Meteorology Standards in ISO

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Abstract

Developments being made in meteorological standards within Subcommittee 5 of ISO Technical Committee 146 (Air Quality) are presented. A potentially large step toward formalizing WMO documents as ISO Standards is available through a WMO/ISO agreement, but the progress requires participation by meteorological experts. A path forward to make this step is also presented.

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1. Introduction

The meteorological measurement community recognizes the importance of uniform measurement methods as an essential first step in providing meteorological data users with comparable information suitable for analysis and archival records. National and global weather organizations publish guidance on preferred monitoring methods. The World Meteorological Organization (WMO) is a long-standing champion of this concept, and remains active through the Instruments of Meteorological Observations Programme (IMOP) and the Technical Commission on Instruments and Methods of Observation (CIMO), in particular within the WMO Global Observing System. Some national and international consensus standard organizations have set forth meteorology standards. The International Organization for Standardization (ISO) is widely recognized and respected for its integrity in creating and maintaining voluntary consensus standards. With one exception, the ISO meteorology standards are written and maintained by Subcommittee 5 (SC5) in Technical Committee 146 (146), Air Quality.

Whether you are just now exploring “standards” in meteorological observations or if you are an accomplished expert in meteorological observation methods, you may be frustrated by the apparent multiple uses of the term “standards”, including in the preceding paragraph. Please consider the attempt in this presentation to clarify this concept and then show how ISO meteorology standards can support the WMO objectives. The specific purposes of this presentation are to:

- Explain the role of voluntary consensus standards
- Identify the current ISO meteorology standards and active work developments
- Describe the potential for efficient transition of World Meteorological Organization meteorological documents to ISO Standards
- Demonstrate that participation by meteorological experts is the primary obstacle limiting further development of ISO Standards.

This paper reflects a continued effort to explain and expand the development of ISO meteorological standards. One previous effort was a presentation at TECO 2008 (Fransioli and Ding, paper 1.6).

2. Voluntary Consensus Standards

In keeping with the concept of utilizing standardized information, the following description of ISO and voluntary consensus standards was taken from the ISO web site (http://www.iso.org/iso/home.htm):

> ISO (International Organization for Standardization) is the world's largest developer of voluntary International Standards. International Standards give state of the art specifications for products, services and good practice, helping to make industry more efficient and effective. Developed through global consensus, they help to break down barriers to international trade.

Please note the last sentence above: one strong focus of voluntary consensus standards is to facilitate commerce; this is not specific to ISO.

ISO meteorological standards are developed by technical experts from a minimum of five countries identified as participating actively in ISO (P-members). The experts may come from manufacturing and service industries, national weather organizations, or academic institutions.

The present focus of our standards is to specify terminology and methods used either to arrive at descriptive performance characteristics of meteorological equipment or to perform a measurement process by a uniform method. Definitions, methods of determining equipment characteristics and proper application of measuring equipment developed by a consensus process can assist providers and users alike.

A significant element of standards is the careful use of the terms "shall" and "should" when describing testing and measurement methods. By comparison, the primary WMO meteorological method guidance document is the well-known and respected CIMO Guide No. 8. The opening paragraph includes the following purpose statement: "The purpose of the *Guide to Meteorological Instruments and Methods of Observation* is to support these activities by giving advice on good practices for meteorological measurements and observations". "Advice on good practices" can be taken conscientiously or politely bypassed under economic or other pressures. With a few minor exceptions, the only usage of the term "shall" in Guide No. 8 is in Chapter 7 on the measurement of solar radiation in "Annex 7.C. Specifications for world, regional and national radiation centres."

The preceding focus on the differences between "shall" and "should" may seem diminished by the term "voluntary" consensus standard. Standards do not carry the status of regulations until regulatory, procurement or other documents require use of the standards for the intended purposes. But when an organization states that information was obtained in compliance with a voluntary consensus standard, the qualitative, and perhaps quantitative, uncertainty is significantly less than if fewer controls were used in performing the work.

3. ISO Meteorology Standards in TC146/SC5

SC5 formally began in 1994. It is currently chaired by Ms. Rodica Nitu, Environment Canada; the author of this paper is the Secretary. SC5 has 12 "Participating" (voting) member countries, and another 14 "Observing" countries that may provide comments, but may not cast ballots. SC5 has formal Liaison relationships with WMO and the Geneva-based Association of Hydro-Meteorological Equipment Industry (HMEI). One complexity in the process is the member countries are formally represented by national standards organizations, who in turn look to technical experts in their countries for direction on voting and agreements to proceed with new work items.

The technical effort to produce the standards occurs in Working Groups. SC5 has had six such WG, but only WG6 (lidar) can claim currently active works in progress.

SC5 has published four standards to date:

- ISO 16622:2002 - Meteorology -- Sonic anemometers/thermometers -- Acceptance test methods for mean wind measurements
- ISO 17713-1:2007: Meteorology -- Wind measurements -- Part 1: Wind tunnel test methods for rotating anemometer performance
- ISO 17714:2007: Meteorology -- Air temperature measurements -- Test methods for comparing the performance of thermometer shields/screens and defining important characteristics
- ISO 28902-1:2012: Air quality -- Environmental meteorology -- Part 1: Ground-based remote sensing of visual range by lidar.

Previous new work items were begun but not completed, such as one intended to be 17713-2 on wind tunnel testing for wind vane performance. The current active work item is in WG6: ISO/WD 28902-2 "Air quality -- Environmental meteorology -- Part 2: Ground-based remote sensing by Doppler wind lidar".

Further information on SC5 is on the ISO web site under Technical Committee 146 (Air Quality), the current location is:
http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=52810 .

4. Potential Transition of WMO Documents to ISO Standards

The relationship between WMO and ISO extends back to WMO recognized as consultative status in ISO since 1954. The relationship took a large step with approval of a formal working arrangement that was approved by WMO in June 2008 and on behalf of ISO on the basis of ISO Council resolution 43/2007 in December 2007. The agreement may be found in Chapter V.6 of WMO No. 60: "Agreements and Working Arrangements with other international organizations, Basic Document 3." Two important statements from the introduction to this section follow:

- "These working arrangements between WMO and ISO aim to strengthen the development of International Standards and to avoid duplication of work on standards related to meteorological, climatological, hydrological, marine and related environmental data, products and services."
- "In the text of these working arrangements the word "standard" is used with the meaning given in ISO/IEC* Guide 2:2004, *Standardization and related activities – General vocabulary*. The resulting standards developed under these working arrangements are hereafter called "common standards"."

One further clarification on the term "standards" when comparing between ISO standards and Guide No. 8 should be made referring to Section 1.5.1 of the Guide: "The term "standard" and other similar terms denote the various instruments, methods and scales used to establish the uncertainty of measurements."

Part III of Guide No. 8 is on Quality Assurance; Chapter 4 is "Testing, Calibration and Intercomparison". This important statement is in this Chapter: "National and international standards and guidelines exist for many aspects of testing and evaluation, and should be used where appropriate. Some of them are referred to in this chapter."

Clause 4 in the agreement has a description of the process document transition process. Two separate scenarios are covered: one for bringing existing WMO documents into ISO, and one for the two organizations jointly developing a new document. Joint approval is needed in either case. Clause 5 covers publication, which is expected to result in "…two separate documents with identical content."

This presentation would not be complete without some expression of caution against expecting quick and easy transition of WMO documents to ISO standards. First, from the perspective of one who has followed the ISO process for format and content of standards in producing and maintaining standards, considerable effort may be needed to transition sound guidance to an acceptable standard. Second, we have yet to explore the process of having ISO Standards available for purchase in parallel with freely supplied WMO technical and governance publications.

5. Participation by Technical Experts and National Standards Bodies

The path forward to developing more ISO meteorological standards whether from a transition of WMO documents or from new work areas, is only blocked by a lack of people willing and able to provide suitable material and make satisfactory revisions sufficient to reach consensus in the subcommittee. Each of the published standards was developed by a dedicated working group of motivated and competent individuals, and was then reviewed at the subcommittee level. Recent economic challenges have left workers in the private sector, governmental and academic institutions with less time and travel funds to participate in outside document development.

One solution to the insufficient time and travel funds obstacle being implemented where possible is the use of electronic exchanges of draft documents and virtual meetings. ISO has made considerable advances in facilitating the process with electronic information exchange web-based tools. Where possible, we schedule subcommittee and working group meetings to occur during and at the location of technical conferences, such as the TECO series and annual professional society meetings.

The closing thought is the two-fold challenge for today's meteorologists engaged in measurements:

- Identify willing and competent technical experts, and
- Ensure that your national standards body participates in ISO TC146/SC5 with your technical support and advisory role.

Please be encouraged to contact the author of this paper for further information or for recommendations on contacting your national standards body.