

AD-A037 835

BELGIAN ROYAL OBSERVATORY UCCLE
TRANS WORLD TIDAL GRAVITY PROFILE. (U)
DEC 76 P MELCHIOR

F/G 8/5

UNCLASSIFIED

AFGL-TR-77-0037

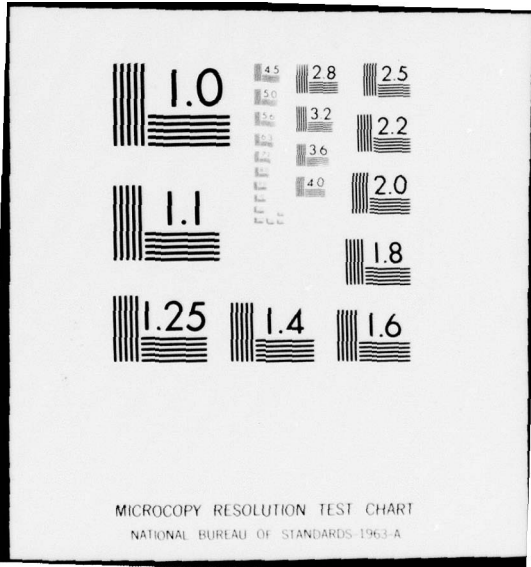
AF-AFOSR-2557-73
NL

| OF |
ADA037835



END

DATE
FILMED
4-77



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

ADA 037835

AFGL-TR-77-0037

①

TRANS WORLD TIDAL GRAVITY PROFILE

P. Melchior

Royal Observatory of Belgium
Avenue Circulaire, 3
B-1180 Brussels, Belgium

Belgium Royal Observatory

Scientific Report No. 3

406687

DDC
RECEIVED
MAR 31 1977
ALBANY NY

December 1976

Approved for public release; distribution unlimited

COPY AVAILABLE TO DDC DOES NOT
PERMIT FULLY LEGIBLE PRODUCTION

DDC FILE COPY

AIR FORCE GEOPHYSICS LABORATORY
AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE
HANSCOM AFB, MASSACHUSETTS 01731

19 REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
18 1. Report Number AFGL-TR-77-0037	2. Govt Accession No.	3. Recipient's Catalog Number	
6 4. Title (and Subtitle) TRANS WORLD TIDAL GRAVITY PROFILE.	9	5. Type of Report & Period Covered Interim Scientific Report, No. 3 1 June 1973 - 30 September 1976	
		6. Performing Org. Report Number	
10 7. Author(s) P./Melchior	15	8. Contract or Grant Number AF-AFOSR-73-2557-73	
9. Performing Organization Name and Address Royal Observatory of Belgium Avenue Circulaire, 3 B-1180 Brussels, Belgium		10. Program Element, Project, Task Area & Work Unit Numbers PE - 61102F Proj/Task: 2309/G1 WU: 2309G102	
11. Controlling Office Name and Address Air Force Geophysics Laboratory/LW Hanscom AFB Bedford, MA 01731	11	12. Report Date December 1976	
		13. Number of Pages 18	
14. Monitoring Agency Name and Address EOARD/LNG, Box 14 FPO New York 09510	12 24p.	15.	
16. & 17. Distribution Statement Approved for public release; distribution unlimited.			
18. Supplementary Notes			
19. Key Words GRAVIMETRY EARTH TIDES			
20. Abstract Tidal gravity profiles were established in Australia and Papua, New Guinea, commencing September 1974. Five stations were occupied in all using four tidal gravimeters. Data were analyzed at the International Center for Earth Tides, Brussels, and the results obtained are presented. The gravimeters were calibrated at the fundamental station established at Canberra. Uniformity is maintained with the Brussels fundamental station. It is assessed that the normalization coefficients for each instrument are correct to about 0.5% for the diurnal waves and about 1% for M_2 .			

406689

18

CONSEIL INTERNATIONAL DES UNIONS SCIENTIFIQUES
FEDERATION DES SERVICES PERMANENTS D'ASTRONOMIE
ET DE GEOPHYSIQUE (FAGS)

CENTRE INTERNATIONAL DES MAREES TERRESTRES

Directeur : P. MELCHIOR
Observatoire Royal de Belgique
Avenue Circulaire, 3
B - 1180 Bruxelles, Belgique

Tél. 71 33 01
Telex OBSBEL 21565

Trans World Tidal Gravity Profile

Grant AFCSR 73-2557

Interim Scientific Report n° 3

Period 1973 June 01 - 1976 September 30

This operation is conducted by the International Center for Earth Tides (ICET) with the support of the Department I (Fundamental Astronomy and Geodynamics) of the Royal Observatory of Belgium (ORB).

The program, the equipments used for it and the method of analysis of the data are described in the previous interim scientific reports n° 1 and n° 2 and will not be reproduced here.

Changes in the initial program of installation of stations had to be made to take profit of new informations and to spare travel expenses when possible. The main changes were the provisional abandon of the measurements planned in India where we encountered some difficulties and an extension of measurements in Australia, Indonesia, New Zealand where efficient support was provided to our project.

A	ACCESSION BY	WRITE SECTION
	NTIS	REF SECTION
BY	CLASSIFIED	<input type="checkbox"/>
JUSTIFICATION		<input type="checkbox"/>
BY	DISTRIBUTION AVAILABILITY CODES	
DATE	MAIL AND/OR SPECIAL	

It must be emphasized indeed that our project raised considerable interest in most of the countries. Efficient support was provided in Thailand and Malaysia for the transportation of the equipments and the preparation of suitable sites. Similar support was given in Australia, Indonesia and New Zealand but some financial support was also obtained there to cover part or total of the travel expenses inside the concerned country.

This has permitted to establish more stations than initially planned : 8 in Australia, 2 in New Zealand and up to 3 or 4 in Indonesia if the program is continued until 1978.

New stations established in 1976

The stations at Penang, Bandung, Noumea and Lauder have been described in previous reports as well as Canberra and Alice Springs still operating in 1976. Four new stations are described here :

Kuala Lumpur (Malaysia)

The gravimeter Geodynamics 765 was transferred from Penang to Kuala Lumpur by P. Melchior on november 8. The instrument is installed in the basement of the Department of Geology of the University of Malaysia.

After some readjustment between inner and outer thermostats it gave a very nice tidal curve.

The station was revisited on november 26 when returning from Indonesia and an excellent two weeks curve was brought back to Bruxelles.

Macassar/Ujung Pandang (Celebes - Indonesia)

The gravimeter La Coste Romberg 336 was transferred from Bandung to Macassar by P. Melchior on november 18. It had been used on november 16-17 to realize precise gravimetric ties between Bandung and Jakarta.

The installation at Macassar, in the Gowa Seismological station was quite easy despite the high temperature in this area.

A beautiful tidal curve was obtained from the third day of installation. It is to be noted that due to some electronic troubles the recorder used at Bandung had to be replaced by a new one brought from Bruxelles by Melchior.

Suva (Fiji)

The gravimeter La Coste Romberg 402 was transferred from Noumea to Suva by B. Ducarme on november 14. Also here the recorder had to be replaced by a new one that Ducarme brought with him.

This installation has been really difficult because of strike in Fiji Airlines but Ducarme succeeded to establish a good station within two days only.

The equipment is installed in the Vunikawai radio station (formerly a provisional seismic station) depending from Post and Telegraph of Fiji.

Hamilton (New Zealand, Northern Island)

Much help was provided by W. Reilly, Director of the Geophysical Department of New Zealand (DSIR). The equipment indeed was disconnected at Lauder and transferred to Hamilton by him so that B. Ducarme could instal it within a few days. The tidal curve just received at Bruxelles is of exceptional quality.

The station is installed in the basement of the building C in the room of mass spectrometer of the Faculty of Sciences of Waikato University.

Technical descriptions of these stations are given in Annex 2.

Calculations of the loading effects for all the station

Dr Henderschott very kindly sent us on a magnetic tape a digitized version of his cotidal map as well as another still unpublished version of it by M.E. Parke.

My assistant, M. Moens, has spent much of his time with the calculation of the indirect effects on the basis of Farrell's procedure, using the Zahel, Bogdanov, Hendershott and Parke maps.

For each station the influence of the different oceans was calculated separately with the aim to find which zone has the determining influence at each place.

Conclusions of this investigation should be available before 3 months.

The future of the project

The obtained results are very encouraging.

One can emphasize the consistency of the phases obtained in New Zealand and New Caledonia with those obtained along the east coast of Australia.

Five different instruments have been used in the six stations concerned (Charters Towers, Armidale, Canberra, Hobart, Lauder, Noumea) and, as shown on the map n° 1, give consistent results for the diurnal waves (K_1 , O_1) as well as for the semi-diurnal wave M_2 .

The same remark is to be made concerning our results in the South China Sea and the Gulf of Thailand (map n° 2) where our stations Hong Kong, Manila, Bangkok and Penang can be compared with the results obtained previously by UCLA at Baguic and Saigon. The station planned at Kota Kinabalu will be extremely interesting in this respect.

It is my feeling that the phases provide a very important constraint for the oceanic cotidal charts and therefore can be used efficiently to improve these maps.

Anyway the results until now obtained demonstrate a clear regional trend which is very different of this one observed in Europe by Melchior, Kuo and Ducarme (1976).

A densification of the network of stations in the other areas is needed and will surely help to understand the mechanism of this "regionality" and provide data for a correct computation of the periodic deformations in large areas of the Earth's surface.

I therefore plan to later install the equipments possibly in Colombo (Sri Lanka), Iran, Afghanistan, Irak, Saudi Arabia, Kuwait and Turkey when returning them towards Europe at the end of 1977.

However I presently try to maintain the five equipments in the remote area where they are, for two reasons :

Firstly it should be extremely expensive if we had to return there later on to add some needed station in the net. We must do the maximum we can now.

Secondly, I have some hope that in the course of 1977 I could be in a position to introduce a proposition to Academia Sinica to establish one or more stations in continental China. It is therefore convenient to keep the equipments not far from Hong Kong.

It is my intention to present for publication all the results now available within three months or so.

Annexes

- 1 - Time Table and Map of the profile in Asia and Pacific area
- 2 - Technical description of the four stations established in november 1976
- 3 - Detailed results of the analysis of the new data obtained at Penang, Bandung, Lauder, Noumea.
(Definitive results in Australia are given in Annex 5).
- 4 - Summary of all results so far obtained in the 21 stations where the measurements are completed.
- 5 - Preprint of a paper under publication which presents a discussion of the results of measurements in Australia and Papua New Guinea.

TRANS WORLD TIDAL GRAVITY PROFILE ASIA - PACIFIC

14/12/76

D NUMBER OF DAYS ANALYSED

INSTR.	STATION	EPOCH	D
G 084	0201 BRUXELLES	71 06 29 - 73 11 08	782
G 084	2501 BANGKOK	73 11 17 - 74 03 13	96
G 084	2502 CHIANG MAI	74 04 09 - 74 09 08	132
G 084	2450 KATHMANDU	74 09 30 - 75 03 14	80
G 084	4206 CANBERRA	75 04 04 - 75 07 03	86
G 084	4205 ARMIDALE	75 07 17 - 76 01 24	160
G 084	* 4209 ALICE SPRINGS	76 02 11 - 77 04	114
G 765	0201 BRUXELLES	75 09 14 - 76 03 27	170
G 765	2551 PENANG	76 04 04 - 76 11 07	164
G 765	* 2550 KUALA LUMPUR	76 11 11 -	
G 765	2555 KOTA KINABALU	77 04	
G 765	RIYADH		
G 765	BAGHDAD		
G 804	0201 BRUXELLES	73 08 02 - 73 11 10	94
G 804	2402 HYDERABAD	73 12 11 - 74 08 29	180
G 804	2401 DELHI	74 10 17 - 75 05	80
G 804	6405 NEW YORK	75 05 -	
G 804	0201 BRUXELLES	77	
L 003	0201 BRUXELLES	73 08 14 - 73 11 06	78
L 003	4011 MANILA	73 11 22 - 74 04 15	86
L 003	2601 HONG KONG	74 04 20 - 74 09 09	110
L 003	4160 PORT MORESBY	74 09 22 - 75 03 13	146
L 003	4206 CANBERRA	75 03 31 - 75 06 27	78
L 003	4208 BROKEN HILL	75 07 09 - 75 12 07	106
L 003	4207 CHARTERS TOWERS	75 12 14 - 76 05 10	92
L 003	4206 CANBERRA	76 05 21 - 76 11	82
L 003	* 0201 BRUXELLES	76 11 30 -	
L 008	4206 CANBERRA	75 07 22 - 75 11 02	94
L 008	4220 HOBART	75 11 11 - 76 04 30	130
L 008	4420 LAUDER NZ/S	76 05 30 - 76 11	82
L 008	* 4400 HAMILTON NZ/N	76 11 21 -	
L 336	0201 BRUXELLES	73 11 09 - 74 08 01	144
L 336	0315 SEVRES BPM	74 08 03 - 74 09 06	28
L 336	3000 CAIRO/HELWAN	74 09 26 - 75 03 04	72
L 336	4206 CANBERRA	75 03 30 - 75 06 27	88
L 336	4211 PERTH/MUNDARING	75 07 11 - 75 11 10	98
L 336	4210 DARWIN	75 12 12 - 76 04 05	88
L 336	4100 BANDUNG	76 04 12 - 76 11 15	126
L 336	* 4110 MACASSAR	76 11 20 - 77 04	
L 336	4150 JAYA PURA	77 04	
L 402	0201 BRUXELLES	76 03 05 - 76 05 15	60
L 402	4450 NOUMEA	76 06 22 - 76 11 08	80
L 402	* 4470 SUVA FIJI	76 11 17 -	

OS

MAP n°1

- CT Charter Towers
- A Armidale
- C Canberra
- H Hobart
- N Noumea
- L Lauder
- H Hamilton
- S Suva

-5°11' N
-3°06'

-1°36' } CT
-1°21' }

-2°39' } A
-1°08' }

-2°17' } C
-0°96' }

-4°14' } H
-2°55' }

-2°32' } L
-2°10' }

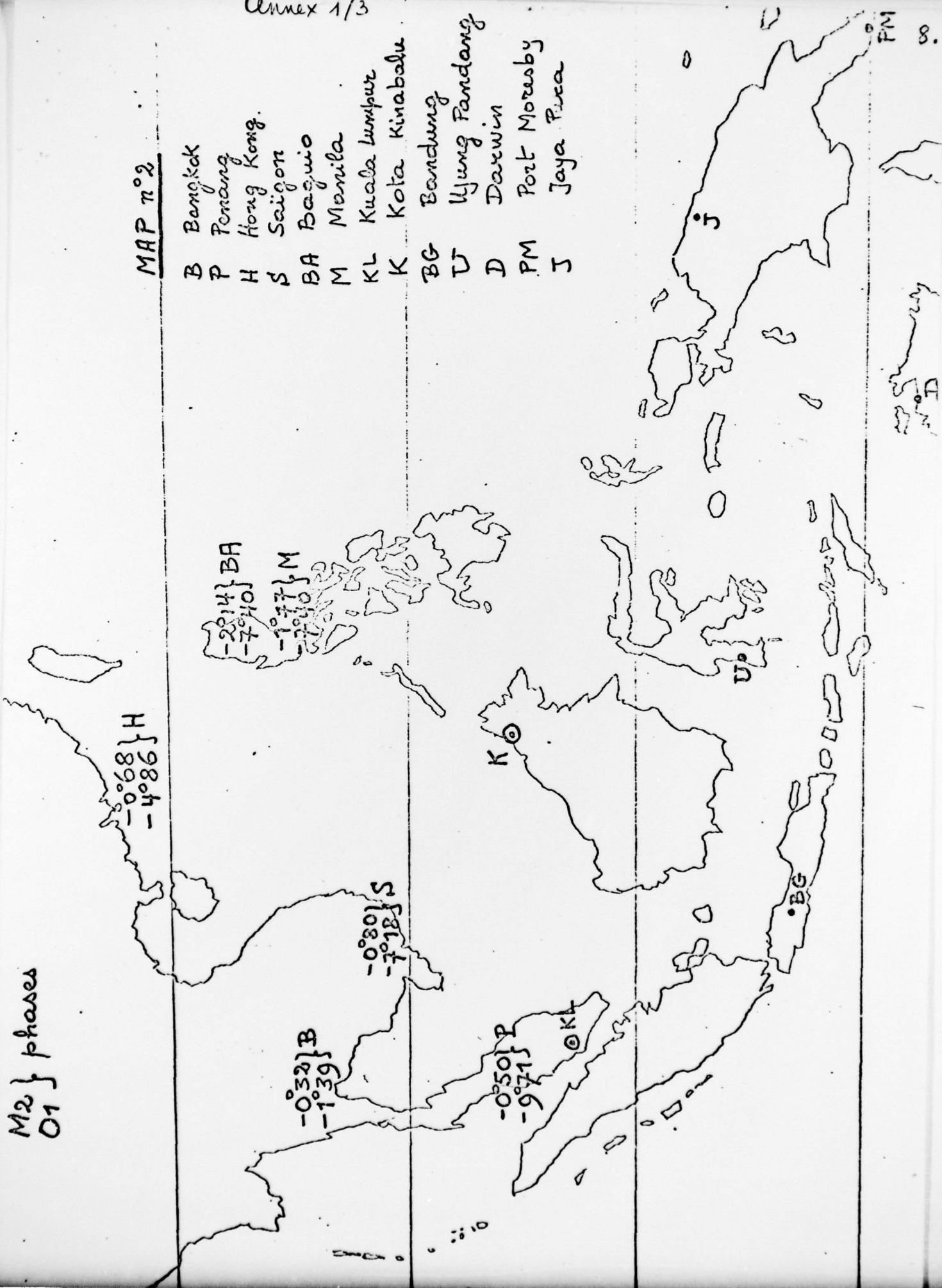


phases

MAP n°2

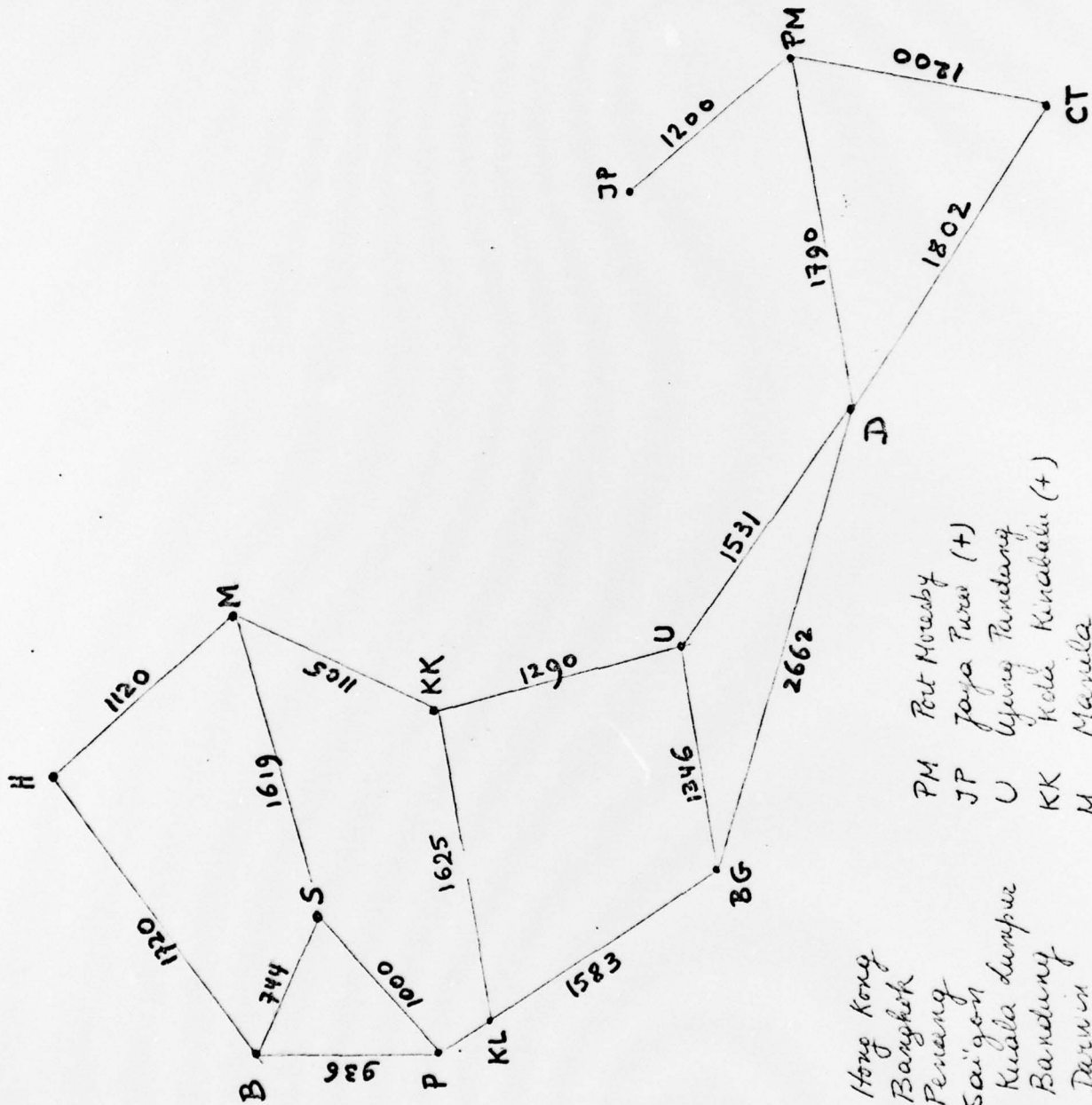
- B Bangkok
- P Penang
- H Hong Kong.
- S Saigon
- BA Baguio
- M Manila
- KL Kuala Lumpur
- K Kota Kinabalu
- BG Bandung
- U Ujung Pandang
- D Darwin
- PM Port Moresby
- J Jaya Pura

M2 } phases
O1 }



Annex 1/4

South East Asia and Northern Australia net
Distances given in kilometers



- H Hong Kong
- B Bangkok
- P Penang
- S Saigon
- KL Kuala Lumpur
- BG Bandung
- D Darwin
- CT Charter Towers
- PM Port Moresby
- JP Jaya Pura (+)
- U Ujung Pandang
- KK Kota Kinabalu (+)
- M Manila

(+) stations in project for 1977

7652550
 00 -101.654 3.122 0.032 978.0 0.66 1.40664 0.81
 TRANS WORLD PROFILE MALAYSIA STATION KUALA LUMPUR 11
 STATION 2550 KUALA LUMPUR VERTICAL COMPONENT SELANGOR-MALAYSIA
 3 07 N 101 39E H 32 M D 30KM 1
 UNIVERSITI MALAYA, DEPARTMENT OF GEOLOGY PROF.N.S.HAILE
 BUILDING ON SEDIMENTARY ROCKS / ARGILLITE AND SANDSTONE / 1
 OF THE KENNY HILL FORMATION, PROBABLY TRIASSIC OR PERMIAN 1
 GRAVIMETRE GEODYNAMICS 765 P.MELCHIOR TRANS WORLD PROFILES
 CALIBRATION BRUXELLES - FUNDAMENTAL STATION
 INSTALLATION P.MELCHIOR
 MAINTENANCE S.C.CHAN / C.T.TAN
 GRANT AFOSR-73-2557 A PROJECT-TASK 8607-02
 99
 GRAV GEO 765
 9999
 3364110
 00 -119.6333 -5.6666 0.028 978.0 1.24 1.00587 1.21
 TRANS WORLD PROFILE INDONESIA STATION UJUNG PANDANG 11
 STATION 4110 UJUNG PANDANG VERTICAL COMPONENT SULAWESI-INDONESIA
 5 4 S 119 38 E H 28 M P 0 M D 12KM
 STASIUN GEOFISIKA GOWA/ PUSAT METEOROLOGI DAN GEOFISIKA, UJUNG PANDANG 1
 UJUNG PANDANG IS MAKASSAR IN SULAWESI/CELEBES/
 IUGG NATIONAL COMMITTEE, J.RAIS
 GRAVIMETER LACOSTE-ROMBERG 336 P.MELCHIOR TRANS WORLD PROFILES
 CALIBRATION CANBERRA-FUNDAMENTAL STATION
 INSTALLATION P.MELCHIOR/Y.S.JOYODIWIRYO
 MAINTENANCE KADENAN
 GRANT AFOSR-73-2557 A PROJECT-TASK 8607-02
 99
 GRAV LCR 336

84400
 00 -175.317 -37.7833 0.030 979.5 1.44 1.0059 0.91
 TRANS WORLD PROFILE NEW ZEALAND STATION HAMILTON 11
 STATION 4400 HAMILTON VERTICAL COMPONENT NEW ZEALAND
 37 47 S 175 19 E H 30 M P D 40KM
 WAIKATO UNIVERSITY SCHOOL OF SCIENCE J.D.MC CRAW
 DEPT OF SCIENTIFIC AND INDUS.RES., GEOPHYSICAL DIVISION W.I.REILLY
 GRAVIMETER LACOSTE-ROMBERG 008 P.MELCHIOR TRANS WORLD PROFILES
 CALIBRATION CANBERRA-FUNDAMENTAL STATION
 INSTALLATION B.DUCARME
 MAINTENANCE A.PEPPER/R.HOLDSWORTH
 GRANT AFOSR-73-2557 A PROJECT-TASK 8607-02
 99
 GRAV LCR 008

4024460
 00 -178.4636 -18.0426 0.160 979.0 0.99 1.01197 0.48
 TRANS WORLD PROFILE FIJI ISLANDS STATION SUVA - VUNIKAWAI 11
 STATION 4460 SUVA - VUNIKAWAI VERTICAL COMPONENT VITI LEVU - FIJI
 MINERAL RESOURCES DIVISION R.N.RICHMOND 1
 18 03 S 178 28 E H 160 M P D 15KM
 GRAVIMETER LACOSTE-ROMBERG 402 P.MELCHIOR TRANS WORLD PROFILES
 CALIBRATION BRUXELLES - FUNDAMENTAL STATION
 INSTALLATION B.DUCARME
 MAINTENANCE K.DRAUNIDALO
 GRANT AFOSR-73-2557 A PROJECT-TASK 8607-02
 99
 GRAV LCR 402

TRANS WORLD PROFILE

MALAYSIA

STATION PENANG

STATION 2551 PENANG

VERTICAL COMPONENT

MALAYSIA

5 21 N 100 18 E

H 12 M P 10 M

D 1.2 KM

UNIVERSITI SAINS MALAYSIA PROF. CHATAR SINGH

BUNKER NEAR THE EAST COAST OF PENANG ISLAND

GRAVITIC INTRUSIVE ABOUT 15 KM BY 22 KM, SEPARATED FROM THE MAINLAND ABOUT 3KM

GRAVIMETER GEODYNAMICS 765 P.MELCHIOR TRANS WORLD PROFILES

CALIBRATION BRUXELLES-FUNDAMENTAL STATION

INSTALLATION B.DUCARME

MAINTENANCE PH. MARTIN/P.RYALL/C.L.SAMZ

GRANT AFOSR-73-2557A PROJECT-TASK 8607-02

METHODE DES MOINDRES CARRES / FILTRES VENEDIKOV / LECTURES HORAIRES

POTENTIEL CARTWRIGHT TAYLER EDDEN / DEVELOPPEMENT COMPLET

CORRECTION D INERTIE PROPORTIONNELLE AU CARRE DES VITESSES

CALCUL CENTRE INTERNATIONAL DES MAREES TERRESTRES /FAGS/ BRUXELLES

FACTEUR D ECHELLE 1.40664

TRAINAGE 01 0.81 M2 0.66 01/M2 1.23

RETARD INSTRUMENTAL 1470.99 MIN.

CORRECTION D ATTENUATION DIFFERENTIELLE M2/01 1.00922 /MODELE 2/

GEO	765	76	4	4	76	4	4	76	4	9	76	4	11	76	4	14	76	5	10
GEO	765	76	5	15	76	5	27	76	6	1	76	6	3	76	6	9	76	6	15
GEO	765	76	6	22	76	7	4	76	7	7	76	7	9	76	7	13	76	8	4
GEO	765	76	8	10	76	8	14	76	8	18	76	8	28	76	9	5	76	9	7
GEO	765	76	9	11	76	9	15	76	9	19	76	9	25	76	9	29	76	10	3
GEO	765	76	10	9	76	10	27												

NOMBRE TOTAL DE JOURS 164

3936 LECTURES

GRUPE	SYMBOLE	AMPLITUDE	PHASE	FACT.AMPL.	DEPHASAGE	AMPLITUDE
		EPOQUE	CENTRALE	EQM	EQM	MOYENNE
1-	62 01	1.1624	-1.56	1.3120	0.1366	1.3919
63-	88 01	5.7361	128.33	1.1546	0.0296	5.6338
89-	110 M1	0.7602	92.47	1.1866	0.2081	0.8109
111-	120 P1	2.8961	254.57	1.1329	0.0545	2.9728
121-	143 S1K1	7.5703	302.73	1.0501	0.0194	7.7247
144-	165 J1	0.4175	70.86	0.9346	0.2781	0.4797
166-	197 001	0.1202	335.84	1.1473	0.8509	0.1900

ERREUR Q.M. D 5.636430

GRUPE	SYMBOLE	AMPLITUDE	PHASE	FACT.AMPL.	DEPHASAGE	AMPLITUDE
		EPOQUE	CENTRALE	EQM	EQM	MOYENNE
198-	236 2N2	0.4616	77.67	1.1432	0.0446	3.1445
237-	260 N2	13.3971	132.38	1.1253	0.0091	16.5487
261-	286 M2	86.6660	270.80	1.1293	0.0017	86.4455
287-	300 L2	1.6914	214.21	0.9916	0.0569	2.2260
301-	309 S2	36.9697	21.65	1.1329	0.0038	37.9427
310-	347 K2	7.9225	264.67	1.1372	0.0175	8.4129

ERREUR Q.M. SD 5.125764

01/K1 1.0996 1-01/1-K1 3.0867 M2/01 0.9781

348-363 M3 1.5537 124.08 1.0687 0.0177 -1.55 0.95 1.6832

ERREUR Q.M. TD 1.052038

EPOQUE DE REFERENCE TJJ# 42976.0

TRANS WORLD PROFILE

INDONESIA

STATION BANDUNG

STATION 4100 BANDUNG

VERTICAL COMPONENT

JAVA - INDONESIA

6 54 S 107 38 E

H 714

D 70KM

INSTITUTE OF TECHNOLOGY BANDUNG PROF. J. RAIS

UNDERLAYER OF VERY THICK VOLCANIC DEPOSIT OF SAND & OTHER VOLC. PRODUCTS

GRAVIMETER LACOSTE-ROMBERG 336 P. MELCHIOR TRANS WORLD PROFILES

CALIBRATION BRUXELLES-FUNDAMENTAL STATION

INSTALLATION

B. DUCARME

MAINTENANCE

M. UNTUNG/Y. JOYODIWIRYO

GRANT AFOSR-73-2557A PROJECT-TASK 8607-02

METHODE DES MOINDRES CARRES / FILTRES VENEDIKOV / LECTURES HORAIRES

POTENTIEL CARTWRIGHT TAYLER EDDEN / DEVELOPEMENT COMPLET

CORRECTION D INERTIE PROPORTIONNELLE AU CARRE DES VITESSES

CALCUL CENTRE INTERNATIONAL DES MAREES TERRESTRES /FAGS/ BRUXELLES

FACTEUR D ECHELLE 1.00587

TRAINAGE 01 1.21 M2 1.24 01/M2 0.98

RETARD INSTRUMENTAL 1061.51 MIN.

CORRECTION D ATTENUATION DIFFERENTIELLE M2/01 1.01611 /MODELE 2/

LCR	336	76	4	11	76	4	21	76	4	25	76	5	3	76	5	7	76	5	7
LCR	336	76	5	12	76	5	20	76	5	22	76	5	22	76	5	25	76	6	4
LCR	336	76	6	8	76	6	18	76	6	22	76	6	24	76	6	27	76	6	29
LCR	336	76	7	2	76	7	4	76	7	7	76	8	28						

NOMBRE TOTAL DE JOURS 126

3024 LECTURES

GRUPE	SYMBOLE	AMPLITUDE	PHASE	FACT. AMPL.	DEPHASAGE	AMPLITUDE
		EPOQUE	CENTRALE	EQM	EQM	MOYENNE
1-	62 Q1	1.5799	151.77	1.4936	0.2572	1.6945
63-	88 O1	7.6735	297.82	1.1669	0.0450	7.5674
89-	110 M1	0.9954	360.83	1.0169	0.2853	1.0250
111-	120 P1	5.2217	134.14	1.5888	0.0901	5.2859
121-	143 S1K1	10.8049	120.95	1.1641	0.0315	10.9558
144-	165 J1	0.5117	266.59	1.3550	0.6873	0.5597
166-	197 O01	0.1576	132.52	1.1368	1.3560	0.2387

ERREUR Q.M. D 10.003016

GRUPE	SYMBOLE	AMPLITUDE	PHASE	FACT. AMPL.	DEPHASAGE	AMPLITUDE
		EPOQUE	CENTRALE	EQM	EQM	MOYENNE
198-	236 2N2	2.0387	353.07	1.1329	0.0942	2.5343
237-	260 N2	16.5253	85.82	1.2358	0.0172	17.3897
261-	286 M2	95.2520	223.20	1.2508	0.0031	95.2440
287-	300 L2	2.6270	164.18	1.5162	0.1247	2.7741
301-	309 S2	39.2227	37.95	1.2108	0.0073	39.7978
310-	347 K2	7.8797	223.52	1.1574	0.0331	8.3541

ERREUR Q.M. SD 8.090041

01/K1 1.0024 1-01/1-K1 1.0170 M2/01 1.0719

EPOQUE DE REFERENCE TJJ# 42949.0

TRANS WORLD PROFILE

NEW ZEALAND

STATION LAUDER

STATION 4420 LAUDER

VERTICAL COMPONENT

NEW ZEALAND

STATION AURORAL J.G.KEYS

45 02 S 169 41 E

H 364 M

P 1 M

D 100KM

GRAVIMETRE LACOSTE-ROMBERG 008 P.MELCHIOR TRANS WORLD PROFILES

CALIBRATION CANBERRA - FUNDAMENTAL STATION

INSTALLATION M.VAN RUYMBEKE

MAINTENANCE P.JOHNSTON/D.ROWLES

GRANT AFOSR-73-2557 A PROJECT-TASK 8607-02

METHODE DES MOINDRES CARRÉS / FILTRES VENEDIKOV / LECTURES HORAIRES

POTENTIEL CARTWRIGHT TAYLER EDDEN / DEVELOPPEMENT COMPLET

CORRECTION D INERTIE PROPORTIONNELLE AU CARRE DES VITESSES

CALCUL CENTRE INTERNATIONAL DES MAREES TERRESTRES /FAGS/ BRUXELLES

FACTEUR D ECHELLE 1.00059

IRAINAGE 01 0.91 M2 1.44 01/M2 0.63

RETARD INSTRUMENTAL 513.90 MIN.

CORRECTION D ATTENUATION DIFFERENTIELLE M2/01 1.01181 /MODELE 2/

LCR 008	76 5 31	76 6 4	76 6 17	76 6 17	76 6 29	76 7 3
LCR 008	76 7 7	76 7 7	76 7 11	76 7 17	76 7 25	76 7 29
LCR 008	76 8 4	76 9 11	76 9 13	76 10 9	76 10 13	76 11 2
LCR 008	76 11 5	76 11 7				

NOMBRE TOTAL DE JOURS 124 2976 LECTURES

GRUPE SYMBOLE	AMPLITUDE	PHASE	FACT.AMPL.	DEPHASAGE	AMPLITUDE
	EPOQUE	CENTRALE	EQM	EQM	MOYENNE
1- 62 Q1	5.8717	14.07	1.2481 0.0525	-4.38 2.41	6.4172
63- 88 O1	32.6073	242.90	1.2351 0.0103	-1.54 0.48	32.5287
89-110 M1	2.9058	328.81	1.3390 0.1175	0.35 5.03	3.0056
111-120 P1	18.5111	110.40	1.3215 0.0193	-4.06 0.84	18.8619
121-143 S1K1	45.6982	229.94	1.1551 0.0071	-2.79 0.35	45.8545
144-165 J1	2.7393	113.89	1.3834 0.1189	7.38 4.90	3.0794
166-197 O01	1.1832	34.44	1.2591 0.2766	-9.23 12.61	1.2068

ERREUR Q.M. D 9.115340

GRUPE SYMBOLE	AMPLITUDE	PHASE	FACT.AMPL.	DEPHASAGE	AMPLITUDE
	EPOQUE	CENTRALE	EQM	EQM	MOYENNE
198-236 2N2	0.8383	146.04	1.0608 0.1791	-8.74 9.75	1.4487
237-260 N2	8.2458	66.74	1.2020 0.0348	-3.20 1.67	9.2748
261-286 M2	45.8101	298.61	1.1810 0.0069	-1.85 0.34	45.7246
287-300 L2	0.6261	-11.72	0.9288 0.3226	-37.45 20.08	0.7257
301-309 S2	18.4582	160.20	1.1024 0.0160	-1.36 0.84	18.7836
310-347 K2	4.3632	107.78	1.2352 0.0732	2.07 3.43	4.6434

ERREUR Q.M. SD 8.978478

01/K1	1.0692	1-01/1-K1	1.5153	M2/01	0.9562	
348-363 M3	0.4674	189.50	1.0761	0.1047	-7.81	5.69 0.6081

ERREUR Q.M. TD 1.944239
EPOQUE DE REFERENCE TJJ# 43010.0

TRANS WORLD PROFILE

NOUVELLE CALEDONIE

STATION NOUMEA

STATION 4450 NOUMEA

VERTICAL COMPONENT

NOUVELLE CALEDONIE

O.R.S.T.O.M. J.DUBOIS

22 19 S 166 27 E H 130 M P 2 M D 1 KM

GRAVIMETRE LACOSTE-ROMBERG 402 P. MELCHIOR TRANS WORLD PROFILES

CALIBRATION BRUXELLES - FUNDAMENTAL STATION

INSTALLATION M.VAN RUYMBEKE

MAINTENANCE F.MISSEGUE/R.LOUAT

GRANT AFOSR-73-2557 A PROJECT-TASK 8607-02

METHODE DES MOINDRES CARRES / FILTRES VENEDIKOV / LECTURES HORAIRES

POTENTIEL CARTWRIGHT TAYLER EDDEN / DEVELOPPEMENT COMPLET

CORRECTION D INERTIE PROPORTIONNELLE AU CARRE DES VITESSES

CALCUL CENTRE INTERNATIONAL DES MAREES TERRESTRES /FAGS/ BRUXELLES

FACTEUR D ECHELLE 1.01197

TRAINAGE O1 0.48 M2 0.99 O1/M2 0.48

RETARD INSTRUMENTAL 12.98 MIN.

CORRECTION D ATTENUATION O1 1.00003 M2 1.00015 /MODELE 1/

LCR	402	76	6	23	76	7	17	76	7	20	76	7	26	76	7	30	76	7	30
LCR	402	76	8	4	76	8	14	76	8	18	76	9	1	76	9	6	76	9	6
LCR	402	76	9	10	76	9	10	76	9	14	76	9	22	76	9	27	76	9	27

NOMBRE TOTAL DE JOURS 80 1920 LECTURES

GRUPE	SYMBOLE	AMPLITUDE	PHASE	FACT.AMPL.	DEPHASAGE	AMPLITUDE
		EPOQUE	CENTRALE	EQM	EQM	MOYENNE
1- 62	Q1	3.6245	16.37	1.3012	0.1364	4.1884
63- 88	O1	21.8000	131.66	1.1640	0.0232	21.8225
89-110	M1	1.7262	112.05	1.0968	0.2617	1.7774
111-143	P1S1K1	29.9418	198.59	1.0777	0.0145	30.2894
144-165	J1	1.9534	344.75	1.5813	0.3274	2.0726
166-197	001	1.3935	145.92	2.1241	0.6594	1.3622

ERREUR Q.M. D 11.669850

GRUPE	SYMBOLE	AMPLITUDE	PHASE	FACT.AMPL.	DEPHASAGE	AMPLITUDE
		EPOQUE	CENTRALE	EQM	EQM	MOYENNE
198-236	2N2	0.7943	252.22	1.1439	0.2642	1.5901
237-260	N2	14.2706	74.06	1.2967	0.0370	15.0919
261-286	M2	87.3559	172.98	1.3158	0.0062	87.2711
287-300	L2	1.6399	80.47	1.4643	0.3235	1.8926
301-347	S2K2	38.1308	140.22	1.2250	0.0135	36.4003

ERREUR Q.M. SD 11.132982

O1/K1 1.0801 1-O1/1-K1 2.1115 M2/O1 1.1304

GRUPE	SYMBOLE	AMPLITUDE	PHASE	FACT.AMPL.	DEPHASAGE	AMPLITUDE
		EPOQUE	CENTRALE	EQM	EQM	MOYENNE
348-363	M3	1.2054	150.01	0.9774	0.0920	1.2183

ERREUR Q.M. TD 2.993405
EPOQUE DE REFERENCE TJJ# 43000.0

TRANS WORLD TIDAL GRAVITY PROFILES

ASIA - PACIFIC

	N	M2	N2	S2	K2	M2	N2	S2	K2	INST
HYDERABAD	180	1.1506	1.129	1.153	1.186	-0.36	-0.79	0.46	1.49	G 804
NEW DELHI	32	1.1546	1.178	1.157		-1.44	-3.29	-1.73		L 002
NEW DELHI	80	1.1901	1.182	1.213		0.32	-0.27	-0.82		G 804
KATHMANDU	80	1.1870	1.182	1.187		-0.27	-1.10	0.44		G 084
CHIANG MAI	132	1.1884	1.194	1.166		-0.32	-0.53	0.36		G 084
BANGKOK	96	1.1871	1.172	1.178		-0.32	0.20	-0.26		G 084
SAIGON	38	1.1565	1.110	1.158		-0.80	-3.52	0.24		L 002
PENANG	164	1.1293	1.125	1.133	1.137	-0.45	0.53	0.56	-0.02	G 765
HONG KONG	110	1.2746	1.222	1.289		-0.68	-1.76	-0.48		L 003
MANILA	86	1.1765	1.059	1.178		-1.77	1.59	-1.20		L 003
BAGUIO	42	1.2035	1.209	1.215		-2.14	-0.16	-1.46		L 002
BANDUNG	126	1.2508	1.236	1.211		-1.37	-1.04	3.59		L 336
WAKE	36	1.1705	1.172	1.218		1.18	-0.17	0.47		L 002
P. MORESBY	152	1.2319	1.267	1.279		-0.37	-2.89	0.90		L 003
CANBERRA	86	1.2097	1.217	1.196		-2.17	-1.97	-0.59		G 084
CANBERRA	78	1.2250	1.244	1.219		-2.17	-0.95	1.18		L 003
CANBERRA	96	1.2038	1.234	1.179		-2.17	-3.26	-1.00		L 008
CANBERRA	88	1.2057	1.203	1.191		-2.17	-3.71	-0.23		L 336
DARWIN	112	1.2044	1.186	1.243		0.95	-0.38	-1.28		L 336
CHARTERS TOW.	106	1.2368	1.265	1.256		-1.36	1.31	-1.11		L 003
ARMIDALE	160	1.1997	1.217	1.155	1.197	-2.39	-2.36	-1.11	0.62	G 084
ALICE SPRINGS	114	1.1730	1.155	1.166		-0.42	-0.60	1.19		G 084
BROKEN HILL	86	1.1587	1.235	1.187		-0.14	-0.61	-0.45		L 003
PERTH/MUND.	98	1.2375	1.224	1.222		0.40	1.02	-0.26		L 336
HOBART	130	1.2033	1.238	1.178		-4.14	-6.87	0.11		L 008
LAUDER	82	1.1723	1.239	1.107	1.203	-2.32	-2.49	-2.39		L 008
NOUMEA	80	1.3158	1.297	1.225		-5.01	-4.87	-3.68		L 402
MIZUSAWA	316	1.2211	1.220	1.243	1.250	1.25	1.73	0.48	-0.59	L 305
HELWAN/CAIRO	72	1.1701	1.300	1.123		-2.09	0.02	-3.15		L 336
BU CRAA	126	1.2109	1.156	1.096	1.224	1.34	0.49	-0.09	-2.47	A 212

	N	K1	P1	O1	Q1	K1	P1	O1	Q1	INST
HYDERABAD	180	1.1100	1.024	1.1531	1.038	-0.87	3.31	1.92	-0.97	G 804
NEW DELHI	32	1.1209		1.1524	1.168	-0.57		-0.61	-0.03	L 002
NEW DELHI	80	1.1969		1.1633	1.145	5.12		-0.10	1.39	G 804
KATHMANDU	80	1.1694		1.1743	1.163	0.29		0.62	4.78	G 084
CHIANG MAI	132	1.1041		1.1559	1.290	0.82		-2.12	-2.03	G 084
BANGKOK	96	1.1560		1.2192	1.274	-3.36		-1.39	-2.85	G 084
SAIGON	38	1.0487		1.1950	1.508	-8.64		-7.18	-6.86	L 002
PENANG	164	1.0501	1.133	1.1546	1.312	-7.44	-2.46	-9.71	-3.12	G 765
HONG KONG	110	1.2129		1.2737	1.287	-4.11		-4.86	-6.49	L 003
MANILA	86	1.1544		1.1582	1.051	-4.47		-7.40	-11.31	L 003
BAGUIO	42	1.1489		1.2139	1.322	-5.09		-7.40	-8.75	L 002
BANDUNG	126	1.1641		1.1669		8.54		9.50		L 336
WAKE	36	1.1856		1.2403	1.120	-2.55		-1.22	-4.85	L 002
P. MORESBY	152	0.9445		1.0690	1.030	7.45		-0.14	-7.41	L 003
CANBERRA	86	1.1641		1.1940	1.163	-0.39		-0.96	2.59	G 084
CANBERRA	78	1.1574		1.1940	1.309	-0.99		-0.96	3.40	L 003
CANBERRA	96	1.1511		1.1940	1.304	-1.63		-0.96	-2.35	L 008
CANBERRA	88	1.1545		1.1940	1.233	-0.57		-0.96	-2.40	L 336
DARWIN	112	1.2315		1.2730	1.323	-8.38		-1.59	3.09	L 336
CHARTERS TOW.	106	1.1329		1.1894	1.131	0.63		-1.21	0.31	L 003
ARMIDALE	160	1.1075	1.118	1.1585	1.189	-0.34	-0.29	-1.08	-1.15	G 084
ALICE SPRINGS	114	1.1510		1.1703	1.202	-0.46		1.51	2.98	G 084
BROKEN HILL	86	1.1307		1.1489	1.223	-0.41		-0.21	-1.27	L 003
PERTH/MUND.	98	1.2418		1.2413	1.292	2.32		2.54	3.63	L 336
HOBART	130	1.2102		1.2516	1.277	-2.94		-2.25	-2.71	L 008
LAUDER	82	1.1658		1.2339	1.257	-2.85		-2.10	-3.85	L 008
NOUMEA	80	1.0777		1.1640	1.301	-0.87		-3.06		L 402
MIZUSAWA	316	1.2236	1.213	1.2431	1.252	-0.09	-1.76	0.63	1.26	L 305
HELWAN/CAIRO	72	1.1448		1.1594	1.267	-1.59		-1.41	6.57	L 336
BU-CRAA	126	1.0912	1.182	1.2606	1.274	-7.22	-30.86	0.60	-4.32	A 212

TRANS WORLD TIDAL GRAVITY PROFILE

ASIA

	G	N	A 01/K1	B 1-01 1-K1	C M2/01	01
HYDERABAD	G 804	180	1.0388	1.3910	0.9978	1.92
NEW DELHI	G 804	80	0.9719	0.8293	1.0230	-0.10
NEW DELHI	L 2	32	1.0281	1.2608	1.0019	-0.61
KATHMANDU	G 84	80	1.0042	1.0287	1.0108	0.62
CHIANG MAI	G 84	132	1.0469	1.4975	1.0281	-2.12
BANGKOK	G 84	96	1.0547	1.4053	0.9737	-1.39
SAIGON	L 2	38	1.1395	4.0013	0.9678	-7.18
PENANG	G 765	164	1.0996	3.0867	0.9781	-9.71
MANILA	L 3	86	1.0033	1.0248	1.0158	-7.40
BAGUIO	L 2	42	1.0565	1.4363	0.9914	-7.40
HONG KONG	L 3	110	1.0501	1.2856	1.0007	-4.86
BANDUNG	L 336	126	1.0024	1.0170	1.0719	1 9.50
PORT MOR.	L 3	152	1.1319		1.1524	-0.14
CANBERRA	G 84	86	1.0257	1.1822	1.0131	-0.96
CANBERRA	L 3	78	1.0316	1.2325	1.0260	-0.96
CANBERRA	L 8	96	1.0373	1.2841	1.0082	-0.96
CANBERRA	G 336	88	1.0343	1.2562	1.0098	-0.96
DARWIN	L 336	112	0.9446	0.7909	0.9731	-0.47
CHART.TOW.	L 003	106	1.0499	1.4252	1.0398	-1.21
ARMIDALE	G 084	160	1.0460	1.4743	1.0356	-1.08
ALICE SPR.	G 084	114	1.0168	1.1278	1.0023	1.51
BROKEN HILL	L 003	86	1.0160	1.1388	1.0086	-0.21
PERTH/MUND	L 336	98	1.0337	1.1792	0.9461	-1.59
LAUDER	L 8	82	1.0584	1.4107	0.9501	-2.10
NOUMEA	L 402	80	1.0801	2.1112	1.1304	-3.06
MIZUSAWA	G 163	66	1.0279	1.1382	0.9592	1.12
MIZUSAWA	L 305	316	1.0160	1.0874	0.9823	0.63
WAKE	L 2	36	1.0461	1.2943	0.9437	-1.22
TEHERAN	A 119	1650	1.0073	1.0796	1.0450	0.43
HELWAN	L 336	72	1.0128	1.1013	1.0092	-1.41
BU-CRAA	A 212	126	1.1551	2.8554	0.9606	0.60

M3 COMPONENT IN TIDAL GRAVITY MEASUREMENTS

LAT	STATION	N	A	δ_3	E.Q.M.	α_3	E.Q.M.	INSTR
05 21	PENANG	164	1.67	1.0687	0.0177	-1.55	0.95	G 765
-06 54	BANDUNG	126	1.64	1.1039	0.0803	-7.07	4.25	L 336
-09 25	PORT MORESBY	146	1.54	1.0716	0.0351	0.13	1.95	L 003
-12 51	DARWIN	112	1.70	1.1814	0.1041	2.92	5.13	L 336
13 48	BANGKOK	96	1.50	1.1088	0.0694	3.77	3.61	G 084
14 38	MANILA	86	1.20	0.9304	0.0654	2.62	4.12	L 003
17 25	HYDERABAD	180	1.35	1.0074	0.0619	1.07	3.52	G 804
18 47	CHIANG MAI	132	1.47	1.1354	0.0412	1.61	2.10	G 084
-20 05	CHARTERS T.	106	1.36	1.0694	0.0799	-0.49	4.50	L 003
22 18	HONG KONG	110	1.21	1.0389	0.0782	-6.10	4.57	L 003
-22 19	NOUMEA	80	1.21	0.9774	0.0920	-7.88	5.25	L 402
-23 43	ALICE SP.	114	1.30	1.0554	0.0422	0.77	2.29	G 084
27 40	KATHMANDU	80	1.23	1.1173	0.0428	0.32	2.19	G 084
-30 35	ARMIDALE	160	1.03	1.0476	0.0372	-0.67	2.05	G 084
-31 59	PERTH	98	1.06	1.1119	0.0366	-0.39	1.89	L 336
-45 02	LAUDER	124	0.61	1.0761	0.1047	-7.81	5.69	G 008

LAT LATITUDE OF THE STATION

N NUMBER OF DAYS ANALYSED

A AMPLITUDE IN MICROGALS

INSTR INSTRUMENT - G - GEODYNAMICS

L - LA COSTE ROMBERG