IONOSONDE NETWORK ADVISORY GROUP (INAG)*

IONOSPHERIC STATION INFORMATION BULLETIN NO. 53**

* Under the auspices of Commision G. Working Group G.1 of the International Union of Radio Science (URSI).

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1. *COMMENTS FROM THE CHAIR*

INAG exists to advise the ionosonde network on how to operate ionosondes, scale the ionograms and pool the data that result from this activity. When INAG was established, little was known about the global ionosphere and contradictory results could be deduced from the same data if unconventional analysis methods were used. Thus, more than anything else, INAG has become associated with maintaining an homogeneous data set by supporting a consistent set of rules for scaling ionograms.

Various simple but powerful ideas underpinned the approach (see UAG 23). However, scaling is a subjective activity and the normal scientific error analysis cannot be used to quantify the results of scaling ionograms. Bounds on reasonable errors can be set, but without continual cross checking between scalers to establish that the subjectivity has concrete limits, scaling will drift. This drift is a product of diligence - scalers seeking to record "more" or record "better" what they otherwise feel will be lost. Any scaler of even moderate skill has seen an ionogram that is unexpected; that appears controlled by unexpected physics. Sometimes these features appear more frequently at one location than another and then local rules arise, first to help in scaling an otherwise awkward ionogram consistently and then to describe the feature more precisely. Those who are fortunate enough to have been associated with a local network of ionosondes for any length of time will understand how easily these things can start, and how, after a while, a particular scaler will regularly interpret results in a specific way, different from another scaler.

Will this level of subjectivity disappear with automatic scaling systems? Probably none of the scaling systems so far produced can replace a competent human scaler, so some subjectivity probably still exists. Consequently, idiosyncratic scalings not only remain, but may well be an unexpected feature of the scaling software for a while yet. However, a major difference from manual scaling is that digital ionograms can be rescaled easily. While some level of manual validation may be required now to ensure the current systems are as reliable as manual scaling, the balance will swing in favour of computer interpretation. The task ahead is to embrace computer scaling for its good points; the 80 to 90% of easy ionograms it scales well, and identify and solve the weak areas; those ionograms where we still believe a manual scaler copes better. Consistency between manual and computer scaling will be established and the more important task will be to ensure digital ionograms are available for rescaling, if necessary, as computer scaling becomes more sophisticated. We can confidently expect computer scaling to become more effective.

However, we are now in a period of transition, when some accept computer scaling as a necessity while others reject it as too error prone to produce reliable research data. This problem must be faced as ionosonde data is in more demand now than it has been for almost twenty years. This demand will be discussed more in later bulletins.

In this bulletin, a step towards quantifying the supply of available ionospheric data is taken. Over the next year the master ionosonde station list will be updated. Everyone is requested to participate. Check your station information is correct and also check that any other station you a familiar with features correctly in the list. A map has been included to help visually identify stations in the list.

The updated list will serve two main purposes. A key issue in future use of ionosonde data is that data are collected during campaign periods and made available for study soon after the campaign. Another important issue yet to be widely considered in INAG is the possibility of nominating stations for long term support. These stations would form baseline stations for monitoring long term change in the ionosphere. Much more will be said on this in future issues of the bulletin.

Finally; who receives INAG bulletins and who reads it? The list of recipients appears at the end of this issue. I hope you will read the accompanying text and respond accordingly.

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2. *IAGA SCIENTIFIC ASSEMBLY INAG MEETING*

There will be an INAG meeting held during the IAGA Scientific Assembly at Exeter, July/Aug 1989. The INAG meeting will be held on Tuesday evening July 24. A further announcement confirming this venue will be made at the IAGA Scientific Assembly.

The proposed agenda follows:

1. Report on Informatics Workshop held in Boston, July 1989.
2. A proposal to establish key stations for long term global monitoring of ionospheric conditions.
   - Requirements on stations.
   - Scaled data
   - Original records.
   - Physical significance of location.
3. Computer scaling of ionograms.
4. Current state of WITS and STEP and the need for ionosonde data.

   How can INAG ensure that data are made available for study more rapidly than at present?
5. State of the network: updating the master station list.
6. Comments on the INAG mailing list.
7. Network reports.
8. URSI General Assembly.
9. Other business.

If you wish to raise items within this agenda or raise additional items please advise me prior to the IAGA meeting.

3. *A NEW AUTOSCALING SYSTEM*

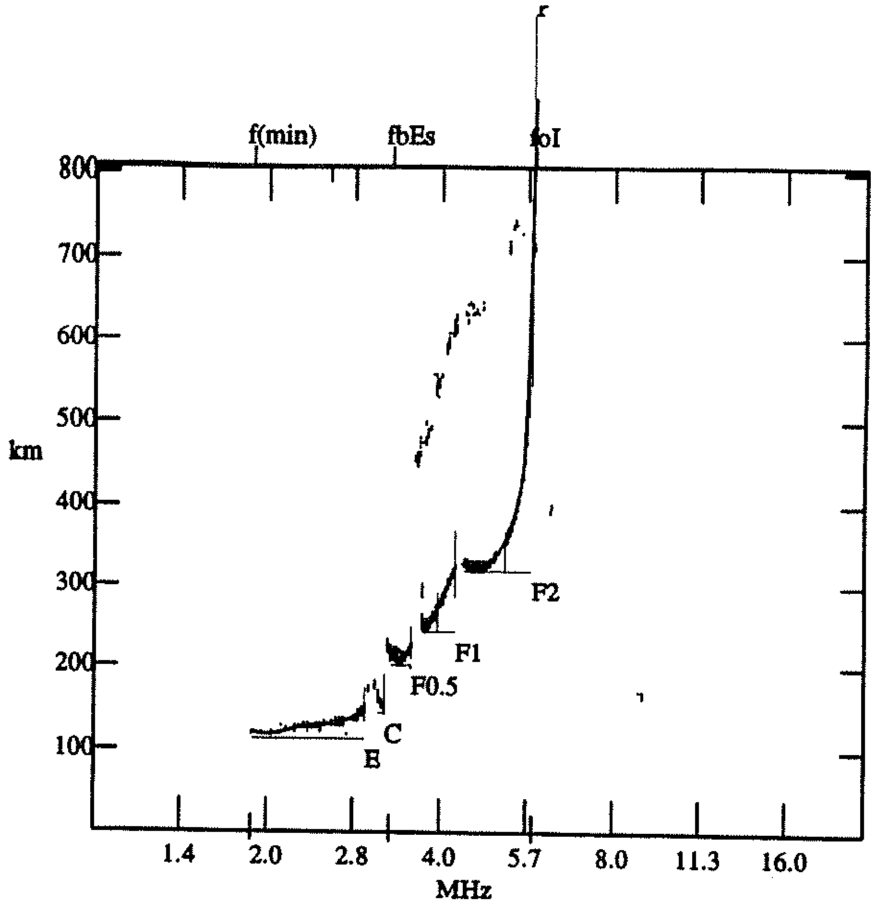
by Matthew W. Fox
IPS Radio and Space Services.
Australia.

The IPS 5A ionosonde has been developed over recent years at IPS Radio and Space Services. It is a new generation, fully digital ionospheric sounder, and will be deployed around the Australian region, replacing the our current 4B ionosondes. The 5A will have greatly enhanced capabilities over the 4B, but in its initial phase of operation will sweep linearly in frequency at 40 kHz intervals, measure 256 echo amplitudes at 3.15 km resolution, and will achieve ordinary-extraordinary ray separation in the hardware.

A crucial part of this new sounding network will be the IPS Autoscaling System. This software system has been designed to automatically scale IPS 5A ionograms on-site. Specifically, it has been trained to scale using the ionograms obtained in two trial runs on a prototype 5A ionosonde. IPS Autoscaling assumes that the ionograms are separated (in particular, ordinary-ray only), and obtained at mid-latitude. The latter applies as the software has been taught to recognise mid-latitude traces, and other specific tests may well be required at high or low latitudes. A version of the Autoscaling has been running on a Ferranti PC (an IBM PC/AT compatible). The PC network operates under Unix, and the software is written in C.

The significant differences between IPS Autoscaling and other systems are as follows. Firstly, polynomial functions are used to accumulate the echoes into traces from the layers. Successive polynomial fits and extrapolations are performed until no more echoes are found, or until the slope of the polynomial drops (indicating a cusp). That is, the nature of the data in the trace so far is used in a mathematically convenient way to indicate where more data could be found. This gives the system some resilience to bands of interference, and gives it the capacity to locate even very weak cusps. Secondly, for each layer trace thus found, a consistent identification is sought. All available information about each trace (frequencies, virtual heights, shapes) and the presence or absence of other, possibly interfering, traces, is used to obtain a consistent overall picture. This is where the system is "trained" to scale. In the manner of training a manual scaler, the simpler, common tests are performed first (reducing the complexity of the remaining task), and other less likely possibilities only considered under particular conditions that suggest that something is still amiss.

Autoscaled parameters follow directly on from the trace identifications, with all traces present yielding parameters, and no parameters scaled when traces are absent. Types of Es are specified (low-, cusp-, high- and flat-types have all been tested so far), and the less common layers E2 and F0.5 have both been scaled successfully. URSI standards are being used as a guide, and a standard set of parameters (fmin, h'E, foE, h'Es, foEs, fbEs, h'F, foF1, h'F2, foF2, foI, MUF(3000)F2 and M(3000)F2) are produced, with a zero indicating no corresponding value.



Camden

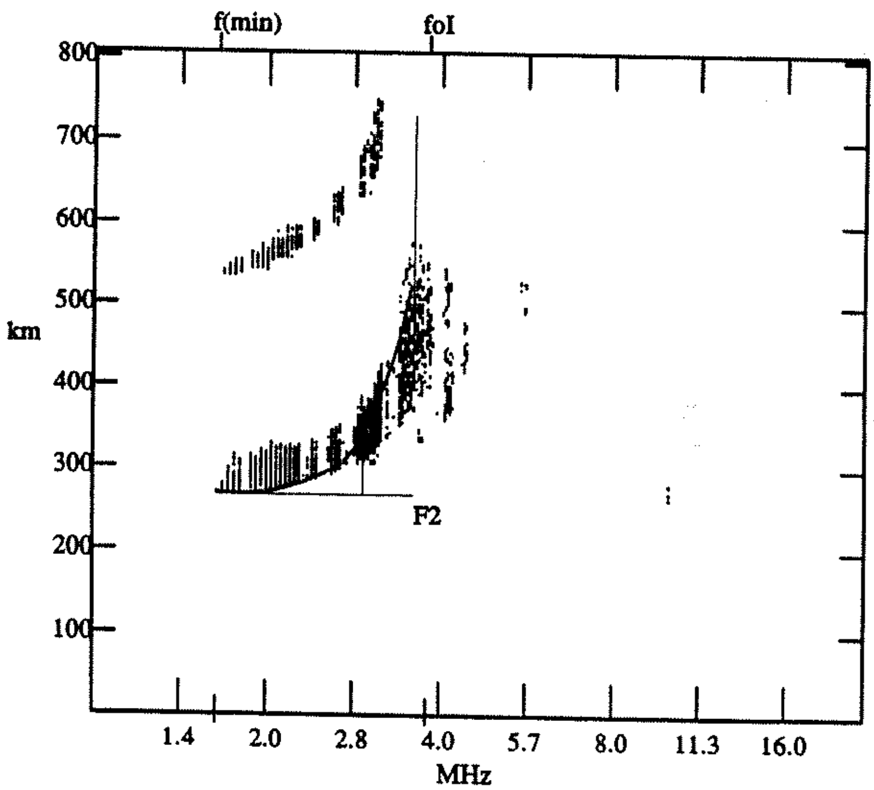
14 September 1987

14:31 Local Time

foF2 = 5.76 MHz

MUF3000 = 17.10 MHz

M3000 = 2.97



Camden

20 September 1987

01:31 Local Time

foF2 = 3.60 MHz

MUF3000 = 9.95 MHz

M3000 = 2.76

All ionograms									
	min fq			hmin			crit fq		
LAYER	Mean	RMS	% good	Mean	RMS	% good	Mean	RMS	% good
Low	0.04	0.12	88	0.2	5.8	88	-0.05	0.06	100
E	-0.00	0.09	92	-2.9	5.4	92	-0.16	0.22	80
Flat	0.00	0.04	96	-2.1	3.0	98	-0.10	0.15	79
Cusp	0.02	0.16	81	-1.8	4.8	94	-0.06	0.09	96
E2	0.10	0.12	100	-0.4	0.4	50	-0.03	0.07	100
F0.5	-0.02	0.06	100	-2.6	4.4	92	-0.06	0.12	100
F1	0.01	0.13	90	-2.0	5.8	89	-0.07	0.17	87
F2	0.02	0.13	86	-0.3	6.0	91	-0.07	0.13	94
All_Es	0.01	0.12	88	-1.8	4.2	95	-0.08	0.12	89

fmin			fbEs			foI		
Mean	RMS	% good	Mean	RMS	% good	Mean	RMS	% good
-0.00	0.07	95	0.00	0.14	74	-0.09	0.15	93

Daytime ionograms									
	min fq			hmin			crit fq		
LAYER	Mean	RMS	% good	Mean	RMS	% good	Mean	RMS	% good
F2	0.03	0.15	89	-0.8	5.0	92	-0.06	0.12	96
All_Es	0.02	0.16	81	-2.0	4.7	95	-0.06	0.09	96

fmin			fbEs			foI		
Mean	RMS	% good	Mean	RMS	% good	Mean	RMS	% good
-0.00	0.08	94	0.00	0.12	86	-0.08	0.13	95

Nighttime ionograms									
	min fq			hmin			crit fq		
LAYER	Mean	RMS	% good	Mean	RMS	% good	Mean	RMS	% good
F2	0.02	0.11	83	0.2	6.9	89	-0.08	0.15	92
All_Es	0.00	0.04	96	-1.6	3.4	96	-0.10	0.15	80

fmin			fbEs			foI		
Mean	RMS	% good	Mean	RMS	% good	Mean	RMS	% good
-0.00	0.06	96	0.00	0.16	55	-0.11	0.16	91

Ionograms without Es									
	min fq			hmin			crit fq		
LAYER	Mean	RMS	% good	Mean	RMS	% good	Mean	RMS	% good
E	0.01	0.09	90	-1.9	4.5	93	-0.17	0.22	82
F1	0.02	0.12	94	-2.4	6.7	91	-0.05	0.16	87
F2	0.02	0.10	94	-4.1	4.1	98	-0.06	0.13	94

fmin			fbEs			foI		
Mean	RMS	% good	Mean	RMS	% good	Mean	RMS	% good
0.00	0.07	92	0.0	0.0	-	-0.09	0.13	94

The Autoscaling has been tested (as well as trained) on over 400 ionograms obtained with a prototype 5A ionosonde run at Camden, near Sydney, in September 1987 and February 1988. Interference was quite severe at times, and the level of suppression of the extraordinary component was not always sufficient. However, all available useful ionograms have been included in an error analysis conducted on the autoscaled parameters. Values for each parameter were derived from comparisons of manually scaled parameters from the same ionograms and several scalers, averaged over all consistent results for each parameter. The statistics under various conditions appear in the accompanying tables. The mean and rms errors for each parameter (in MHz or km) are indicated, as well as the percentage of cases where a "good" parameter was scaled (that is, the scaling error was less than 10%). Statistics are included for all ionograms, daytime and nighttime ionograms, and for ionograms without any type of Es present. Note the improvement in F layer statistics in this latter case. Overall, the accuracies are well within acceptable standards. One exception to this is foE, which is consistently underestimated by the Autoscaling system. This is because the E-layer traces produced by the prototype 5A ionosonde showed very little retardation at the high frequency end, and this will encourage a manual scaler to extrapolate to the "real" value. Clearly, an extrapolation algorithm for foE is required in the IPS Autoscaling system.

Scalings are currently performed 'blind'; that is, without the assistance of previous ionograms or scaled values (however, estimates of foE and foF1 are used as guides in the initial identification phase). It is envisaged that a study of the time variation of autoscaled parameters would help to isolate incorrect values.

A couple of examples of autoscaled ionograms are shown in the figure. These displays are generated solely from output of the autoscaling, and indicate what is routinely recorded in this system. In this graphical display, critical parameters for each layer are given by thin horizontal or vertical lines, and the smooth trace (derived from a taut spline fit to the echoes) by a solid continuous line. Layer identifications are as marked. These examples show that this new autoscaling system can correctly scale ionograms. In general, the simpler the ionogram, the more correct the scaling. Many complex cases can also be scaled. There are further developments planned, such as developing an extrapolation to foE, and incorporating scaling letters, and these will be reported to INAG upon completion. A summary of this system is available as an IPS Technical Report (IPS-TR-88-04).

4. *IONOSONDE STATION MASTER LIST - CALL FOR INFORMATION*

Periodically the master list of ionosonde stations is updated. The present update is different from previous updates as extra information is being requested. During the next decade, the STEP program commences and ionosonde data will be required for a number of scientific applications. In preparation for this program information on data availability is particularly important. For data to be useful, validated scaled data should be available reasonably soon after it is recorded. Those stations that are able to distribute data quickly should indicate this now so experimenters will know to count on data from these locations.

Now is also the time to plan a long term global monitoring strategy for the ionosphere. As a start, this update seeks to establish how much current data is available for stations. An accurate assessment of this will assist thinking about potential long term monitoring sites. In the draft table printed here, an assessment of the available data is given. Please advise me if you feel there are errors here.

In addition, the number of years for which original ionograms still exist; eg. paper records, film etc. will be important information when assessing stations that should be supported for long term studies. Please give an indication of the data available for your stations, if you are able.

Several conventions for identifying station locations have been used. Here three are included; the ESSA number given in UAG-23; the IUWDS number, used for rapid data transmission; and the IPS number, an example of a local numbering convention. These numbering conventions are often used for computer identification of station data and there is a need for a consistent code that is supported internationally. The IUWDS code is probably a good code to support, as many other solar terrestrial station data sets are coded with this identification. However, as is apparent from the draft table, there are many stations that have no associated IUWDS code. The three codes are included here for comment. If you have strong feelings about identification numbers for computer stored data, please inform the Chair, INAG.

The distribution of stations, and the extent of data available are illustrated in the two accompanying maps. The upper map shows the location of all stations in the draft table split into those stations that are closed (small plus) and those that are believed to be open (a cross). The lower map illustrates the available data in terms of the number of solar cycles of data that have been recorded. Both these maps were produced from the accompanying table and could be in error. They are included here to assist in absorbing the information in the table.

The present draft list represents the present status of data held in the WDC-C1 archives and as published in the recent UAG-93 report. My thanks to Dr. Mike Hapgood for supplying the WDC C1 listing in computer accessible form. The geomagnetic coordinates and magnetic dip have been added by Richard Smith, IPS, using the IGRF-86. The number of years of scaled data that are available are estimated from the number of median years of foF2 data that are thought to exist.

If you recognise a station on this list and feel the information cited is incorrect please contact:

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with the correct information.

A word of explanation about the table entries follows.

IPS: A local ionosonde station coding used at IPS. These numbers are included as an example of a local coding convention and also because many groups have received data from IPS using this local convention.

ESSA: A 3 character station code proposed for international use. A list is also given in UAG-23.

IUWDS: The International Ursigram and World Day Service (IUWDS) numbering convention is used in coding data for rapid transmission. The system is maintained and has the major advantage that the same numbering system will be used for all STP data locations. However, many stations currently have no IUWDS code.

NAME: Common name for station. There are often several names associated with a station and only the most likely current/common name is listed.

Alternatives are listed in a second table, but if other alternate names are known, or an alternate name is more appropriate as the common name, please advise.

LAT LONG: The geographic location refers to the common name.

GLAT GLONG DIP: the geomagnetic coordinates of the station based on the geographic location of the common name and calculated using the IGRF-86 magnetic field model.

Please advise me if these coordinates are incorrect for a station.

YEARS: This is an estimate of the number of years of scaled data that I am aware exist for a station. Please advise me if the estimate is incorrect.

The value is flagged with an asterisk if it is possible to obtain scaled data within 18 months of the ionograms being recorded.

If you feel that a station falls in this category and is not flagged please advise me. If a station appears, and shouldn't, also advise. This is important information as these stations are most likely to be used first in future data analyses.

OPEN: The date when the station first began reporting scaled data. The date format is year-month-day.

CLOSED: The date when the station closed. The date format is year-month-day.

For both these categories, 0-0-0 is inserted if the date is unknown. Most commonly, this date is used for stations that are still open.

Please check through the lists and report any changes and additions as soon as possible. An updated complete listing will be published towards the end of 1991 after the next URSI General Assembly.

IPS	ESSA	IUWDS	NORMAL STATION NAME	LAT	LONG	GLAT	GLONG	DIP	YEARS	OPEN	CLOSED
4619	651	28501	ADAK	51.90	183.40	47.55	241.39	63.2	21	1945- 10- 1	1965- 12- 1
1834	223	37201	AHMEDABAD	23.00	72.60	13.82	145.23	33.7	33*	1953- 2- 1	0- 0- 0
3525	539	44409	AKITA	39.70	140.10	29.75	206.74	53.4	42*	1949- 12- 1	0- 0- 0
7404	J82	0	ALERT	82.50	297.40	85.98	165.34	86.2	0	1957- 8- 1	1958- 12- 1
3357	42L	0	ALICE SPRINGS	-23.86	133.83	-34.12	206.93	-56.4	1	1985- 5- 1	1985- 10- 31
1923	343	38401	ALMA-ATA	43.20	77.00	33.41	151.94	62.5	43*	1943- 1- 1	0- 0- 0
5314	761	25601	ANCHORAGE	61.20	210.10	61.22	259.73	74.0	17	1949- 4- 1	1965- 12- 1
7477	J6M	0	ARGENTINE IS.	-65.25	295.73	-54.03	4.34	-57.7	27*	1962- 2- 1	0- 0- 0
1013	163	34601	ARKHANGELSK	64.50	40.50	58.75	129.19	76.1	1*	0- 0- 0	0- 0- 0
1526	237	36401	ASHKHABAD	37.90	58.30	30.36	134.47	56.4	37	0- 0- 0	0- 0- 0
626	138	0	ATHENS	38.00	23.60	36.36	102.54	54.2	6	1943- 12- 1	0- 0- 0
4464	63P	0	AUCKLAND	-37.00	175.00	-40.95	254.04	-62.9	12	1967- 1- 1	0- 0- 0
6613	964	0	BAKER LAKE	64.30	264.00	73.81	317.81	85.5	11	1949- 2- 1	1959- 2- 1
2748	400	0	BANDOENG	6.90	107.60	-4.41	178.02	-3.8	0	1943- 5- 1	1945- 9- 30
2538	314	0	BANGKOK	13.80	100.60	2.61	171.26	12.3	15	1963- 8- 1	0- 0- 0
543	104	32001	BANGUI	4.60	18.60	4.70	89.93	-16.1	4	1958- 2- 1	1966- 9- 1
5109	771	26701	BARROW	71.20	203.20	68.78	242.71	80.2	17	1949- 12- 1	1965- 11- 1
6730	930	0	BATON ROUGE	30.50	268.80	40.98	336.10	60.9	11	1943- 7- 1	1953- 9- 30
680	17V	0	BAUDOUIN	-70.40	23.20	-68.11	63.87	-63.3	0	1958- 4- 1	1967- 2- 1
524	147	0	BEKESCSABA	46.70	21.20	45.22	103.28	63.2	21*	1964- 1- 1	0- 0- 0
8083	A7Q	0	BELGRANO	-77.90	321.40	-67.49	16.77	-65.5	0	1958- 7- 1	0- 0- 0
523	145	32402	BEOGRAD	44.80	20.50	43.53	101.89	61.4	15	1958- 3- 1	0- 0- 0
7223	J43	0	BILLERICA	42.60	288.70	53.92	358.89	70.1	10	1965- 11- 1	1970- 9- 1
7143	J05	0	BOGOTA	4.50	285.80	15.79	356.07	31.0	10	1945- 8- 1	1967- 6- 1
1836	219	0	BOMBAY	19.00	72.80	9.82	144.92	25.6	36	1945- 8- 1	0- 0- 0
7224	J42	0	BOSTON	42.40	288.80	53.72	359.01	69.9	7	1945- 3- 1	1951- 7- 31
6425	840	0	BOULDER	40.00	254.70	48.90	318.19	67.2	25*	1958- 7- 1	0- 0- 0
3859	52P	85301	BRISBANE	-27.53	152.92	-35.41	228.29	-58.0	44*	1943- 6- 1	0- 0- 0
521	147	32501	BUDAPEST	47.00	19.00	45.93	101.33	63.4	4	1956- 1- 1	1959- 12- 1
7562	J3M	56301	BUENOS AIRES	-34.50	301.50	-23.40	10.68	-35.0	30	1950- 2- 1	0- 0- 0
844	102	0	BUNIA	1.50	30.20	-.60	100.70	-21.6	4	1957- 10- 1	1960- 11- 1
8916	056	0	BURGHEAD	57.70	356.50	60.45	85.40	71.0	16	1941- 1- 1	1947- 4- 30
6085	88V	62801	BYRD STATION	-80.00	240.00	-70.66	336.47	-73.5	11	1957- 7- 1	1970- 12- 1
830	130	0	CAIRO	30.00	31.20	27.13	107.60	43.6	0	1945- 11- 1	1946- 9- 30
2234	322	0	CALCUTTA	23.00	88.60	12.38	160.27	32.5	0	1944- 7- 1	0- 0- 0
3862	53L	85305	CAMDEN	-34.05	150.67	-42.14	227.32	-64.9	5	1980- 11- 1	1985- 3- 31
4271	65K	87501	CAMPBELL IS.	-52.50	169.20	-56.97	254.44	-75.7	42	1944- 4- 1	1986- 10- 1
3763	53N	85302	CANBERRA	-35.32	149.00	-43.66	225.74	-66.4	51*	1937- 3- 1	0- 0- 0
2832	421	0	CANTON	23.10	113.30	11.80	183.49	32.3	11*	0- 0- 0	0- 0- 0
4381	67K	0	CAPE HALLETT	-72.30	170.20	-74.45	278.73	-83.6	8	1957- 1- 1	1964- 2- 1
7031	929	18301	CAPE KENNEDY	28.40	279.30	39.51	348.25	59.5	0	1958- 3- 1	1966- 6- 1
4511	669	28701	CAPE SCHMIDT	68.80	179.50	62.85	228.09	76.9	7	1960- 1- 1	0- 0- 0
3650	51J	0	CAPE YORK	-11.00	142.40	-20.43	214.58	-37.2	3	1944- 12- 1	1946- 5- 31
828	135	0	CAPE ZEVGARI	34.60	32.90	31.31	110.36	50.6	0*	1964- 1- 1	0- 0- 0
562	13M	72301	CAPETOWN	-34.10	18.30	-33.10	81.19	-66.7	39*	1944- 9- 1	1971- 5- 1
8829	033	0	CASABLANCA	33.60	352.40	38.12	70.35	46.5	8	0- 0- 0	0- 0- 0
2878	46O	81702	CASEY	-66.28	110.53	-77.62	181.71	-81.4	18	1969- 3- 1	0- 0- 0
3123	443	0	CHANGCHUN	43.80	125.30	32.84	193.45	60.8	0*	0- 0- 0	0- 0- 0
7048	90P	0	CHICLAYO	-6.80	280.20	4.37	350.65	10.8	0	1957- 7- 1	1959- 5- 1
7050	90R	0	CHIMBOTE	-9.10	281.40	2.11	351.91	6.7	0	1957- 7- 1	1959- 5- 1
2819	452	0	CHITA	52.00	113.50	40.70	183.17	70.5	12	1946- 1- 1	1963- 5- 1
4367	64L	87402	CHRISTCHURCH	-43.60	172.80	-47.75	254.06	-68.8	48*	1942- 9- 1	0- 0- 0
3032	424	0	CHUNG-LI	24.91	121.24	13.79	190.83	35.1	39*	1965- 7- 1	0- 0- 0
2730	429	0	CHUNGKING	29.40	106.80	18.09	177.44	43.7	11*	1945- 8- 1	1949- 10- 31
6616	958	19601	CHURCHILL	58.80	265.80	68.71	324.86	82.5	46*	1943- 7- 1	0- 0- 0
7310	J70	0	CLYDE	70.50	291.40	81.81	4.24	84.3	10	1943- 10- 1	1958- 10- 1
2451	31K	79101	COCOS IS.	-12.20	96.80	-23.22	166.38	-44.4	14	1961- 11- 1	1974- 10- 1
5313	764	25602	COLLEGE	64.80	212.20	64.89	258.25	76.9	28	1941- 7- 1	0- 0- 0
2042	306	0	COLOMBO	6.90	79.87	-2.95	150.50	-3.6	0	1945- 4- 1	1946- 7- 31
7263	J3O	0	CONCEPCION	-36.60	287.00	-25.29	357.70	-35.9	23	1957- 10- 1	0- 0- 0
6933	923	0	CUBA	23.00	278.00	34.06	347.10	54.2	0	1964- 8- 1	0- 0- 0
3025	439	0	DAIRAN	39.00	121.60	27.90	190.54	56.0	0	1944- 12- 1	1945- 2- 28
8638	A14	12101	DAKAR	14.70	342.60	21.29	56.01	11.4	40*	1949- 5- 1	0- 0- 0

3351	41K	0	DARWIN	-12.45	130.95	-22.90	202.66	-40.7	7*	1982- 12- 1	0- 0- 0
1979	36Q	78701	DAVIS	-68.58	77.96	-76.89	122.55	-72.0	2*	1985- 2- 1	0- 0- 0
119	053	30504	DE BILT	52.10	5.20	53.48	90.50	67.0	35	1949- 11- 1	0- 0- 0
7576	J6L	0	DECEPCION	-63.00	299.30	-51.80	7.11	-55.8	9	1951- 1- 1	1967- 11- 1
1931	328	38301	DELHI	28.60	77.20	18.90	150.19	43.3	41*	1942- 1- 1	0- 0- 0
2008	373	38701	DIXON IS.	73.50	80.40	63.06	162.20	83.8	13	1957- 7- 1	0- 0- 0
1139	111	34101	DJIBOUTI	11.50	42.80	6.87	114.89	7.2	31	1951- 10- 1	1981- 7- 1
120	049	30505	DOURBES	50.10	4.60	51.70	88.88	65.4	11*	1957- 6- 1	0- 0- 0
625	139	0	EKALI	48.00	23.00	46.13	105.47	64.5	0	0- 0- 0	0- 0- 0
751	11J	0	ELIZABETHVILLE	-11.60	27.50	-12.92	95.46	-49.5	6	1952- 4- 1	1960- 6- 1
8084	A7P	0	ELLSWORTH	-77.72	318.80	-67.15	15.53	-65.4	6	1957- 7- 1	1962- 11- 1
6905	980	0	EUREKA	80.00	274.10	86.86	237.79	87.8	0	1957- 7- 1	1959- 1- 1
4554	61Q	0	FIJI	-18.00	178.20	-21.78	252.49	-39.3	0	1946- 4- 1	1948- 4- 30
6404	982	0	FLETCHERS ICE IS.	75.90	235.70	78.29	255.86	86.8	0	1957- 6- 1	1959- 1- 1
440	109	0	FORT ARCHAMBAULT	9.20	18.35	9.25	90.65	-4.2	0	1969- 1- 1	1974- 2- 1
7316	J58	0	FORT CHIMO	58.10	291.60	69.41	3.02	79.4	7	1949- 4- 1	1958- 12- 1
7225	J40	0	FORT MONMOUTH	40.40	285.90	51.69	355.47	68.9	11	1955- 3- 1	1965- 12- 1
5913	864	0	FORT NORMAN	64.90	234.50	69.33	279.83	81.2	0	1957- 7- 1	1958- 10- 1
8916	056	0	FRASERBURGH	57.65	357.90	60.18	86.80	71.0	16	1948- 3- 1	1951- 10- 31
221	048	0	FREIBURG	48.10	7.60	49.21	90.88	63.7	38	1946- 7- 1	1976- 12- 1
7313	J63	0	FROBISHER BAY	63.80	291.40	75.11	3.11	82.1	0	1957- 9- 1	1959- 1- 1
122	042	30506	GARCHY	47.30	3.10	49.32	86.09	62.9	15	1959- 10- 1	0- 0- 0
326	037	0	GIBILMANNA	38.00	14.00	38.23	93.33	53.4	6	0- 0- 0	0- 0- 0
7710	J69	0	GODHAVN	69.30	306.50	79.62	34.79	81.6	26	1951- 11- 1	0- 0- 0
7518	J54	16501	GOOSE BAY	54.30	299.67	65.37	14.23	75.5	0	1972- 2- 1	0- 0- 0
1119	156	34503	GORKY	56.15	44.28	50.28	127.74	71.6	30*	1958- 3- 1	0- 0- 0
662	13L	0	GRAHAMSTOWN	-33.30	26.50	-33.92	89.37	-65.5	12	1958- 3- 1	0- 0- 0
7032	926	0	GRAND BAHAMA IS.	26.60	281.80	37.80	351.18	57.7	15	1957- 6- 1	1971- 6- 1
421	146	0	GRAZ	47.10	15.50	46.70	98.06	63.2	31	1947- 8- 1	0- 0- 0
3638	513	0	GUAM	13.50	144.87	4.19	214.30	11.0	13	1944- 2- 1	1956- 5- 31
2835	420	0	HAIKOU	20.00	110.30	8.68	180.67	26.2	0*	0- 0- 0	0- 0- 0
8383	A7O	0	HALLEY BAY	-75.50	333.40	-66.04	25.27	-63.9	22	1957- 4- 1	0- 0- 0
2929	433	0	HANKOW	30.70	114.30	19.41	184.29	45.4	0	1941- 9- 1	1944- 12- 31
1405	281	0	HEISS IS.	80.60	58.00	71.35	156.42	84.5	15	1938- 1- 1	0- 0- 0
562	13M	0	HERMANUS	-34.50	19.30	-33.68	82.04	-66.5	39*	1971- 5- 1	0- 0- 0
3766	54K	85401	HOBART	-42.92	147.32	-51.37	225.87	-72.9	43*	1945- 12- 1	0- 0- 0
3545	50K	0	HOLLANDIA	-2.50	140.80	-12.15	211.97	-22.2	0	1957- 2- 1	1959- 2- 1
2833	423	0	HONG KONG	22.33	114.20	11.01	184.34	30.8	0	1969- 1- 1	0- 0- 0
3427	536	0	HONSHU	35.00	140.00	25.07	207.24	47.7	0	0- 0- 0	0- 0- 0
7151	91K	57101	HUANCAYO	-12.00	284.70	-.72	355.22	1.8	45	1937- 1- 1	0- 0- 0
2036	317	38201	HYDERABAD	17.35	78.47	7.63	150.19	21.5	10	1963- 5- 1	0- 0- 0
141	007	0	IBADAN	7.40	3.90	10.31	76.02	-9.8	24	1951- 12- 1	0- 0- 0
7254	J1P	0	ILO	-17.40	288.80	-6.08	359.24	-8.0	0	1959- 2- 1	1959- 5- 1
8916	056	0	INVERNESS	57.40	355.80	60.31	84.47	70.8	16	1951- 10- 1	1963- 6- 1
2619	352	40501	IRKUTSK	52.50	104.00	41.22	175.48	71.7	40*	0- 0- 0	0- 0- 0
758	12O	73302	JOHANNESBURG	-26.10	28.10	-27.22	92.83	-64.2	42*	1946- 5- 1	0- 0- 0
7253	J1N	0	JULIACA	-15.50	289.80	-4.18	.20	-4.5	0	1959- 3- 1	1959- 5- 1
318	055	31506	JULIUSRUH/RUGEN	54.60	13.40	54.25	99.73	69.1	27	1957- 4- 1	0- 0- 0
518	154	0	KALININGRAD	54.70	20.62	52.96	106.41	69.5	1*	1964- 2- 1	0- 0- 0
1820	249	0	KARAGANDA	49.80	73.10	40.32	149.77	68.5	11*	0- 0- 0	0- 0- 0
6620	949	0	KENORA	50.00	266.00	60.09	328.95	76.7	26	1963- 10- 1	1976- 12- 1
1870	24R	0	KERGUELEN IS.	-49.35	70.24	-57.38	129.85	-67.5	35	1953- 2- 1	0- 0- 0
4660	62R	88301	KERMADEC	-29.20	182.10	-32.00	259.02	-53.5	14	1943- 6- 1	1972- 9- 1
3421	548	43501	KHABAROVSK	48.50	135.10	38.10	201.26	63.6	27*	1959- 9- 1	0- 0- 0
837	115	0	KHARTOUM	15.55	32.58	12.78	105.79	14.7	0	1952- 3- 1	1954- 3- 31
820	150	33502	KIEV	50.70	30.30	47.36	113.24	67.1	3*	1964- 1- 1	0- 0- 0
447	10M	0	KINSHASA-BINZA	-4.50	15.20	-3.55	84.81	-37.8	19	1952- 2- 1	0- 0- 0
511	167	32702	KIRUNA	67.84	20.42	65.07	116.33	77.0	40*	1949- 3- 1	0- 0- 0
315	059	0	KJELLER	60.00	11.10	59.73	101.17	72.6	14	1942- 4- 1	1959- 1- 1
221	048	0	KOCHEL	47.70	11.40	48.08	94.39	63.6	38	1941- 1- 1	0- 0- 0
1940	310	38101	KODAIKANAL	10.20	77.50	.57	148.47	4.8	29*	1952- 7- 1	0- 0- 0
7353	J1O	0	LA PAZ	-16.50	291.90	-5.19	2.22	-6.5	11	1957- 10- 1	0- 0- 0
7456	J2K	0	LA QUIACA	-22.10	294.40	-10.82	4.54	-16.7	0	1958- 6- 1	1959- 1- 1
1456	22J	75202	LA REUNION	-21.10	55.90	-27.48	122.07	-54.2	7*	1981- 10- 1	0- 0- 0
2627	336	0	LANCHOW	36.10	103.80	24.83	174.85	53.8	0*	1946- 2- 1	1949- 7- 31

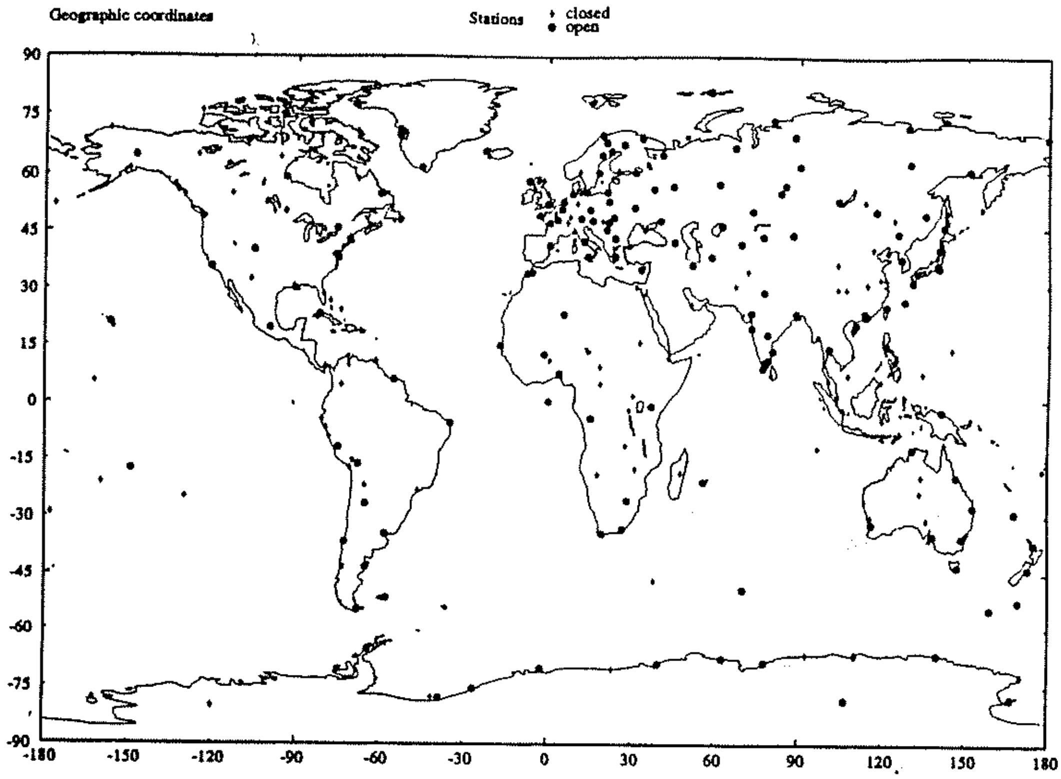
8921 043	10505	LANNION	48.45	356.73	51.72	80.18	63.8	18*	1971- 1- 1	0- 0- 0
815 160	33603	LENINGRAD	59.95	30.70	56.13	118.33	73.2	46*	1939- 1- 1	0- 0- 0
3140 411	0	LEYTE	11.00	125.00	.08	195.12	6.3	0	1945- 6- 1	1948- 9- 30
319 050	31511	LINDAU	51.65	10.10	52.15	95.03	66.8	33	1947- 1- 1	1979- 7- 1
4984 77Q	0	LITTLE AMERICA	-78.20	197.80	-73.96	312.28	-78.7	0	1957- 7- 1	1958- 2- 1
406 178	0	LONGYEARBYEN	78.20	15.70	74.27	131.19	81.9	4	1956- 6- 1	1959- 8- 1
2630 329	0	LOSHAN	29.50	103.70	18.23	174.60	44.0	0	1946- 1- 1	1946- 5- 31
612 165	0	LULEA	65.60	22.10	62.80	115.46	75.9	16	1947- 9- 1	0- 0- 0
746 10K	73001	LWIRO	-2.30	28.80	-4.06	98.59	-31.0	13	1952- 2- 1	1967- 8- 1
513 164	32603	LYCKSELE	64.62	18.76	62.49	111.80	75.3	32*	1957- 1- 1	0- 0- 0
2834 422	0	MACAU	22.20	113.60	10.91	183.78	30.6	8	1958- 5- 1	0- 0- 0
4072 55M	86501	MACQUARIE IS.	-54.50	159.00	-60.74	244.46	-79.1	13*	1950- 6- 1	0- 0- 0
2038 313	0	MADRAS	13.10	80.30	3.18	151.50	11.4	24	1944- 7- 1	0- 0- 0
3715 560	45601	MAGADAN	60.00	151.00	50.86	211.59	71.1	2*	0- 0- 0	0- 0- 0
3048 40N	0	MAKASSAR	5.20	119.50	-5.95	189.92	-6.9	0	1944- 1- 1	1944- 10- 31
2920 450	0	MANCHOULI	49.60	117.40	38.37	186.45	67.8	11*	0- 0- 0	0- 0- 0
3038 414	42101	MANILA	14.70	121.10	3.60	191.15	14.7	39*	1944- 3- 1	0- 0- 0
968 14O	0	MARION IS.	-46.87	37.85	-49.28	95.81	-61.0	0	1957- 7- 1	1980- 5- 1
5135 720	26203	MAUI	20.80	203.50	21.14	269.56	38.5	40*	1944- 3- 1	0- 0- 0
1679 26P	76701	MAWSON	-67.60	62.88	-73.31	105.10	-68.2	30*	1958- 2- 1	0- 0- 0
7223 J43	0	MAYNARD	42.43	288.55	53.72	358.64	70.0	10	0- 0- 0	0- 0- 0
6218 855	0	MEANOOK	54.60	246.70	61.96	303.01	77.1	0	1957- 7- 1	1959- 1- 1
6535 919	0	MEXICO CITY	19.40	260.30	29.15	328.10	47.0	18	1958- 4- 1	0- 0- 0
519 152	0	MIEDZESZYN	52.20	21.20	50.48	105.68	67.7	28	1958- 7- 1	0- 0- 0
2378 36O	0	MIRNY	-66.50	93.00	-76.96	149.68	-76.2	14	1956- 4- 1	1973- 1- 1
223 044	0	MONTE CAPELLINO	44.60	9.00	45.58	90.78	60.5	18	1956- 5- 1	1973- 12- 1
917 155	34502	MOSCOW	55.50	37.30	50.74	121.51	70.8	44*	1944- 3- 1	0- 0- 0
2961 43K	82302	MUNDARING	-31.98	116.22	-43.23	187.70	-67.1	29*	1959- 4- 1	0- 0- 0
810 168	33702	MURMANSK	69.00	33.00	64.04	127.22	78.0	23	1956- 3- 1	0- 0- 0
946 10J	0	NAIROBI	-1.28	36.83	-4.61	106.65	-26.2	6	1952- 3- 1	0- 0- 0
3029 432	42301	NANKING	32.10	119.00	20.92	188.53	47.1	0	1947- 9- 1	1949- 1- 31
7914 J61	14601	NARSSARSSUAQ	61.20	314.55	70.91	38.35	76.7	26	1950- 9- 1	0- 0- 0
8149 A0N	0	NATAL	-5.70	324.80	3.57	35.09	-15.1	0	1957- 8- 1	0- 0- 0
2739 412	0	NHA TRANG	12.25	109.20	.98	179.62	9.1	0	1951- 7- 1	1956- 4- 30
4260 63O	87301	NORFOLK IS.	-29.03	167.97	-34.42	244.58	-56.6	25*	1964- 2- 1	0- 0- 0
2210 369	39700	NORILSK	69.40	88.10	58.60	165.68	82.8	2*	0- 0- 0	0- 0- 0
1522 245	0	NOVO KAZALINSK	45.80	62.10	37.63	139.54	64.6	18*	0- 0- 0	0- 0- 0
2118 354	38501	NOVOSIBIRSK	54.60	83.20	44.22	158.94	73.0	1	1969- 1- 1	0- 0- 0
615 159	32604	NURMIJARVI	60.50	24.60	57.67	113.47	73.2	31*	1957- 1- 1	1987- 12- 31
3232 426	43301	OKINAWA	26.30	127.80	15.50	196.90	36.8	43*	1946- 4- 1	0- 0- 0
7122 945	18406	OTTAWA	45.40	284.10	56.65	352.98	72.8	47*	1942- 1- 1	0- 0- 0
8939 012	10101	OUAGADOUGOU	12.37	358.47	16.23	71.64	2.8	23*	1966- 5- 1	0- 0- 0
3441 407	0	PALAU IS.	7.30	134.50	-2.98	204.73	-2.2	0	1939- 7- 1	1944- 5- 31
4942 705	0	PALMYRA	5.38	197.82	4.94	267.18	12.4	1	1946- 1- 1	1949- 1- 31
7040 909	0	PANAMA	9.40	280.10	20.56	350.00	37.8	8	1951- 6- 1	1958- 12- 1
7642 J06	15101	PARAMARIBO	5.80	304.80	16.71	15.81	26.1	12	1957- 7- 1	0- 0- 0
3920 550	0	PARAMUSHIRO	50.10	155.30	41.63	217.90	61.8	0	1943- 11- 1	1944- 9- 30
20 039	0	PARIS-DOMONT	49.02	2.32	51.11	86.07	64.4	0	1950- 3- 1	1952- 4- 30
121 047	0	PARIS-SACLAY	48.10	2.30	50.25	85.65	63.6	14	1960- 6- 1	1970- 12- 1
2925 440	0	PEIPING	39.90	116.40	28.65	185.95	57.7	11*	1946- 4- 1	1948- 2- 29
2542 305	0	PENANG	5.50	100.40	-5.68	170.81	-7.7	0	1944- 3- 1	1945- 8- 31
1828 234	0	PESHAWAR	34.00	71.50	24.85	145.69	51.6	0	1945- 8- 1	1947- 5- 31
5858 82N	0	PITCAIRN IS.	-25.00	230.00	-18.93	304.28	-37.7	0	1944- 10- 1	1945- 2- 28
6027 836	22306	POINT ARGUELLO	35.60	239.40	42.30	302.39	60.1	2*	1963- 7- 1	0- 0- 0
22 046	30511	POITIERS	46.57	.35	49.20	82.97	62.1	37*	1948- 7- 1	0- 0- 0
7477 J6M	0	PORT LOCKROY	-64.80	296.50	-53.54	4.94	-57.3	27*	1948- 4- 1	1961- 12- 1
3750 50R	85101	PORT MORESBY	-9.40	147.10	-18.29	219.25	-33.8	12	1961- 5- 1	1972- 7- 31
7671 J5J	56501	PORT STANLEY	-51.70	302.20	-40.60	10.27	-48.0	38*	1945- 2- 1	0- 0- 0
6520 950	0	PORTAGE LA PRAIRIE	49.90	261.70	59.52	323.56	76.2	0	1946- 9- 1	1951- 4- 30
5718 854	0	PRINCE RUPERT	54.30	229.70	58.62	284.19	73.1	10	1945- 6- 1	1954- 6- 30
4713 664	0	PROVIDENYA	64.40	186.60	59.91	237.11	73.7	25	1957- 3- 1	1984- 2- 29
420 052	31519	PRUHONICE	50.00	14.56	49.65	98.49	65.7	28	1958- 4- 1	0- 0- 0
7336 J18	17201	PUERTO RICO	18.50	292.80	29.80	3.51	48.1	18	1941- 2- 1	1963- 6- 1
1730 230	0	QUETTA	30.20	67.00	21.61	141.01	46.3	0	1957- 10- 1	1964- 12- 1
8828 034	0	RABAT	33.90	353.90	38.14	71.98	46.9	12	1958- 2- 1	0- 0- 0

2437 316	0	RANGOON	16.80	96.50	5.76	167.41	19.1	0	1943- 6- 1	1945- 2- 28
5056 72J	66201	RAROTONGA	-21.20	200.20	-20.65	274.95	-38.6	36	1945- 1- 1	1980- 3- 1
6608 974	19701	RESOLUTE BAY	74.70	265.10	83.18	292.87	88.9	40*	1949- 2- 1	0- 0- 0
8513 A64	12601	REYKJAVIK	64.10	338.20	69.84	71.98	75.7	17	1944- 4- 1	1964- 12- 1
324 041	31406	ROME	41.90	12.52	42.29	93.18	57.9	33*	1951- 1- 1	0- 0- 0
1021 149	0	ROSTOV-ON-DON	47.20	39.68	42.35	120.32	64.8	33	1957- 1- 1	0- 0- 0
1712 266	37701	SALEKHARD	66.50	66.70	57.34	149.81	79.2	25	1957- 7- 1	0- 0- 0
3562 53M	0	SALISBURY (AUST.)	-34.70	138.60	-44.37	213.90	-67.2	18*	1960- 6- 1	0- 0- 0
854 11P	0	SALISBURY (RHOD.)	-17.80	31.00	-19.68	97.61	-57.1	0	1958- 1- 1	1958- 2- 1
7133 J24	0	SAN SALVADOR	24.10	285.50	35.39	355.42	55.1	0	1958- 11- 1	1965- 2- 1
8980 07V	0	SANAE BASE	-70.30	357.60	-63.95	45.37	-62.0	18	1962- 6- 1	0- 0- 0
2736 418	0	SANYA	18.30	109.30	6.98	179.72	22.6	0	1942- 6- 1	1943- 6- 30
7857 J2L	0	SAO PAULO	-23.50	313.50	-13.09	22.43	-29.8	12	1953- 8- 1	1965- 5- 1
222 045	0	SCHWARZENBURG	46.60	6.70	47.95	89.34	62.3	23	1950- 12- 1	1972- 11- 1
4284 67Q	87802	SCOTT BASE	-77.90	166.80	-78.83	294.58	-81.5	29	1957- 3- 1	0- 0- 0
3226 437	43402	SEOUL	37.23	126.57	26.32	195.07	53.0	16*	1966- 10- 1	0- 0- 0
3526 537	0	SHIBATA	37.90	139.30	27.89	206.26	51.4	0	1946- 3- 1	1949- 9- 30
3620 549	0	SHIKUKA	49.30	143.00	39.53	207.75	62.9	0	1940- 10- 1	1941- 12- 28
923 144	33402	SIMFEROPOL	44.80	34.10	41.00	114.47	62.3	3	1957- 1- 1	1959- 12- 1
2644 301	0	SINGAPORE	1.30	103.80	-9.96	174.12	-17.2	28	1943- 2- 1	1971- 7- 1
19 051	10504	SLOUGH	51.50	359.43	54.05	84.42	66.4	46*	1930- 1- 1	0- 0- 0
18 057	0	SNAINTON	54.23	359.48	56.59	86.06	68.5	0	1944- 8- 1	1945- 4- 30
711 166	33703	SODANKYLA	67.40	26.60	63.64	120.78	76.9	32*	1957- 8- 1	0- 0- 0
624 143	0	SOFIA	42.70	23.40	40.95	103.87	59.5	11	0- 0- 0	0- 0- 0
8172 A5M	0	SOUTH GEORGIA	-54.27	323.50	-44.53	27.17	-54.0	9	1970- 7- 1	1978- 9- 10
90 09V	70901	SOUTH POLE	-90.00	999.99	-78.68	360.00	-73.3	11	1957- 7- 1	1968- 3- 1
8816 058	0	SOUTH UIST	57.37	352.67	60.91	81.30	70.8	4*	1967- 11- 1	0- 0- 0
405 179	31801	SPITZBERGEN	78.00	15.00	74.24	130.29	81.8	0	1942- 9- 1	1943- 9- 8
7721 J47	15501	ST. JOHNS	47.60	307.30	58.23	22.93	69.2	32	1944- 5- 1	1981- 9- 1
218 060	31527	ST. PETER-ORDING	54.18	8.37	54.84	94.77	68.7	7*	0- 0- 0	0- 0- 0
1517 256	36601	SVERDLOVSK	56.70	61.10	48.43	141.71	72.9	43*	1944- 5- 1	0- 0- 0
6519 952	0	SWAN RIVER	52.10	258.80	61.32	319.06	77.4	0	1946- 4- 1	1946- 8- 1
1080 16R	74701	SYOWA BASE	-69.00	39.60	-69.97	79.40	-64.5	22	1959- 2- 1	0- 0- 0
5354 71P	65201	TAHITI	-17.70	210.70	-15.19	284.38	-30.8	32*	1957- 12- 1	0- 0- 0
3032 424	42202	TAIPEI	25.00	121.53	13.91	191.11	35.3	39*	1950- 3- 1	1965- 6- 1
7047 90M	0	TALARA	-4.60	278.70	6.52	349.07	14.4	11	1954- 10- 1	1965- 12- 1
134 022	30201	TAMANRASSET	22.80	5.53	25.09	80.85	27.4	16	1956- 2- 1	0- 0- 0
1254 21Q	75201	TANANARIVE	-18.80	47.50	-23.76	113.93	-53.2	21	1951- 11- 1	1972- 5- 1
1724 241	37401	TASHKENT	41.30	69.00	32.36	144.64	60.3	21*	0- 0- 0	0- 0- 0
1124 142	0	TBILISI	41.70	44.80	36.15	123.22	59.9	19	1963- 6- 1	0- 0- 0
1327 236	0	TEHRAN	35.70	51.40	29.22	127.75	53.5	4	1963- 4- 1	0- 0- 0
3355 41R	0	TENNANT CREEK	-19.65	134.25	-29.80	206.99	-50.9	1	1985- 5- 1	1985- 11- 30
3578 560	84701	TERRE ADELIE	-66.66	140.02	-75.36	232.40	-88.8	34	1949- 12- 1	0- 0- 0
7307 J76	17801	THULE (QANAQ)	77.50	290.80	88.79	12.54	85.9	17	1968- 9- 1	0- 0- 0
1941 308	38102	THUMBA	8.60	76.90	-.96	147.72	.9	20	1964- 11- 1	0- 0- 0
2040 311	0	TIRUCHIRAPALLI	10.80	78.70	1.05	149.71	6.1	34	1949- 2- 1	0- 0- 0
3209 471	43701	TIXIE BAY	71.50	128.90	60.59	192.34	82.6	21	1957- 7- 1	0- 0- 0
40 011	0	TOGO	10.80	.40	14.31	73.22	-1.3	3	1965- 7- 1	1967- 2- 1
3527 535	44406	TOKYO	35.70	139.50	25.72	206.71	48.7	43*	1934- 6- 1	0- 0- 0
2117 356	38601	TOMSK	56.50	84.90	45.99	160.62	74.6	50*	1937- 3- 1	0- 0- 0
25 040	30402	TORTOSA	40.80	.30	43.61	80.70	56.0	26	1957- 5- 1	0- 0- 0
3755 51R	85201	TOWNSVILLE	-19.63	146.85	-28.42	220.49	-49.3	41*	1946- 6- 1	0- 0- 0
3621 546	0	TOYOHARA	46.90	142.80	37.14	208.00	60.6	0	1942- 9- 1	1944- 7- 31
7467 J4L	0	TRELEW	-43.20	294.70	-31.92	4.39	-41.3	0	1958- 4- 1	0- 0- 0
7540 J10	16101	TRINIDAD	10.75	298.43	21.98	9.34	37.0	8	1944- 2- 1	1951- 6- 30
1941 308	0	TRIVANDRUM	8.50	77.00	-1.07	147.81	.7	20	1957- 1- 1	1964- 10- 1
510 169	32703	TROMSO	69.60	19.00	66.89	117.37	77.8	34	1932- 8- 1	0- 0- 0
3121 447	0	TSITSIHAR	47.30	123.90	36.27	192.00	64.6	0	1940- 4- 1	1945- 8- 31
455 11R	0	TSUMEB	-19.20	17.70	-18.44	84.25	-60.6	14	1957- 7- 1	1975- 12- 1
7458 J2O	56303	TUCUMAN	-26.90	294.60	-15.62	4.64	-24.1	26	1957- 7- 1	0- 0- 0
2214 361	39601	TUNGUSKA	61.60	90.00	50.77	165.40	78.5	12*	1968- 1- 1	0- 0- 0
415 158	32606	UPPSALA	59.80	17.60	58.31	106.88	72.6	37*	1951- 11- 1	0- 0- 0
7372 J5M	0	USHUAIA	-54.80	291.70	-43.49	1.68	-50.1	15	1957- 11- 1	0- 0- 0
3546 50L	84001	VANIMO	-2.70	141.30	-12.30	212.50	-22.5	25*	1964- 7- 1	0- 0- 0
5921 848	0	VICTORIA	48.40	236.60	54.26	294.81	70.2	0	1957- 7- 1	1959- 1- 1

2784 47P	0	VOSTOK	-78.40	106.90	-89.40	116.33	-77.2	10	1958- 3- 1	0- 0- 0
3522 545	44408	WAKKANAI	45.40	141.70	35.55	207.31	59.3	42*	1947- 3- 1	0- 0- 0
7126 937	17402	WALLOPS IS.	37.90	284.50	49.17	353.85	67.2	17*	1963- 7- 1	0- 0- 0
7125 938	0	WASHINGTON	38.70	282.90	49.93	351.88	68.0	31	1929- 12- 1	1968- 9- 1
2960 43V	0	WATHEROO	-30.30	115.90	-41.54	187.28	-65.4	22	1935- 7- 1	1959- 3- 1
6329 832	21303	WHITE SANDS	32.30	253.50	41.15	318.61	60.0	31	1946- 6- 1	1982- 3- 1
2878 460	0	WILKES	-66.90	110.50	-78.22	181.75	-81.3	18	1957- 7- 1	1969- 1- 1
6620 949	19502	WINNIPEG	49.80	265.60	59.85	328.50	76.5	26	1951- 4- 1	1963- 9- 1
3460 53J	84301	WOOMERA	-30.80	136.30	-40.75	210.64	-63.7	7	1961- 5- 1	1969- 12- 1
2930 430	0	WUCHANG	30.57	114.35	19.31	184.30	45.3	0	1946- 8- 1	1949- 5- 31
2223 344	0	WULUMUQI	43.70	87.60	33.08	161.15	63.2	0*	0- 0- 0	0- 0- 0
3214 462	43601	YAKUTSK	62.00	129.60	51.19	194.85	76.1	17*	1957- 2- 1	0- 0- 0
3329 431	43302	YAMAGAWA	31.20	130.60	20.56	199.12	44.1	43*	1946- 12- 1	0- 0- 0
6114 862	0	YELLOWKNIFE	62.40	245.60	69.13	295.41	82.0	0	1957- 11- 1	1959- 1- 1
3622 547	0	YUZHNO SAKHALINSK	47.00	143.00	37.26	208.15	60.7	16	0- 0- 0	1970- 8- 1

List of Alternate Station Names.

AKROTIRI	CAPE ZEVGARI
ALICE SPS	ALICE SPRINGS
AMUNDSEN-SCOTT	SOUTH POLE
ARCHANGEL	ARKHANGELSK
BAFFIN	CLYDE
BARENTSBURG	SPITZBERGEN
BAS ROI BAUDOUIN	BAUDOUIN
BELGRADE	BEOGRAD
BELMAR	FORT MONMOUTH
BELVOIR	WASHINGTON
BOSTON	BILLERICA
BREISACH	FREIBURG
BUKHTA TIKSY	TIXIE BAY
CAMBRIDGE TUNNEL	HOBART
CAMPBELL IS	CAMPBELL IS.
CAMPBELL IS.	CAMPBELL IS.
CAPE CANAVERAL	CAPE KENNEDY
CENTRO GEOFISICO	CUBA
CLYDE RIVER	CLYDE
CYPRUS	CAPE ZEVGARI
DAPANGO	TOGO
DIKSON	DIXON IS.
DIXON	DIXON IS.
DJIBOUTI (ARTA)	DJIBOUTI
DOMONT	PARIS-DOMONT
DUMONT D'URVILLE	TERRE ADELIE
EBRO	TORTOSA
EL CERRILLO	MEXICO CITY
FAIRBANKS	COLLEGE
FALKLAND ISLANDS	PORT STANLEY
FARADAY	ARGENTINE IS.
FLETCHERS ICE	FLETCHERS ICE IS.
FORT BELVOIR	WASHINGTON
FT BELVOIR	WASHINGTON
GEARBOX	SPITZBERGEN
GENERAL BELGRANO	BELGRANO
GENOVA	MONTE CAPELLINO
GODLEY HEAD	CHRISTCHURCH
GRAND BAHAMA	GRAND BAHAMA IS.
GREAT BADDOW	BADDOW
HALLETT	CAPE HALLETT
HARINGHATA	CALCUTTA
ICE ISLAND	FLETCHERS ICE IS.
IVATO	TANANARIVE
JAKUTSK	YAKUTSK
JULIUSRUH	JULIUSRUH/RUGEN
KARAVIA	ELIZABETHVILLE
KERGUELEN	KERGUELEN IS.
KHEYSA IS	HEISS IS.
KIHEI MAUI	MAUI
KOKOBUNJI	TOKYO
KOKUBUNJI	TOKYO
KOREA	SEOUL
KRASNAYA PAKHRA	MOSCOW
LEOPOLDVILLE	KINSHASA-BINZA
LOPARSKAJA	MURMANSK
LOPARSKAYA	MURMANSK
LOUISIANA ST UNIV	BATON ROUGE
MACAO	MACAU
MOUNT STROMLO	CANBERRA
NARSSARSSUAK	NARSSARSSUAQ
NEW DELHI	DELHI
NICHOLS FIELD	MANILA
NORFOLK IS	NORFOLK IS.
NORFOLK ISLAND	NORFOLK IS.
OPERATION GEARBOX	SPITZBERGEN
OSLO	KJELLER
OUGADOUGOU	OUAGADOUGOU
POINT BARROW	BARROW
POLE STATION	SOUTH POLE
PORT-AUX-FRANCAIS	KERGUELEN IS.
PORTAGE	PORTAGE LA PRAIRIE
PRAGUE	PRUHONICE
PRETORIA	JOHANNESBURG
PROVIDENIE BAY	PROVIDENYA
PROVIDENIYA BUKHTA	PROVIDENYA
RAMEY AFB	PUERTO RICO
RAOUL IS	KERMADEC
RAOUL ISLAND	KERMADEC
RIVER SWAN	SWAN RIVER
ROMA	ROME
ROSTOV	ROSTOV-ON-DON
RUGEN	JULIUSRUH/RUGEN
SALISBURY	SALISBURY (AUST.)
SAN ALESSIO	ROME
SANAE	SANAE BASE
SANKT PETER-ORDING	ST. PETER-ORDING
SCARAMANGA	ATHENS
SHOWA	SYOWA BASE
SOTTENS	SCHWARZENBURG
ST PETER-ORDING	ST. PETER-ORDING
ST.PETER-ORDING	ST. PETER-ORDING
STANLEY	PORT STANLEY
SVALBARD	LONGYEARBYEN
SYOWA	SYOWA BASE
SYOWA BAY	SYOWA BASE
SYOWA STATION	SYOWA BASE
TARAVAO	TAHITI
TENNANT CR	TENNANT CREEK
THUMBA	TRIVANDRUM
TIKHAYA BAY	HEISS IS.
TIKSI BAY	TIXIE BAY
TIKSY BAY	TIXIE BAY
TOLASA	LEYTE
TRICHY	TIRUCHIRAPALLI
VANDENBURG AFB	POINT ARGUELLO
WALLER FIELD	TRINIDAD
WARSAW	MIEDZESZYN
WEDDELL SEA	ELLSWORTH
WEST GEIRINISH	SOUTH UIST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● open
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75
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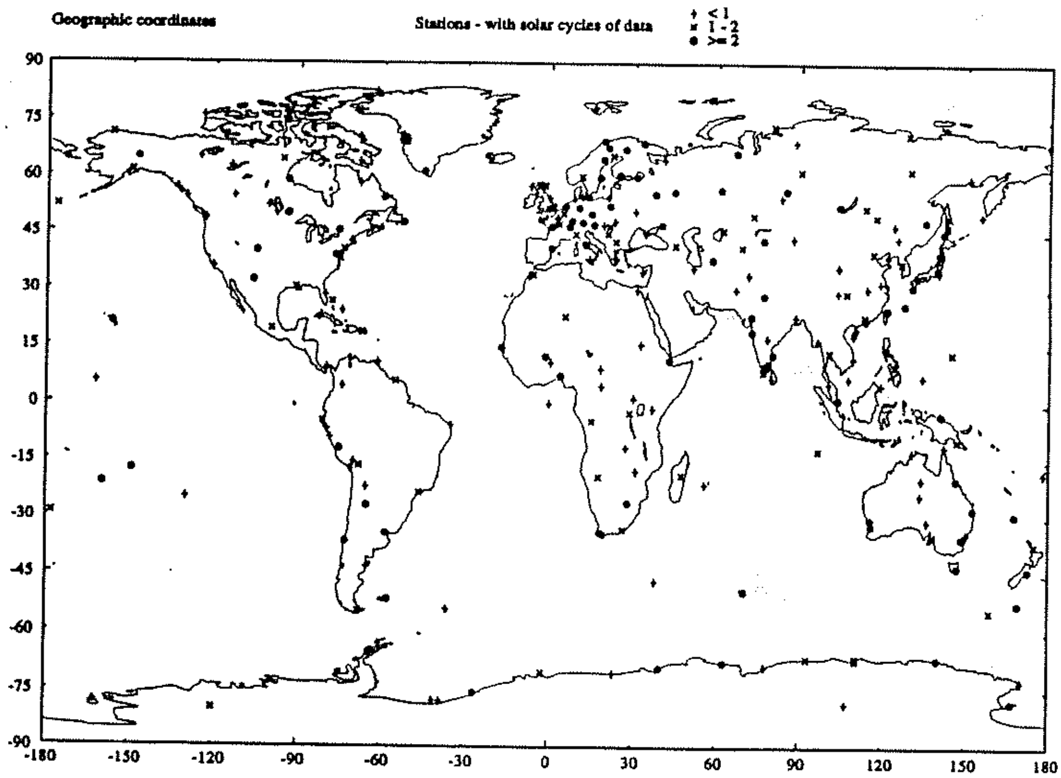
Geographic coordinates
Stations - with solar cycles of data
+ < 1
× 1 - 2
● >= 2
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75
60
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-45
-60
-75
-90
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180

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For the INAG Bulletin to be effective, it must reach all groups who can profit by receiving it. However to be cost effective, it is clearly not sensible to send it to addresses where nobody has an interest in the bulletin contents.

The present mailing list has evolved over many years and seems never to have either purged or displayed, to ensure the coverage is effective. Consequently, in this issue of the Bulletin, the complete mailing list with abbreviated addresses has been published.

Would everyone please look through this list and respond in two ways.

i. If you wish to stay on the mailing list, confirm that by writing directly to me to let me know.

ii. If, after scanning the list, you feel some names are missing, please advise me of the people or groups concerned.

Over the next few bulletins, prior to the Prague 1990 URSI General Assembly, this list will be republished with names of people who have responded bolded. At the General Assembly, we can discuss what should happen to those who have not responded, although, at this stage, I believe they should be removed from the mailing list.

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Jose L. Bendito

YUGOSLAVIA
Dr. L.R. Cander

ZAIRE
Service de Geophysique, Mr. Kashala L. Mbayabo, Mondondo Moimanyinga

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