

Metrology, meteorology and climatology: joint effort on uncertainty evaluation

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BIPM-WMO workshop: Metrology for climate action, September 2022

❖ [WG1](#) of Joint Committee for guides in metrology, [JCGM](#), and the [ET-MU](#) of the WMO held online workshop on “Measurement uncertainty in meteorology and climatology” on 5, 6 April 2022

❖ Aims

- recognise current level of convergence in field of measurement uncertainty (MU)
- identify outstanding problems (see “topics” below)
- contribute to addressing their solution
- prepare joint contributions (oral or poster) on the topic for *this* workshop

❖ Topics

- MU-related concepts: precision, accuracy, calibration, traceability, representation uncertainty
- Modelling, definition of the measurand
- Reconciliation of bottom-up and top-down approaches
- Case examples

❖ Nine presentations given on topics described above, followed by a round table.

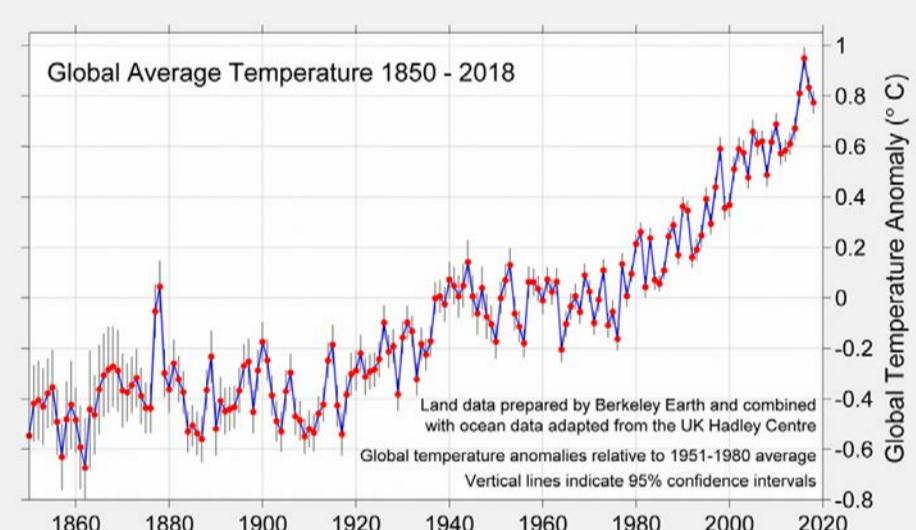
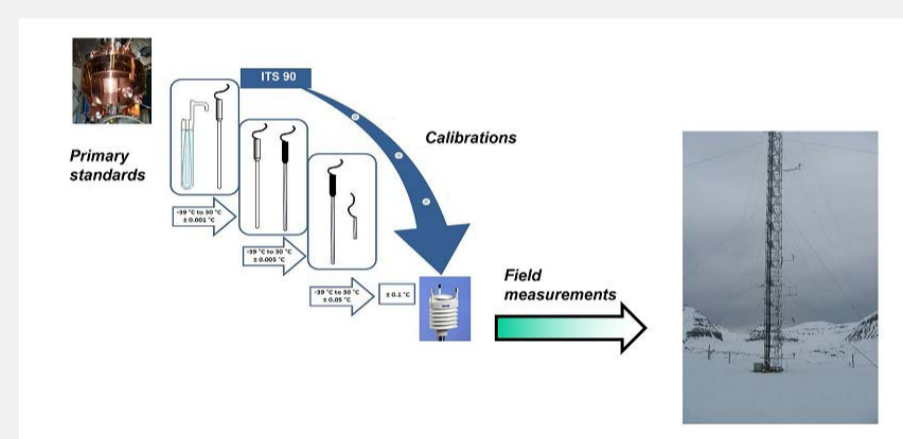
❖ Seventy-seven scientists, from all continents, registered for the event

❖ Workshop contributed to **enhancing cooperation** between JCGM-WG1 and ET-MU of WMO, promoting better understanding of the topics deserving highest priority

❖ Key issues identified:

- relationship between “representation uncertainty” of meteorology-climatology and “definition of the measurand” of metrology
- interconnection between **metrological traceability and MU**, often misunderstood in both fields
- invaluable role of **modelling the measurement** in a valid assessment of MU
- **reconciliation** of bottom-up and top-down approaches in a unique framework

❖ Some further issues highlighted, e.g., common need to extract meaningful means and standard uncertainties from time series



As a follow-up of the workshop, in May 2022 the 5th Arctic Metrology Workshop was organized in Longyearbyen (Svalbard)

The event focused on challenges in evaluating MU for instruments exposed to polar environment where the associated influence quantities play a dominant role in the uncertainty budget

Again, a contribution from JCGM and one from ET-MU raised the discussion on the topic



As a result of the collaboration, a relevant recommendation submitted for approval at second session of the WMO INFCOM, the "INFCOM 2 DOC 7.4/2 on "Harmonization of the definition of uncertainty and related terminology across key INFCOM-related WMO publications", stating

To avoid potential confusion in the use and interpretation of the uncertainties expressed in the WMO publications, it is necessary to harmonize the definition of uncertainty and related terminology and, if appropriate, fully align it with

1) Joint Committee for Guides in Metrology: Evaluation of measurement data — Guide to the expression of uncertainty in measurement (**GUM**): JCGM 100:2008

2) Joint Committee for Guides in Metrology: International vocabulary of metrology — Basic and general concepts and associated terms (**VIM**): JCGM 200:2012

The already established collaboration between SC-ON/JET-EOSDE and SC-MINT/ET-MU and with the WGs of BIPM/Joint Committee for Guides in Metrology will be essential for the completion of these tasks

Next steps to progress joint activity include further mini workshops on key issues identified above