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TASK TEAM ON GOS REGULATORY MATERIAL
(TT-GRM)

ITEM: 2 and 3

GENEVA, SWITZERLAND, 26-30 NOVEMBER 2001

Original: ENGLISH

Proposed changes to Vol. A of WMO Publication N° 9

(Submitted by Mr H. Daan, Rapporteur on the improvement of Volume A)

Summary and Purpose of Document

The document presents analysis of the present content of Volume A and recommendations on its possible improvement.

ACTION PROPOSED

The meeting is invited to consider information contained in this document and decide upon proposed recommendations to improve the content of WMO Publication N° 9.

- Annexes:
- A. Covering letter from the Rapporteur
 - B. Draft report on possible improvements regarding WMO Publication N° 9 - Volume A

To:

- focal points in Lead Monitoring Centres and Regional Co-ordinators:
- Mr I. Gitonga (Kenya)
- Mr C. Bower (USA)
- Mr B. Sumner and Mr T. Hart (Australia)
- Ms N.P. Fakhrutdinova (Russian Federation)
- Mr M.J. Garcia (Argentina)
- Mr B. Richter (Germany)
- Mr T. Yuzyk (Canada)
- Mr H. Boettger (ECMWF)
- Mr M. Saloum (Niger)
- Mr Yongqing Chen (China)
- Mr L. Farias Briceno (Chile)

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From:

- Harald Daan, rapporteur on Volume A

De Bilt, 23 October 2001

Dear Colleagues,

Attached is the 4th version of the discussion paper on improvement of the functionality of Volume A. At the same time, this version is the draft final report.

I intend to release the final report by 1 January 2002, unless major objections or problems will require more discussion. Therefore, I would urge you to review this version carefully and respond not later than 10 December 2001.

In this letter, I will address some issues that you raised. I will not address your many supportive comments on proposals. Thank you very much for that.

In discussing various items, I will indicate individual responders with initials.

1. Inclusion of more information on equipment and consumables used

The idea has been suggested (CB) to include such information, which is contained (e.g.) in the "Catalogue of Radiosondes and Wind-Finding Systems in Use". This suggestion is related to the basic philosophy of Volume A: should it be as comprehensive as possible standard catalogue, or should it contain the minimally required information for operational purposes?

With a view to the purpose of Volume A (both the old and the new version), it is my opinion that, in general, the contents should be limited to:

- static information on the location
- obs programme information on issues that are relevant to most of the stations.

The main reason to limit the information in the **flatfile** is that the amount of information to be downloaded by users should not be excessive. It seems not a good idea to trouble users with much information which is absorbed by some specialised users only.

The reason to limit the information in the **data base** is in the manageability of this system. Inclusion of specialised information should be supervised by specialists. Extending the data base with a variety of information types might contribute to pollution of the data, as it may disable an adequate supervision.

The links to separate data bases which contain specialised information should solve this problem. An essential requirement would be that the specialised data bases refer to the primary data base for the primary data.

2. Types of observation

Many stations provide more than one type of observation (surface, radar, radiosonde, wind profiler). It is pointed out (CB, TY) that in several cases, the location of observing is not the same. In my proposal, each type of observation requires a separate entry which carries the same index number with a different suffix (TypeIndicator). In operational message exchange, this indicator may be suppressed.

3. Representation of co-ordinates

First of all, I withdraw my comments in earlier versions based on an assumed minimum distance of 1500 meters between two stations. Mr Carl Bower drew my attention to this issue. The 1500 meters criterion was probably a confusion.

In the Guide on GOS, a synoptic site is advised as an area of at least 100 meters diameter. This could be translated as a diameter of 100 to 200 meters. This should be the magnitude of the location accuracy.

Several responders (BS/TH, IG, BR, CB) touched this problem. All agreed that a finer accuracy should be aimed at. However, the preferences were not all in line. Some preferred addition of seconds, others hundredths or thousandths of degrees or tenths of minutes.

In an alternative presentation, the risk of confusion should be minimised. Therefore, a presentation in hundredths of degrees is not recommended.

A presentation in seconds would presume an accuracy which is not realistic vis-a-vis the diameter of an observing site. My proposal for tenths of minutes is argued in the text. However, for the case that a clear majority of responses would support seconds instead of tenths of minutes, I am prepared to change this.

4. Length of station names

The name of a station should be a name, and - if that is not sufficient - preferably provide some geographical information. Information that is of interest otherwise should be taken out of the name and be inserted in a separate field, allowing for systematic use of that information. This refers, e.g., to additions as "AWS" or "Light House" or "Airport" or the name of administrative units in large countries (examples: states in the USA, provinces in Canada, islands in Indonesia).

Then, the length of names (now up to 49 chars) can be reduced to 24 characters.

It should be noted that Volume A is primarily meant for use abroad; it is not the place to lay down national documentation.

There are very different opinions on this point (TY,BS/TH,BR). The preferences range from 9 to 49 characters. Although I had a smaller figure in mind, the figure 24 seems to be an acceptable compromise.

5. Station numbering and historical index numbers

All respondents who reacted to this issue (YC, CB, TY, BS/TH) agreed that the index numbering system is no longer adequate. However, proposing changes seems to be beyond my mandate.

In order to respond to the need for an identification for climatology, I developed a system for geographic numbering: the LocationIdentifier. A description of the system is included in Appendix B.

This Identifier could replace the current system in future, if it would prove to be adequate. This will take time for consideration and experience.

Some respondents propose to add a sixth figure to the current index number. I would not be in favour of this solution, as it may raise confusion. A six figure number could easily be generated by error. In my opinion, an alternative numbering system should be based on an entirely different format.

It should be noted that the current numbering system has been polluted. In some countries, the shortage of numbers has forced deviation from the guidelines on numbering, and has led to random assignment. Also, the basis of political entities for the current system appears to be a source of changes. An invariant basis (geographical !) would prevent such changes.

The idea to have previous stations that used the same index number in Volume A (BS/TH) is covered by the extension of the data base to historical stations. This would work as follows:

- ordering the stations by index number would provide for each index number the stations that did possess that number, including the period of operation.

- ordering by location identifier would provide a list of station numbers that have been used consecutively for the same station.

6. Ordering of stations

Respondents, referring to this issue (IG, CB, TY), generally prefer an ordering by country. This, however, relates to manual use of the printed version. My personal experience is that generally the clue is the index number, and that the list should be sorted accordingly. However, we could compromise by having the printed (or CD-ROM) version ordered by Region and country, and the flatfile by index number.

7. Focal points

It has been proposed (YC) to include e-mail addresses of focal points. In my opinion, the idea is ok, but it might be better to have a separate (small) file available with:

- Country names (full names)
- UN Country codes (3-letter)
- Region number
- Focal point address (e-mail)
- Range of index numbers

This file might be extended to a further explanation of the contents of Volume A.

8. Monitoring figures

In the proposal, the detailed contents of the monitoring sections are left blank. This is a matter that should be discussed also in the OPAG ISS.

The following may give you an idea of my thoughts about the contents:

- reception rate in tenths of a full programme, for each main (or intermediate) hour
- stdev and bias of surface pressure
- stdev and bias of geopotential at 1 or 2 levels
- stdev of upper wind vector at 1 level

I look forward to your comments.

Yours sincerely,

Harald Daan

Draft report on possible improvements regarding WMO Publication No 9 - Volume A

Discussion paper on the maintenance of a reliable and useful list of observing stations
(version 4, Harald Daan, De Bilt, October 2001)

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 with 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 8, 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.

Considering a 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 Appendix A.

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, make 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.

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 fed 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 50 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 of the

station (A, C, LH, M), status of the station or membership of certain networks (AGRIMET, BAPMON, 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.

- 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 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.

Appendix A 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 VoIA does not contain

Some information that is important for specific users is not contained in VoIA. 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, dfff, 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 are not carrying 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 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. In the observing programme for each relevant item, a column is added filled by the letter 'm'. The LMC's make a copy of this edition of VoIA and replace the 'm's by the appropriate monitoring figures or 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 coordinates 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 very 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 than on 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 requested 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 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 coordinates (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 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 should be ordered in the following sections:

section 1	Identifiers (index, ODAS, ICAO), including type of station
section 2	Administrative organisation (name, state, region, function)
section 3	Location (latitude, longitude, ground elevation)
section 4	Operational status and dates of start and closure
section 5	Reports provided and Network membership
section 6	References to other information
section 7	Parameters observed
section 8	Time schedule of obs reports

Note: this sequence accounts for the discrimination between (semi-)permanent information in sections 1-4 and more variable information in sections 5-8.

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 9 (Monitoring results). If required, some sections (e.g. 2, 4, 5 and/or 6) 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 Appendix C. Particular features in the sections are discussed below.

5.3.1 Section 1: 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 B.
- An indication of the source of the information is included (PR, informal channels, or LMC).
- The current Index Subnumber (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 2: 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.
- 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 or on high seas (moored buoys).

5.3.3 Section 3: 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 should be more specific on this issue. It should provide clear criteria for the maximum distances between sensors at the same observing site. A figure of (e.g.) 200 meters seems quite appropriate.

In attaining a better accuracy, there are in practice two 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).

Both notations are in principle acceptable.

Note: Most 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 second option is preferred. Nevertheless, the possibility of facilitating input and output in thousandths could be facilitated by offering this value in a separate field. In this report this possibility is not included.

- Geographical positions should be given in degrees, minutes and tenths of minutes. The Hemisphere indicator should precede the should be facilitated, both for input and output. Different formats for both representations should be clearly defined.
- 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 7, as it is part of the instrumentation.
- A flag for indicating reliability 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, desert, ice, flat land).
- A field for indicating characteristics of the environment may be added (urban, crop, forest, grass, waste land, ice, desert).

5.3.4 Section 4: 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, if appropriate.
- An indicator on whether a station is operational or suspended observations temporarily should be added. The latter now is recorded generally in a footnote.

5.3.5 Section 5: 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 indication should be added on whether a station provides standard reports (SYNOP, SHIP, BUOY, TEMP, PILOT, RAOB, RAREP, CLIMAT (TEMP)-like, 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 6: Reference to other information

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

- 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.

5.3.7 Section 7: 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 Hp 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 8: 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 Appendix C.

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. However, if the Synoptic general version would be provided on CD-ROM, a printed version may become redundant.

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 2 flat files, based upon the Synoptic general version, and extended with appropriate fields for synoptic and CLIMAT monitoring results respectively.

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

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

5.4.4 Climatological 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.

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 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 1</i>	<i>Identifiers (index, ODAS, ICAO), including type of station</i>
<i>section 2</i>	<i>Administrative organisation (name, state, region, function)</i>
<i>section 3</i>	<i>Location (latitude, longitude, ground elevation)</i>
<i>section 4</i>	<i>Operational status and dates of start and closure</i>
<i>section 5</i>	<i>Reports provided and Network membership</i>
<i>section 6</i>	<i>References to other information</i>
<i>section 7</i>	<i>Parameters observed</i>
<i>section 8</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

It is recommended that in a period of transition the contents of the Volume A data base are transferred to the new format. Then, simultaneous provision of both Volume A and A1 should be anticipated for a limited period of time (3-6 months).

Volume A2 will be a new facility. Its development can wait until Volume A1 is established well.

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 containing the full flat file;
- the footnotes will not be included;
- the many ObsRemarks will either be eliminated or included in standard fields.

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.