

Note: This PDF copy combines in one four files received from the CBS/OPAG/IOS Rapporteur on the Improvement of WMO Publication No. 9, Volume A, Mr Harald Daan (De Bilt, Netherlands), namely:

- Report on possible improvements to WMO No. 9, Vol. A;
 - A two-page table "Information contained in Volume A";
 - Introduction to the data base of meteorological observing stations; and
 - Appendices 1 to 7.
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Report on possible improvements of WMO Publication No 9 - Volume A

(Harald Daan, De Bilt, January 2002)

1. Introduction

1.1 Background

The Commission for Basic Systems, in its twelfth session (Geneva, 29 November - 8 December 2000), reviewed the World Weather Watch Operational Information Service regarding WMO Publication No 9, Volume A: Observing Stations.

The Commission concluded that there is a necessity to re-examine this Volume with respect to its contents and the procedures for updating, in order to ensure that it could serve the purposes for which it was intended. Also, the Commission agreed that linking the station list with information on actual availability of observations from lead monitoring centres could improve its usefulness.

The Commission designated a Rapporteur with the following terms of reference:

To work closely with Lead Centres and the WMO Secretariat to develop measures for improvement of the utility of WMO Publication No 9, Volume A with emphasis on completeness, accuracy of information and adding indications of operational performance as derived from monitoring results. Such measures may refer to:

- procedures for the exchange of information between individual Members and the WMO Secretariat;
- procedures for monitoring the information quality and for initiating corrections;
- the lay-out of the information, including presentation;
- insertion of information from lead monitoring centres.

1.2 Procedure and results

The task was started early in the year 2001 with a circular letter from the WMO Secretariat to Lead Monitoring Centres (further referred to as LMC's), requesting co-operation and designation of focal points. This procedure was extended to the World Meteorological Centres (WMC's).

The problems and possible solutions have been discussed mainly in correspondence by electronic mail between the rapporteur and the focal points. Also, the Regional co-ordinators for the GOS have been involved in this discussion.

This report includes a compilation of the evaluations and a set of recommendations that may serve to respond to the problems with Volume A.

1.3 Contents of this paper

In section 2, an inventory of the current purposes and contents of the Publication is provided, together with the procedures relating to its updating and presentation. Also, this section contains a survey of the practical applications that are made by Members.

Section 3 contains an diagnosis of Volume A, referring to practical problems in the application, insufficiencies and inadequacies.

Section 4 is dedicated to the problem of including monitoring information in Volume A.

In section 5, a discussion on possible changes is presented, referring to purposes, contents and mechanisms, with a view to improvements of the applicability.

Finally, in section 6, recommendations for practical measures are listed.

2. Inventory of purposes, contents, related procedures and applications

2.1 Purposes and terms of reference

Already before the establishment of WMO, IMO maintained a catalogue of observing stations, called "Fascicule II". In 1953, the WMO Executive Council (EC-III) decided to prepare a new edition of this catalogue as "Publication No. 9 "Synoptic Weather Messages" in accordance with the principle that "all

stations (surface and upper air) actually in operation and used for synoptic purposes shall be included and no others".

Note:

The information on the stations was spread over two pages, one containing the - fixed - geographical and administrative information, and one containing the - variable - programme information. This concept still seems worthwhile to be taken into consideration nowadays.

This clearly defined purpose has not changed formally. The 2001 edition still only refers to surface and upper air stations used for synoptic purposes. The exchange of meteorological observations from fixed stations between WMO Members is one of the basic procedures which allow for further processing and developing meteorological information and products. In order to limit the amount of information that is exchanged (but also for other reasons), such stations are labelled with a "block and index number". The WMO Secretariat maintains the catalogue (Publication No 9, Volume A, further referred to as "VoIA"), providing referential information on these stations to Members.

This real-time exchange has certainly been the primary purpose of VoIA by the time it was established. However, also other use has been made from VoIA ever since, according to the evolving contents of the publication. In particular, many of the remarks do not correspond to the primary (and formally only) purpose of VoIA, but refer to use for climatology, agrometeorology, meteorological research, atmospheric chemistry, hydrology and geophysics (including seismology). On the other hand, new technologies have been developed, introducing new types of stations which serve synoptic purposes, such as radar and wind profiler stations. And also, new technologies in the computerised application of the information require a reconsideration of the contents, next to the publication of a digitised version on the web which has already been realised.

The idea of assigning index numbers also to mobile stations, both on land and at sea, has been considered. The conclusion was that this should not be recommended, as index numbers are primarily a link between observing programmes and geographical locations. Such a link is not possible for mobile stations.

As a result of these considerations, some redefinition of the purpose of VoIA seems appropriate.

2.2 Contents

The catalogue contains the following types of information.

- the block and index number
- name of the station, state, nation, territory, in text and in coded form
- geographical co-ordinates: latitude, longitude, elevation
- observing times for standard surface and/or upper air observations, as appropriate
- observing times for aeronautical purposes (METAR)
- type of surface (automatic/visual) and upper air (radiosonde, pilot balloon, etc.) observations
- miscellaneous remarks regarding observations schedules and special types of observation.

A detailed summary of the contents is provided in the table "Information on the contents of Volume A" that is attached to this report.

2.3 Procedures

Keeping the information up-to-date is primarily a responsibility of Members. Errors in the transfer of information from Members to the WMO Secretariat can and will happen once in a while. As the Members concerned are the only ones who avail over the right information, they have the primary responsibility to check the correctness of the contents.

In the past, the WMO Secretariat accordingly accepted changes, corrections and deletions exclusively from the Permanent Representative of the Member State concerned, or by individuals who have been nominated explicitly by the PR concerned. This rule, however, is not laid down explicitly in any WMO resolution. In practice, sometimes others, in particular Monitoring Centres, can make solid suggestions for corrections, or indicate that the information is most probably erroneous. In such situations, the WMO Secretariat generally addresses the Member concerned, but this is not always successful.

2.4 Practical application

In this subsection, several applications of VoIA are recorded. The list is not at all exhaustive, but it may provide a reasonable image of the variety in the use that is made of the publication.

2.4.1 Application for digital data processing

- Most automated National and Regional Centres maintain data bases or data files, containing observational data from fixed land stations. For the interpretation of these data, a station list is

indispensable. The basic information for such station lists is mainly derived from the digitised version of Volume A.

2.4.2 Application for other tasks under WWW

A number of possible applications is recorded here.

- Preparation of the lay-out of weather maps for reference purposes; the maps are provided with station positions and index numbers, sometimes also with station names.
- Forecasters, "reading" synoptic reports, sometimes need a reference to a station name or position.
- In preparing output products, e.g. an actual weather summary in main cities on the continent, VoIA offers a possibility to find stations near such cities.
- In examining the quality of methods of observation, VoIA may provide some relevant information. Although Methods of Observation are a task under WWW, this task cannot be classified as "synoptic". In practice the information on methods that is included in VoIA is very limited.
- The application for aviation meteorological purposes with regard to METAR reporting is not clear. VoIA certainly is not providing a complete overview.

2.4.3 Diagnostic and Corrective action

- Monitoring centres obviously need the digitised station information. The availability of information on network membership (e.g., RBSN, GCOS) would improve the usefulness.
- National Centres need a list by country for examining the correctness of the national entries in VoIA.

2.4.4 Application for other WMO or WMO-related programmes

Apart from Climatology and Meteorological Research, for most other programmes the information that is provided on non-synoptic issues is probably incomplete and often doubtful.

- For climatology, the preservation of information on station changes and on obsolete stations would be very supportive.

2.4.5 Search keys

In most applications, a search is carried out based on an index number. In some cases, however, the country and station name may be the key for a search. Incidentally, also other keys may be applied.

This is important with a view to the ordering of stations. In electronic versions, the user can change the ordering in an appropriate way, but for printed versions the ordering should be adapted to practical use.

3. Diagnose of limitations, problems, insufficiencies and inadequacies

3.1 Reliability of information

In practice, it is felt that Volume A does not always contain the right and the actual information, which is indispensable for practical use. Sometimes, large errors, e.g. in geographical co-ordinates, are persisting for a long time. Also, sometimes changes or extensions in the network are not notified to the WMO Secretariat.

Most NMHS's apply for their own use a station list, which is derived from Volume A. From this list, clear errors in the official catalogue are eliminated. Updating such a meta-data-base is then based on changes in Volume A only, avoiding to re-introduce each time the same errors.

A better practice, which is followed only occasionally, would be to inform the Secretariat on clear errors and suspect information. This would enable a request for feed-back from the Member State concerned. However, the follow-up actions require time, and are often not decisive.

3.2 Presentation of the information

The information is available both as a computer file and a hard copy. The computer file is a flat file. Some argue that it can easily be imported in a spreadsheet programme, others would prefer a data base format.

The ordering has changed from a sequence by index number into an alphabetical categorisation by country. For practical application this ordering seems questionable for most applications. On the other hand, for computerised processing there is no problem in adapting the ordering in a suitable way.

The information is presented in a tab-delimited flatfile, allowing for import in a spreadsheet. A space-delimited (column oriented) presentation might be preferable, certainly for direct viewing, but also for computer oriented applications. This requires fixed field lengths for all information items. Currently, this is a problem for names (Region, country, station), for information on hourly observations, and for the ObsRemarks.

It should be noted that much of the information in the ObsRemarks is not processable by computer. This is partly due to the feature that these remarks are all compressed in one field. Another obstacle is that the remarks often contain plain text.

3.3 Contents

There is quite some variation in the information provided by Members. Although very essential information (block and index number, latitude, longitude) is generally provided in the same manner, other items may be subject to different interpretation. E.g.:

- Name of station: some Members prefer short references to a nearby town or village, others provide official station names, sometimes with a length of up to 49 characters.
- Elevation: for some stations surface elevation is provided only, for others barometer elevation only, whereas for some stations not any elevation figure is provided.
- Obs Remarks: these remarks are a mixture of additional information on observations that are made (e.g., AUR, CLIMAT, SUNDUR, RAD), provision of observations for particular users (METAR, SPECI), indications of the location or function of the station (A. C, LH, M), status of the station or membership of certain networks (AGRIMET, BAPMON, GAW), methods of observation that are applied (AUT, WN-WP-WT), and notes on the hours and days of operation (e.g., O/R, NOT ON SUNDAYS, WINTER ONLY). In the current presentation, many remarks are useless for computer application.
- Some Obs Remarks have no relation at all with observing programmes (TAF, R/F, HU/FC).
- The interpretation of the information is clearly not the same in all Member States. For example, AUT may be interpreted as a fully automatic weather station, but also as a station where some parameters are sometimes provided automatically.
- The definitions of the acronyms are not always unambiguous.
- Under the ObsRemarks, very often text is added which is not explained in the Code Table A (e.g., "ACIDRAIN", "ON/LE", "NOT ON/SAUF").
- The footnotes appear in English and French only.
- Although 224 footnotes are defined, only 24 are practically referred to.

The table "Information on the contents of Volume A", appended to this report, contains a comprehensive summary of the contents. Also, information on the numbers of Members providing specific information is included, and on the numbers of stations concerned.

3.4 What VolA does not contain

Some information that is important for specific users is not contained in VolA. Some examples are listed below.

- Monitoring information: availability and quality of the observations as they are received at lead monitoring centres.
- Information on the parameters that are measured or estimated (P, T, ddf, etcetera); it is peculiar that this info is not available, whereas observations of noctilucent clouds or aurora are specifically recorded.
- Headings of bulletins carrying the observations (Volume C serves for this purpose).
- Date of start of observations at the site concerned (important for climatology).
- Historical stations, that have been closed (idem).
- Reference to former index numbers of the station (idem).
- Reference to ICAO station identifier code ("CCCC").
- Many aerodrome observing sites which do not carry a WMO index number.
- Moored buoys, in particular those included in the RBSN.
- Types of reports provided: for hourly reporting, it is interesting whether this is done in SYNOP or in METAR reports.
- Membership of main networks (RBSN, RBCN, GCOS networks).
- Information on instrumentation, except for some parameters (e.g. upper air wind finding, evaporation and radiation).
- Information on the topographical and environmental aspects of the station (except for "coastal" and "mountain" stations).

3.5 The limitations of the index numbering system

The numbering system has arrived at its limits. In several areas, it is impossible to assign new numbers to stations or to do so without duplicating numbers that have been used earlier for other locations. For climatological applications, this is a major complication.

Many meteorological codes require index numbers. However, the technological state of the art of communication no longer requires shortening station identification to a 5-digit number. The operational

obstacles for fully recording the geographical co-ordinates (position and elevation) within a message seem to be fading. On the other hand, absence of a clear identification would affect the feasibility of monitoring and raise major problems for climatology.

As long as index numbers were assigned according to geographical guidelines that are given by WMO, an approximate location could be derived from the number. Clear deviations often pointed towards erroneous co-ordinates. Nowadays, however, the lack of available index numbers no longer allows for this relationship.

In summary, both climatology and monitoring need a clear key to identify stations. Geographical co-ordinates are not sufficient for the purpose. An identifier that is based on the geographical location, but also accounts for a singular relation with a station will be required.

3.6 Diversity of Observation Remarks

The Obs Remarks and Footnotes contain a wide range of miscellaneous information; they may refer to the function of the station, the topography, methods of observation, parameters observed, time schedule, etcetera. Several of these remarks could be very useful if only they were presented in a processable form. This refers in particular to functional and topographical information, the operating country (if not obvious) and method of observation. These types of information deserve more applicable recording.

3.7 Names

Names of Regions, countries and stations are sometimes very long (up to 65, 125 and 49 characters, respectively). This extends the data load of the flatfile unnecessarily, and is an obstacle in working with the downloaded file.

3.8 Geographical co-ordinates

There are requests for an other notation and for more precision. E.g., notation in:

- degrees and hundredths of degrees (accuracy <=1111 meters)
- degrees and thousandths of degrees (accuracy <=111 meters)
- degrees, minutes and tenths of minutes (accuracy <=185 meters)
- degrees, minutes and seconds (accuracy <=31 meters)

The current accuracy (notation in degrees and minutes) is <=1852 meters.

4. Observing programmes and monitoring information

4.1 The benefits of monitoring information

In its current presentation, VoIA provides very detailed information on the observing programme. As many details appear in the ObsRemarks in plain text, it is not easy to absorb all this information.

On the other hand, the observing programme is not always the best guide for assessing the performance of a station. Monitoring figures can be more useful, as these represent a more practical approach from the user's point of view.

A presentation of both types of information together may give additional value, as it would reveal weak spots in the WWW operation: discrepancies between the programme and the monitoring result would point towards shortcomings, not necessarily in the observing programme, but possibly in the coding, transmission or decoding procedures.

4.2 Limiting the information on observing programmes

Inclusion of monitoring figures in the information together with observation programme specifications implies that the latter should allow for comparison. This defines a minimum set of specifications. However, it is not necessary to add much more information, which cannot be checked by monitoring routines.

An example: some stations are not operating in the weekend or on public holidays. As WWW does not require the monitoring centres to check the reception of reports by day of the week (not to speak of public, and in particular, national holidays), an indication of the degree of availability seems sufficient. For such a station, an indication of the availability should be included without further details.

4.3 Presentation of the information

Inclusion of monitoring information in VoIA raises two major problems:

- The organisation of input from an external source (LMC) into the database is complicated. Direct access to the data base by LMC's could be established, but is not recommendable from a point of view of maintaining integrity of the data base. Indirect input via the Secretariat would enlarge the work load substantially.

- The monitoring data have by definition a short validity, as opposed to the (ideally everlasting) validity of station meta-data. The combination of these two types of data in one data base can be a source of conflicting situations.

Also in the case that the first objection could be overcome, a combination of both data types in the central data base seems not recommendable. It might be better to find a solution in a way where each of the parties (WWW Department and LMC's) retain their own responsibilities in the procedure.

This could be carried out as follows. Prior to a monitoring period, the WMO Secretariat makes available a monitoring version of VoIA. In this version, information which is not relevant to monitoring may be suppressed. The LMC's make a copy of this edition of VoIA and add a number of columns, filled with appropriate monitoring figures and flags. The LMC's then return the result to the WWW ftp server as the Monitor version.

A procedure along these lines would avoid problems of shared responsibilities.

Note: LMC's should be encouraged to provide information on suspect geographical co-ordinates and elevations. This could also be indicated in the Monitor version of VoIA by flags or suggested corrections.

5. Discussion on purposes, contents and mechanisms

5.1 Purpose

5.1.1 Scope

The purpose of VoIA should be updated by extending the scope from
"surface and upper air stations"

to

"all stations at fixed locations providing real-time meteorological observations"

However, the absence of any other sound source of historical information requires that some basic information will be preserved after closure of a station. This could be anticipated by including historical stations (with limited basic information) in the database that contains the Volume A information, without including these in Volume A itself.

5.1.2 Observing versus Reporting practices

In practice, VoIA serves mainly the real-time use of data collected on an international basis. If data are disseminated only nationally, or are not disseminated at all, VoIA has no clear function. Therefore, VoIA should provide better information on the reporting of observations and not limit information to the observing programme only.

5.1.3 Use for climatology

It should be recognised that the climatological community has very close links with the WWW, as both use the same observations, albeit in different frameworks of time. The only difference is that the data in VoIA are of permanent importance for climatology, and remain so after stations are changed or deleted in VoIA. This issue has been discussed above (para 5.1.1). In addition, dates of start and closure should be added to the information.

5.1.4 Other applications beyond the scope of WWW

Other fields of application beyond WWW formally never were within the scope of VoIA. The many remarks and footnotes which refer to other applications should be removed in order to keep VoIA manageable, also noting that this information provides not a complete picture. Lists of stations with information on activities relating to other WMO programmes should be transferred to the appropriate departments in the WMO Secretariat, and the Technical Commissions concerned should decide on the future of this information.

5.1.5 Aviation meteorology

In some countries METAR reports are regarded solely as products for aviation, not as observation reports to be processed (many stations make simultaneously SYNOP and METAR reports). In other countries, however, METAR reports often take the place of SYNOP reports.

In VoIA, METAR reporting is included in the remarks. However, as many METAR producing stations have no index number, VoIA is incomplete as a list of METAR producing (and disseminating) stations.

In order to keep the information in VoIA clear and as complete as possible, there are two extreme options.

- Inclusion of all METAR producing stations, with or without index number.

➤ Exclusion of the METAR information from VoIA.

Note: The inclusion of M/B or SPECI reporting in VoIA is questionable anyway, as these reports are specifically oriented to external users, not to forecasters or climatologists..

It should be noted that ICAO maintains lists of METAR producing stations. Inclusion of METAR reporting in VoIA might infer discrepancies between the two lists, which is not recommendable.

Note: In this report, inclusion of METAR reporting and - consequently - of the ICAO station identifier is anticipated. However, advice should be asked from the Commission for Aeronautical Meteorology.

5.1.6 Redefinition of the purpose

With the correction made in para 5.1.1 and the considerations in the following paragraphs above, the redefined purpose of VoIA could read:

The Volume shall contain all stations at fixed locations providing real-time meteorological observations for synoptic use. It shall include relevant information on the operations, on location and elevation, and on the observing and reporting programme. The data base contents will be preserved after closure of stations in support of climatology.

5.2 Procedures

In order to keep the information in VoIA correct and up to date, the current procedures are insufficient. The following measures are proposed.

- Members of WMO should designate (a) focal point(s) (with e-mail address) to communicate with the WMO Secretariat and LMC's on VoIA matters. The focal point should be authorised to act in these matters on behalf of the PR concerned.
- If a Lead Monitoring Centre (LMC) detects a (probable) error in the geographical co-ordinates (latitude, longitude or elevation) of a station, the Centre advises the NMC concerned and the WMO Secretariat. The Centre may suggest corrected values.
- Upon reception of such an advice, the WMO Secretariat requests the PR or the national focal point concerned to provide clarification.
- As long as no response is received, the values concerned are flagged. If the LMC advised a correction, an additional entry will be made for the station concerned.

For monitoring, the procedure described in para 4.3 is proposed for implementation. It should be noted that monitoring should cover all stations that are more or less regularly received, also including stations (e.g., non-RBSN or RBCN) which are not in the monitoring file. This would help in identifying unknown stations.

5.3 Contents

After elimination of information beyond the scope of VoIA, the contents of the data base should be ordered in the following sections:

section A	Identifiers (index, ODAS, ICAO), including type of station
section B	Administrative organisation (name, state, region, function)
section C	Location (latitude, longitude, ground elevation)
section D	Historical information, dates of start and closure
section E	Operational status, Reports provided and Network membership
section F	References to other information
section G	Parameters observed
section H	Time schedule of obs reports

Note: this sequence accounts for the discrimination between (semi-)permanent information in sections A-D and more variable information in sections E-H.

In the Volume-A-new-style, section D could be suppressed; in the historical version, the sections E-H are not needed.

Monitoring figures, which are of a really temporary nature, should not be included in VoIA or in its underlying data base, but be inserted in separate files, prepared from VoIA, and completed by monitoring centres. Otherwise, the integrity of the data base might be affected.

An option could be to include these figures in a version, extended with a section M (Monitoring results). If required, some sections (e.g. B, D, F, parts of E and G) could be suppressed in this version.

The information should be provided in a column-oriented, space-delimited flatfile, with fixed field lengths.

A comprehensive summary of the proposed contents of the data base is provided in the draft "Introduction to the proposed Volume A data base", that is attached as an Annex to this report, and in its appendix 1. Particular features in the sections are discussed below.

5.3.1 Section A: Identifiers and general type of observations

- In order to facilitate inclusion of stations without an index number, and with a view to anticipating the problems that will obtain in the near future regarding the index numbering system, a purely geographical Location Identifier is included, calculated automatically from the geographical position. This identifier may also be helpful in linking historical station index numbers to current index numbers. A definition of the Location Identifier is presented in appendix 3 of the Annex.
- An indication of the source of the information is included (PR, informal channels, or LMC).
- In the text of the Introduction, more guidance should be included on the criteria for assigning new index numbers in case of changes. In particular, station moves over more than 5 kilometers should result in assigning a new index number.
- The current Index Sub-number (0 or 1) is currently used for stations with two locations. This refers in most cases to stations where the surface obs and upper air obs are not made at the same location. It is proposed to replace this subnumber by a Type Indicator, which may refer to: surface, moored buoy, upper air (in-situ), radar or wind profiler. For stations making more than one of these types of observations at the same location, separate entries in VoIA should be introduced.
- ODAS number and CCCC aerodrome identifier are included as appropriate.

5.3.2 Section B: Administrative organisation

- The length of the station name should be limited to maximally 24 characters. The name preferably should start with an indication (city, village, river, cape) which can be retrieved in a comprehensive atlas. Further specification may follow. Function of the station and reference to subnational administrative units (states, provinces, islands) should be transferred to new entries (see below).
- A function descriptor should be added, referring to aerodromes, light houses/ships, platforms, as appropriate.
- A field for an abbreviated indication of subnational administrative units (e.g., state, province, island) should be added.
- In computer presentation, the UN 3-character code for country/area identification should be applied instead of the full name. A list of correspondence between these codes and official country names should be available.
- The WMO Region name should be suppressed; the Region number is sufficient.
- For cases where countries operate beyond the border, a field should be added containing the UN code for the operating country. This may apply to Members, operating stations in other countries or, e.g., in the Antarctic, at detached islands or on high seas (moored buoys).

5.3.3 Section C: Location co-ordinates and characteristics

The Guide on GOS recommends that the observing area at a site extends to minimally 100 meters. Therefore, the accuracy of the geographical co-ordinates should not be more detailed than this figure. A finer accuracy might be misleading for some parameters. On the other hand, the current accuracy (1 minute latitude = 1 nautical mile = 1852 meters) is felt to be not adequate.

Note: the Manual on GOS is not specific on this issue. It requires that the observations should be representative for the surrounding area, but provides no indication of the size of that area. There are no clear criteria for the maximum distances between sensors at the same observing site. In practice, however, a figure of about 200 meters seems quite appropriate.

In attaining a better accuracy, there are in practice three options (see also para 3.8):

- notation in degrees and thousandths of degrees (accuracy <=111 meters);
- notation in degrees, minutes and tenths of minutes (accuracy <=185 meters).
- notation in degrees, minutes and seconds (accuracy <=31 meters).

Note: Atlases apply the current VoIA notation when providing co-ordinates in the Index.

A change to another system might raise much confusion. For that reason, the first option is not recommended. In this report, the second option is proposed, including a separate field for the tenths of minutes. This field could be shared with the field for flags. (When the location is approximate or suspect, the precision is not relevant.)

Notation in seconds might lead to many more station changes, which are often not relevant. The exception might be in radiosonde stations. For this case, seconds could be provided in the Catalogue on Radiosonde Stations, which should be linked to the data base.

- Geographical positions should be given in degrees, minutes and tenths of minutes. The Hemisphere indicator should precede the degrees.
- The provision of the elevation H should be mandatory. It should refer to the ground elevation at relevant sensor locations. E.g., for surface observations, it should refer to the rain gauge or - if absent - the temperature sensor; for radiosonde stations, it should refer to the point of releasing balloons. The elevation H_a is not relevant.
- H_p should not be included in this section, but in section G, as it is part of the instrumentation.
- A flag for indicating unreliability of the co-ordinates and elevation should be added as appropriate for each of these entries separately.
- A field for indicating the geographical location may replace the Remarks C (coastal) and M (mountain). Additional features may be proposed (lake, mountain slope versus top, flat land).
- A field for indicating characteristics of the vegetation and population of the environment may be added (urban, crop, forest, grass, waste land, ice, desert).

5.3.4 Section D: Operational status, establishment, closure

- Inclusion of the year and month the station was established at or moved to this site is proposed, and also year and month of termination, as appropriate.
- This section could also refer to former index numbers for the same stations, and to alternative names that are (or may have been) in use.

5.3.5 Section E: Operational status, Reports provided and Network membership

The type of reports that is provided is generally indicated by code forms. However, in a foreseeable future we may have only BUFR and CREX coded reports (for wind profilers the latter codes are already used). There will still be a need for terminology for SYNOP-like or TEMP-like reports.

- An indicator on whether a station is operational or suspended observations temporarily should be added. The latter now is recorded generally in a footnote.
- An indication should be added on whether a station provides standard reports (SYNOP, SHIP, BUOY, TEMP, PILOT, RADOB, RAREP, CLIMAT (TEMP) or BUFR/CREX counterparts, wind profiler data, METAR's).
- An indication on the membership of basic networks should be included: RBSN, RBCN, GSN and GUAN.

Inclusion of bulletin headings will deliberately not be proposed. This information is and should be included in Volume C. Inclusion of bulletin headings would endanger the integrity of the data in both data bases. A routine check of the stations in Volume C with the contents of Volume A is recommended.

5.3.6 Section F: Reference to other information

This section should contain indicators on other catalogues, that make use of the information in VolA.

- An important reference file is the catalogue of "Radiosonde and Upper Air Wind finding Systems in Use". This link should prevent discrepancies between different catalogues. Inclusion of the catalogue information in Volume A is not recommended, as it is rather extensive information, related to only a small number of stations.
- Another reference file could be a catalogue of aviation met stations with more expanded information on time schedules.
- Provisionally, a reference to stations with current Obs Remarks regarding information concerning other WMO programmes should be included.
- A reference to Volume C may serve to get information on exchange.
- A reference to monitoring files, for both real-time and climatological reports.
- A reference to Regional networks and GCOS networks is already included in Section E.

5.3.7 Section G: Parameters observed

For all common parameters, there should be a clear indication on whether these are observed or not. In addition, some essential information on the interpretation of reported observations should be included (barometer elevation H_p and Pressure level).

The list is proposed to contain:

- Temperature
- Pressure
- Wind
- Humidity

- Cloud information (N and h as a minimum)
- Visibility
- Present weather
- Precipitation amount
- Minimum and maximum temperature
- Soil temperature
- Snow cover
- Sun duration
- Sea surface temperature
- Sea and/or swell
- Ice
- Tides

5.3.8 Section H: Time schedule of obs reports

It is proposed to include 9 entries for surface stations and upper air stations each. These entries should replace the corresponding entries in the current VoIA (LIKE: "X X X X X X X X" AND "RW . RW ."), but also provide information on interruptions in the time schedule, on time deviations, and on the method of observation.

5.3.8.1 Surface observations

For surface observations, 8 entries should refer to the main and intermediate hours (unchanged) and a 9th and 10th to hourly and half-hourly observations respectively.

For each entry, the following information is included.

- Method: means of observation: visual (manned), automatic (unmanned), or a mix of both (e.g. visual on weekdays, automatic in the weekend).
- Continuity: continuous programme, programme interrupted on certain hours or days (e.g. weekend, holidays) or in certain seasons, and irregular or incidental.
- Time Shift: indicating if observations are made one hour earlier or one hour later.

For hourly and half-hourly observations, only the Method and the Continuity apply.

5.3.8.2 Upper air observations

For upper air observations, each main hour is spliced into two entries, referring to Radiosonde (geopotential, temperature, humidity) data and to Upper Wind data respectively. The 9th and 10th entry provide additional information on observations at non-standard times.

For these entries the following information is included:

- Method (applies to upper wind only): profiler, navaid, radio/radar tracking, optical tracking.
- Continuity: (see under 5.3.8.1 above).

5.4 Presentation

The presentation is currently twofold: a weekly updated computer file and a semi-annually updated printed version. Replacing the latter by a version on CD-ROM is under examination.

Variants of these presentations might be considered, in accordance with the differentiated use that is made of VoIA. This proposal will consider some standard presentations, serving the most essential needs. However, for the future, a system allowing for an interactive selection from the data base by users would be the most appropriate mechanism.

5.4.1 Synoptic general version

For active stations, the relevant data base contents should be available in a flat file. Presentation in data base or spreadsheet format is not recommended, as there is no standard yet for these systems. Most systems allow for importing a flatfile. The file should be fully column oriented; that is, the length of text in the columns should be constant.

An inventory of the items contained in the flatfile is recorded in the Annex, appendix 2.

The ordering in the flatfile could be:

- by index number: this anticipates numerical use;
- by country and index number: this may be helpful in manual use and for checking national entries;
- by location identifier; this allows for a geographical search.

The file should be updated at least monthly; the current weekly updating is excellent.

5.4.2 Synoptic printed version

This version should - necessarily - be abridged, as limited by the page size. It is anticipated that this version will no longer be printed centrally, but will be made available on CD-ROM.

5.4.3 Monitor version

Monitoring results can be an excellent tool for keeping VoIA up-to-date. Monitoring Centres may detect unknown index numbers, suspect co-ordinates or elevations, and deviations between formal programmes and practice.

Not only quality monitoring, but also quantity monitoring is of great importance.

The Monitoring version, therefore, should allow for LMC's and other Centres which apply monitoring practices for various purposes to have a broad access to VoIA information. It seems doubtful whether the preparation of dedicated blank Monitoring files, e.g. per Region, is the right procedure. It might be better to prepare one comprehensive Monitoring file; the Monitoring Centres can make an appropriate selection themselves.

From these considerations, the following procedure is recommended.

This version is a set of 3 flat files, based upon the Synoptic general version, and extended with appropriate fields for Synoptic surface and upper air and CLIMAT monitoring results respectively.

The files in this version should be ordered by index number.

These files with blank columns at the end are made available at the beginning of a new monitoring period. After this period, the blank columns will be completed by the Lead Monitoring Centres.

5.4.4 Historical version

This version should provide information for all stations for which data are available in the data base, including historical stations. The information per station could be reduced; Sections 5-8 could be suppressed. An annual update would be sufficient.

5.4.5 Other versions

One could imagine many other versions, including subsets of stations: upper air stations, marine stations, aerodromes, etcetera.

6. Recommendations

6.1 Proposed additions to the Manual on GOS

In the Manual on the Global Observing System, the text in paragraphs 6.1 through 6.4 should be included in a new section.

Definition, purpose and scope of Volume A

With a view to the identification of observing stations, a list of historical and actual stations is maintained in a data base. This list should contain all stations at fixed locations, providing - currently or in the past - routinely in-situ observations of weather parameters near the earth surface, at sea and in the upper air, and will also include sites for remote observations by means of weather radar and profilers.

The information on actually operating stations in the data base is made available to Members as "WMO Publication No 9, Volume A1". This Volume shall contain all stations at fixed locations providing real-time meteorological observations for synoptic use. It shall include relevant information on the operations, on location and elevation, and on the observing programme. The Volume will be updated on at least a monthly basis. It is provided in digital form on the WMO website and (as appropriate) via other electronic means.

Limited information on all stations - historical and actual - is made available to Members as "WMO Publication No 9, Volume A2". This Volume will include information on identifiers used, on geographical location and elevation and on the years of operation.

Procedures for updating information

Each Member of WMO shall designate a national focal point to communicate with the WMO Secretariat on matters regarding the contents of Volume A1 and A2. The national focal point shall be authorised to act in these matters on behalf of the Permanent Representative concerned.

Whenever a Lead Monitoring Centre (LMC) detects a (probable) error in the geographical co-ordinates (latitude, longitude or elevation) of a station, the Centre advises the NMC concerned and the WMO Secretariat. The Centre may suggest corrected values.

Upon reception of such an advice, the WMO Secretariat requests the PR or the national focal point concerned to provide clarification.

As long as no response is received, the values concerned are flagged. If the LMC advised a correction, an additional entry can be made for the station concerned.

Monitoring procedures

Monitoring results are an essential tool for keeping the Volumes A1 and A2 up to date. For this purpose, a Monitoring version of Volume A1 will be made available preceding a monitoring period. This version will be identical to the general version, extended with fields for entering figures resulting from quantity and quality monitoring during the period concerned.

Monitoring centres will copy this version and return it to WMO after completing it with the monitoring results. Subsequently, the completed versions will be made available for Members at the WMO website.

Contents of Volume A1 and A2

Volume A1 will be composed of 8 sections, which are listed below

<i>section A</i>	<i>Identifiers (index, ODAS, ICAO), including type of station</i>
<i>section B</i>	<i>Administrative organisation (name, state, region, function)</i>
<i>section C</i>	<i>Location (latitude, longitude, ground elevation)</i>
<i>section D</i>	<i>Historical information, dates of start and closure</i>
<i>section E</i>	<i>Operational status, Reports provided and Network membership</i>
<i>section F</i>	<i>References to other information</i>
<i>section G</i>	<i>Parameters observed</i>
<i>section H</i>	<i>Time schedule of obs reports</i>

Volume A2 will contain the section 1-4.

The Monitoring version consists of Volume A1, extended with:

<i>section 9</i>	<i>Monitoring results</i>
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The detailed contents and formats of Volumes A1 and A2 will be recorded in the Introductions to these Volumes.

6.2 Proposed addition to the Manual on Codes

In the Manual on Codes, the reference to the station list should be extended with a reference to the appropriate section in the Manual on GOS.

6.3 Measures for transition

The contents of the Volume A (edition October 2001) have been transferred to the new data base in EXCEL format.

The proposed Volume A1 is available as a flat file. Simultaneous provision of both Volume A and A1 should be anticipated for a limited period of time (3-6 months).

Volume A2 is a new facility that is also available as a flat file.

The proposal includes a number of new items, that should provide information which was not always available or reliable. This requires checks and corrections from the Member States. Also, the new format requires revised procedures within the Secretariat.

It should be noted that the features that were major problems in the development of the current data base will be absent in the proposed lay-out:

- the printed version can be replaced by a CD-ROM version (also, 2 diskettes are sufficient) containing the full flat file;
- footnotes are not included;
- the many ObsRemarks are either eliminated or included in standard fields.

If the data base should be transformed into a data-base-format, the development of the new data base will be based on a rather simple and straightforward concept.

The rapporteur is prepared to be available for advice and for practical support in the implementation.

Information contained in Volume A		(dd 12 March 2001)	Given for	Countries/
		Examples	Stations	in Areas
Referential information				
Region number		2	10616	264
Region name		ASIA/ASIE	10616	264
Country		JAPAN/JAPON	10616	264
Country code		2190	10616	264
Station identifier	(for file management)	3019	10616	264
Index number		47778	10613	263
Index subnumber		0	10616	264
Station name		SHIONOMISAKI	10616	264
Geographical information				
Latitude		33 27N	10616	264
Longitude		135 46E	10616	264
Barometer elevation		75	8811	253
Surface elevation		73	7723	219
Flags for approximate values		#	17	9
Pressure level			904	83
OBS REMARKS				
	Mountain station	M	208	42
	Coastal station	C	740	92
	Light House	LH	64	21
	Light Vessel	L	7	4
	Platform	FIXED PLATFORM/PLATE-FORME FIXE	2	2
Observing program				
3 hourly SYNOP obs		. X+ X+ X X X X 20	10616	264
hourly obs		H06-20	10616	264
semi-hourly obs		S0830-1630	10616	264
6 hourly UA obs		RW W RW P	10616	264
OBS REMARKS				
Availability	Incomplete program	OBS REDUCED	2	2
	Irregular	IRREG.	84	20
	At request	A/R O/R	119	23
	Not real-time	OBS. RECORDED ONLY	82	3
	Variations by day	NOT ON 6,7/SAUF 6,7	168	38
	Variations by season	SUMMER/ETE	89	15
	Not available	OBS (TEMPORARILY) SUSPENDED	40	20
	Additional obs	EXTRA OBS	8	6
Observed parameters				
OBS REMARKS				
Standard parameters	Wind	WIND ONLY ; NO WIND	26	4
	Precipitation	RAINGAUGE STATION	8	3
Additional parameters	Temp. extremes		6	1
	Sun duration	SUNDUR	2855	193
	Soil temperature	SOILTEMP	1861	135
	Snow depth	SNOW	372	21
Special obs	Clouds	MONT	59	19
	Noctilucent cloud	NLC	30	8
	Nephoscope	NEPH	97	8
	Ice nuclei	ICE NUCLEI	1	1
	Aurora	AUR	6	3
Marine obs	Waves	SEA/SWELL	424	72
	Ice	ICE	61	9
	Tide	TIDE	97	17
	Sea temperature	SEATEMP	144	39
Hydrological obs	River stage	RIVSTG	74	4
	River current	RIVCUR	19	2
Agricultural obs	Evaporation	EVAP	1827	148
	Phenological	PH	486	22

Radar	Storm detection	RSD	284	64
Upper air	Rocket	ROCOB	9	7
	Aircraft	RECCO	2	2
Atm electricity	Lightning counter	LIT	73	10
	Atm electricity	ATMEL	14	9
	Atmospherics	ATMOS	5	3
	Atmospherics	SFERIC	9	4
Radiation	General	RAD	199	34
	Total	TOTRA	247	58
	Solar	SOLRA	729	100
	Sky	SKYRA	73	22
	Nocturnal	NOCTRA	25	7
	Cosmic	COSRA	2	2
	Gamma ray	GAMMA RAY	134	6
	UV-B	UV-B	1	1
Chemistry	Acid precip	ACIDRAIN	23	1
	CO2	CARBON DIOXIDE	9	7
	Radioactive sampling	RADSAMP	209	22
	Ozone	OZONE	68	43
Geophysical	Seismological	SEISMO	218	39
	Magnetic	MAGNET	32	20
	Volcano	VOLCANO	19	2
	Earth current	EARTH CURRENT	5	3
	Ionosphere	IONOS	14	8
Observing times				
OBS REMARKS	Departures	NOT ON 6 & PUBLIC HOLIDAYS	285	
Observing methods				
OBS REMARKS				
Automation	Aut measurement	AUT; SEMI-AUT; MAN/AUT	2121	89
UA wind finding	Navaid	WN	47	19
	Radiotheodolite/radar	WT; WR; WTR	372	93
Wind profiler		WP	4	4
Station type, networks				
OBS REMARKS				
	Aerodrome	A	2792	203
	Seaplane basis	HY/A	3	2
	Agrimet	AGRIMET	383	46
	Global Atm Watch	GAW	54	22
	Bapmon	BAPMON	4	2
Reporting				
OBS REMARKS				
Climatology	Monthly report	CLIMAT(C); CLIMAT(CT); CLIMAT(T)	2739	226
Aviation	Actuals	METAR; SPECI; M/B	2304	161
Radar	Radar report	RAREP; RADOB	88	27
Telecommunication	Platform	VIA ARGOS; VIA GOES-E; DCP	48	6
Forecasting				
OBS REMARKS				
Aviation	Forecasts	TAF/ TAFOR	2	1
Hurricane warning	Forecast center	HU/FC	18	15
Tidal waves	Forecast center	TI/WA/FC	6	2
River	Forecast center	R/F	1	1

Introduction to the data base of meteorological observing stations

1. Contents of the data base

The data base contains a comprehensive list of actual and historical observing stations. For each station, a set of information items is stored in the data base. A complete list of these items is provided in Appendix 1: Legend.

2. Presentation of the information

The information is presented in several ways. In Appendix 2: Presentation, a survey of the available sets of information is provided.

In principle, all sets are available as text-files, suitable for electronic processing. However, one set ("VolPri") is put into a format that allows for direct printing. A print can be made on A4 "landscape" or on A3, requiring an 8 pt constant width type character.

All files are column-oriented; that is, the field width of all items is fixed and corresponding items appear all in the same column.

All files are provided with the extension .prn, referring to the absence of column delimiters. For importing the data in, e.g., an EXCEL worksheet, the fixed width option should be selected and the delimiters should be set carefully, based on the field width (see Appendix 1). If required, a version with (e.g. TAB-) delimiters can easily be provided. This could be easier for EXCEL or other spreadsheet applications.

3. Guide on the use and provision of information

A general remark:

The accuracy of the information contained in the data base is completely depending on the accuracy of provision of this information. Only the Member States operating observing stations can provide the full range of information that is necessary.

In the following, some guidance will be given on the provision of information, and on the interpretation of the legend, as given in Appendix 1.

A Station identification

A0-A1: Location Identifier

In Appendix 3: Location Identifier, a comprehensive explanation of this item is provided. The item is necessary, as the data base needs a unique identifier for each entry. This could also be solved by simply numbering the entries, but the Location Identifier has the advantage that it facilitates the assessment of two entries at the same location.

Also, it allows for an geographical ordering mechanism, in such a way that nearby stations also appear close in the ordered file.

Finally, it might be a future alternative for the current system of block and index numbers which is getting exhausted in many areas of the world.

The Location Identifier can be assessed automatically by the data base system; it does not require any additional action by Members or by the WMO Secretariat.

A2: Authorisation

In perfect information transfer, this field should be empty. Action is required only in the other case. If the field is not empty, the Member concerned is urged to check the data for that particular station, and inform the Secretariat accordingly.

Monitoring centres should inform the Member concerned and the Secretariat whenever station data are doubtful.

Members are invited to check their stations routinely for added flags.

Note: see also C1, C3, C5 and G3."

A3: Block and index number

In principle, block numbers should refer to well-defined non-overlapping areas. Index numbers should be organised in latitude bands from north to south, each containing ranges of numbers which in its turn are

organised from west to east. In practice, this principle is not observed in many areas, generally as a consequence of insufficient room for numbering.

In some cases, two surface stations (index numbers) are defined at the same site. This is not very satisfactory as each station is assumed to provide representative observations.

If a station is moved over a small distance, there is no reason to change the index number. For a move of less than 2 kilometre, the same number may be preserved. However, if a station moves over larger distances, it may be recommendable to assign a new index number. Moves over 5 kilometre should - in general - lead to a new number. In arbitrary cases, the change of environment may play a role. If the move does not imply major changes in measurement series, the same number could be maintained.

A4: Type Indicator

In the new layout, different types of observations now define different stations. As a consequence, the numbering of e.g. upper air stations can be independent of the surface station numbering. However, it is recommended that if two or more types of stations are co-located, these will receive identical index numbers.

A5-A6: ODAS number and ICAO CCCC code

This information is entered here if available. Including a CCCC code makes sense only when reports (METAR's, SPECI's) are provided under this identifier. If the CCCC code refers to (e.g.) a telecommunication centre only, the field should be left blank.

B Administrative information

B0: Station name

The name of the station may be helpful for users for a quick rough idea on the location of the station. This may be helpful for a rough check, if there is some doubt about the co-ordinates.

Also, the name can be used, e.g., when a forecaster gets questions on the weather in other parts of the world, often focusing on well-known cities or areas. Therefore, the name should be chosen in such a way that a user (abroad) gets an idea about the approximate location.

Many names are quite lengthy, and in many centres only a limited set of characters is read automatically. So, the name should preferably start with a recognisable item.

E.g.:

London / Heathrow	not:	Heathrow, London
Honolulu, Oahu	not:	Oahu/Honolulu

Note that a slash is followed by an item that gives more detail, whereas a comma is followed by a broader context.

Personal names and other multi-word structures should be concatenated with hyphens:

Paris / Charles-de-Gaulle
Rostov-na-Donu
Rio-de-Janeiro

National additions to names often refer to type or status of stations, but are generally not understandable for others. On the other hand, some essential information is often provided in the name, but should be provided in a more systematic way to allow processing. This refers to, e.g., airports, research stations and automatic systems.

Name length must be limited to 24 characters.

B1: The Function Designator

This feature offers a better tool to use information that was contained formerly in the name of the station. The Legend in Appendix 1 contains a list of options to be used here. The list could be extended further, as required.

B2: State, Province or Island

Also this addition may be helpful in shortening the name length, and to make recognition of a location easier. It is recommended that this field will be used for very large countries, and for archipelago's.

B3: Country or Area

The country or area where the station is located is denoted by the UN/ISO country/area code. A summary of the codes used is provided in Appendix 4: List of country/area codes.

For a few cases, new codes have been added, or the official code has been modified. In particular, the codes AOC, IOC and POC have been introduced for marine stations. Correspondingly, AOI, IOI and POI are used for islands for which no clear alternative is available. Finally, the code AAC is introduced for Antarctica.

In Appendix 5, a Conversion table for current numeric WMO country codes to the new system is provided.

In addition, Appendix 6 contains a table interrelating between the ICAO identifiers (A6) and the country/area codes.

B4: WMO Region

In the printed version, this number will be replaced by the Region name on each page.

B5: Operating Member

The operating country is generally the same as the country under B3. In a number of cases, however, the area under B3 is not an integral part of a country. This happens to be the case in Antarctica, and in some detached islands.

Also, a country may operate one or more stations in another country. The principle is that B5 should denote the Member State (or Territory) that takes responsibility for the operation of the station.

B6 & B7: Ordering indices

The contents of these fields are not fixed. the fields may be used to fix a sequence of stations.

C Geographical co-ordinates

C0 & C2: Latitude and Longitude

Latitude and longitude should be provided in degrees, minutes and (if available) tenths of minutes. The latter provision is in particular useful for upper air measurements using GPS techniques.

For upper air stations, the location where the balloon is released should be decisive for the exact location. For radar stations this is the antenna.

For surface stations, parameters may be measured at various locations within the site. The location of the raingauge or of the temperature measurement should be decisive.

In principle, the diameter of an observing site for surface parameters is not limited. The Guide on the GOS recommends an area of 100x100 meters. But the requirement that the observations should be representative for a substantial area sometimes involves a situation where distances between, e.g., anemometer and thermometer is more than 1000 meters, as the same exact location may not be suitable for all kinds of measurement.

C1 & C3: Lat/Long flags

A flag (#) may be added if the co-ordinates are of an approximate nature.

Monitoring centres also may add a flag (*) if the co-ordinates are suspect. If possible, monitoring centres are invited to suggest alternative values in such cases. Then, an alternative entry may be inserted with a flag (&), while the Authorisation (A2) is set to '1' and '2' for the two entries.

C4-C5: Ground Elevation

In field C4, the ground elevation should be inserted, at the exact location of the site.

For flags, the procedure for C5 is identical to C1 & C3.

C6-C7: Geo- and Bio-Environment

The inclusion of these indicators is inspired by the Global Historical Climate Network (GHCN), composed by NOAA/NCDC in the U.S.A.

The GeoEnvironment relates mainly to the shape of the earth surface at and around the site. The following criteria are a preliminary draft and need to be studied and refined further.

A station is coastal, if the site is really on the coast or at a distance not more than 200 meters.

A lake station is defined similarly; the lake should measure at least 10 square km.

Flat land should allow height variations of not more than 5 meters within a radius of 5 km around the station.

Mountain stations should have variations in height of more than 200 meters within such a radius.

The BioEnvironment indicator should refer to biological inferences, in particular human influence. Also this indicator should be developed further. As a start, the indicators of "urban", "rural" and "small town" as provided for the GHCN are included. This could be extended with refinements based on types of vegetation.

D Historical information

D0: Source

A list of identifiers of sources is provided in Appendix 7.

D1-D6

The period of operation (D1-D2) should refer to regular observations on a daily basis under the index number given in A3. If a station started observations before an index number was assigned, this first period should be included in the record referring to the first index number that was assigned.

The other items do not need further clarification.

E Operational status, reporting and networks

E0: Operational Status

This indicator needs examination, in particular the cases 'A', 'B' and 'W'. The indicator is decisive on which stations are to be regarded as actual and which as historical.

E1-E3: Reporting

The station is assumed to provide reports according to the information in Volume A. Also other stations that were received routinely in recent times at monitoring centres are marked as reporting.

E4&E5: Networks

This information is inserted by the Secretariat.

F References

The information in fields F0-F5 is inserted by the Secretariat.

G Parameters observed

G0&G4-G6: Parameters

The parameters that are being observed should be provided. For upper-air stations and wind profilers only G0 is relevant. For radar stations this whole section can be left blank.

G6 only applies to marine and coastal stations.

G1-G3: Barometer practices

These fields are relevant for stations with a barometer only. The data are the same as "HP", "HP-flag" and "Pressure level" in the existing Volume A.

H Time schedules

This section combines information on 3- and 6-hourly observing programmes with means of observation. In particular, the application of automatic systems and of wind-finding systems is included.

Another feature is that the availability of observations is not provided in detail, but is expressed in an overall indicator, which may be a figure in the range 0-9 or a more rough indicator (C, P or I).

Some examples:

A manual station is operated on weekdays only.

the availability is consequently about 70%:

code= VP. or V7.

A station is operated on weekdays manually, automatic on other times.

the availability is consequently 100%:

code= MC.

A manual station is operated in winter only:

the availability is consequently about 50%:

code= VP. or V5.

A pilot balloon is launched about once in a week.

the availability is consequently about 14%:

code= Pl. or P1.

Appendix 1
Contents of the data base for a revised Volume A

Column a	Field number
Column b	Field name
Column c	Indicator on whether the information is mandatory note: a/a = as appropriate
Column d	Indicators with a fixed meaning note: sec=inserted at the secretariat
Column e	Field description
Column f	Field width (maximum)

a	b	c	d	e	f
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Section A	Identifiers
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A0	LocationIdentifier	sec		Site identifier, defined by the geographical position Coding: Llxxyzz	8
	This indicator will be calculated from the co-ordinates after insertion in the data base.	LL		Letter combination identifying the square: 10 deg lat * 180 deg long area between 80 and 90 deg lat 10 deg lat * 60 deg long area between 70 and 80 deg lat 10 deg lat * 30 deg long area between 60 and 70 deg lat 10 deg lat * 10 deg long area between 60 N and 60 S	
		xx		Figures identifying the location in tenths of dimensions of LL	
		yy		Figures identifying the location in tenths of dimensions of yy	
		zz		Figures identifying the location in tenths of dimensions of xx	
				A more detailed description of this indicator is available	
A1	TypeIndicator1	sec		=TypeIndicator0, or subsequent letter if a station already exists or existed at the same location	1
A2	Authorisation	no	<empty>	Indication of endorsement of data by PR concerned	1
		+		data endorsed on behalf of Permanent Representative	
		*		data provided by Monitoring Centre or via informal channels	
		1,2		idem, data need checking	
				alternative data for the same station, need checking	
A3	IndexNumber	a/a		Block and index number	5
				This item is mandatory if A5 and A6 are left blank	
A4	TypeIndicator0	yes		Indicator of the type of observing station	1
	Stations making more types of observations should be entered for each type separately.	c		surface observations (including platforms at sea)	
		m		marine surface observations (moored buoys)	
		p		profiler observations	
		r		radar observations	
		t		in situ upper air observations	
A5	ODAS-Number	a/a		According to the ODAS numbering system	5
A6	CCCC	a/a		Four character CCCC code for aerodromes	4

a	b	c	d	e	f
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Section B		Administrative organisation			
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B0	StationName	yes		<p>limitation to 24 characters allowed are: capital letters, figures, apostrophe ('), slash (/), comma (,), hyphen (-), et-sign (& Do not use other tokens. start with a name that can be traced in a good atlas; then / specification (reference to smaller scale) , specification (reference to larger scale) Recommendations on naming are provided elsewhere</p>	24
B1	FunctionDescriptor	no	<p>AB Air base (military) AE Aerodrome other than Airport or Air base AH Hydroplane AP Airport BA Antarctic base CG Coast Guard station EN Energy plant FO Forestry HO Hospital HY Hydrological station, water plant LH Light House LS Light Ship MB Moored buoy MO Meteorological office/weather office NS Naval station OB Observatory PF Platform PO Post office PS Police station RA Research station for agriculture RS Research station other than agriculture UW University of Wisconsin (Antarctica) UN University (general)</p>	Indicator of the function of the station	2
B2	State-Province-Island	no		As applicable, max 5 characters	3
B3	CountryAreaCode	yes		UN/ISO code for the state or territory extensions: see list of countries and areas	3
B4	WMO-Region			WMO Region number	1
B5	OperatingMember	no		UN code for the operating Member State, if different from the above code under B3	3
B6	OrderingByIndex	sec		Number used for ordering by country and index number	5
B7	OrderingByAlphabet	sec		Number used for ordering by country in alphabetical order	5

a	b	c	d	e	f
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Section C			Location	
C0	Latitude	yes	Format for latitude (eg): "N002 36" The first character denotes the hemisphere. Then, the full degrees are provided in 3 figures, including leading zero's. The minutes are given in 2 figures, also including leading zero's. Degrees and minutes are separated by a space	7
C1	LatFlag	a/a # & ? s	Flag for latitude Approximate value Alternative value suggested by Monitoring Centre Value disputed by Monitoring Centre This field may also be used for entering tenths of minutes for more precision. In particular for upper air stations, this is recommended.	2
C2	Longitude	yes	Format for longitude (eg): "W145 02" see C0 Latitude	7
C3	LongFlag	a/a	Flag for longitude Coding as LatFlag This field may also be used for entering tenths of minutes.	2
C4	Elevation	yes	The value should refer to the ground elevation above sea level at the relevant location of observations in meters	4
C5	ElevFlag	a/a b	Flag for elevation Coding as LatFlag with the following addition: elevation refers to barometer level	1
C6	GeoEnvironment	no C L H M T F S	Indication of the geological nature of the location: coast lake hilly environment in mountains at mountain top flat land at sea	1
C7	BioEnvironment	no u r s	Indication of biological inference urban site, >50,000 people within 5 km distance rural site, <10,000 people within 5 km distance semi-urban, conditions in-between to be refined with vegetation indications	1

a	b	c	d	e	f
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Section D

Operational status and history

D0	SourceIdentifier	sec		Provides more extended information on the source for co-ordinates and historical meta-data A list of possible indicators is available separately.	1
D1	StationStart	yes	YYYYm a l x - +	Starting year and month YYYY refers to the year m refers to the month: January December unknown in the year YYYY or earlier in the year YYYY or later If no better information is available, the date should refer to the year of inclusion in Volume A with a '-'	5
D2	StationClose	yes	9999+	Year and month of closure see 'Station started' if the station is open	5
D3	PreviousIndex	a/a		In case of a change of index numbers, this field can be used for information on the previously used number	5
D4	PosteriorIndex	a/a		In case of a change of index numbers, this field can be used for information on the subsequently used number	5
D5	Re-useIndex	sec		A figure indicating the number of sites for which the index number was used before	1
D6	AlternativeName	a/a		This field may be used for historical names of the station, if these are very different from the current name	24

a	b	c	d	e	f
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Section E

Reporting and networks membership

E0	Operations	yes		Indication of operational status or reliability of the information	1
		O		Fully operational	
		L		Limited operations	
		T		Temporarily closed	
		X		Closed	
		W		Station is working, although formally closed	
		B		Station in basic networks, although formally closed	
		A		Alternative co-ordinates	
		E		Erroneous co-ordinates	
		Y		Buoy, status unknown	
E1	ReportingRealTime	a/a		types of real-time reports issued	2
		WP		Standard wind profiler reports (BUFR, CREX)	
		BU		Standard buoy reports (BUOY, BUFR, CREX)	
		PI		Standard balloon upper wind reports (PILOT, BUFR, CREX)	
		RA		Standard radar reports (RAREP, RADOB, BUFR)	
		SY		Standard surface obs (SYNOP, SHIP, BUFR, CREX)	
		TE		Standard radiosonde+wind reports (TEMP, BUFR, CREX)	
		<empty>		no reports	
				Note: TE precedes PI if both reports are produced	
E2	ReportingClimate	a/a		type of climatological reports issued	2
		CL		CLIMAT reports	
		CT		CLIMAT TEMP reports	
E3	ReportingAviation	a/a		types of reports produced for aviation	2
		MR		METAR	
		SP		SPECI (or M/B) only	
E4	RBSN	sec		inclusion in the RBSN	1
		S		as surface station	
		W		as upper wind station	
		R		as radiosonde station	
E5	RBCN-GCOS	sec		inclusion in the RBCN, GSN and GUAN	1
		C		RBCN surface station, not in GSN	
		T		RBCN upper air station, not in GUAN	
		G		GSN station	
		U		GUAN station	

a	b	c	d	e	f
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Section F

Links to other information

F0	ActualList	sec	V	Link to actual Volume A, excluding historical stations	1
F1	AviationList	sec	A	Link to aviation stations data base	1
F2	UpperairList	sec	U	Link to Catalogue of Upper Air Stations Equipment	1
F3	SpecialObsList	sec	S	Link to special obs data base	1
F4	MonitoringList	sec	M	Link to inclusion in Monitoring files	1

a	b	c	d	e	f
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Section G		Parameters observed			
G0	ParameterTPFH	yes		If the parameter concerned is observed, the appropriate character is inserted, otherwise a period.	4
			T	temperature	
			P	pressure/geopotential	
			F	wind	
			H	humidity	
G1	BarometerElev	a/a		Elevation of the barometer relative to sea level in meters	4
G2	BarElevFlag	a/a		Flag for approximate or alternative value Coding see C1 LatFlag	1
G3	PressureLevel	a/a		Level to which pressure is reduced Note: abbreviate HPA to H, GPM to G, STATION to STN e.e.: 850H or: 2000G	5
G4	ParameterCVWR	yes		See G0	4
			C	cloud information (minimally "N" and/or "h")	
			V	visibility	
			W	present weather	
			R	precipitation amounts	
G5	ParameterXENS	yes		idem	4
			X	temperature extremes	
			E	soil temperature	
			N	snow cover	
			S	sun duration	
G6	ParameterSWIT	yes		idem	4
			S	sea surface temperature	
			W	wave information	
			I	ice information	
			T	tides	

a	b	c	d	e	f
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Section Ha

Observing time schedules for surface observations

H0	SO-00	yes		indicator of reporting at main and intermediate hours	3
H1	SO-03			representation:	3
H2	SO-06			XYZ	3
H3	SO-09			coding X:	3
H4	SO-12	V		visual obs (may be supported by an automatic system)	3
H5	SO-15	A		fully automatic station (no human interference or adds)	3
H6	SO-18	M		mixed system	3
H7	SO-21	.		no reports	3
				coding Y:	
		C		Continuous	
		P		Partly, e.g. not on holidays, in winter only etcetera	
				Note: instead of P, a figure may be given, representing the expected number of obs in tenths of the continuous program.	
		I		Irregular, or less than 25% availability	
				coding Z:	
		+		obs made 1 hour later	
		-		obs made 1 hour earlier	
		.		obs made exactly at the standard time	
H8	SO-H	no		indicator of hourly report generation	2
				representation:	
				XY	
				coding X as above	
				coding Y	
		C		Continuous 24-hour-a-day programme	
		P		Partly, not continuously but regular and >=25%	
		I		Irregular, or less than 25% availability	
H9	SO-S	no		indicator of half-hourly report generation	2
				Coding as SO-H	

a	b	c	d	e	f
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Section 8b

Observing time schedules for upper air observations

H0	UT-00	yes		indicator of radiosonde report generation at 00 UTC representation: XYZ Coding of X: radiosonde reports (TEMP) made R no reports Coding of Y C Continuous P Partly, e.g. not on holidays, in winter only etcetera I Irregular, or less than 25% availability Coding of Z + obs made 1 hour later - obs made 1 hour earlier	3
H1	UW-00	yes		indicator of upper wind report generation at 00 UTC representation: XYZ Coding of X: N upper wind assessed by navaid systems T upper wind assessed by radar or radiotheodolite P upper wind assessed by visual means F upper wind assessed by wind profiler X method not specified - no reports Coding Y and Z as UT-00	3
H2	UT-06			indicator of radiosonde report generation at 06 UTC Coding as UT-00	3
H3	UW-06			indicator of upper wind report generation at 06 UTC Coding as UW-00	3
H4	UT-12			indicator of radiosonde report generation at 12 UTC Coding as UT-00	3
H5	UW-12			indicator of upper wind report generation at 12 UTC Coding as UW-00	3
H6	UT-18			indicator of radiosonde report generation at 18 UTC Coding as UT-00	3
H7	UW-18			indicator of upper wind report generation at 18 UTC Coding as UW-00	3
H8	UT-H	no		indicator of radiosonde reporting at other hours representation: XY coding X as above (UT-00) coding Y C 4 obs per day at intermediate hours ±1 P Partly, not continuously but regular and ≥1 per day I Irregular, or less than 1 per day	2
H9	UW-H	no		indicator of upper wind reporting at other hours Coding as UT-H	2

a	b	c	d	e	f
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Section M	Monitoring results
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M. QualityMonitoring		These fields should be developed, mainly referring to field 70
M. QualityMonitoring		(pressure and wind)
M. QuantityMonitoring		These fields should be developed referring to fields 80-87
M. QuantityMonitoring		(reception at main, for surface obs also intermediate hours)

Section S	Special Observations
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S00 Agrimet	no AG	Agrimet station	2
S01 Evap	no EV	Evaporation measurements	2
S02 PH	no PH	Phenological observations	2
S03 Acidrain	no AC	Acid rain observations	2
S04 Bapmon	no BM	Bapmon station	2
S05 CO2	no C2	Carbondioxyde observations	2
S06 GAW	no GW	Global Atmospheric Watch station	2
S07 Ozone	no OZ	Ozone observations	2
S08 Radsamp	no RS	Radioactive sampling	2
S09 Atmel	no AE	ATMEL observations	2
S10 Atmos	no AO	ATMOS observations	2
S11 Lightning	no LT	Lightning counter	2
S12 Sferic	no SF	Sferics observations	2
S13 EarthCurrent	no EC	Earth current observations	2
S14 Magnet	no MG	Magnetic station	2
S15 Seismo	no SE	Seismo reporting station	2
S16 Volcano	no VC	Volcano observations	2
S17 River	no CS	River stage and river current observations	2
S18 Cosra	no CR	Cosmic radiation obs	2
S19 GammaRay	no GM	Gamma ray obs	2
S20 Noctra	no NR	Nocturnal radiation obs	2
S21 Rad	no RD	Radiation obs	2
S22 Skyra	no SK	Sky radiation obs	2
S23 Solra	no SL	Solar radiation obs	2
S24 Totra	no TR	Total radiation obs	2
S25 Aur	no AU	Aurora obs	2
S26 Iono	no IO	Ionospheric obs	2
S27 Nlc	no NC	Noctilucent cloud obs	2
S28 Mont	no MO	Downward cloud obs from mountain station	2
S29 Neph	no NP	Nephanalysis	2

Appendix 2

Availability of information items from the full data base in particular editions of the Volume

Versions	number of stations	max record length (Bytes)	max file size (kByte)	real file size .prn (kByte)	real file size .txt (kByte)
complete data base flat file excluding monitoring data and special obs	28,200	260	7332		
volpri (Volume A1) printed version, to be published on diskette or CD-ROM	12,900	162	2090	1900	
volact (Volume A1) web version, as a flat file	12,900	210	2709	2100	2100
volmon (Monitoring version) monitoring version	± 8,000	230	1840		
volavi (Aviation version) aviation version	8,700	139	1209	1000	1000
volupp (Upper air version) upper air version to be extended with the catalogue of radiosonde stations	2,800	216	605	600	500
volspe (Special obs version) special observations	3,100	130	403	500	400
volbuo (Buoy version) marine stations	400	165	66	60	40
volrad (Radar version) radar stations	400	121	48	50	50
volhis (Volume A2) historical station catalogue	28,200	167	4709	3900	2700

Note:

Files with extension **.prn** are column-oriented with fixed field widths.
This type of file is appropriate as input for numerical processing.

Files with extension **.txt** have tab-delimiters between the fields.
This type of file is appropriate for importing in a spreadsheet or database format.

For composition of the particular editions, see the following page

Sections	volpri	volact	volmon	volavi	volupp	volspe	volbuo	volrad	volhis
LocationIdentifier		A0	A0	A0	A0	A0	A0	A0	A0
TypeIndicator1		A1	A1	A1	A1	A1	A1	A1	A1
Authorisation	A2	A2	A2	A2	A2	A2	A2	A2	A2
IndexNumber	A3	A3	A3	A3	A3	A3	A3	A3	A3
TypeIndicator0	A4	A4	A4	A4	A4	A4	A4	A4	A4
ODAS-Number	A5	A5	A5				A5	A5	A5
CCCC	A6	A6	A6	A6				A6	A6
StationName	B0	B0	B0	B0	B0	B0	B0	B0	B0
FunctionDescriptor	B1	B1	B1	B1	B1	B1	B1	B1	B1
State-Province-Island	B2	B2	B2	B2	B2	B2	B2	B2	B2
CountryAreaCode	B3	B3	B3	B3	B3	B3	B3	B3	B3
WMO-Region	B4	B4	B4	B4	B4	B4	B4	B4	B4
OperatingMember	B5	B5	B5	B5	B5	B5	B5	B5	B5
OrderingByIndexnumber									
OrderingByAlphabet									
Latitude	C0	C0	C0	C0	C0	C0	C0	C0	C0
LatFlag	C1	C1	C1	C1	C1	C1	C1	C1	C1
Longitude	C2	C2	C2	C2	C2	C2	C2	C2	C2
LongFlag	C3	C3	C3	C3	C3	C3	C3	C3	C3
Elevation	C4	C4	C4	C4	C4	C4	C4	C4	C4
ElevFlag	C5	C5	C5	C5	C5	C5	C5	C5	C5
GeoEnvironment	C6	C6	C6	C6		C6			C6
SocioEnvironment	C7	C7	C7	C7		C7			C7
SourceIdentifier					D0		D0	D0	D0
StationStart					D1		D1	D1	D1
StationClose					D2		D2	D2	D2
PreviousIndex					D3				D3
PosteriorIndex					D4				D4
Re-useIndex					D5				D5
AlternativeName					D6				D6
Operations	E0	E0	E0	E0	E0		E0	E0	E0
ReportingRealTime	E1	E1	E1	E1	E1		E1	E1	
ReportingClimate	E2	E2	E2	E2	E2		E2		
ReportingAviation	E3	E3	E3	E3			E3		
RBSN	E4	E4	E4	E4	E4		E4		
RBCN-GCOS	E5	E5	E5	E5	E5		E5		E5
ActualList		F0			F0				
AviationList		F1			F1				
UpperairList		F2			F2				
SpecialObsList		F3			F3				
MonitoringList		F4			F4				
		F5			F5				
ParameterTPFH	G0	G0	G0	G0	G0	G0	G0		
BarometerElev	G1	G1	G1	G1	G1	G1	G1		
BarElevFlag	G2	G2	G2	G2	G2	G2	G2		
PressureLevel	G3	G3	G3	G3	G3	G3	G3		
ParameterCVWR	G4	G4	G4	G4		G4	G4		
ParameterXENS	G5	G5	G5			G5	G5		
ParameterSWIT	G6	G6	G6			G6	G6		
SO-00 / UT-00	H0	H0	H0		H0				
SO-03 / UW-00	H1	H1	H1		H1				
SO-06 / UT-06	H2	H2	H2		H2				
SO-09 / UW-06	H3	H3	H3		H3				
SO-12 / UT-12	H4	H4	H4		H4				
SO-15 / UW-12	H5	H5	H5		H5				
SO-18 / UT-18	H6	H6	H6		H6				

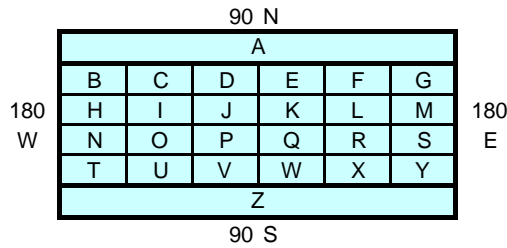
Sections	volpri	volact	volmon	volavi	volupp	volspe	volbuo	volrad	volhis
SO-21 / UW-18	H7	H7	H7		H7				
SO-H / UT-H	H8	H8	H8		H8				
SO-S / UW-H	H9	H9	H9		H9				
Monitoring information			M.						
Special observations						S.			

Appendix 3
Location identifier

The Location Identifier is a 9-character group with format: **LLffffffl**
 where L represents an upper case letter, f a figure and l a lower case letter.

- pos 1 The Globe is divided in 26 areas (from N to S and from W to E), each indicated by a capital letter.
- A refers to the area north of 60 degrees N
 Z refers to the area south of 60 degrees S
 B through Y refer to blocks of 30 degrees latitude and 60 degrees longitude

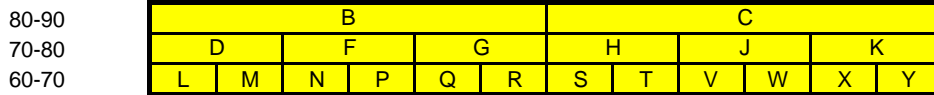
On a global conform map this looks as follows.



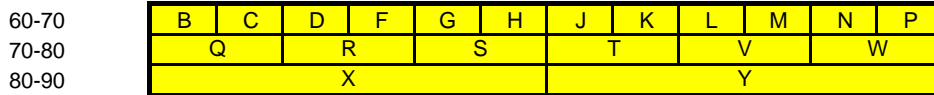
Note: All boxes include the bordering Northern latitude circle and the Western meridian but exclude the Southern latitude circle and the Eastern meridian.

- pos 2 The subdivision of the areas above is again indicated by a capital letter. The subdivision is based on getting 10 degree blocks, but in the polar areas the longitude dimensions are larger. For the polar areas (A and Z) the subdivision is as follows.

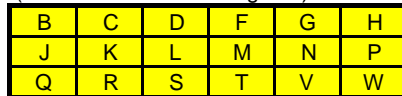
Area A:



Area Z:



For the other areas, the subdivision is as follows:
 (all blocks are 10x10 degrees)



The positions 2 through 7 contain figures.

- pos 3 The block is subdivided in strokes of 1 degree latitude, numbered 0-9, from N to S.
- pos 4 The block is subdivided in strokes of one tenth of the block longitude (generally 1 deg), numbered from 0-9, from W to E.
- The subdivision yields boxes of 1 degree between 60 N and 60 S, and up to 1 degree lat x 18 degree long at the poles.
- pos 5 The box is subdivided in strokes of 1 tenth of the box depth (6 minutes).
- pos 6 The box is subdivided in strokes of 1 tenth of the box width (from 6 to 108 minutes).

This subdivision yields locations of roughly 10 kilometers squared.

pos 7 The box is subdivided in strokes of 1 tenth of the box depth (0.6 minutes).

pos 8 The box is subdivided in strokes of 1 tenth of the box width (from 0.6 to 10.8 minutes).

This subdivision yields locations of roughly 1 kilometer squared.

The figures of position 3-4, 5-6 and 7-8 can be illustrated as follows

00	01	02	03	04	05	06	07	08	09
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

pos 9 Within a location different sites may be identified. These are indicated by a small letter.

Letters a-l surface observing sites
Letters m-o marine observations (moored buoys)
Letters p-q profiler systems
Letters r-s radar observing sites
Letters t-w upper air observing sites
Letters x-z reserved

By definition, the following identifiers are assigned:

North Pole: AA999999
South Pole: ZZ000000
Unknown position: ZZ999999

Examples:

A radar station at 48d34mN and 67d15mW has a location identifier:
CP124735r

An upper air station at 81d42mS 124d30mE has a location identifier:
ZY167901t

A surface station at 50d00mN and 10d00mE has a location identifier:
EK000000a

A moored buoy at the equator and the 0-meridian has location indicator:
QB000000m

Appendix 4

List of country/area codes

Note: an asterisk before a code refers to codes that are not included in the formal ISO code list.

Country/area name	Nom du pays ou region	ISO codes (* = non-ISO)	
		Area	WMO Member
Antarctica	Antarctique	* AAC	
Aruba	Aruba	ABW	
Afghanistan	Afghanistan	AFG	AFG
Angola	Angola	AGO	AGO
Anguilla	Anguilla	AIA	
Albania	Albanie	ALB	ALB
Netherlands Antilles and Aruba	Antilles neerlandaises et Aruba	ANT	ANT
Atlantic Ocean	Ocean atlantique	* AOC	
Atlantic Ocean Islands	Iles dans l'océan atlantique	* AOI	
United Arab Emirates	Emirats arabes unis	ARE	ARE
Argentina	Argentine	ARG	ARG
Armenia	Arménie	ARM	ARM
Antigua and Barbuda	Antigua-et-Barbuda	ATG	ATG
Australia	Australie	AUS	AUS
Austria	Autriche	AUT	AUT
Azerbaijan	Azerbaïdjan	AZE	AZE
British Caribbean Territories	Territoires Caraïbiens britanniques	* BCT	BCT
Burundi	Burundi	BDI	BDI
Belgium	Belgique	BEL	BEL
Benin	Benin	BEN	BEN
Burkina Faso	Burkina Faso	BFA	BFA
Bangladesh	Bangladesh	BGD	BGD
Bulgaria	Bulgarie	BGR	BGR
Bahrain	Bahreïn	BHR	BHR
Bahamas	Bahamas	BHS	BHS
Bosnia and Herzegovina	Bosnie et Herzégovine	BIH	BIH
Belarus	Belarus	BLR	BLR
Belize	Belize	BLZ	BLZ
Bermuda	Bermudes	BMU	
Bolivia	Bolivie	BOL	BOL
Brazil	Bresil	BRA	BRA
Barbados	Barbade	BRB	BCT
Brunei Darussalam	Brunei Darussalam	BRN	BRN
Botswana	Botswana	BWA	BWA
Central African Republic	Republique centrafricaine	CAF	CAF
Canada	Canada	CAN	CAN
Cocos Islands	Ile Cocos	CCK	
Switzerland	Suisse	CHE	CHE
Chile	Chili	CHL	CHL
China	Chine	CHN	CHN
Cote d'Ivoire	Cote d'Ivoire	CIV	CIV
Cameroon	Cameroun	CMR	CMR
Congo	Congo	COG	COG
Cook Islands	Archipel de Cook	COK	NZL
Colombia	Colombie	COL	COL
Comoros	Comores	COM	COM
Cape Verde	Cap-Vert	CPV	CPV
Costa Rica	Costa Rica	CRI	CRI
Cuba	Cuba	CUB	CUB
Cayman Islands	Iles Caïmanes	CYM	
Cyprus	Chypre	CYP	CYP
Czech republic	Republique Tchèque	CZE	CZE
Germany	Allemagne	DEU	DEU
Djibouti	Djibouti	DJI	DJI

Appendix 4 (Continued)**List of country/area codes**

Note: an asterisk before a code refers to codes that are not included in the formal ISO code list.

Country/area name	Nom du pays ou region	ISO codes (* = non-ISO)	
		Area	WMO Member
Dominica	Dominique	DMA	DMA
Denmark	Danemark	DNK	DNK
Dominican Republic	Republique Dominicaine	DOM	DOM
Democratic Republic of Congo	Republique democratique du Congo	* DRC	DRC
Algeria	Algerie	DZA	DZA
Ecuador	Equateur	ECU	ECU
Egypt	Egypte	EGY	EGY
Eritrea	Eritree	ERI	ERI
Western Sahara	Sahara occidental	ESH	
Spain	Espagne	ESP	ESP
Estonia	Estonie	EST	EST
Ethiopia	Ethiopie	ETH	ETH
Finland	Finlande	FIN	FIN
Fiji	Fidji	FJI	FJI
France	France	FRA	FRA
Faeroe Islands	Iles Feroe	* DNF	
Micronesia, Federal States of	Etats-Federales de Micronesie	FSM	FSM
Gabon	Gabon	GAB	GAB
United Kingdom	Royaume-Uni	GBR	GBR
Georgia	Georgie	GEO	GEO
Ghana	Ghana	GHA	GHA
Gibraltar	Gibraltar	GIB	
Guinea	Guinee-Bissau	GIN	GIN
Guadeloupe c.a.	Guadeloupe c.a.	GLP	
Gambia	Gambie	GMB	GMB
Guinea-Bissau	Guinee-Bissau	GNB	GNB
Equatorial Guinea	Guinee equatoriale	GNQ	
Greece	Grece	GRC	GRC
Grenada	Grenade	GRD	
Greenland	Groenland	GRL	
Guatemala	Guatemala	GTM	GTM
French Guiana	Guyane francaise	GUF	
Guam	Guam	GUM	
Guyana	Guyana	GUY	GUY
Hong Kong, China	Hong-kong, Chine	HKG	HKG
Honduras	Honduras	HND	HND
Croatia	Croatie	HRV	HRV
Haiti	Haiti	HTI	HTI
Hungary	Hongrie	HUN	HUN
Indonesia	Indonesie	IDN	IDN
India	Inde	IND	IND
Indian Ocean	Ocean indien	* IOC	
Indian Ocean Islands	Iles dans l'ocean indien	* IOI	
Ireland	Irlande	IRL	IRL
Iran, Islamic Republic of	Iran, Republique islamique d'	IRN	IRN
Iraq	Iraq	IRQ	IRQ
Iceland	Islande	ISL	ISL
Israel	Israel	ISR	ISR
Italy	Italie	ITA	ITA
Jamaica	Jamaique	JAM	JAM
Jordan	Jordanie	JOR	JOR
Japan	Japon	JPN	JPN
Kazakhstan	Kazakhstan	KAZ	KAZ
Kenya	Kenya	KEN	KEN

Appendix 4 (Continued)**List of country/area codes**

Note: an asterisk before a code refers to codes that are not included in the formal ISO code list.

Country/area name	Nom du pays ou region	ISO codes (* = non-ISO)	
		Area	WMO Member
Dominica	Dominique	DMA	DMA
Denmark	Danemark	DNK	DNK
Dominican Republic	Republique Dominicaine	DOM	DOM
Kyrgyzstan	Kirghizistan	KGZ	KGZ
Cambodia	Cambodge	KHM	KHM
Kiribati	Kiribati	KIR	
Saint Kitts and Nevis	Saint-Kitts-et-Nevis	KNA	
Republic of Korea	Republique de Coree	KOR	KOR
Kuwait	Koweit	KWT	KWT
Lao People's Democr Republic	Republique democratique populaire Lao	LAO	LAO
Lebanon	Liban	LBN	LBN
Liberia	Liberia	LBR	LBR
Libyan Arab Jamahiriya	Jamahiriya arabe libyenne	LBY	LBY
Saint Lucia	Sainte-Lucie	LCA	BCT
Lesotho	Lesotho	LES	LES
Liechtenstein	Liechtenstein	LIE	
Sri Lanka	Sri Lanka	LKA	LKA
Lithuania	Lituanie	LTU	LTU
Luxembourg	Luxembourg	LUX	LUX
Latvia	Lettonie	LVA	LVA
Macau	Macao	MAC	MAC
Morocco	Maroc	MAR	MAR
Monaco	Monaco	MCO	MCO
Republic of Moldova	Republique de Moldova	MDA	MDA
Madagascar	Madagascar	MDG	MDG
Maldives	Maldives	MDV	MDV
Mexico	Mexique	MEX	MEX
Marshall Islands	Iles Marshall	MHL	
The FYR Macedonia	Ex-Republique yougoslave de Macedonie	MKD	MKD
Mali	Mali	MLI	MLI
Malta	Malte	MLT	MLT
Myanmar	Myanmar	MMR	MMR
Mongolia	Mongolie	MNG	MNG
Northern Mariana Islands	Iles Mariane du Nord	MNP	
Mozambique	Mozambique	MOZ	MOZ
Mauritania	Mauritanie	MRT	MRT
Montserrat	Montserrat	MSR	
Martinique	Martinique	MTQ	
Mauritius	Maurice	MUS	MUS
Malawi	Malawi	MWI	MWI
Malaysia	Malaisie	MYS	MYS
Namibia	Namibie	NAM	NAM
New Caledonia	Nouvelle-Caledonie	NCL	NCL
Niger	Niger	NER	NER
Nigeria	Nigeria	NGA	NGA
Nicaragua	Nicaragua	NIC	NIC
Niue	Niue	NIU	NIU
Netherlands	Pays-Bas	NLD	NLD
Norway	Norvege	NOR	NOR
Nepal	Nepal	NPL	NPL
Nauru	Nauru	NRU	
New Zealand	Nouvelle-Zelande	NZL	NZL
Oman	Oman	OMN	OMN
Pakistan	Pakistan	PAK	PAK

Appendix 4 (Continued)**List of country/area codes**

Note: an asterisk before a code refers to codes that are not included in the formal ISO code list.

Country/area name	Nom du pays ou region	ISO codes (* = non-ISO)	
		Area	WMO Member
Dominica	Dominique	DMA	DMA
Denmark	Danemark	DNK	DNK
Dominican Republic	Republique Dominicaine	DOM	DOM
Panama	Panama	PAN	PAN
Pitcairn	Pitcairn	PCN	
Peru	Perou	PER	PER
Philippines	Philippines	PHL	PHL
Palau Islands	Iles Palau	PLW	
Papua New Guinea	Papouasie-Nouvelle-Guinee	PNG	PNG
Pacific Ocean	Ocean pacifique	* POC	
Pacific Ocean Islands	Iles dans l'ocean pacifique	* POI	
Poland	Pologne	POL	POL
Puerto Rico	Porto-Rico	PRI	
Democratic People's Republic of Korea	Republique populaire democratique de Coree	PRK	PRK
Portugal	Portugal	PRT	PRT
Paraguay	Paraguay	PRY	PRY
French Polynesia	Polynesie francaise	PYF	PYF
Qatar	Qatar	QAT	QAT
Reunion	Reunion	REU	
Romania	Roumania	ROM	ROM
Russian Federation	Federation de Russie	RUS	RUS
Rwanda	Rwanda	RWA	RWA
Saudi Arabia	Arabie saoudite	SAU	SAU
Sudan	Soudan	SDN	SDN
Senegal	Senegal	SEN	SEN
Singapore	Singapour	SGP	SGP
Saint Helena	Sainte Helena	SHN	
Svalbard and Jan Mayen Islands	Iles Svalbard et Jan Mayen	* NOJ	
Solomon Islands	Iles Salomon	SLB	SLB
Sierra Leone	Sierra Leone	SLE	SLE
El Salvador	El Salvador	SLV	SLV
Somalia	Somalie	SOM	SOM
Saint Pierre and Miquelon	Saint Pierre et Miquelon	SPM	
Sao Tome and Principe	Sao Tome et Principe	STP	STP
Suriname	Suriname	SUR	SUR
Slovakia	Slovaquie	SVK	SVK
Slovenia	Slovenie	SVN	SVN
Sweden	Suede	SWE	SWE
Swaziland	Swaziland	SWZ	SWZ
Seychelles	Seychelles	SYC	SYC
Syrian Arab Republic	Republique arabe syrienne	SYR	SYR
Turks and Caicos Islands	Iles Turks et iles Caiques	TCA	
Chad	Tchad	TCD	TCD
Togo	Togo	TGO	TGO
Thailand	Thailande	THA	THA
Tajikistan	Tajikistan	TJK	TJK
Tokelau	Tokelau	TKL	
Turkmenistan	Turkmenistan	TKM	TKM
East Timor	Timor orientale	TMP	
Tonga	Tonga	TON	TON
Trinidad and Tobago	Trinite and Tobago	TTO	TTO
Tunisia	Tunisie	TUN	TUN
Turkey	Turquie	TUR	TUR
Tuvalu	Tuvalu	TUV	

Appendix 4 (Continued)**List of country/area codes**

Note: an asterisk before a code refers to codes that are not included in the formal ISO code list.

Country/area name	Nom du pays ou region	ISO codes (* = non-ISO)	
		Area	WMO Member
Dominica	Dominique	DMA	DMA
Denmark	Danemark	DNK	DNK
Dominican Republic	Republique Dominicaine	DOM	DOM
United Republic of Tanzania	Republique-Unie de Tanzanie	TZA	TZA
Uganda	Ouganda	UGA	UGA
Ukraine	Ukraine	UKR	UKR
Uruguay	Uruguay	URY	URY
United States of America	Etats-Unis d'Amerique	USA	USA
Uzbekistan	Ouzbekistan	UZB	UZB
Saint Vincent c.a.	Saint-Vincent c.a.	VCT	
Venezuela	Venezuela	VEN	VEN
British Virgin Islands	Iles Vierges britanniques	VGB	
Virgin Islands	Iles Vierges	VIR	
Viet Nam	Viet Nam	VNM	VNM
Vanuatu	Vanuatu	VUT	VUT
Wallis and Futuna Islands	Iles Wallis et Futuna	WLF	
Samoa	Samoa	WSM	WSM
Yemen	Yemen	* YEM	YEM
Yugoslavia	Yougoslavie	YUG	YUG
South Africa	Afrique du Sud	ZAF	ZAF
Zambia	Zambie	ZMB	ZMB
Zimbabwe	Zimbabwe	ZWE	ZWE

Appendix 5**Conversion table for current WMO country codes as used in Volume A to the proposed system**

WMO code	Country/area name	SPI	Area code	WMO region	Operating Member
1006	Madeira	MD	PRT	1	PRT
1008	Cape Verde		CPV	1	CPV
1010	Canary Islands	CI	ESP	1	ESP
1014	Western Sahara		ESH	1	MAR
1020	Morocco		MAR	1	MAR
1024	Ceuta and Melilla	CM	ESP	1	ESP
1030	Algeria		DZA	1	DZA
1040	Tunisia		TUN	1	TUN
1050	Niger		NER	1	NER
1060	Mali		MLI	1	MLI
1070	Mauritania		MRT	1	MRT
1080	Senegal		SEN	1	SEN
1090	Gambia		GMB	1	GMB
1100	Guinea-Bissau		GNB	1	GNB
1110	Guinea		GIN	1	GIN
1120	Sierra Leone		SLE	1	SLE
1130	Amsterdam Island	AI	IOI	1	FRA
1130	Reunion		REU	1	FRA
1130	Saint Helena		SHN	1	GBR
1130	Sao Tome and Principe		STP	1	STP
1130	Ascension Island	*	AOI	1	USA
1130	Diego Garcia	* DG	IOI	1	USA
1138	Mauritius		MUS	1	MUS
1140	Libyan Arab Jamahiriya		LBY	1	LBY
1150	Egypt		EGY	1	EGY
1160	Sudan		SDN	1	SDN
1170	Eritrea		ERI	1	ERI
1180	Djibouti		DJI	1	DJI
1190	Somalia		SOM	1	SOM
1200	Ethiopia		ETH	1	ETH
1210	Uganda		UGA	1	UGA
1220	Kenya		KEN	1	KEN
1230	United Republic of Tanzania		TZA	1	TZA
1240	Seychelles		SYC	1	SYC
1260	Rwanda		RWA	1	RWA
1270	Burundi		BDI	1	BDI
1280	Congo		COG	1	COG
1282	Democratic Republic of Congo	*	DRC	1	DRC
1290	Gabon		GAB	1	GAB
1300	Central African Republic		CAF	1	CAF
1310	Chad		TCD	1	TCD
1320	Equatorial Guinea		GNQ	1	
1330	Cameroon		CMR	1	CMR
1340	Nigeria		NGA	1	NGA
1350	Benin		BEN	1	BEN
1360	Togo		TGO	1	TGO
1370	Ghana		GHA	1	GHA
1380	Burkina Faso		BFA	1	BFA
1390	Cote d'Ivoire		CIV	1	CIV
1400	Liberia		LBR	1	LBR
1410	Angola		AGO	1	AGO
1420	Comoros		COM	1	COM
1430	Madagascar		MDG	1	MDG
1440	Mozambique		MOZ	1	MOZ
1450	Zambia		ZMB	1	ZMB

Appendix 5 (Continued)

Conversion table for current WMO country codes as used in Volume A to the proposed system

WMO code	Country/area name	SPI	Area code	WMO region	Operating Member
1460	Malawi		MWI	1	MWI
1470	Zimbabwe		ZWE	1	ZWE
1476	Namibia		NAM	1	NAM
1490	Botswana		BWA	1	BWA
1496	Swaziland		SWZ	1	SWZ
1500	Lesotho		LES	1	LES
1510	Bouvet Island	*	BV	1	NOR
2010	Russian Federation		RUS	2	RUS
2012	Kazakhstan		KAZ	2	KAZ
2014	Uzbekistan		UZB	2	UZB
2016	Kyrgyzstan		KGZ	2	KGZ
2018	Turkmenistan		TKM	2	TKM
2020	Tajikistan		TJK	2	TJK
2024	Saudi Arabia		SAU	2	SAU
2030	Kuwait		KWT	2	KWT
2032	Bahrain		BHR	2	BHR
2034	Qatar		QAT	2	QAT
2036	United Arab Emirates		ARE	2	ARE
2038	Oman		OMN	2	OMN
2044	Yemen	*	YEM	2	YEM
2050	Iraq		IRQ	2	IRQ
2060	Iran, Islamic Republic of		IRN	2	IRN
2070	Afghanistan		AFG	2	AFG
2090	Pakistan		PAK	2	PAK
2092	Bangladesh		BGD	2	BGD
2100	India		IND	2	IND
2110	India		IND	2	IND
2120	Sri Lanka		LKA	2	LKA
2126	Maldives		MDV	2	MDV
2140	Mongolia		MNG	2	MNG
2146	Nepal		NPL	2	NPL
2150	Hong Kong, China		HK	2	HKG
2160	Macau		MO	2	MAC
2176	Democratic People's Republic of Korea		PRK	2	PRK
2180	Republic of Korea		KOR	2	KOR
2190	Japan		JPN	2	JPN
2200	Myanmar		MMR	2	MMR
2210	Thailand		THA	2	THA
2220	Viet Nam		VNM	2	VNM
2230	Lao People's Democr Republic		LAO	2	LAO
2240	Cambodia		KHM	2	KHM
2250	China		CHN	2	CHN
3010	Colombia		COL	3	COL
3020	Venezuela		VEN	3	VEN
3030	Guyana		GUY	3	GUY
3040	Suriname		SUR	3	SUR
3050	French Guiana		GUF	3	FRA
3060	Brazil		BRA	3	BRA
3070	Ecuador		ECU	3	ECU
3080	Peru		PER	3	PER
3090	Bolivia		BOL	3	BOL
3100	Chile		CHL	3	CHL
3110	Paraguay		PRY	3	PRY
3120	Uruguay		URY	3	URY
3130	Argentina		ARG	3	ARG

Appendix 5 (Continued)

Conversion table for current WMO country codes as used in Volume A to the proposed system

WMO code	Country/area name	SPI	Area code	WMO region	Operating Member
1460	Malawi		MWI	1	MWI
1470	Zimbabwe		ZWE	1	ZWE
1476	Namibia		NAM	1	NAM
3140	Atlantic Ocean Islands	*	AOI	3	GBR
4010	Alaska	AK	USA	4	USA
4020	Canada		CAN	4	CAN
4026	Saint Pierre and Miquelon		SPM	4	FRA
4030	United States of America		USA	4	USA
4040	Mexico		MEX	4	MEX
4050	Bermuda		BMU	4	USA
4060	Bahamas		BHS	4	BHS
4064	Turks and Caicos Islands		TCA	4	BCT
4070	Cuba		CUB	4	CUB
4080	Cayman Islands		CYM	4	BCT
4090	Jamaica		JAM	4	JAM
4100	Haiti		HTI	4	HTI
4110	Dominican Republic		DOM	4	DOM
4120	Puerto Rico		PRI	4	USA
4120	Virgin Islands		VIR	4	USA
4122	British Virgin Islands		VGB	4	BCT
4130	Belize		BLZ	4	BLZ
4140	Guatemala		GTM	4	GTM
4150	El Salvador		SLV	4	SLV
4160	Honduras		HND	4	HND
4170	Nicaragua		NIC	4	NIC
4180	Costa Rica		CRI	4	CRI
4190	Panama		PAN	4	PAN
4200	Clipperton	CL	POI	4	FRA
4208	Anguilla		AIA	4	BCT
4210	Saint Kitts and Nevis		KNA	4	BCT
4212	Antigua and Barbuda		ATG	4	ATG
4220	St Maarten c.a.		ANS	4	ANT
4230	Guadeloupe c.a.		GLP	4	FRA
4240	Dominica		DMA	4	DMA
4250	Martinique		MTQ	4	FRA
4260	Saint Lucia		LCA	4	LCA
4262	Saint Vincent c.a.		VCT	4	BCT
4270	Barbados		BRB	4	BRB
4272	Grenada		GRD	4	BCT
4280	Trinidad and Tobago		TTO	4	TTO
4290	Aruba		ABW	4	ANT
4292	Curacao and Bonaire		ANT	4	ANT
4300	San Andres and Providencia		COL	4	COL
4310	Isla de Aves		VEN	4	VEN
5010	Malaysia peninsular		MYP	5	MYS
5020	Singapore		SGP	5	SGP
5030	Micronesia, Federal States of		FSM	5	USA
5030	American Samoa		WSM	5	USA
5030	Guam		GUM	5	USA
5030	Marshall Islands		MHL	5	USA
5030	Northern Mariana Islands		MNP	5	USA
5030	Palau Islands		PLW	5	USA
5030	Hawaii Islands	HI	USA	5	USA
5030	Islands in the Pacific Ocean	*	POI	5	USA
5040	Solomon Islands		SLB	5	SLB

Appendix 5 (Continued)

Conversion table for current WMO country codes as used in Volume A to the proposed system

WMO code	Country/area name	SPI	Area code	WMO region	Operating Member
1460	Malawi		MWI	1	MWI
1470	Zimbabwe		ZWE	1	ZWE
1476	Namibia		NAM	1	NAM
5048	Nauru		NRU	5	
5050	Banaba		KIR	5	NZL
5070	Vanuatu		VUT	5	VUT
5080	New Caledonia		NCL	5	NCL
5090	Kiribati		KIR	5	USA
5100	Tuvalu		TUV	5	
5110	Fiji		FJI	5	FJI
5114	Phoenix Islands		KIR	5	USA
5120	Tokelau		TKL	5	
5130	Wallis and Futuna Islands		WLF	5	FRA
5142	Samoa		WSM	5	WSM
5150	Tonga		TON	5	TON
5160	Cook Islands		COK	5	NZL
5162	Niue		NIU	5	NIU
5164	Southern Line Islands		KIR	5	USA
5170	Marquesas Islands	MQ	PYF	5	FRA
5190	Society Islands	SC	PYF	5	FRA
5200	Tuamotu & Gambier Islands	TG	PYF	5	FRA
5210	Austral Islands	AL	PYF	5	FRA
5220	Pitcairn		PCN	5	NZL
5230	New Zealand		NZL	5	NZL
5240	Papua New Guinea		PNG	5	PNG
5250	Australia		AUS	5	AUS
5260	Australia		AUS	5	AUS
5270	Australia		AUS	5	AUS
5280	Australia		AUS	5	AUS
5290	Australia		AUS	5	AUS
5300	Australia		AUS	5	AUS
5310	Australia		AUS	5	AUS
5320	Lord Howe Island	*	POI	5	AUS
5320	Kerguelen Islands	* KG	IOI	1	AUS
5320	Macquary Island	* MQ	IOI	5	AUS
5320	Norfolk Island	*	POI	5	AUS
5330	Sumatra	SM	IDN	5	IDN
5336	Brunei Darussalam		BRN	5	BRN
5340	Sabah and Sarawak		MYS	5	MYS
5350	Kalimantan	KL	IDN	5	IDN
5360	Jawa	JW	IDN	5	IDN
5370	Cocos Islands	*	IOI	5	AUS
5370	Christmas Island	*	IOI	5	AUS
5380	Sulawesi	SL	IDN	5	IDN
5390	Nusatenggara	NT	IDN	5	IDN
5400	East Timor		TMP	5	
5410	Maluku & Irian	MI	IDN	5	IDN
5420	Philippines		PHL	5	PHL
6010	Norway		NOR	6	NOR
6010	Svalbard and Jan Mayen Islands		SJM	6	NOR
6020	Sweden		SWE	6	SWE
6030	Finland		FIN	6	FIN
6040	United Kingdom		GBR	6	GBR
6050	Ireland		IRL	6	IRL
6060	Iceland		ISL	6	ISL

Appendix 5 (Continued)

Conversion table for current WMO country codes as used in Volume A to the proposed system

WMO code	Country/area name	SPI	Area code	WMO region	Operating Member
1460	Malawi		MWI	1	MWI
1470	Zimbabwe		ZWE	1	ZWE
1476	Namibia		NAM	1	NAM
6070	Greenland		GRL	6	DNK
6080	Denmark		DNK	6	DNK
6080	Faeroe Islands		FRO	6	DNK
6090	Netherlands		NLD	6	NLD
6100	Belgium		BEL	6	BEL
6110	Luxembourg		LUX	6	LUX
6120	Switzerland		CHE	6	CHE
6120	Liechtenstein		LIE	6	CHE
6130	France		FRA	6	FRA
6140	Spain		ESP	6	ESP
6150	Gibraltar		GIB	6	GBR
6160	Portugal		PRT	6	PRT
6160	Azores Islands	AZ	PRT	6	PRT
6170	Germany		DEU	6	DEU
6180	Austria		AUT	6	AUT
6190	Czech republic		CZE	6	CZE
6192	Slovakia		SVK	6	SVK
6200	Poland		POL	6	POL
6210	Hungary		HUN	6	HUN
6214	Palestine	*	PAL	6	
6216	Yugoslavia		YUG	6	YUG
6218	The former Yugoslav Republic of Macedonia		MKD	6	MKD
6222	Slovenia		SVN	6	SVN
6224	Croatia		HRV	6	HRV
6226	Bosnia and Herzegovina		BIH	6	BIH
6230	Albania		ALB	6	ALB
6240	Romania		ROM	6	ROM
6250	Bulgaria		BGR	6	BGR
6260	Italy		ITA	6	ITA
6270	Malta		MLT	6	MLT
6280	Greece		GRC	6	GRC
6290	Turkey		TUR	6	TUR
6300	Cyprus		CYP	6	CYP
6310	Russian Federation		RUS	6	RUS
6312	Estonia		EST	6	EST
6314	Latvia		LVA	6	LVA
6316	Lithuania		LTU	6	LTU
6318	Belarus		BLR	6	BLR
6320	Ukraine		UKR	6	UKR
6322	Republic of Moldova		MDA	6	MDA
6324	Georgia		GEO	6	GEO
6326	Armenia		ARM	6	ARM
6328	Azerbaijan		AZE	6	AZE
6330	Kazakhstan		KAZ	6	KAZ
6334	Syrian Arab Republic		SYR	6	SYR
6336	Lebanon		LBN	6	LBN
6340	Israel		ISR	6	ISR
6350	Jordan		JOR	6	JOR
7010	Antarctica	*	AAC	7	ARG
7020	Antarctica	*	AAC	7	ZAF
7030	Antarctica	*	AAC	7	DEU
7034	Antarctica	*	AAC	7	FIN

Appendix 5 (Continued)**Conversion table for current WMO country codes as used in Volume A to the proposed system**

WMO code	Country/area name	SPI	Area code	WMO region	Operating Member
1460	Malawi		MWI	1	MWI
1470	Zimbabwe		ZWE	1	ZWE
1476	Namibia		NAM	1	NAM
7040	Antarctica	*	AAC	7	USA
7042	Antarctica	*	AAC	7	USA
7050	Antarctica	*	AAC	7	GBR
7060	Antarctica	*	AAC	7	RUS
7062	Antarctica	*	AAC	7	UKR
7070	Antarctica	*	AAC	7	POL
7080	Antarctica	*	AAC	7	URY
7090	Antarctica	*	AAC	7	CHL
7100	Antarctica	*	AAC	7	CHN
7102	Antarctica	*	AAC	7	ESP
7104	Antarctica	*	AAC	7	KOR
7106	Antarctica	*	AAC	7	NOR
7108	Antarctica	*	AAC	7	IND
7110	Antarctica	*	AAC	7	JPN
7120	Antarctica	*	AAC	7	AUS
7130	Antarctica	*	AAC	7	FRA
7134	Antarctica	*	AAC	7	ITA
7140	Antarctica	*	AAC	7	NZL
8010	Fixed ship stations	*	AOC	6	NOR

Appendix 6**Table for assessing the country or area from the first 2 characters of the ICAO CCCC code**

CCCC code	Country/area name	Area code	WMO Region
AG	Solomon Islands	SLB	5
AN	Nauru	NRU	5
AY	Papua New Guinea	PNG	5
BG	Greenland	GRL	6
BI	Iceland	ISL	6
CU	Canada	CAN	4
CW	Canada	CAN	4
CX	Canada	CAN	4
CY	Canada	CAN	4
CZ	Canada	CAN	4
DA	Algeria	DZA	1
DB	Benin	BEN	1
DF	Burkina Faso	BFA	1
DG	Ghana	GHA	1
DI	Cote d'Ivoire	CIV	1
DN	Nigeria	NGA	1
DR	Niger	NER	1
DT	Tunisia	TUN	1
DX	Togo	TGO	1
EB	Belgium	BEL	6
ED	Germany	DEU	6
EE	Estonia	EST	6
EF	Finland	FIN	6
EG	United Kingdom	GBR	6
EH	Netherlands	NLD	6
EI	Ireland	IRL	6
EK	Denmark	DNK	6
EL	Luxembourg	LUX	6
EN	Norway	NOR	6
EP	Poland	POL	6
ES	Sweden	SWE	6
ET	Germany	DEU	6
EV	Latvia	LVA	6
EY	Lithuania	LTU	6
FA	South Africa	ZAF	1
FB	Botswana	BWA	1
FC	Congo	COG	1
FD	Swaziland	SWZ	1
FE	Central African Republic	CAF	1
FG	Equatorial Guinea	GNQ	1
FH	Ascension Island	ASC	1
FI	Mauritius	MUS	1
FJ	Diego Garcia	DGA	1
FK	Cameroon	CMR	1
FL	Zambia	ZMB	1
FM	Comoros	COM	1
FM	Madagascar	MDG	1
FM	Reunion	REU	1
FN	Angola	AGO	1
FO	Gabon	GAB	1
FP	Sao Tome and Principe	STP	1
FQ	Mozambique	MOZ	1
FS	Seychelles	SYC	1
FT	Chad	TCD	1
FV	Zimbabwe	ZWE	1

Appendix 6 (Continued)**Table for assessing the country or area from the first 2 characters of the ICAO CCCC code**

CCCC code	Country/area name	Area code	WMO Region
FW	Malawi	MWI	1
FX	Lesotho	LES	1
FY	Namibia	NAM	1
FZ	Democratic Republic of Congo	DRC	1
GA	Mali	MLI	1
GB	Gambia	GMB	1
GC	Canary Islands	ESP	1
GE	Ceuta and Melilla	ESP	1
GF	Sierra Leone	SLE	1
GG	Guinea-Bissau	GNB	1
GL	Liberia	LBR	1
GM	Morocco	MAR	1
GO	Senegal	SEN	1
GQ	Mauritania	MRT	1
GS	Western Sahara	ESH	1
GU	Guinea	GIN	1
GV	Cape Verde	CPV	1
HA	Ethiopia	ETH	1
HB	Burundi	BDI	1
HC	Somalia	SOM	1
HE	Egypt	EGY	1
HF	Djibouti	DJI	1
HH	Eritrea	ERI	1
HK	Kenya	KEN	1
HL	Libyan Arab Jamahiriya	LBY	1
HR	Rwanda	RWA	1
HS	Sudan	SDN	1
HT	United Republic of Tanzania	TZA	1
HU	Uganda	UGA	1
K.	United States of America	USA	4
LA	Albania	ALB	6
LB	Bulgaria	BGR	6
LC	Cyprus	CYP	6
LD	Croatia	HRV	6
LE	Spain	ESP	6
LF	France	FRA	6
LG	Greece	GRC	6
LH	Hungary	HUN	6
LI	Italy	ITA	6
LJ	Slovenia	SVN	6
LK	Czech republic	CZE	6
LL	Israel	ISR	6
LM	Malta	MLT	6
LO	Austria	AUT	6
LP	Portugal	PRT	6
LQ	Bosnia and Herzegovina	BIH	6
LR	Romania	ROM	6
LS	Switzerland	CHE	6
LT	Turkey	TUR	6
LW	The FYR Macedonia	MKD	6
LX	Gibraltar	GIB	6
LY	Yugoslavia	YUG	6
LZ	Slovakia	SVK	6
MB	Turks and Caicos Islands	TCA	4
MD	Dominican Republic	DOM	4

Appendix 6 (Continued)

Table for assessing the country or area from the first 2 characters of the ICAO CCCC code

CCCC code	Country/area name	Area code	WMO Region
FW	Malawi	MWI	1
FX	Lesotho	LES	1
MG	Guatemala	GTM	4
MH	Honduras	HND	4
MK	Jamaica	JAM	4
MM	Mexico	MEX	4
MN	Nicaragua	NIC	4
MP	Panama	PAN	4
MR	Costa Rica	CRI	4
MS	El Salvador	SLV	4
MT	Haiti	HTI	4
MU	Cuba	CUB	4
MW	Cayman Islands	CYM	4
MY	Bahamas	BHS	4
MZ	Belize	BLZ	4
NC	Cook Islands	COK	5
NF	Fiji	FJI	5
NF	Tonga	TON	5
NG	Tuvalu	TUV	5
NI	Niue	NIU	5
NL	Wallis and Futuna Islands	WLF	5
NT	French Polynesia	PYF	5
NV	Vanuatu	VUT	5
NW	New Caledonia	NCL	5
NZ	New Zealand	NZL	5
OA	Afghanistan	AFG	2
OB	Bahrain	BHR	2
OE	Saudi Arabia	SAU	2
OI	Iran, Islamic Republic of	IRN	2
OJ	Jordan	JOR	6
OK	Kuwait	KWT	2
OL	Lebanon	LBN	6
OM	United Arab Emirates	ARE	2
OO	Oman	OMN	2
OP	Pakistan	PAK	2
OR	Iraq	IRQ	2
OS	Syrian Arab Republic	SYR	6
OT	Qatar	QAT	2
OY	Yemen	YEM	2
PA	United States of America	USA	4
PG	Guam, North Marianas	GUM	5
PH	Hawaii Islands	HI USA	5
PJ	Johnston Island	JTN	5
PK	Marshall Islands	MHL	5
PL	Kiribati	KIR	5
PM	Midway Islands	MID	5
PT	Palau Islands	PLW	5
PW	Wake Island	WAK	5
RC	China	CHN	2
RJ	Japan	JPN	2
RK	Republic of Korea	KOR	2
RO	Japan, islands	JPN	2
RP	Philippines	PHL	5
SA	Argentina	ARG	3
SB	Brazil	BRA	3

Appendix 6 (Continued)**Table for assessing the country or area from the first 2 characters of the ICAO CCCC code**

CCCC code	Country/area name	Area code	WMO Region
FW	Malawi	MWI	1
FX	Lesotho	LES	1
SC	Chile	CHL	3
SE	Ecuador	ECU	3
SG	Paraguay	PRY	3
SK	Colombia	COL	3
SL	Bolivia	BOL	3
SM	Suriname	SUR	3
SO	French Guiana	GUF	3
SP	Peru	PER	3
SU	Uruguay	URY	3
SV	Venezuela	VEN	3
SY	Guyana	GUY	3
TA	Antigua and Barbuda	ATG	4
TB	Barbados	BRB	4
TD	Dominica	DMA	4
TF	Guadeloupe c.a.	GLP	4
TF	Martinique	MTQ	4
TG	Grenada	GRD	4
TI	Virgin Islands	VIR	4
TJ	Puerto Rico	PRI	4
TK	Saint Kitts and Nevis	KNA	4
TL	Saint Lucia	LCA	4
TN	Aruba	ABW	4
TN	Netherlands Antilles	ANT	4
TQ	Anguilla	AIA	4
TT	Trinidad and Tobago	TTO	4
TU	British Virgin Islands	VGB	4
TV	Saint Vincent c.a.	VCT	4
TX	Bermuda	BMU	4
UA	Kazakhstan	KAZ	2
UA	Kyrgyzstan	KGZ	2
UB	Azerbaijan	AZE	6
UE	Russian Federation	RUS	2
UG	Armenia	ARM	6
UG	Georgia	GEO	6
UH	Russian Federation	RUS	2
UI	Russian Federation	RUS	2
UK	Republic of Moldova	MDA	6
UK	Ukraine	UKR	6
UL	Russian Federation	RUS	6
UM	Russian Federation	RUS	6
UM	Belarus	BLR	6
UN	Russian Federation	RUS	2
UR	Russian Federation	RUS	6
US	Russian Federation	RUS	2
UT	Uzbekistan	UZB	2
UT	Tajikistan	TJK	2
UT	Turkmenistan	TKM	2
UU	Russian Federation	RUS	6
UW	Russian Federation	RUS	2
VA	India	IND	2
VC	Sri Lanka	LKA	2
VD	Cambodia	KHM	2
VE	India	IND	2

Appendix 6 (Continued)**Table for assessing the country or area from the first 2 characters of the ICAO CCCC code**

CCCC code	Country/area name	Area code	WMO Region
FW	Malawi	MWI	1
FX	Lesotho	LES	1
VG	Bangladesh	BGD	2
VH	Hong Kong, China	HKG	2
VI	India	IND	2
VL	Lao People's Democr Republic	LAO	2
VM	Macau, China	MAC	2
VN	Nepal	NPL	2
VO	India	IND	2
VR	Maldives	MDV	2
VT	Thailand	THA	2
VV	Viet Nam	VNM	2
VY	Myanmar	MMR	2
WA	Indonesia, Sumatra & Kalimantan	IDN	5
WB	Brunei Darussalam	BRN	5
WB	Malaysia, Sabah and Sarawak	MYS	5
WI	Indonesia, Sulawesi, Maluku & Irian Jaya	IDN	5
WM	Malaysia, Malaccan peninsula	MYS	5
WP	East Timor	TMP	5
WR	Indonesia, Jawa & Nusatenggara	IDN	5
WS	Singapore	SGP	5
YB	Australia	AUS	5
YD	Australia	AUS	5
YM	Australia	AUS	5
YP	Australia	AUS	5
YS	Australia	AUS	5
ZB	China	CHN	2
ZG	China	CHN	2
ZH	China	CHN	2
ZK	Democratic People's Republic of Korea	PRK	2
ZK	China	CHN	2
ZL	China	CHN	2
ZM	Mongolia	MNG	2
ZM	China	CHN	2
ZP	China	CHN	2
ZS	China	CHN	2
ZU	China	CHN	2
ZW	China	CHN	2
ZY	China	CHN	2

Appendix 7

List of sources and source codes used for the SourceIdentifier (D0)

v	Volume A, edition October 2001
w	Volume A, editions 1996-2001
y	Volume A, editions 1960-1963
d	Direct communication with Members on various occasions
u	NWS Washington list of stations, as published on the web
m	suggested corrections by monitoring centres DWD Offenbach and BOM Melbourne
c	NCDC Asheville: data list of the CARDS project for upper air stations
g	NCDC Asheville: data list of the Global Historical Climate Network (GHCN)
h	NCDC Asheville: data list of the Global Station List History
i	DWD Offenbach: data list from the monitoring centre
o	ODAS bulletin 1998
b	WMO RBSN and GCOS lists, and monitoring information from ECMWF
j	Historical files from the University of East Anglia, UK
n	WMO publication on normals for 1961-1990
t	Times atlas or other external sources

It should be noted that only one identifier per station could be provided in the list.

In many cases, the record data have been composed of elements from several sources.

In such cases, the/a source of the geographical co-ordinates is generally recorded.