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**EXPERT TEAM ON REQUIREMENTS FOR DATA FROM
AUTOMATIC WEATHER STATIONS**
Third Session

ITEM: 3.2

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**Maintenance of Accurate Metadata
for all Automatic Weather Station Installations**

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Summary and Purpose of Document

The document contains a proposal for a standard set of metadata elements for all Automatic Weather Station Installations.

ACTION PROPOSED

The meeting is invited to examine the proposal and to submit recommendations for consideration by CBS-XIII.

References:

1. Manual on GOS, WMO-No. 544
2. Guide to Meteorological Instruments and Methods of Observation, WMO-No. 8
3. Automated Weather Stations for Applications in Agriculture and water Resources Management: Current Use and Future Perspectives, Proceedings of an International Workshop, 6-10 March 2000, Lincoln, Nebraska, USA
4. Guide to Metadata and homogeneity,
www.bom.gov.au/wmo/climate/ccl/CCI_HM_250603.doc
5. CBS-Ext.(02), Abridged Final Report with Resolutions and Recommendations, WMO-No. 955

Maintenance of Accurate Metadata for all Automatic Weather Station Installations

1. BACKGROUND

Metadata (data about data), as applied to measurement and observation, describe the location, instrument and method of observation, quality, and other characteristics of data. Metadata are important for data users, as they need to know the circumstances of the observations/measurements and understand the origins of the meteorological values themselves. Metadata are especially important for the elements that are particularly sensitive to exposure, such as precipitation, wind and temperature.

Metadata can be considered as an extended version of the station administrative record, containing all possible information related to the station and instruments installed, type and time of changes that occurred during the history of an observing system. The expanded metadata information can include digital images, a wide range of instrument specifications, calibration and maintenance records, and many other pieces of information.

Metadata are dynamic. Station location, ground cover, instruments, observation/ measurement practices, processing algorithms, data formats etc. change over time. The system has to track all these changes.

As computer data management systems gradually become an important component of the data delivery systems, it is desirable that metadata are available as a computer database enabling computerized composition, updating, and use.

2. ELEMENTS OF A METADATA DATABASE RELATED TO AN AUTOMATIC WEATHER STATION

(The proposal for a standard set of metadata elements)

A metadata database should provide detailed information necessary for users to gain adequate background knowledge about the station and observational data, together with updates due to changes that occur.

Major database elements include the following:

- Network information (beyond a scope of this document);
- Station information;
- Individual instrument information;
- Data processing information;
- Data handling information;
- Data transmission information.

2.1 Station information

There is a great deal of information related to a station's location, local topography and others. Basic station metadata include:

- Station name and station index number(s);
- Geographical co-ordinates;
- Elevation above mean sea level;

- Types of soil, physical constants and profile of soil;
- Types of vegetation and condition;
- Local topography description;
- Type of AWS, manufacturer, model, serial number;
- Observing programme of the station: parameters measured, reference time, times at which observations/measurements are made and reported;
- The datum level to which atmospheric pressure data of the station refer.

2.2 Individual instrument information

(Information related to sensors installed at the station, including recommended, scheduled and performed maintenance and calibration)

Relevant metadata should be:

- Sensor type, manufacturer, model, serial number;
- Principle of operation; method of measurement/observation; type of detection system;
- Performance characteristics;
- Unit of measurement, measuring range;
- Resolution, accuracy (uncertainty), time constant, time resolution, output averaging time;
- Siting and exposure: location, shielding, height above ground (or level of depth);
- Data acquisition: sampling interval, averaging interval and type;
- Correction procedures;
- Calibration data and time of calibration;
- Preventive and corrective maintenance: recommended/scheduled maintenance and calibration procedures, including frequency, procedure description;
- Results of comparison with travelling standard.

2.3 Data processing information

For each individual meteorological element, metadata related to processing procedures include:

- Measuring/observing programme: time of observations, reporting frequency, data output;
- Data-processing method/procedure/algorithm;
- Formula to calculate the element;
- Mode of observation/measurement;
- Processing interval;
- Reported resolution;
- Input source (instrument, element, etc.);
- Constants and parameter values.

2.4 Data handling information

Metadata elements of interest include:

- Quality control procedures/algorithms;
- QC flags definition;
- Constants and parameter values;
- Processing and storage procedures;

2.5 Data transmission information

The transmission-related metadata of interest are:

- Method of transmission;
- Data format;
- Transmission time;
- Transmission frequency.

3. RESPONSIBILITIES

3.1 Maintenance of metadata

Meteorological data producers should take responsibility for maintenance of up-to-date metadata files.

3.2 Exchange of metadata

Metadata should be disseminated jointly with the AWS data. BUFR templates for AWS data after an appropriate adjustment would be the suitable tools for this purpose.

3.3 Publication of guidelines

Guidelines for maintenance of accurate metadata for all automatic weather station installations should be published in Manual on GOS, WMO-No. 544 and Guide to Meteorological Instruments and Methods of Observation, WMO-No. 8 to ensure complete and correct information about data.