

**WORLD METEOROLOGICAL ORGANIZATION**

**COMMISSION FOR INSTRUMENT AND  
METHODS OF OBSERVATION  
*OPAG-SURFACE***

**EXPERT TEAM ON SURFACE TECHNOLOGY AND  
MEASUREMENT TECHNIQUES  
*First Session***

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ITEM: 3.1

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**STANDARDS FOR AUTOMATED VISUAL AND SUBJECTIVE OBSERVATIONS**  
**Systems measuring present weather**

*Submitted by Chairman*

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**Summary and Purpose of Document**

The document contains an introduction on the requirements for standards of systems measuring present weather.

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**ACTION PROPOSED**

The meeting is invited to take notice of the document and to supply suggestions or recommendations on how to provide documentation and guidelines to standardize present weather observing systems.

**References:**

1. CIMO-XIII, abridged final report
2. CIMO MG (2003) final report
3. IOM 73 (TD 887), *WMO Intercomparison of Present Weather Sensors/Systems - Final Report* (1998)
4. EUMETNET report, *Present Weather – Science (E-PWS-SCI), “Exploratory actions on automatic present weather observations” (2003), final report with recommendations.*

## Background

### 1.1. Introduction

The measurement of physical quantities is performed by instruments readings. Weather phenomena and many other parameters related to the weather, could not been measured by instruments until mid of the 1980s. At manned weather stations, observers read out the instruments and take care of the observations, usually identified as “present weather observations”. Typically these types of observations were reported in the SYNOP as the “ww” and “w<sub>1</sub>w<sub>2</sub>” code (present and past weather).

For more than 20 years several systems were developed that should be capable to determine these typical “present weather” parameters, such as precipitation identification, cloudiness, state of the ground and weather phenomena, like icing, lightning and thunderstorms. Equipment, capable to determine such parameters is usually called “present weather system” although most of these devices only determine the type and intensity of precipitation, some in combination with visibility.

Parallel to the development of these present weather sensors or systems (PWS), the use of automatic weather stations (AWS) become more and more popular. It is expected that these AWSs will replace most of the manned weather stations in future. The development of PWS has become of outmost importance and it was experienced that the design and future development do require well-defined standards and further uniformity. Moreover, because present weather observations by observers are subjective and qualitative, definitions of the typical present weather parameters required more appropriate definitions in objective, quantitative terms, as required for any other measuring instrument. For this purpose a number of expert meetings were organized to provide uniform requirements for PWS. CIMO, CBS and EC have adopted the stated recommendations.

### 1.2. Instrument development

To identify weather phenomena, new techniques were developed starting in the 1980s. Although the first devices were designed for the determination of type and intensity of precipitation, today new technologies are developed and coming up to cover the other PW parameters as well. To provide the Members with information on the state-of-the-art of PWS, an intercomparison was organized from 1993-1995 (IOM 73, 1998). It was found that many PWS performed reasonably well, but suffer in many cases with bad performances. Moreover a number of parameters cannot be measured directly and methods are used to derive such parameters from a “multi-sensors system” and other sources using algorithms (e.g. cloudiness, undercooled precipitation). Those algorithms are typically based on empery and use fine-tuned discrimination criteria based on the local climate. Also the technology used in PWS is very divers. Use is made of optical techniques, RADAR, sound detection and other passive or active sensing devices.

We may conclude that at present no uniform or standard technology is recommended which is suitable to determine all PW parameters according to the required performances. For that reason Eumetnet already organized the “PWS programme” and a dedicated project “E-PWS-SCI” (Exploratory Actions on Automatic Present Weather Observations). The report of this project recommends a number of activities to be organized for further instrument and algorithm development to better fulfil the requirements. An important issue will be the development of algorithms to derive PW information from a diversity of sources, inclusive of data from satellites.

## Activity plan

### 2.1. Planned activities

In line with CIMO XIII, the CIMO management group has decided to continue the work on standardization of automated visual and subjective observations. Because PWS is of substantial interest for many disciplines within meteorology, it was stated that special attention would be given to systems measuring present weather. In particular those PW parameters and phenomena, which are not well described in terms of methods of observation or observation technology, should get attention. Moreover standardization of the measuring technology and algorithms to derive such parameters have to be proposed to CIMO.

To realize this request, further review of existing recommendations and newly available publications will be carried out. As a result, recommendations for standards will be developed and proposed at the next CIMO session. Furthermore, analyses results and recommended practices have to be published as an IOM reports. Consequently, the relevant parts in the CIMO Guide will be updated as well.

### 2.2. Time Table

	<b><i>deliverable</i></b>	<b><i>deadline</i></b>
a.	Report on reviewed past recommendations	February 2005
b.	IOM report on current standards and practices	September 2005
c.	Proposal for updating the CIMO Guide	December 2005
d.	Recommendation(s) to CIMO XIV	May 2006

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