|  |  |
| --- | --- |
| **World Meteorological Organization**  **Commission for Instruments and Methods of Observation**  **Joint Session of the Expert Team on Operational In Situ Technologies (ET-OIST) and the Expert Team on Developments in In Situ Technologies (ET-DIST)**  Geneva, Switzerland, 21-23 June 2017 | **CIMO/ET-A1-A2/Doc. 5.5** |
| Submitted by: Michel Leroy  23.05.2017 |

# 

# UPDATE OF WMO GUIDANCE MATERIAL ON AWSs

|  |
| --- |
| **Summary and purpose of document**  This document provides a proposal for the update of the CIMO Guide chapter on the Automatic Weather Stations (Part II, Chapter 1). |

**Action proposed**

The Meeting is invited to review the proposal and to agree on the further steps, including timelines, needed to ensure the relevant material is timely accessible by WMO Members.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Appendices:** None

# UPDATE OF WMO GUIDANCE MATERIAL ON AWSs

The proposed updates to the Guide to Meteorological Instruments and Methods of Observation, Part II, Chapter 1: Measurements at Automatic Weather Stations, are presented in a form of chapter structure, as follows:

1. Measurements at automatic weather stations
   1. General
      1. Definition
      2. Purpose
      3. Meteorological requirements

*Much lighter than the current text, because many considerations currently listed are not specific to an AWS, but should apply to any observing system or sensor.*

*Some words about climatological requirements to be included.*

* + 1. System configuration

*An AWS is usually not used as a stand-alone equipment. It is part of a system with 3 main elements: the local AWS and its sensors ; the telecommunication network used between the AWS and a central processing system fed by the AWS data. This central system is usually connected to the GTS to transmit the standard observation messages.*

*Except for fully standalone AWS, directly transmitting standard observation messages on the SMT, an AWS cannot be considered independently of the main global system. Data processing and message coding may be split between the AWS and a central processing system, depending on the characteristics of the telecommunication network or link used between them.*

* + 1. Types of automatic weather stations

*Light automatic stations (measurement of precipitation and/or air temperature).*

*“Basic” AWS (typically measurement of pressure, air temperature, relative humidity, wind, precipitation quantity)*

*“Extended” AWS (additional measurement of solar radiation, sunshine duration, soil temperature, evaporation, …)*

*Automated visual observation AWS (basic or extended AWS with automatic observation of visibility, clouds layers, present weather).*

*Real-time AWS and off-line AWS (when no telecommunication link is available)*

* + 1. Telecommunications

*The available ways of communication on a site or within an area is a major point for the design and the specification of an AWS system.*

*Many technologies have to be considered : PSTN, leased lines, access to Internet network, cellular networks, satellite transmission (service offered by meteorological geostationary satellite, commercial system such as Iridium, Inmarsat, …).*

*A characteristic of the telecommunication network is also a rapid change of the offer, of the pricing, of the coverage.*

* + 1. Networking
  1. System configuration

*Depending on the data collection system (capacity of the telecommunication network), data processing may be shared between a local AWS and a central system, both having advantages and disadvantages (data volume, facility to update the software, immunity to transmission breaks, ...).*

* + 1. Telecommunication network
       1. One-way communication
       2. Two-way communication
       3. Satellite
       4. Cellular network
       5. Public Switched Telephone Network
       6. Leased lines
       7. Remote connection to Internet or VPN
    2. Central processing system
    3. Automatic Weather Station
  1. Automatic Weather station hardware

*Two main system types exist: integrated system (electronics, connections, local energy hub, surge protection, enclosure protection, telecommunication modem) or data-logger to be integrated with cable connections, local energy hub, enclosure protection, modem.*

*Depending on the manufacturers, an AWS can be delivered with sensors from the same manufacturer or designed to be used with third-party sensors.*

* + 1. CPU

*Including a real-time clock. Possibly a GPS receiver for time reference.*

* + 1. Sensors’ interface

*Analog, counter, serial line, SDI12, …*

*Part of the current §1.2.2.1 Data acquisition*

*Sensors are not described as in the current chapter, because the sensors are dealt in part I of the Guide.*

* + 1. Cable connection
    2. Power supply, local energy hub

*Floating battery, solar panel with regulator, external electrical power, special (non-solar) electric generator, ...*

* + 1. Surge protection
    2. Enclosure protection
    3. Installing structure

For the AWS itself, sometimes for the sensors

* 1. Automatic Weather Station Software
     1. Operating system
     2. Application software
        1. Configuration
        2. Sampling and filtering

*Reference to Part IV, Chapter 2.*

* + - 1. Raw-data conversion
      2. Manual entry of observations
      3. Local data storage
      4. Message coding, data transmission

*Depends on the distribution of tasks between AWS and central system. Strategies to cope with temporary loss of the data link, missing values, …*

* + 1. Maintenance, remote diagnostics
    2. Local data display

*If any! Depends on the presence of local staff. May be useful for the maintenance.*

* 1. AWS siting considerations

*Reference to Siting Classification (Part I, chapter 1), both for the complete AWS and its sensors and between the sensors if an integrated installing structure is used.*

* 1. Central processing system

*Collecting data from a network of AWS and data-processing, quality control.*

*Often, coding of standard observing message (such as SYNOP – if still in use – or BUFR messages for surface observation).*

* 1. Quality control

*Mainly, reference to Part IV, chapter 1, in particular if this chapter is updated to include the WMO recommendations concerning plausible checks.*

*The quality control is split between the local AWS and the central processing system, depending on the distribution of tasks between both.*

* 1. Maintenance
     1. On line diagnostics
        1. In-house parameters
        2. Use of a central system to monitor the technical status of a network
     2. AWS calibration
  2. Considerations about system specifications and costs

*The cost of a system is split between:*

*A site: piece of land, fence, availability of power lines*

*The hardware for a local AWS installation: AWS itself, sensors, installing structures*

*The installation*

*The current expenditure for telecommunication*

*The maintenance and calibration costs during the life of the system*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_