



World Meteorological Organization  
Organisation météorologique mondiale

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Weather • Climate • Water  
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Our ref.: OBS/IMO/Intercomparison

GENEVA, 20 August 2013

Annex: 1 (available in English only)

Subject: Requirements for improving the accuracy of rainfall intensity measurements

Dear Sir/Madam,

The Commission for Instruments and Methods of Observation (CIMO) organized the Field Intercomparison of Rainfall Intensity Gauges in Vigna di Valle, Italy. The final report of this intercomparison was published in the WMO Instruments and Observing Methods series as WMO/TD-No. 1504 (IOM-99, 2009), which is available on the WMO website at <http://www.wmo.int/pages/prog/www/IMOP/publications-IOM-series.html>. This report provides an improved understanding of rainfall intensity gauge characteristics and their potential use, and will contribute to improving rainfall intensity measurements that are of crucial importance in mitigating the impact of severe weather events, such as flash floods.

Taking into account the results of the intercomparison, the fifteenth session of CIMO (Helsinki, Finland, 2-8 September 2010) recognized that improvements in the instrumentation and its operation were still needed, and endorsed the requirements for improved accuracy of rainfall intensity measurements, which ensued from the intercomparison.

Those requirements are included in the annex to this letter. I would like to invite you to implement them in your observing systems and in the development of your instruments.

Yours faithfully,

A handwritten signature in purple ink, appearing to read 'E. Manaenkova'.

(E. Manaenkova)  
for the Secretary-General

To: Permanent Representatives (or Directors of Meteorological or Hydrometeorological Services) of Members of WMO (PR-6716)  
HMEI Executive Secretary, Dr Alexander Karpov (hmei@wmo.int)

cc: Hydrological Advisers to Permanent Representatives

**REQUIREMENTS FOR IMPROVING THE ACCURACY OF  
RAINFALL INTENSITY MEASUREMENTS**

The results obtained during the Field Intercomparison of Rainfall Intensity Gauges, held in Vigna di Valle, Italy, between 2007 and 2009, allowed in particular identification of the following requirements for the improvement of rainfall intensity measurements:

- (1) The minimum list of technical parameters provided below, and an adequate description of each of them, should be included in the user manual of each instrument so that the user can decide on the best choice of output values to be selected for their application:
    - Measurement range, resolution, threshold and linearity;
    - Measurement uncertainty (for the whole measurement range);
    - Dead time, delay time and time constant;
    - Internal calculation or update cycle and possible output cycles.
  - (2) Tipping bucket rain gauges should be corrected to compensate for underestimation of high rainfall intensity. Software correction methods that take into account the timestamp of each tip provide the best results.
  - (3) The calculation of rainfall intensity and accumulation should be separated and both values should be reported.
  - (4) The use of algorithms that increase the time constant should be avoided.
  - (5) Quality information should be provided in the output data message.
  - (6) The design of instruments should be improved to reduce the uncertainty of 1-min rainfall intensity measurements at low rainfall intensities (especially below 20 mm/h).
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