.397	.195	-1.011	.727	.105	1.060	.087	.764	-.337	4.496	-1.002	2
11	.152	.954	-3.160	.629	-.881	1.048	-1.184	.137	1.744	2.402	-1.080	-2.859	-1.952	1
12	-2.002	.206	-1.095	-.503	-1.546	1.895	.127	.217	1.316	1.255	-1.757	-.019	1.796	
n/m	0	1	2	3	4	5	6	7	8	9	10	11	12	

S_n^m

June 1978



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15. Supplementary Notes

Atlas of Nimbus 7 data for November 1978 to October 1985 is presented in NASA RP-1186, 1987.

16. Abstract

An atlas of monthly mean outgoing longwave radiation global contour maps and associated spherical harmonic coefficients is presented. The atlas contains 36 months of continuous data from July 1975 to June 1978. The data were derived from the first Earth radiation budget experiment, which was flown on the Nimbus 6 Sun-synchronous satellite in 1975. Only the wide-field-of-view longwave measurements are documented in this atlas. The contour maps along with the associated sets of spherical harmonic coefficients form a valuable data set for studying different aspects of our changing climate over monthly, annual, and interannual scales in the time domain and over regional, zonal, and global scales in the spatial domain.

17. Key Words (Suggested by Authors(s))		18. Distribution Statement
Earth radiation budget	Variability	Unclassified—Unlimited
Longwave outgoing radiation	Time series	
Nimbus 6	Broadband	
Deconvolution	Wide field of view	
Spherical harmonics		Subject Category 47

19. Security Classif.(of this report)	20. Security Classif.(of this page)	21. No. of Pages	22. Price
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