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**GLOBAL OCEAN TUBES: FRA
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1° x 1° grid system in an atlas of 42° x 71° overlapping charts covering the whole oceanic globe. A corresponding atlas of global corange and cotidal maps is included to provide the reader with a quick general overview of the major tidal phenomena. The specifying hydrodynamical parameters of the model are listed along with quoted sources of empirical tide data, and significant tidal features are explained and discussed. The diurnal O_1 ocean tide is found to resemble closely the diurnal K_1 tide and qualitatively also the semidiurnal S_2 and M_2 tides which were presented in Parts IV, III, and II of this report, respectively.

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FOREWORD

In Part I of this report (Schwiderski, 1978a), a combined hydrodynamical-empirical method was introduced to compute numerically harmonic partial tides in the world oceans with an accuracy of better than 5 cm, which is needed in various military and civil applications of today. In this report, the computed diurnal principal lunar tide (O_1) is displayed in an atlas of tabulated tidal charts and plotted corange and cotidal maps.

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ABSTRACT

In Part I (Schwiderski, 1978a) of this report, a unique hydrodynamical interpolation technique was introduced, extensively tested, and evaluated in order to compute partial global ocean tides in great detail and with a high degree of accuracy. This novel method has been applied to construct the diurnal principal lunar (O_1) ocean tide with a relative accuracy of better than 5 cm anywhere in the open oceans. The resulting tidal amplitudes and phases are tabulated on a $1^\circ \times 1^\circ$ grid system in an atlas of $42^\circ \times 71^\circ$ overlapping charts covering the whole oceanic globe. A corresponding atlas of global corange and cotidal maps is included to provide the reader with a quick general overview of the major tidal phenomena. The specifying hydrodynamical parameters of the model are listed along with quoted sources of empirical tide data, and significant tidal features are explained and discussed. The diurnal O_1 ocean tide is found to resemble closely the diurnal K_1 tide and qualitatively also the semidiurnal S_2 and M_2 tides which were presented in Parts IV, III, and II of this report, respectively.

1. INTRODUCTION

Part 1 of this report (Schwiderski, 1978a) introduced a unique combination of hydrodynamical and empirical methods to model detailed ocean tides with a relative component accuracy of better than 5 cm anywhere in the open oceans. This enormous accuracy is well above minimum requirements set by, for instance, the National Aeronautics and Space Administration (NASA) and the Department of Defense (DoD) to map the geoid at sea by satellite altimetry to within 10 cm. The following features of this unique hydrodynamical interpolation model made the achievement of this accuracy possible.

a. A spherically graded $1^\circ \times 1^\circ$ grid system is set up in connection with a corresponding $1^\circ \times 1^\circ$ bathymetry to assure a sufficient resolution of all important tidal phenomena.

b. The bathymetry of the gridwise, simply connected ocean basin is hydrodynamically defined (Schwiderski, 1978c) by appropriate modifications of earlier realistic depth data collections. The hydrodynamical redefinition was needed in order to model the well-known strong distortion and retardation effects of shallow continental shelves, narrow ocean ridges or island chains, and other significant bottom irregularities.

c. The Boussinesq substitution of the turbulent Reynolds stresses is applied in the form of eddy dissipation with a novel physically meaningful eddy viscosity that depends linearly on the lateral grid-cell area and, hence, directly on the ocean depth.

d. The linear law of bottom friction is introduced with a bottom-friction coefficient depending linearly on the bottom grid-cell area which is independent of the ocean depth. In boundary cells, the otherwise constant friction coefficient is subjected to an indirect cellwise adjustment in order to permit a consistent hydrodynamical interpolation (see h., below) of empirical tide data known from tide gauge stations at continental shores, islands, or other shallow-ocean bottom irregularities.

e. The effects of the terrestrial tide and the oceanic tidal load are included as simple second-order approximations in the sense of Love and Accad and Pekeris (1978).

f. The Hansen-Zahel (Zahel, 1970 and 1977; Estes, 1977) finite differencing technique is modified by a new differencing scheme in time which improved decay, dispersion, and stability characteristics of the numerical procedure and facilitates the simple indirect adjustment of the bottom-friction coefficient in the hydrodynamical interpolation technique (see d. and h.).

g. At land-ocean cell walls, the conditions of no-flow across and free-slip along the boundaries are enforced. The no-flow condition is subsequently relaxed by allowing controlled periodic inflows and outflows over the mathematically assumed boundaries. This allowance redefines indirectly more realistic shorelines in order to further improve the consistency of the hydrodynamical interpolation of empirical data (see d. and h.).

h. A unique hydrodynamical interpolation technique is introduced which incorporates into the theoretical model empirical tidal constants collected from over 2 000 tide-gauge stations around the world in a hydrodynamically consistent fashion (see d., f., and g., above).

i. A new higher order approximation of Arctic Ocean tides is used, that is described in Schwiderski (1981c).

With these features, the new model was successfully applied to chart the semidiurnal principal lunar (M_2) ocean tide with the desired accuracy. The technique and accuracy of the model were extensively described and discussed in Part I of this report as well as in subsequent journal publications and symposia presentations by the author (Schwiderski 1978a, b; 1979a, b, c, d, e; and 1980).

The same hydrodynamical interpolation technique has been applied to chart the diurnal principal lunar (O_1) ocean tide with the same relative accuracy as M_2 . Again, it must be emphasized that the enormous accuracy achieved over all open ocean regions diminishes somewhat near coastal areas where known empirical data are marginal in quantity and/or quality.

A complete listing of all sources of empirical ocean tide data, which were interpolated into the O_1 tidal charts, is presented in Appendix A. In the meantime, Section 2 of this report lists the significant hydrodynamical input parameters that specified the constructed O_1 ocean tide. The major features of the global O_1 tide are discussed in Section 3. A complete numerical display is presented in Appendix A where all tidal amplitudes and phases are gridwise tabulated in map-like charts. Corange (equi-amplitude) and cotidal (equi-phase) maps of the O_1 ocean tide are plotted in Appendix B.

2. O₁ OCEAN-TIDE PARAMETERS

The astronomical diurnal principal lunar (O₁) equilibrium tide η (or tide-generating potential $G\eta$; see Schwiderski, 1978a) at the geographical point (λ, ϕ) and instant (Y, D, t) is determined by

$$\eta = K \sin 2\phi \cos(\sigma t + \chi + \lambda) \quad (1)$$

where

$G = 9.81 \text{ m/sec}^2$ earth gravity acceleration

λ = longitude (east in rad)

ϕ = latitude (north in rad)

$Y (\geq 1975)$ = year number

D = day number of year Y ($D = 1$ for January 1)

t = universal standard time of day D (in sec)

$K = 0.100574 \text{ m} = \text{O}_1$ equilibrium tide amplitude

$\sigma = 0.67598 \cdot 10^{-4} \text{ sec}^{-1} = \text{O}_1$ tide frequency

$\chi = \pi (h_o - 2s_o - 90)/180 = \text{O}_1$ astronomical argument (in rad)

$h_o \begin{cases} = 279.69668 + 36000.768930485T + 3.03 \cdot 10^{-4} T^2 \\ = \text{mean longitude of the sun relative to Greenwich midnight of day } D \text{ (in deg)} \end{cases}$

$s_o \begin{cases} = 270.434358 + 481267.88314137T - 0.001133T^2 + 1.9 \cdot 10^{-6} T^3 \\ = \text{mean longitude of the moon relative to Greenwich midnight of day } D \text{ (in deg)} \end{cases}$

$T = [27392.500528 + 1.000000356\bar{D}]/36525$

$\bar{D} = D + 365(Y - 1975) + \text{Int}[(Y - 1973)/4]$

$\text{Int}[x]$ = integral part of x

The corresponding instantaneous ocean partial tide (Schwiderski, 1978a) is determined by

$$\xi = \xi \cos(\sigma t + \chi - \delta), \quad (2)$$

where the local harmonic constants

$\xi = \xi(\lambda, \phi) = \text{O}_1$ ocean tide amplitude (in m)

and

$\delta = \delta(\lambda, \phi) = \text{O}_1$ ocean tide Greenwich phase (in rad)

must be determined, say, by linear interpolation in the tidal charts of Appendix A.

A simple second-order approximation in the sense of Love and Accad and Pekeris (see Part I, Schwiderski, 1978a, 1979c, and 1980; and Accad and Pekeris, 1978) yields

$$\xi' \approx 0.012\eta \text{ and } \xi'' \approx -0.0667\xi, \quad (3)$$

i.e., the corresponding terrestrial tide ξ' and the earth dip ξ'' (yielding) under the oceanic tidal load ξ , respectively. A more elaborate and probably slightly more accurate earth dip ξ'' may be computed by using Farrell's Green function (see Farrell, 1972 and 1973; and Schwiderski, 1980). In linear superposition, one finds the corresponding instantaneous geocentric partial O_1 tide:

$$\xi^G = \xi + \xi' + \xi'' . \quad (4)$$

A detailed description of the hydrodynamical-empirical model to compute the ocean tidal amplitudes ξ and phases δ (listed in Appendix A) was given in Schwiderski (1978a, 1979c, d, and 1980). In particular, all model input parameters such as the dimensionless eddy coefficient ϵ (Eq's. 103 and 123), the bottom-friction parameter b (Eq's. 4a and b), and the differencing parameters κ and $\bar{\kappa}$ (Eq's. 64 and 72) were all specified in Schwiderski (1978a) (referenced equations). These parameters were determined for M_2 by extensive trial-and-error computations and remained unchanged for the construction of O_1 .

In the computation of the O_1 tide model, the following mode-dependent parameters were used (see referenced equations in Schwiderski, 1978a):

- a. The time step Δt (Eq's. 64, 123):

$$\Delta t = 193.6443 \text{ sec} \quad (5)$$

- b. The hydrodynamical interpolation control limits, k_1 , k_2 , and k_3 (Eq's. 88, 89, 94, 97, and 99)

$$k_1 = 0.025, k_2 = 0.040, k_3 = 0.5. \quad (6)$$

It may be noted that the input parameters k_1 and k_2 of Equations 6 are the same as for the diurnal K_1 component, but different from those values used for the semidiurnal S_2 and M_2 species (see Parts IV, III, and II).

3. O_1 OCEAN-TIDE FEATURES

The entire constructed O_1 ocean tide is gridwise displayed in map-like amplitude and phase tables in Appendix A. The $42^\circ \times 71^\circ$ charts cover the whole globe north of colatitude 169° (Antarctica) in three zones: a northern zone N from 0° to 71° colatitude, a middle zone M from 48° to 118° colatitude, and a southern zone S from 98° to 168° colatitude. The overlapping geographical areas of the tidal charts have been chosen to provide a worldwide coverage for special applications and to allow the reader to scan the large amplitude and phase charts together in order to evaluate their quality and visualize the important tidal features. In addition, a generally superficial overview of some tidal features can be recognized by inspecting the more schematically plotted corange and cotidal maps provided in Appendix B.

For an easy evaluation of the tidal charts in Appendix A, all hydrodynamically interpolated empirical tidal amplitudes and phases have been visibly marked by subbars for all shore data and subbrackets for all near-shore deep-sea input constants. Furthermore, the charts display the approximate locations of distant off-shore deep-sea stations by subtildes under the computed amplitude and phase data. The corresponding empirical data, which were excluded from hydrodynamical interpolation (see Sect. 1 and Schwiderski, 1978a, 1979d, and 1980), are listed and compared with the modeled data in Tables 1, 2, and 3. Finally, the approximate geographical locations of the important amphidromic points of zero amplitudes are marked by a circled $\otimes$.

The tidal charts and maps permit the viewer to follow the tidal waves, that is the high water fronts (crests), in forward (or backward) direction, for instance, on their rotation around the amphidromic points. In the tidal phase charts of Appendix A, it is best to start from the prominently visible $0^\circ = 360^\circ$ or 100° cotidal lines. Since the Greenwich phases specify the time lags (in degrees: $15^\circ \approx 1$ hour) of the tidal crests relative to the cresting time of the corresponding equilibrium tide along Greenwich meridian, one gathers a vivid impression of the significant global and local tidal phenomena.

By following the tidal waves on their periodic rotations, one finds these waves passing through the specially marked stations in empirically correct time and with the correct height. In fact, all over the globe over 2 000 tidal phases and 2 000 amplitudes are coherently integrated. This is particularly impressive for the charts of the Pacific Ocean, where the empirical data from so many clustered and scattered island stations fit smoothly into the surrounding computed tides. From the smoothness features of erratically interpolated tidal data (see Parts I and II), one concludes that this result is not an artifact of the interpolation applied but constitutes a vivid manifestation of the excellent compatibility of both the empirical and hydrodynamical procedures combined.

On the basis of this observation, it can again (see Schwiderski, 1978a, b; 1979a, b, d, e; 1980, and 1981a, b) be estimated that the O_1 tidal charts permit a tide prediction with a uniform accuracy relative to M_2 of better than 5 cm anywhere in the open oceans. Naturally, near rough ocean basin reliefs (e.g., Arctic and Antarctic shores), where empirical tide (and depth) data are marginal in quality and quantity, a somewhat lesser accuracy must be expected. The estimated

accuracy of the computed O_1 tide is, of course, fully validated by all 32 empirical tide data from distant off-shore deep-sea tide gauge stations, which are listed along with the computed data in Tables 1, 2, and 3. The differences (not necessarily errors) range from 0 to 1 cm in amplitudes and 0° to 11° (44 minutes) in phases and thus verify the estimated prediction accuracy. In this connection one may recall the accuracy evaluation of the deep-sea empirical data presented in Part IV of this report.

Table 1. North Atlantic Ocean Deep-Sea Empirical and Modeled O_1 Tides

LONG W	LAT N	EMP ξ	MOD ξ	$\Delta\xi$	EMP δ	MOD δ	$\Delta\delta$	IAPSO NR	SOURCES
13°51'	58°16'	7	6	-1	16	13	-3	1.1.37	C
24°43'	62°50'	6	6	0	75	64	-11	1.1.29	C
28°46'	60°12'	5	5	0	66	66	0	1.1.30	C
29°58'	57°01'	5	4	-1	66	58	-8	1.1.31	C
30°10'	53°39'	3	3	0	57	51	-6	1.1.32	C
25°06'	53°31'	4	4	0	19	25	+6	1.1.33	C
20°00'	53°39'	5	5	0	9	9	0	1.1.34	C
28°11'	48°45'	3	2	-1	26	22	-4	1.1.38	C
28°09'	45°21'	2	2	0	10	8	-2	1.1.39	C
27°57'	41°25'	2	2	0	342	343	+1	1.1.40	C
20°05'	37°09'	4	3	-1	318	319	+1	1.1.41	C
14°15'	36°41'	6	5	-1	316	314	-2	1.1.42	C
75°38'	32°42'	8	7	-1	192	191	-1	1.2. 3	C, M
76°25'	30°26'	7	7	0	194	196	+2	1.2.11	C, P
76°48'	28°27'	7	7	0	196	198	+2	1.2.15	C
76°47'	28°01'	7	7	0	202	198	-4	1.2.14	C
67°32'	28°14'	6	5	-1	197	200	+3	1.2. 5	C, Z
69°45'	28°08'	6	6	0	198	199	+1	1.2. 4	C, Z
69°40'	27°59'	7	6	-1	201	201	0	1.2. 8	C, Z
69°40'	27°58'	6	6	0	196	201	+5	1.2. 7	C, Z
69°20'	26°28'	6	6	0	200	204	+4	1.2.10	C, Z
69°19'	26°27'	6	6	0	199	204	+5	1.2. 9	C, Z

ξ = Amplitudes (cm)

δ = Greenwich Phases (deg)

IAPSO = Int. Assoc. for the Phys. Sci. of the Oceans

C = Cartwright et al. (1979)

M = Moffield (1975)

P = Pearson (1975)

Z = Zetler et al. (1975)

Table 2. Northeastern Pacific Ocean Deep-Sea Empirical and Modeled O_1 Tides

LONG W	LAT N	EMP ξ	MOD ξ	$\Delta\xi$	EMP δ	MOD δ	$\Delta\delta$	IAPSO NR	SOURCES
144°22'	56°08'	27	28	+1	250	253	+3	2.1.17	C
135°38'	53°19'	28	28	0	244	244	0	2.1.16	C
132°47'	49°35'	26	26	0	231	235	+4	2.1.15	C
145°00'	34°00'		15	-	-	227	-	-	-
145°00'	34°00'		15	-	-	227	-	-	-
124°26'	27°45'	18	17	-1	199	199	0	2.1.13	C, M
129°01'	24°47'	16	15	-1	201	204	+3	2.1.10	C, M

ξ = Amplitudes (cm)

δ = Greenwich Phases (deg)

IAPSO = Int. Assoc. for the Phys. Sci. of the Oceans

C = Cartwright et al. (1979)

M = Munk et al. (1970)

Table 3. Southeast Indian Ocean Deep-Sea Empirical and Modeled O_1 Tides

LONG E	LAT S	EMP ξ	MOD ξ	$\Delta\xi$	EMP δ	MOD δ	$\Delta\delta$	IAPSO NR	SOURCES
132°01'	37°01'	14	13	-1	218	219	+1	4.1. 1	C, IS
132°09'	50°02'	12	11	-1	220	221	+1	4.1. 2	C, IS
132°07'	60°01'	15	16	+1	215	214	-1	4.1. 3	C, IS

ξ = Amplitudes (cm)

δ = Greenwich Phases (deg)

IAPSO = Int. Assoc. for the Phys. Sci. of the Oceans

C = Cartwright et al. (1979)

IS = Irish and Snodgrass (1972)

From the tidal charts and maps in Appendixes A and B, one concludes that the rotating tidal waves of the diurnal O_1 tide resemble closely those of the diurnal K_1 tide. There is also a qualitative similarity to the semidiurnal S_2 and M_2 tides. However, the distribution of the amphidromic systems between the diurnal and semidiurnal species varies considerably (compare Parts II, III, and IV). Also, as was mentioned for K_1 the computed and empirical distortions and retardations of the O_1 waves by boundary and bottom irregularities are generally significantly subdued when compared to the rougher semidiurnal tides as S_2 and M_2 .

4. CONCLUSIONS

The hydrodynamical interpolation technique has been applied to construct the diurnal principal lunar tide (O_1) with a relative accuracy of better than 5 cm anywhere in the open oceans. The constructed tide is displayed by tabulated charts in Appendix A and by corange and cotidal maps in Appendix B. The major features of the O_1 tide are discussed in Section 3. A comparison with the earlier computed diurnal K_1 tide reveals close similarities. However, only qualitative similarities exist between the diurnal and semidiurnal species as M_2 and S_2 .

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APPENDIX A

ATLAS OF $1^{\circ} \times 1^{\circ}$ O₁ OCEAN TIDE AMPLITUDE
AND PHASE CHARTS FOR $42^{\circ} \times 71^{\circ}$ AREAS

APPENDIX A

ATLAS OF $1^\circ \times 1^\circ$ O₁ OCEAN TIDE AMPLITUDE AND PHASE CHARTS FOR $42^\circ \times 71^\circ$ AREAS

1. GUIDE TO TIDAL CHARTS

- M = m : Longitude Number
 N = n : Colatitude Number
 λ_m = $(m - 0.5)^\circ$: Geographical Longitude East
 θ_n = $(n - 0.5)^\circ$: Geographical Colatitude
 $\xi_{m,n}$ = $\xi(\lambda_m, \theta_n)$: Amplitude (in cm)
 $\delta_{m,n}$ = $\delta(\lambda_m, \theta_n)$: Greenwich Phases (in deg.; $15^\circ \approx 1$ h)
 $\otimes$ = Amphidromic Points
... = Subbars Mark Empirical Input Data at Shore Stations
┌ = Subbrackets Mark Empirical Input Data at Near-Shore Deep-Sea Stations
~ = Subtildes Mark Approximately Distant Offshore Deep-Sea Stations with Excluded Empirical Tide Data Listed in Tables 1, 2, and 3

2. SOURCES OF EMPIRICAL TIDE DATA

Publications:

National Ocean Survey (1942), British Admiralty (1977), International Hydrographic Bureau (1978), Defant (1961), Miyazaki et al. (1967), Nowroozi et al. (1969), Munk et al. (1970), Zahel (1970), Irish et al. (1971), Irish and Snodgrass (1972), Nowroozi (1972), Luther and Wunsch (1975), Mofjeld (1975), Pearson (1975), Zetler et al. (1975), Cartwright et al. (1979), and Pugh (1979).

Private Communications:

D. C. Simpson (1977), National Ocean Survey, Rockville, Maryland; S. K. Gill and D. L. Porter (1978), National Ocean Survey, Rockville, Maryland; K. Wyrki (1978), University of Hawaii, Honolulu, Hawaii, and D. E. Cartwright and D. Pugh (1978), Institute of Oceanographic Sciences, Bidston Observatory, U.K.

[illegible]

MONDAY

WESTERN EUROPE

SECTION 101

TABLE 1N: $1^{\circ} \times 1^{\circ} O_1$ OCEAN TIDE GREENWICH PHASES δ (DEG)

Lat	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1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[illegible]

	IRAN	PAKISTAN	WESTERN INDIA
62			
63	10	20	
64	10	20	
65	10	20	
66	10	20	
67	10	20	
68	10	20	
69	10	20	
70	10	20	
71	10	20	

TABLE 2N: 1° x 1° O, OCEAN TIDE GREENWICH PHASES δ (DEG)

lat	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	
2	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348
3	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364
4	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	
5	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	
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18	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	
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22	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	
23	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	
24	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677		
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26	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	
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29	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752		
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31	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772												

TABLE 3N: 1° x 1° O, OCEAN TIDE AMPLITUDES ξ (CM)

[illegible]

SIBERIAN USSR

[illegible]

NW	73	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120				
1	28	280	280	280	280	280	275	275	279	279	279	279	278	278	278	278	277	277	277	277	276	276	276	276	276	276	275	275	275	275	275	275	274	274	274	274	274	274	274	274	274	274	273	273		
2	28	275	275	275	275	275	273	273	273	273	273	273	273	273	273	273	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272		
3	275	272	271	271	271	271	265	265	264	263	263	263	263	263	263	263	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262		
4	270	269	269	269	269	269	265	265	264	263	263	263	263	263	263	263	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	
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6	255	253	253	253	253	253	249	249	249	249	249	249	249	249	249	249	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	
7	247	247	247	247	247	247	243	243	243	243	243	243	243	243	243	243	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	
8	239	239	239	239	239	239	235	235	235	235	235	235	235	235	235	235	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234
9	230	230	230	230	230	230	226	226	226	226	226	226	226	226	226	226	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225
10	230	230	230	230	230	230	226	226	226	226	226	226	226	226	226	226	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225
11	237	237	237	237	2																																									

SIBERIAN USSR

SOUTHERN CHINA

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2
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92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
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SOUTHEASTERN JAPAN

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11	15	17	18

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F 9	17	17	17	17

29 27 27 28
29 29 18 17

5 15 14 14 14

2 13 13 13 13

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TABLE 4N: 1° x 1° O, OCEAN TIDE GREENWICH PHASES δ (DEG)

[illegible]

EASTERN SIBERIAN USSR

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																								
EASTERN CHINA	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
GULF OF CHINA	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
SOUTHEASTERN JAPAN	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
SEA OF JAPAN	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
KAMCHATKA	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
TAIWAN	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300

[illegible]

TABLE 5N: $1^\circ \times 1^\circ$ O₁ OCEAN TIDE GREENWICH PHASES δ (DEG)

[illegible]

TABLE 6N: 1° x 1° O, OCEAN TIDE AMPLITUDES ξ (CM)

[illegible]

TABLE 6N: 1° x 1° O₁ OCEAN TIDE GREENWICH PHASES δ (DEG)

[illegible]

ALASKA

[illegible]

WESTERN USA

7	263	260	259	257	256	254	253	251	250	245	247	246	245	243	242	241	240	239	237	236	235	234	233	232	231	230	229	228	227	226	225	224	223	222	221	220	219	218	217	216	215	214	213	212	211	210	209	208	207	206	205	204	203	202	201	200	199	198	197	196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173	172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149	148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	WESTERN USA
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TABLE 7N: 1° x 1° O₁ OCEAN TIDE GREENWICH PHASES δ (DEG)

N	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
1	276	279	279	277	277	279	280	280	280	280	281	281	281	281	282	282	282	283	283	283	284	284	284	284	285	285	285	286	286	286	287	287	287	288	288	288	289	289	289	290	290																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
2	266	266	267	268	268	269	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
3	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
4	230	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
5	274	278	282	286	290	294	297	301	305	313	317	321	325	329	333	336	338	341	343	345	347	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
6	312	316	316	323	326	330	332	334	336	338	339	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
7	325	328	331	333	336	339	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
8	328	331	333	336	339	340	342	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
9	321	325	320	332	334	336	338	340	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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TABLE 8N: 1° x 1° O₁ OCEAN TIDE AMPLITUDES ξ (CM)

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1</
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TABLE 8N. 1° x 1° O₁ OCEAN TIDE GREENWICH PHASES δ (DEG)

LAT	LONG	OCEAN TIDE GREENWICH PHASES δ (DEG)											
		280	281	282	283	284	285	286	287	288	289	290	291
0	0	280	281	282	283	284	285	286	287	288	289	290	291
1	0	290	291	292	293	294	295	296	297	298	299	300	301
2	0	300	301	302	303	304	305	306	307	308	309	310	311
3	0	310	311	312	313	314	315	316	317	318	319	320	321
4	0	320	321	322	323	324	325	326	327	328	329	330	331
5	0	330	331	332	333	334	335	336	337	338	339	340	341
6	0	340	341	342	343	344	345	346	347	348	349	350	351
7	0	350	351	352	353	354	355	356	357	358	359	360	361
8	0	360	361	362	363	364	365	366	367	368	369	370	371
9	0	370	371	372	373	374	375	376	377	378	379	380	381
10	0	380	381	382	383	384	385	386	387	388	389	390	391
11	0	390	391	392	393	394	395	396	397	398	399	400	401
12	0	400	401	402	403	404	405	406	407	408	409	410	411
13	0	410	411	412	413	414	415	416	417	418	419	420	421
14	0	420	421	422	423	424	425	426	427	428	429	430	431
15	0	430	431	432	433	434	435	436	437	438	439	440	441
16	0	440	441	442	443	444	445	446	447	448	449	450	451
17	0	450	451	452	453	454	455	456	457	458	459	460	461
18	0	460	461	462	463	464	465	466	467	468	469	470	471
19	0	470	471	472	473	474	475	476	477	478	479	480	481
20	0	480	481	482	483	484	485	486	487	488	489	490	491
21	0	490	491	492	493	494	495	496	497	498	499	500	501
22	0	500	501	502	503	504	505	506	507	508	509	510	511
23	0	510	511	512	513	514	515	516	517	518	519	520	521
24	0	520	521	522	523	524	525	526	527	528	529	530	531
25	0	530	531	532	533	534	535	536	537	538	539	540	541
26	0	540	541	542	543	544	545	546	547	548	549	550	551
27	0	550	551	552	553	554	555	556	557	558	559	560	561
28	0	560	561	562	563	564	565	566	567	568	569	570	571
29	0	570	571	572	573	574	575	576	577	578	579	580	581
30	0	580	581	582	583	584	585	586	587	588	589	590	591
31	0	590	591	592	593	594	595	596	597	598	599	600	601
32	0	600	601	602	603	604	605	606	607	608	609	610	611
33	0	610	611	612	613	614	615	616	617	618	619	620	621
34	0	620	621	622	623	624	625	626	627	628	629	630	631
35	0	630	631	632	633	634	635	636	637	638	639	640	641
36	0	640	641	642	643	644	645	646	647	648	649	650	651
37	0	650	651	652	653	654	655	656	657	658	659	660	661
38	0	660	661	662	663	664	665	666	667	668	669	670	671
39	0	670	671	672	673	674	675	676	677	678	679	680	681
40	0	680	681	682	683	684	685	686	687	688	689	690	691
41	0	690	691	692	693	694	695	696	697	698	699	700	701
42	0	700	701	702	703	704	705	706	707	708	709	710	711
43	0	710	711	712	713	714	715	716	717	718	719	720	721
44	0	720	721	722	723	724	725	726	727	728	729	730	731
45	0	730	731	732	733	734	735	736	737	738	739	740	741
46	0	740	741	742	743	744	745	746	747	748	749	750	751
47	0	750	751	752	753	754	755	756	757	758	759	760	761
48	0	760	761	762	763	764	765	766	767	768	769	770	771
49	0	770	771	772	773	774	775	776	777	778	779	780	781
50	0	780	781	782	783	784	785	786	787	788	789	790	791
51	0	790	791	792	793	794	795	796	797	798	799	800	801
52	0	800	801	802	803	804	805	806	807	808	809	810	811
53	0	810	811	812	813	814	815	816	817	818	819	820	821
54	0	820	821	822	823	824	825	826	827	828	829	830	831
55	0	830	831	832	833	834	835	836	837	838	839	840	841
56	0	840	841	842	843	844	845	846	847	848	849	850	851
57	0	850	851	852	853	854	855	856	857	858	859	860	861
58	0	860	861	862	863	864	865	866	867	868	869	870	871
59	0	870	871	872	873	874	875	876	877	878	879	880	881
60	0	880	881	882	883	884	885	886	887	888	889	890	891
61	0	890	891	892	893	894	895	896	897	898	899	900	901
62	0	900	901	902	903	904	905	906	907	908	909	910	911
63	0	910	911	912	913	914	915	916	917	918	919	920	921
64	0	920	921	922	923	924	925	926	927	928	929	930	931
65	0	930	931	932	933	934	935	936	937	938	939	940	941
66	0	940	941	942	943	944	945	946	947	948	949	950	951
67	0	950	951	952	953	954	955	956	957	958	959	960	961
68	0	960	961	962	963	964	965	966	967	968	969	970	971
69	0	970	971	972	973	974	975	976	977	978	979	980	981
70	0	980	981	982	983	984	985	986	987	988	989	990	991
71	0	990	991	992	993	994	995	996	997	998	999	1000	1001

GREENLAND

BAFFIN ISLAND

EASTERN CANADA

EASTERN USA

NOVA SCOTIA

NEWFOUNDLAND

QUEEN ELIZABETH ISLANDS

HISPANIOLA

[illegible]

TABLE 9N: 1° x 1° O, OCEAN TIDE GREENWICH PHASES δ (DEG)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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	78	79	80
WM	39	40	41
	47	46	45
	50	51	52
	54	55	56
	57	58	59
	61	60	61
	63	64	65
	67	68	69
	70	71	72
	73	74	75
	76	77	78
	79	80	

39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
AM	AN	AO	AP	AR	AS	AT	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB	JC	JD	JE	JF	JG	JH	JI	JJ	JK	JL	JM	JN	JO	JP	JQ	JR	JS	JT	JU	JV	JW	JX	JY	JZ	KA	KB	KC	KD	KE	KF	KG	KH	KI	KJ	KK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE	XF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YY	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080																																																						
1993	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180

39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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201

NORTHWESTERN AUSTRALIA

TABLE 4M: 1° x 1° O₁ OCEAN TIDE AMPLITUDES ξ (CM)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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TABLE 5M: 1° x 1° O₁ OCEAN TIDE GREENWICH PHASES δ (DEG)

160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	191	192	193	194	195	196	197	198	199	200	201	202																											
343	344	339	337	335	333	331	329	327	325	324	322	320	318	316	314	312	309	307	305	303	301	298	296	294	292	290	287	285	283	281	279	277	275	273	271	269	267	265	264	262	260	259	258																									
345	346	341	339	338	336	334	332	330	328	326	324	322	320	317	315	313	311	309	306	304	302	299	297	295	293	291	289	286	284	282	280	278	276	274	272	270	268	266	264	263	261	259	258																									
347	348	343	341	339	337	335	333	331	329	327	325	323	321	319	317	315	313	311	308	306	303	301	299	296	294	292	290	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257																								
349	350	345	343	341	339	337	335	333	331	329	327	325	323	321	319	317	315	313	310	308	305	303	301	299	296	294	292	290	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257																							
351	352	347	345	343	341	339	337	335	333	331	329	327	325	323	321	319	317	315	312	310	307	305	303	301	299	296	294	292	290	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257																						
353	354	349	347	345	343	341	339	337	335	333	331	329	327	325	323	321	319	317	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257																				
355	356	351	349	347	345	343	341	339	337	335	333	331	329	327	325	323	321	319	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257																			
357	358	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	323	321	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257																		
359	360	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	323	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257																	
361	362	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257																
363	364	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257															
365	366	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257														
367	368	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257													
369	370	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257												
371	372	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257											
373	374	369	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257										
375	376	371	369	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257									
377	378	373	371	369	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257								
379	380	375	373	371	369	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257							
381	382	377	375	373	371	369	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257						
383	384	379	377	375	373	371	369	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257					
385	386	381	379	377	375	373	371	369	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257				
387	388	383	381	379	377	375	373	371	369	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257			
389	390	385	383	381	379	377	375	373	371	369	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257		
391	392	387	385	383	381	379	377	375	373	371	369	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257	
393	394	389	387	385	383	381	379	377	375	373	371	369	367	365	363	361	359	357	355	353	351	349	347	345	343	341	339	337	335	333	331	329	327	325	322	320	318	316	314	312	310	308	306	304	302	300	298	295	293	291	289	287	285	283	281	279	277	275	273	271	269	267	265	263	261	260	258	257
395	396	391	389	387	385	383	381	379	377	375	373	371	369	367	365	363	361	359	357	355	353	351	349	347	345	343																																										

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TABLE 6M: 1° x 1° O₂ OCEAN TIDE GREENWICH PHASES δ (DEG)

LAT	LONG												USA
	200	201	202	203	204	205	206	207	208	209	210	211	CALIFORNIA
48	262	260	258	257	255	254	253	252	251	250	249	248	247
49	264	262	260	258	256	255	254	253	252	251	250	249	248
50	266	264	262	260	258	256	255	254	253	252	251	250	249
51	268	266	264	262	260	258	256	255	254	253	252	251	250
52	270	268	266	264	262	260	258	256	255	254	253	252	251
53	272	270	268	266	264	262	260	258	256	255	254	253	252
54	274	272	270	268	266	264	262	260	258	256	255	254	253
55	276	274	272	270	268	266	264	262	260	258	256	255	254
56	278	276	274	272	270	268	266	264	262	260	258	256	255
57	280	278	276	274	272	270	268	266	264	262	260	258	256
58	282	280	278	276	274	272	270	268	266	264	262	260	258
59	284	282	280	278	276	274	272	270	268	266	264	262	260
60	286	284	282	280	278	276	274	272	270	268	266	264	262
61	288	286	284	282	280	278	276	274	272	270	268	266	264
62	290	288	286	284	282	280	278	276	274	272	270	268	266
63	292	290	288	286	284	282	280	278	276	274	272	270	268
64	294	292	290	288	286	284	282	280	278	276	274	272	270
65	296	294	292	290	288	286	284	282	280	278	276	274	272
66	298	296	294	292	290	288	286	284	282	280	278	276	274
67	300	298	296	294	292	290	288	286	284	282	280	278	276
68	302	300	298	296	294	292	290	288	286	284	282	280	278
69	304	302	300	298	296	294	292	290	288	286	284	282	280
70	306	304	302	300	298	296	294	292	290	288	286	284	282
71	308	306	304	302	300	298	296	294	292	290	288	286	284
72	310	308	306	304	302	300	298	296	294	292	290	288	286
73	312	310	308	306	304	302	300	298	296	294	292	290	288
74	314	312	310	308	306	304	302	300	298	296	294	292	290
75	316	314	312	310	308	306	304	302	300	298	296	294	292
76	318	316	314	312	310	308	306	304	302	300	298	296	294
77	320	318	316	314	312	310	308	306	304	302	300	298	296
78	322	320	318	316	314	312	310	308	306	304	302	300	298
79	324	322	320	318	316	314	312	310	308	306	304	302	300
80	326	324	322	320	318	316	314	312	310	308	306	304	302
81	328	326	324	322	320	318	316	314	312	310	308	306	304
82	330	328	326	324	322	320	318	316	314	312	310	308	306
83	332	330	328	326	324	322	320	318	316	314	312	310	308
84	334	332	330	328	326	324	322	320	318	316	314	312	310
85	336	334	332	330	328	326	324	322	320	318	316	314	312
86	338	336	334	332	330	328	326	324	322	320	318	316	314
87	340	338	336	334	332	330	328	326	324	322	320	318	316
88	342	340	338	336	334	332	330	328	326	324	322	320	318
89	344	342	340	338	336	334	332	330	328	326	324	322	320
90	346	344	342	340	338	336	334	332	330	328	326	324	322
91	348	346	344	342	340	338	336	334	332	330	328	326	324
92	350	348	346	344	342	340	338	336	334	332	330	328	326
93	352	350	348	346	344	342	340	338	336	334	332	330	328
94	354	352	350	348	346	344	342	340	338	336	334	332	330
95	356	354	352	350	348	346	344	342	340	338	336	334	332
96	358	356	354	352	350	348	346	344	342	340	338	336	334
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98	362	360	358	356	354	352	350	348	346	344	342	340	338
99	364	362	360	358	356	354	352	350	348	346	344	342	340
100	366	364	362	360	358	356	354	352	350	348	346	344	342
101	368	366	364	362	360	358	356	354	352	350	348	346	344
102	370	368	366	364	362	360	358	356	354	352	350	348	346
103	372	370	368	366	364	362	360	358	356	354	352	350	348
104	374	372	370	368	366	364	362	360	358	356	354	352	350
105	376	374	372	370	368	366	364	362	360	358	356	354	352
106	378	376	374	372	370	368	366	364	362	360	358	356	354
107	380	378	376	374	372	370	368	366	364	362	360	358	356
108	382	380	378	376	374	372	370	368	366	364	362	360	358
109	384	382	380	378	376	374	372	370	368	366	364	362	360
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113	392	390	388	386	384	382	380	378	376	374	372	370	368
114	394	392	390	388	386	384	382	380	378	376	374	372	370
115	396	394	392	390	388	386	384	382	380	378	376	374	372
116	398	396	394	392	390	388	386	384	382	380	378	376	374
117	400	398	396	394	392	390	388	386	384	382	380	378	376
118	402	400	398	396	394	392	390	388	386	384	382	380	378
119	404	402	400	398	396	394	392	390	388	386	384	382	380

14 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280

Abstract

[illegible]

1M 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280

CALIFORNIA

[illegible]

[illegible]

TABLE 8M: 1° x 1° O₁ OCEAN TIDE GREENWICH PHASES δ (DEG)

Lat	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Lon	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
48	169	166	163	160	157	154	151	148	145	142	139	136	133	130	127	124	121	118	115	112	109	106	103	100	97	94	91	88	85	82	79	76	73	70	67	64	61	58	55	52	49	46	43	40	37	34	31	28	25	22	19	16	13	10	7	4	1	-2	-5	-8	-11	-14	-17	-20	-23	-26	-29	-32	-35	-38	-41	-44	-47	-50	-53	-56	-59	-62	-65	-68	-71	-74	-77	-80	-83	-86	-89	-92	-95	-98	-101	-104	-107	-110	-113	-116	-119	-122	-125	-128	-131	-134	-137	-140	-143	-146	-149	-152	-155	-158	-161	-164	-167	-170	-173	-176	-179	-182	-185	-188	-191	-194	-197	-200	-203	-206	-209	-212	-215	-218	-221	-224	-227	-230	-233	-236	-239	-242	-245	-248	-251	-254	-257	-260	-263	-266	-269	-272	-275	-278	-281	-284	-287	-290	-293	-296	-299	-302	-305	-308	-311	-314	-317	-320	-323	-326	-329	-332	-335	-338	-341	-344	-347	-350	-353	-356	-359	-362	-365	-368	-371	-374	-377	-380	-383	-386	-389	-392	-395	-398	-401	-404	-407	-410	-413	-416	-419	-422	-425	-428	-431	-434	-437	-440	-443	-446	-449	-452	-455	-458	-461	-464	-467	-470	-473	-476	-479	-482	-485	-488	-491	-494	-497	-500	-503	-506	-509	-512	-515	-518	-521	-524	-527	-530	-533	-536	-539	-542	-545	-548	-551	-554	-557	-560	-563	-566	-569	-572	-575	-578	-581	-584	-587	-590	-593	-596	-599	-602	-605	-608	-611	-614	-617	-620	-623	-626	-629	-632	-635	-638	-641	-644	-647	-650	-653	-656	-659	-662	-665	-668	-671	-674	-677	-680	-683	-686	-689	-692	-695	-698	-701	-704	-707	-710	-713	-716	-719	-722	-725	-728	-731	-734	-737	-740	-743	-746	-749	-752	-755	-758	-761	-764	-767	-770	-773	-776	-779	-782	-785	-788	-791	-794	-797	-800	-803	-806	-809	-812	-815	-818	-821	-824	-827	-830	-833	-836	-839	-842	-845	-848	-851	-854	-857	-860	-863	-866	-869	-872	-875	-878	-881	-884	-887	-890	-893	-896	-899	-902	-905	-908	-911	-914	-917	-920	-923	-926	-929	-932	-935	-938	-941	-944	-947	-950	-953	-956	-959	-962	-965	-968	-971	-974	-977	-980	-983	-986	-989	-992	-995	-998	-1001	-1004	-1007	-1010	-1013	-1016	-1019	-1022	-1025	-1028	-1031	-1034	-1037	-1040	-1043	-1046	-1049	-1052	-1055	-1058	-1061	-1064	-1067	-1070	-1073	-1076	-1079	-1082	-1085	-1088	-1091	-1094	-1097	-1100	-1103	-1106	-1109	-1112	-1115	-1118	-1121	-1124	-1127	-1130	-1133	-1136	-1139	-1142	-1145	-1148	-1151	-1154	-1157	-1160	-1163	-1166	-1169	-1172	-1175	-1178	-1181	-1184	-1187	-1190	-1193	-1196	-1199	-1202	-1205	-1208	-1211	-1214	-1217	-1220	-1223	-1226	-1229	-1232	-1235	-1238	-1241	-1244	-1247	-1250	-1253	-1256	-1259	-1262	-1265	-1268	-1271	-1274	-1277	-1280	-1283	-1286	-1289	-1292	-1295	-1298	-1301	-1304	-1307	-1310	-1313	-1316	-1319	-1322	-1325	-1328	-1331	-1334	-1337	-1340	-1343	-1346	-1349	-1352	-1355	-1358	-1361	-1364	-1367	-1370	-1373	-1376	-1379	-1382	-1385	-1388	-1391	-1394	-1397	-1400	-1403	-1406	-1409	-1412	-1415	-1418	-1421	-1424	-1427	-1430	-1433	-1436	-1439	-1442	-1445	-1448	-1451	-1454	-1457	-1460	-1463	-1466	-1469	-1472	-1475	-1478	-1481	-1484	-1487	-1490	-1493	-1496	-1499	-1502	-1505	-1508	-1511	-1514	-1517	-1520	-1523	-1526	-1529	-1532	-1535	-1538	-1541	-1544	-1547	-1550	-1553	-1556	-1559	-1562	-1565	-1568	-1571	-1574	-1577	-1580	-1583	-1586	-1589	-1592	-1595	-1598	-1601	-1604	-1607	-1610	-1613	-1616	-1619	-1622	-1625	-1628	-1631	-1634	-1637	-1640	-1643	-1646	-1649	-1652	-1655	-1658	-1661	-1664	-1667	-1670	-1673	-1676	-1679	-1682	-1685	-1688	-1691	-1694	-1697	-1700	-1703	-1706	-1709	-1712	-1715	-1718	-1721	-1724	-1727	-1730	-1733	-1736	-1739	-1742	-1745	-1748	-1751	-1754	-1757	-1760	-1763	-1766	-1769	-1772	-1775	-1778	-1781	-1784	-1787	-1790	-1793	-1796	-1799	-1802	-1805	-1808	-1811	-1814	-1817	-1820	-1823	-1826	-1829	-1832	-1835	-1838	-1841	-1844	-1847	-1850	-1853	-1856	-1859	-1862	-1865	-1868	-1871	-1874	-1877	-1880	-1883	-1886	-1889	-1892	-1895	-1898	-1901	-1904	-1907	-1910	-1913	-1916	-1919	-1922	-1925	-1928	-1931	-1934	-1937	-1940	-1943	-1946	-1949	-1952	-1955	-1958	-1961	-1964	-1967	-1970	-1973	-1976	-1979	-1982	-1985	-1988	-1991	-1994	-1997	-2000	-2003	-2006	-2009	-2012	-2015	-2018	-2021	-2024	-2027	-2030	-2033	-2036	-2039	-2042	-2045	-2048	-2051	-2054	-2057	-2060	-2063	-2066	-2069	-2072	-2075	-2078	-2081	-2084	-2087	-2090	-2093	-2096	-2099	-2102	-2105	-2108	-2111	-2114	-2117	-2120	-2123	-2126	-2129	-2132	-2135	-2138	-2141	-2144	-2147	-2150	-2153	-2156	-2159	-2162	-2165	-2168	-2171	-2174	-2177	-2180	-2183	-2186	-2189	-2192	-2195	-2198	-2201	-2204	-2207	-2210	-2213	-2216	-2219	-2222	-2225	-2228	-2231	-2234	-2237	-2240	-2243	-2246	-2249	-2252	-2255	-2258	-2261	-2264	-2267	-2270	-2273	-2276	-2279	-2282	-2285	-2288	-2291	-2294	-2297	-2300	-2303	-2306	-2309	-2312	-2315	-2318	-2321	-2324	-2327	-2330	-2333	-2336	-2339	-2342	-2345	-2348	-2351	-2354	-2357	-2360	-2363	-2366	-2369	-2372	-2375	-2378	-2381	-2384	-2387	-2390	-2393	-2396	-2399	-2402	-2405	-2408	-2411	-2414	-2417	-2420	-2423	-2426	-2429	-2432	-2435	-2438	-2441	-2444	-2447	-2450	-2453	-2456	-2459	-2462	-2465	-2468	-2471	-2474	-2477	-2480	-2483	-2486	-2489	-2492	-2495	-2498	-2501	-2504	-2507	-2510	-2513	-2516	-2519	-2522	-2525	-2528	-2531	-2534	-2537	-2540	-2543	-2546	-2549	-2552	-2555	-2558	-2561	-2564	-2567	-2570	-2573	-2576	-2579	-2582	-2585	-2588	-2591	-2594	-2597	-2600	-2603	-2606	-2609	-2612	-2615	-2618	-2621	-2624	-2627	-2630	-2633	-2636	-2639	-2642	-2645	-2648	-2651	-2654	-2657	-2660	-2663	-2666	-2669	-2672	-2675	-2678	-2681	-2684	-2687	-2690	-2693	-2696	-2699	-2702	-2705	-2708	-2711	-2714	-2717	-2720	-2723	-2726	-2729	-2732	-2735	-2738	-2741	-2744	-2747	-2750	-2753	-2756	-2759	-2762	-2765	-2768	-2771	-2774	-2777	-2780	-2783	-2786	-2789	-2792	-2795	-2798	-2801	-2804	-2807	-2810	-2813	-2816	-2819	-2822	-2825	-2828	-2831	-2834	-2837	-2840	-2843	-2846	-2849	-2852	-2855	-2858	-2861	-2864	-2867	-2870	-2873	-2876	-2879	-2882	-2885	-2888	-2891	-2894	-2897	-2900	-2903	-2906	-2909	-2912	-2915	-2918	-2921	-2924	-2927	-2930	-2933	-2936	-2939	-2942	-2945	-2948	-2951	-2954	-2957	-2960	-2963	-2966	-2969	-2972	-2975	-2978	-2981	-2984	-2987	-2990	-2993	-2996	-2999	-3002	-3005	-3008	-3011	-3014	-3017	-3020	-3023	-3026	-3029	-3032	-3035	-3038	-3041	-3044	-3047	-3050	-3053	-3056	-3059	-3062	-3065	-3068	-3071	-3074	-3077	-3080	-3083	-3086	-3089	-3092	-3095	-3098	-3101	-3104	-3107	-3110	-3113	-3116	-3119	-3122	-3125	-3128	-3131	-3134	-3137	-3140	-3143	-3146	-3149	-3152	-3155	-3158	-3161	-3164	-3167	-3170	-3173	-3176	-3179	-3182	-3185	-3188	-3191	-3194	-3197	-3200	-3203	-3206	-3209	-3212	-3215	-3218	-3221	-3224	-3227	-3230	-3233	-3236	-3239	-3242	-3245	-3248	-3251	-3254	-3257	-3260	-3263	-3266	-3269	-3272	-3275	-3278	-3281	-3284	-3287	-3290	-3293	-3296	-3299	-3302	-3305	-3308	-3311	-3314	-3317	-3320	-3323	-3326	-3329	-3332	-3335	-3338	-3341	-3344	-3347	-3350	-3353	-3356	-3359	-3362	-3365	-3368	-3371	-3374	-3377	-3380	-3383	-3386	-3389	-3392	-3395	-3398	-3401	-3404	-3407	-3410	-3413	-3416	-3419	-3422	-3425	-3428	-3431	-3434	-3437	-3440	-3443	-3446	-3449	-3452	-3455	-3458	-3461	-3464	-3467	-3470	-3473	-3476	-3479	-3482	-3485	-3488	-3491	-3494	-3497	-3500	-3503	-3506	-3509	-3512	-3515	-3518	-3521	-3524	-3527	-3530	-3533	-3536	-3539	-3542	-3545	-3548	-3551	-3554	-3557	-3560	-3563	-3566	-3569	-3572	-3575	-3578	-3581	-3584	-3587	-3590	-3593	-3596	-3599	-3602	-3605	-3608	-3611	-3614	-3617	-3620	-3623	-3626	-3629	-3632	-3635	-3638	-3641	-3644	-3647	-3650	-3653	-3656	-3659	-3662	-3665	-3668	-3671	-3674	-3677	-3680	-3683	-3686	-3689	-3692	-3695	-3698	-3701	-3704	-3707	-3710	-3713	-3716	-3719	-3722	-3725	-3728	-3731	-3734	-3737	-3740	-3743	-3746	-3749	-3752	-3755	-3758	-3761	-3764	-3767	-3770	-3773	-3776	-3779	-3782	-3785	-3788	-3791	-3794	-3797	-3800	-3803	-3806	-3809	-3812	-3815	-3818	-3821	-3824	-3827	-3830	-3833	-3836	-3839

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099																																																																											
1999	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099

[illegible]

TABLE 9M: 1° x 1° O₁ OCEAN TIDE GREENWICH PHASES δ (DEG)

319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360																																	
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200

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NORTHWESTERN AFRICA

EASTERN BRAZIL

10	25	26	27	28	29	30	31	32	33	34	35	36	37	38
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SOUTHERN AFRICA

ANTARCTICA

TABLE 18: 1° x 1° O₁ OCEAN TIDE GREENWICH PHASES δ (DEG)

LAT	LONG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
		357	356	355	354	353	352	351	350	349	348	347	346	345	344	343	342	341	340	339	338	337	336	335	334	333	332	331	330	329	328	327	326	325	324	323	322	321	320	
90	330	232	235	236	241	244	247	249	252	255	257	260	263	266	269	274	274																							
89	234	236	239	240	242	246	249	251	253	256	258	261	264	267	270	274																								
88	238	240	242	244	247	250	252	254	256	258	260	262	264	266	268	270	272																							
87	242	244	246	248	250	252	254	256	258	260	262	264	266	268	270	272	274																							
86	246	248	250	252	254	256	258	260	262	264	266	268	270	272	274	276	278																							
85	250	252	254	256	258	260	262	264	266	268	270	272	274	276	278	280	282																							
84	254	256	258	260	262	264	266	268	270	272	274	276	278	280	282	284	286																							
83	258	260	262	264	266	268	270	272	274	276	278	280	282	284	286	288	290																							
82	262	264	266	268	270	272	274	276	278	280	282	284	286	288	290	292	294																							
81	266	268	270	272	274	276	278	280	282	284	286	288	290	292	294	296	298																							
80	270	272	274	276	278	280	282	284	286	288	290	292	294	296	298	300	302																							
79	274	276	278	280	282	284	286	288	290	292	294	296	298	300	302	304	306																							
78	278	280	282	284	286	288	290	292	294	296	298	300	302	304	306	308	310																							
77	282	284	286	288	290	292	294	296	298	300	302	304	306	308	310	312	314																							
76	286	288	290	292	294	296	298	300	302	304	306	308	310	312	314	316	318																							
75	290	292	294	296	298	300	302	304	306	308	310	312	314	316	318	320	322																							
74	294	296	298	300	302	304	306	308	310	312	314	316	318	320	322	324	326																							
73	298	300	302	304	306	308	310	312	314	316	318	320	322	324	326	328	330																							
72	302	304	306	308	310	312	314	316	318	320	322	324	326	328	330	332	334																							
71	306	308	310	312	314	316	318	320	322	324	326	328	330	332	334	336	338																							
70	310	312	314	316	318	320	322	324	326	328	330	332	334	336	338	340	342																							
69	314	316	318	320	322	324	326	328	330	332	334	336	338	340	342	344	346																							
68	318	320	322	324	326	328	330	332	334	336	338	340	342	344	346	348	350																							
67	322	324	326	328	330	332	334	336	338	340	342	344	346	348	350	352	354																							
66	326	328	330	332	334	336	338	340	342	344	346	348	350	352	354	356	358																							
65	330	332	334	336	338	340	342	344	346	348	350	352	354	356	358	360	362																							
64	334	336	338	340	342	344	346	348	350	352	354	356	358	360	362	364	366																							
63	338	340	342	344	346	348	350	352	354	356	358	360	362	364	366	368	370																							
62	342	344	346	348	350	352	354	356	358	360	362	364	366	368	370	372	374																							
61	346	348	350	352	354	356	358	360	362	364	366	368	370	372	374	376	378																							
60	350	352	354	356	358	360	362	364	366	368	370	372	374	376	378	380	382																							
59	354	356	358	360	362	364	366	368	370	372	374	376	378	380	382	384	386																							
58	358	360	362	364	366	368	370	372	374	376	378	380	382	384	386	388	390																							
57	362	364	366	368	370	372	374	376	378	380	382	384	386	388	390	392	394																							
56	366	368	370	372	374	376	378	380	382	384	386	388	390	392	394	396	398																							
55	370	372	374	376	378	380	382	384	386	388	390	392	394	396	398	400	402																							
54	374	376	378	380	382	384	386	388	390	392	394	396	398	400	402	404	406																							
53	378	380	382	384	386	388	390	392	394	396	398	400	402	404	406	408	410																							
52	382	384	386	388	390	392	394	396	398	400	402	404	406	408	410	412	414																							
51	386	388	390	392	394	396	398	400	402	404	406	408	410	412	414	416	418																							
50	390	392	394	396	398	400	402	404	406	408	410	412	414	416	418	420	422																							
49	394	396	398	400	402	404	406	408	410	412	414	416	418	420	422	424	426																							
48	398	400	402	404	406	408	410	412	414	416	418	420	422	424	426	428	430																							
47	402	404	406	408	410	412	414	416	418	420	422	424	426	428	430	432	434																							
46	406	408	410	412	414	416	418	420	422	424	426	428	430	432	434	436	438																							
45	410	412	414	416	418	420	422	424	426	428	430	432	434	436	438	440	442																							
44	414	416	418	420	422	424	426	428	430	432	434	436	438	440	442	444	446																							
43	418	420	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450																							
42	422	424	426	428	430	432	434	436	438	440																														

[illegible]

ANTARCTICA

ANTARCTICA

	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119			
NA																																													
39	3	3	4	4	4	4	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16
39	3	4	4	4	4	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16	
40	4	4	4	4	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16		
41	4	4	4	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16		
42	4	4	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16			
43	4	5	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16			
44	4	5	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16			
45	4	5	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16			
46	4	5	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16			
47	4	5	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16			
48	4	5	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16			
49	4	5	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	9	9	10	10	10	10	10	10	11	11	12	12	12	13	13	14	14	15	15	16			
50	4	5	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	9																										

SUMMA ISLANDS

WESTERN AUSTRALIA

ANTARCTICA

TABLE 3S: 1° x 1° O, OCEAN TIDE GREENWICH PHASES δ (DEG)

[illegible]

TABLE 4S: 1° x 1° O₁ OCEAN TIDE AMPLITUDES ξ (CM)

11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	1496	1497	1498	1499	1500	1501	1502	1503	1504	1505	1
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ANTARCTICA

TABLE 55: 1° x 1° O, OCEAN TIDE AMPLITUDES ξ (CM)

[illegible]

TABLE 5S: 1° x 1° O, OCEAN TIDE GREENWICH PHASES δ (DEG)

19	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	
30	30	31	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
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30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
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TABLE 7S: 1° x 1° O₁ OCEAN TIDE GREENWICH PHASES δ (DEG)

1M	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
98	225	227	230	232	235	238	243	248	253	258	263	268	273	278	283	288	293	298	303	308	313	318	323	328	333	338	343	348	353	358	363	368	373	378	383	388	393	398	403	408	413	418	423	428	433	438	443	448	453	458	463	468	473	478	483	488	493	498	503	508	513	518	523	528	533	538	543	548	553	558	563	568	573	578	583	588	593	598	603	608	613	618	623	628	633	638	643	648	653	658	663	668	673	678	683	688	693	698	703	708	713	718	723	728	733	738	743	748	753	758	763	768	773	778	783	788	793	798	803	808	813	818	823	828	833	838	843	848	853	858	863	868	873	878	883	888	893	898	903	908	913	918	923	928	933	938	943	948	953	958	963	968	973	978	983	988	993	998	1003	1008	1013	1018	1023	1028	1033	1038	1043	1048	1053	1058	1063	1068	1073	1078	1083	1088	1093	1098	1103	1108	1113	1118	1123	1128	1133	1138	1143	1148	1153	1158	1163	1168	1173	1178	1183	1188	1193	1198	1203	1208	1213	1218	1223	1228	1233	1238	1243	1248	1253	1258	1263	1268	1273	1278	1283	1288	1293	1298	1303	1308	1313	1318	1323	1328	1333	1338	1343	1348	1353	1358	1363	1368	1373	1378	1383	1388	1393	1398	1403	1408	1413	1418	1423	1428	1433	1438	1443	1448	1453	1458	1463	1468	1473	1478	1483	1488	1493	1498	1503	1508	1513	1518	1523	1528	1533	1538	1543	1548	1553	1558	1563	1568	1573	1578	1583	1588	1593	1598	1603	1608	1613	1618	1623	1628	1633	1638	1643	1648	1653	1658	1663	1668	1673	1678	1683	1688	1693	1698	1703	1708	1713	1718	1723	1728	1733	1738	1743	1748	1753	1758	1763	1768	1773	1778	1783	1788	1793	1798	1803	1808	1813	1818	1823	1828	1833	1838	1843	1848	1853	1858	1863	1868	1873	1878	1883	1888	1893	1898	1903	1908	1913	1918	1923	1928	1933	1938	1943	1948	1953	1958	1963	1968	1973	1978	1983	1988	1993	1998	2003	2008	2013	2018	2023	2028	2033	2038	2043	2048	2053	2058	2063	2068	2073	2078	2083	2088	2093	2098	2103	2108	2113	2118	2123	2128	2133	2138	2143	2148	2153	2158	2163	2168	2173	2178	2183	2188	2193	2198	2203	2208	2213	2218	2223	2228	2233	2238	2243	2248	2253	2258	2263	2268	2273	2278	2283	2288	2293	2298	2303	2308	2313	2318	2323	2328	2333	2338	2343	2348	2353	2358	2363	2368	2373	2378	2383	2388	2393	2398	2403	2408	2413	2418	2423	2428	2433	2438	2443	2448	2453	2458	2463	2468	2473	2478	2483	2488	2493	2498	2503	2508	2513	2518	2523	2528	2533	2538	2543	2548	2553	2558	2563	2568	2573	2578	2583	2588	2593	2598	2603	2608	2613	2618	2623	2628	2633	2638	2643	2648	2653	2658	2663	2668	2673	2678	2683	2688	2693	2698	2703	2708	2713	2718	2723	2728	2733	2738	2743	2748	2753	2758	2763	2768	2773	2778	2783	2788	2793	2798	2803	2808	2813	2818	2823	2828	2833	2838	2843	2848	2853	2858	2863	2868	2873	2878	2883	2888	2893	2898	2903	2908	2913	2918	2923	2928	2933	2938	2943	2948	2953	2958	2963	2968	2973	2978	2983	2988	2993	2998	3003	3008	3013	3018	3023	3028	3033	3038	3043	3048	3053	3058	3063	3068	3073	3078	3083	3088	3093	3098	3103	3108	3113	3118	3123	3128	3133	3138	3143	3148	3153	3158	3163	3168	3173	3178	3183	3188	3193	3198	3203	3208	3213	3218	3223	3228	3233	3238	3243	3248	3253	3258	3263	3268	3273	3278	3283	3288	3293	3298	3303	3308	3313	3318	3323	3328	3333	3338	3343	3348	3353	3358	3363	3368	3373	3378	3383	3388	3393	3398	3403	3408	3413	3418	3423	3428	3433	3438	3443	3448	3453	3458	3463	3468	3473	3478	3483	3488	3493	3498	3503	3508	3513	3518	3523	3528	3533	3538	3543	3548	3553	3558	3563	3568	3573	3578	3583	3588	3593	3598	3603	3608	3613	3618	3623	3628	3633	3638	3643	3648	3653	3658	3663	3668	3673	3678	3683	3688	3693	3698	3703	3708	3713	3718	3723	3728	3733	3738	3743	3748	3753	3758	3763	3768	3773	3778	3783	3788	3793	3798	3803	3808	3813	3818	3823	3828	3833	3838	3843	3848	3853	3858	3863	3868	3873	3878	3883	3888	3893	3898	3903	3908	3913	3918	3923	3928	3933	3938	3943	3948	3953	3958	3963	3968	3973	3978	3983	3988	3993	3998	4003	4008	4013	4018	4023	4028	4033	4038	4043	4048	4053	4058	4063	4068	4073	4078	4083	4088	4093	4098	4103	4108	4113	4118	4123	4128	4133	4138	4143	4148	4153	4158	4163	4168	4173	4178	4183	4188	4193	4198	4203	4208	4213	4218	4223	4228	4233	4238	4243	4248	4253	4258	4263	4268	4273	4278	4283	4288	4293	4298	4303	4308	4313	4318	4323	4328	4333	4338	4343	4348	4353	4358	4363	4368	4373	4378	4383	4388	4393	4398	4403	4408	4413	4418	4423	4428	4433	4438	4443	4448	4453	4458	4463	4468	4473	4478	4483	4488	4493	4498	4503	4508	4513	4518	4523	4528	4533	4538	4543	4548	4553	4558	4563	4568	4573	4578	4583	4588	4593	4598	4603	4608	4613	4618	4623	4628	4633	4638	4643	4648	4653	4658	4663	4668	4673	4678	4683	4688	4693	4698	4703	4708	4713	4718	4723	4728	4733	4738	4743	4748	4753	4758	4763	4768	4773	4778	4783	4788	4793	4798	4803	4808	4813	4818	4823	4828	4833	4838	4843	4848	4853	4858	4863	4868	4873	4878	4883	4888	4893	4898	4903	4908	4913	4918	4923	4928	4933	4938	4943	4948	4953	4958	4963	4968	4973	4978	4983	4988	4993	4998	5003	5008	5013	5018	5023	5028	5033	5038	5043	5048	5053	5058	5063	5068	5073	5078	5083	5088	5093	5098	5103	5108	5113	5118	5123	5128	5133	5138	5143	5148	5153	5158	5163	5168	5173	5178	5183	5188	5193	5198	5203	5208	5213	5218	5223	5228	5233	5238	5243	5248	5253	5258	5263	5268	5273	5278	5283	5288	5293	5298	5303	5308	5313	5318	5323	5328	5333	5338	5343	5348	5353	5358	5363	5368	5373	5378	5383	5388	5393	5398	5403	5408	5413	5418	5423	5428	5433	5438	5443	5448	5453	5458	5463	5468	5473	5478	5483	5488	5493	5498	5503	5508	5513	5518	5523	5528	5533	5538	5543	5548	5553	5558	5563	5568	5573	5578	5583	5588	5593	5598	5603	5608	5613	5618	5623	5628	5633	5638	5643	5648	5653	5658	5663	5668	5673	5678	5683	5688	5693	5698	5703	5708	5713	5718	5723	5728	5733	5738	5743	5748	5753	5758	5763	5768	5773	5778	5783	5788	5793	5798	5803	5808	5813	5818	5823	5828	5833	5838	5843	5848	5853	5858	5863	5868	5873	5878	5883	5888	5893	5898	5903	5908	5913	5918	5923	5928	5933	5938	5943	5948	5953	5958	5963	5968	5973	5978	5983	5988	5993	5998	6003	6008	6013	6018	6023	6028	6033	6038	6043	6048	6053	6058	6063	6068	6073	6078	6083	6088	6093	6098	6103	6108	6113	6118	6123	6128	6133	6138	6143	6148	6153	6158	6163	6168	6173	6178	6183	6188	6193	6198	6203	6208	6213	6218	6223	6228	6233	6238	6243	6248	6253	6258	6263	6268	6273	6278	6283	6288	6293	6298	6303	6308	6313	6318	6323	6328	6333	6338	6343	6348	6353	6358	6363	6368	6373	6378	6383	6388	6393	6398	6403	6408	6413	6418	6423	6428	6433	6438	6443	6448	6453	6458	6463	6468	6473	6478	6483	6488	6493	6498	6503	6508	6513	6518	6523	6528	6533	6538	6543	6548	6553	6558	6563	6568	6573	6578	6583	6588	6593	6598	6603	6608	6613	6618	6623	6628	6633	6638	6643	6648	6653	6658	6663	6668	6673	6678	6683	6688	6693	6698	6703	6708	6713	6718	6723	6728	6733	6738	6743	6748	6753	6758	6763	6768	6773	6778	6783	6788	6793	6798	6803	6808	6813	6818	6823	6828	6833	6838	6843	6848	6853	6858	6863	6868	6873	6878	6883	6888	6893	6898	6903	6908	6913	6918</

WM	284	205	206	207	208	249	291	292	293	294	295	296	297	298	299	300	301	302	303	334	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325
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[illegible]

TABLE 88: 1° x 1° O, OCEAN TIDE GREENWICH PHASES δ° (DEG)

[illegible]

TABLE 98: 1° x 1° O₁ OCEAN TIDE AMPLITUDES ξ (CM)

NW	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000																																																																																																																																																																																																																																																																																																																									
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TABLE 9S: 1° x 1° O₁ OCEAN TIDE GREENWICH PHASES δ (DEG)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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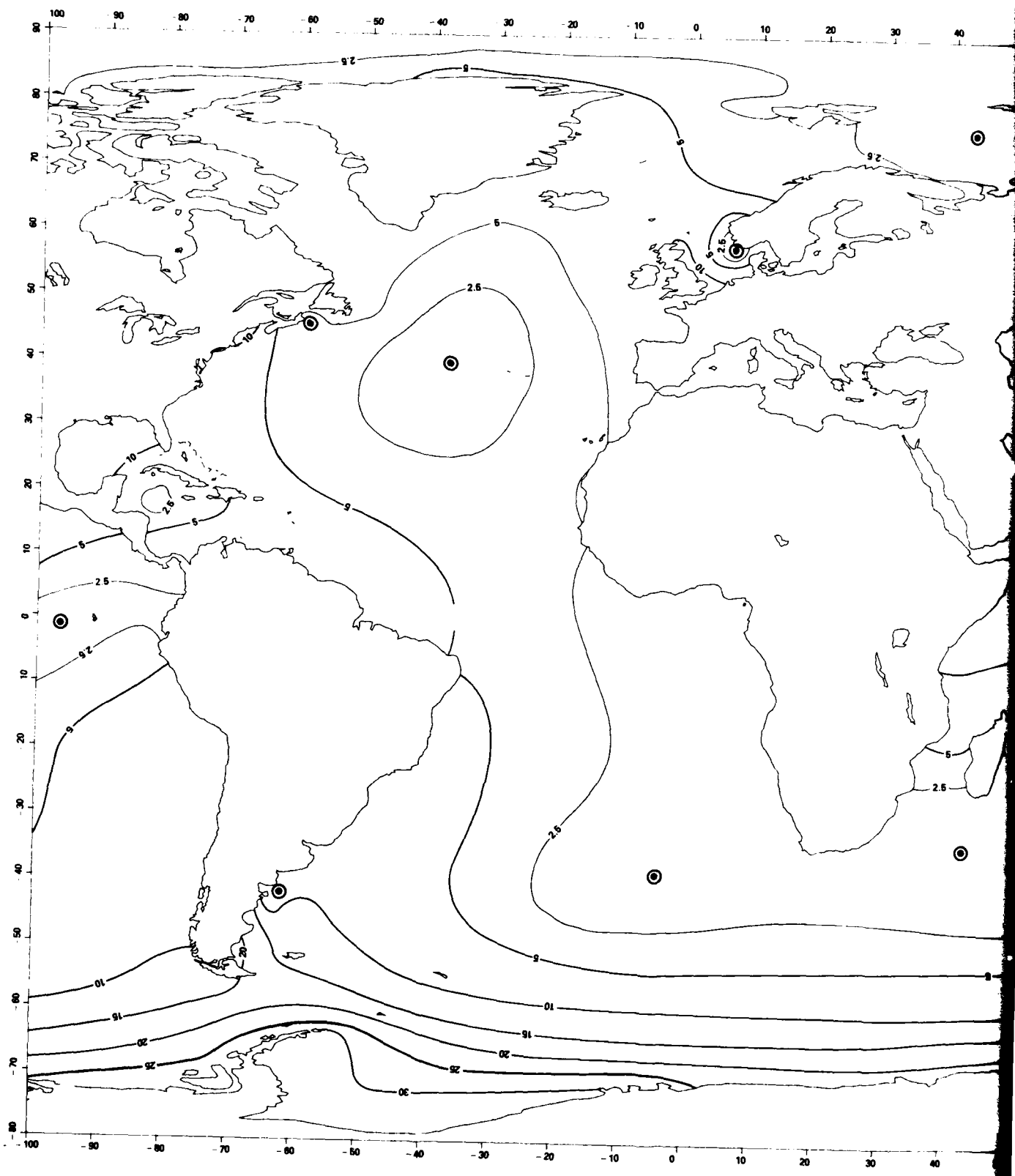
**ATLAS OF GLOBAL O₁ OCEAN TIDE
CORANGE AND COTIDAL MAPS**

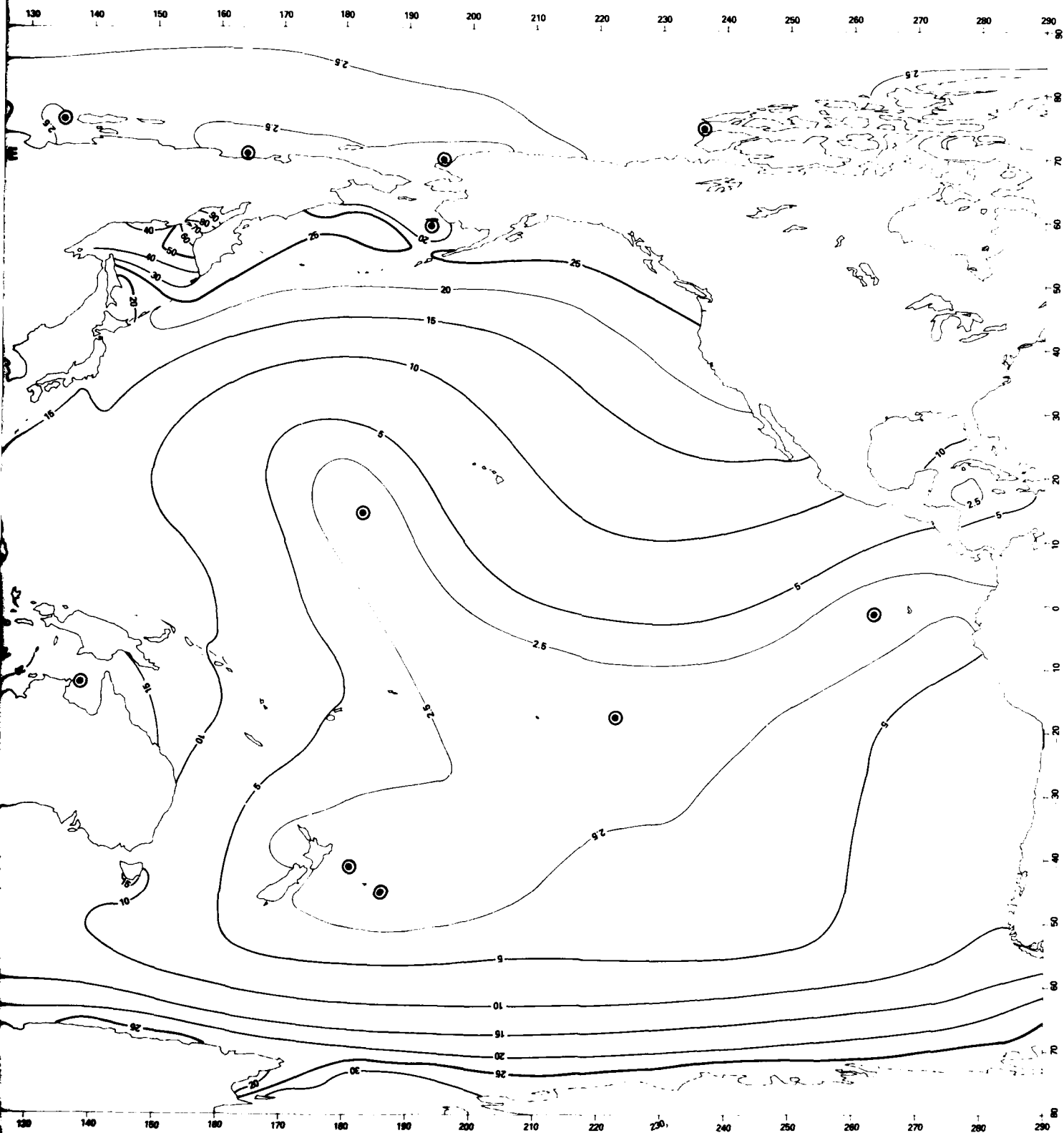
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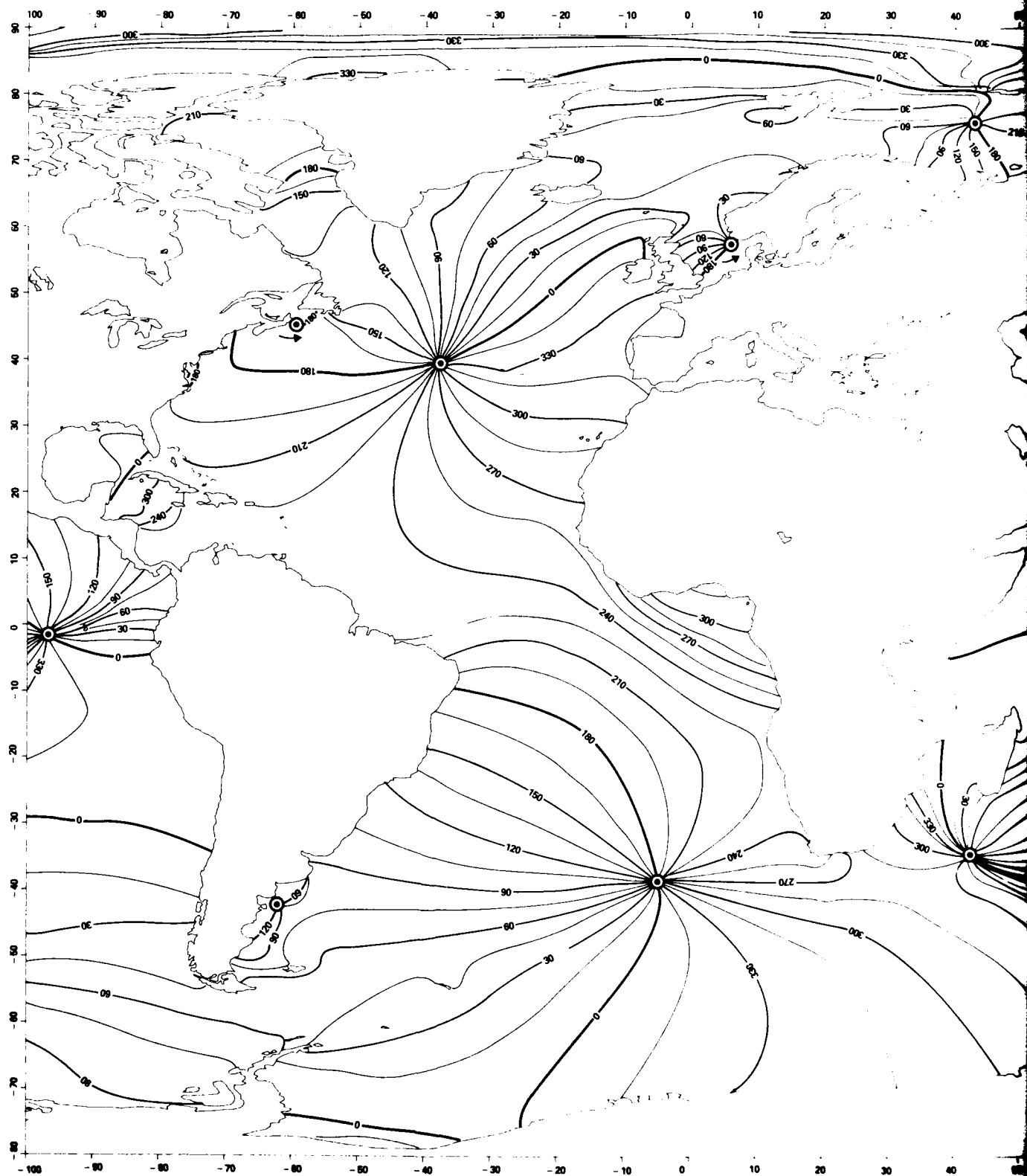
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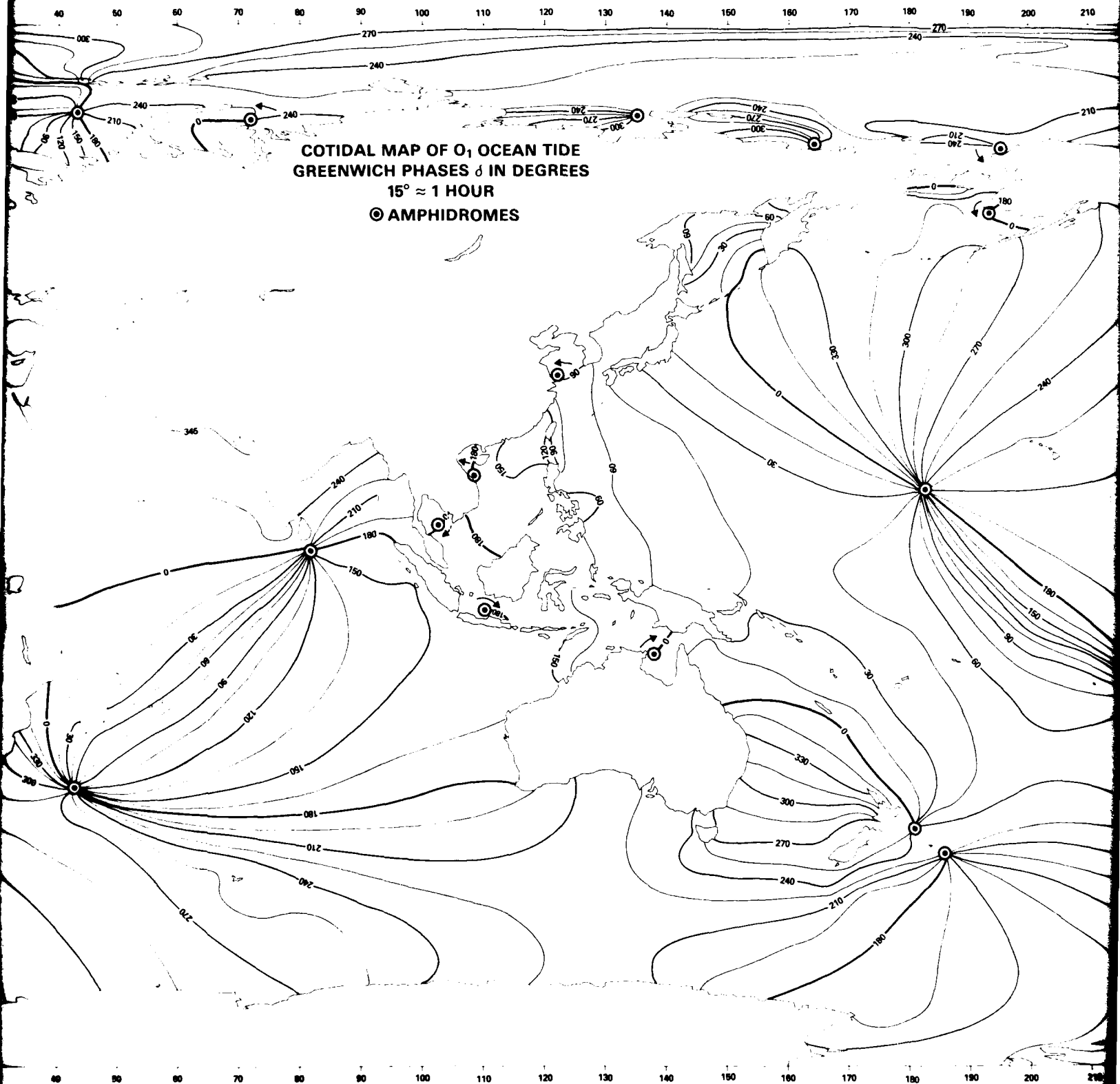
Amplitudes ξ of corange lines in cm.

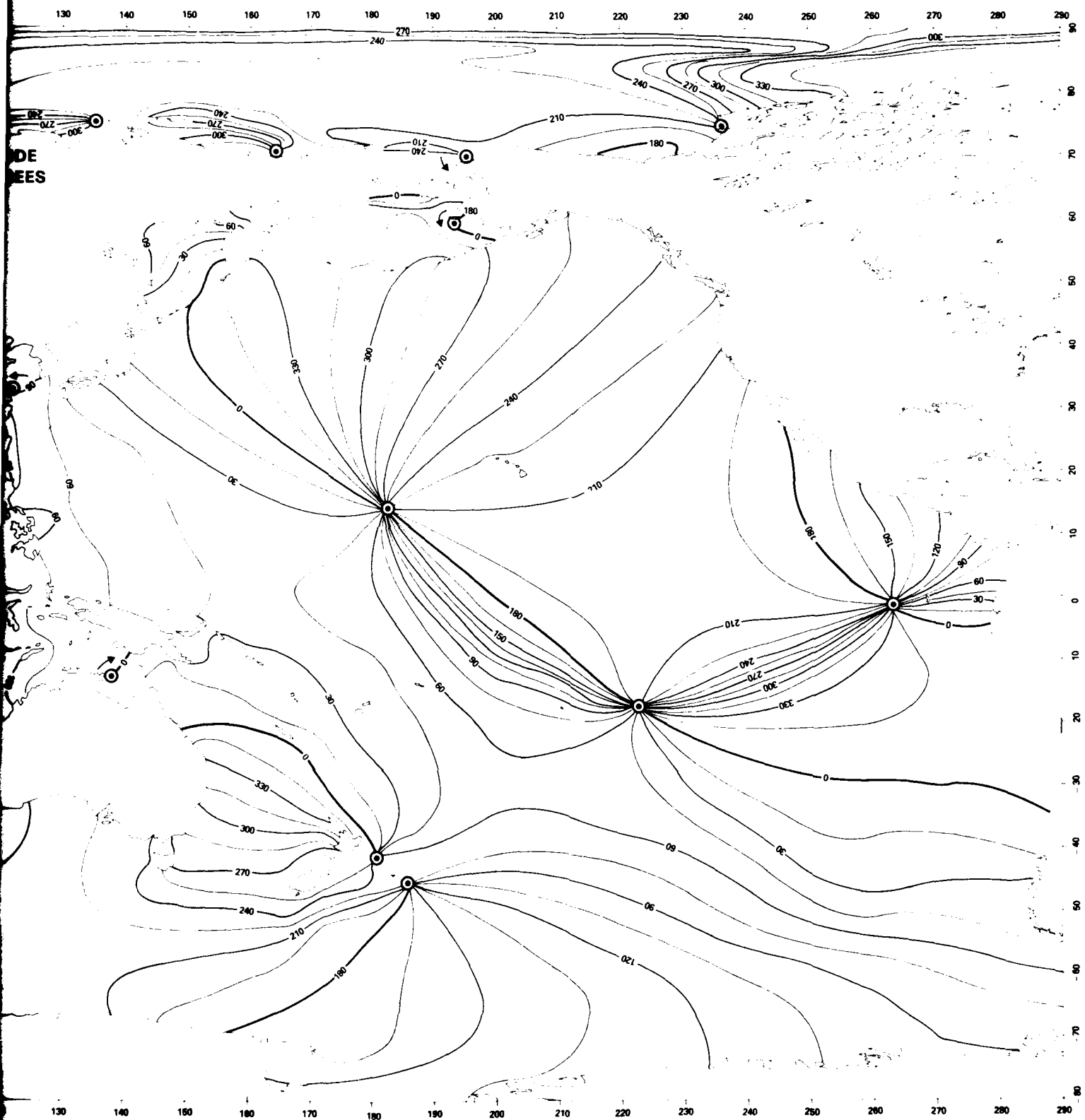
Greenwich phases δ of cotidal lines in 15, 30, 45, 60, 75, 90, 105, 120, 135, 150, 165, 180, 195, 210, 225, 240, 255, 270, 285, 300, 315, 330, 345, 360 = 0° where 15° $\approx$ 1 hour.



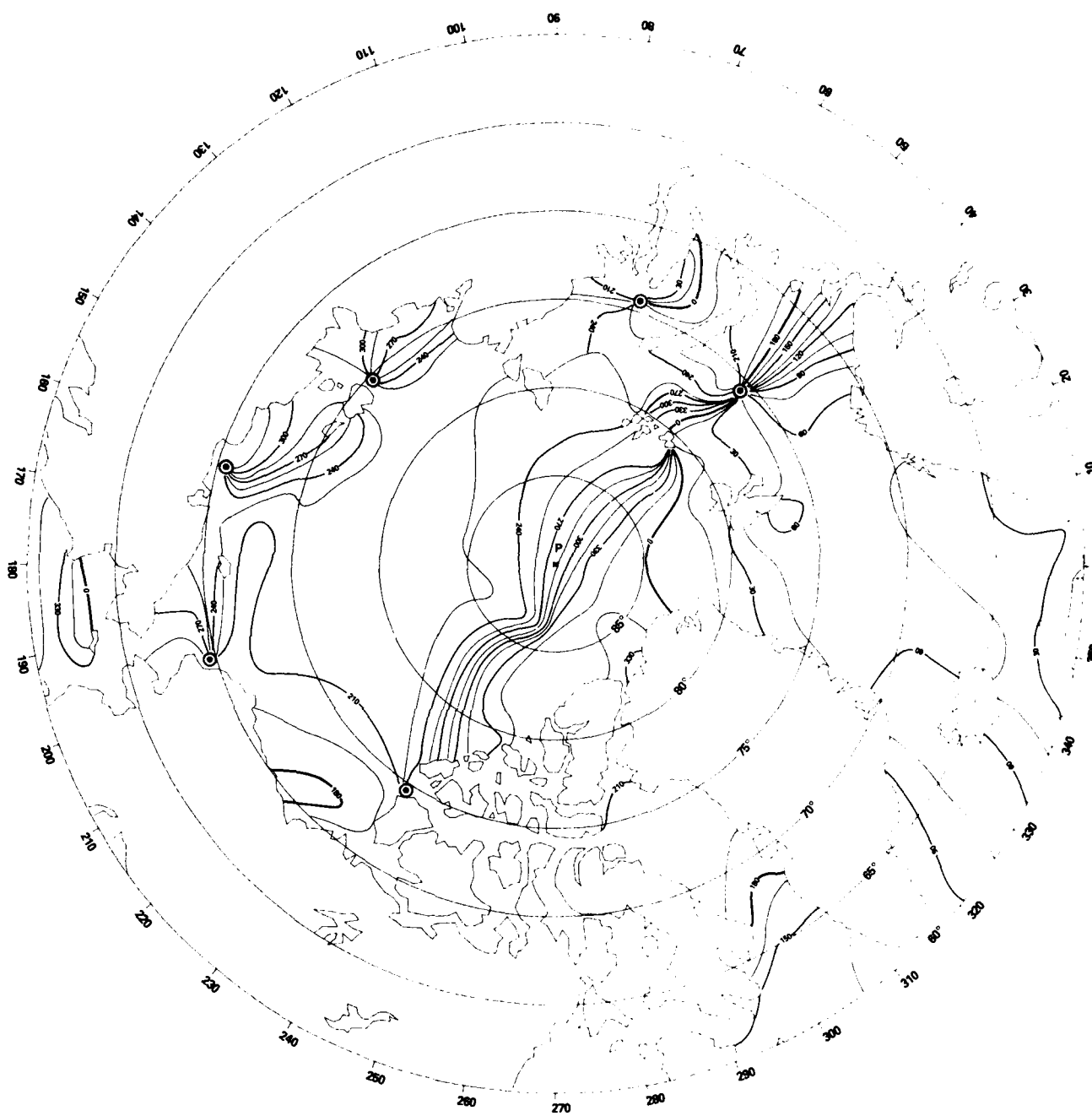












ARCTIC COTIDAL MAP OF O_1 OCEAN TIDE
 GREENWICH PHASES δ IN DEGREES
 $15^\circ \approx 1$ HOUR

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