# WMDS Validation Report

Topic: **Cryospheric observations**

Issue(s) addressed (URLs): <https://github.com/wmo-im/wmds/issues/155>
<https://github.com/wmo-im/wmds/issues/154>

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## Document History

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| In Preparation | 2020-05-19 | 0.1 | Charles Fierz | Complete draft |
| Under Review | 2020-05-28 | 1.0 | Charles Fierz | Following telecon #11 and mail feedback |
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## Background

The current code list of observing methods for the atmosphere (<http://codes.wmo.int/wmdr/ObservingMethodAtmosphere>) specifies 3 entries for in situ measurements of snow on the ground:

* <http://codes.wmo.int/wmdr/ObservingMethodAtmosphere/260>
(\Atmosphere\Precipitation\In situ\Snow\(Ultra)sonic ranger
* <http://codes.wmo.int/wmdr/ObservingMethodAtmosphere/261>
(\Atmosphere\Precipitation\In situ\Snow\Gradiated pole
* <http://codes.wmo.int/wmdr/ObservingMethodAtmosphere/262>
(\Atmosphere\Precipitation\In situ\Snow\Snow pillow

OSCAR/Surface, however, has already moved the snow variables from ‘\Atmosphere\Precipitation\ ... ‘ (<http://codes.wmo.int/wmdr/ObservedVariableAtmosphere>) to ‘\Terrestrial\Land surface\Snow / Ice / Glacier\Snow\ ... ‘ (<http://codes.wmo.int/wmdr/ObservedVariableTerrestrial>).

Note also that this issue is linked to issue #[154](https://github.com/wmo-im/wmds/issues/154) as the latter aims to add a method to measure snow depth on the ground.

## Proposal

In short the proposal is to move the observing methods for snow on the ground from Table 5-02-01 [ObservingMethodAtmosphere](http://codes.wmo.int/wmdr/ObservingMethodAtmosphere) to table 5-02-05 [ObservingMethodTerrestrial](http://codes.wmo.int/wmdr/ObservingMethodTerrestrial).

The resulting entries in table 5-02-02 should read:
260,\Terrestrial\Remote-sensing, active\Snow\(Ultra)sonic ranger,(Ultra)sonic ranger,
261,\Terrestrial\In situ\Snow\Gradiated pole,Gradiated pole,
262,\Terrestrial\In situ\Snow\Snow pillow,Snow pillow,

## Considerations

From a measurement perspective, snow as deposited on the ground versus falling (solid) precipitation has been an ongoing debate. The reasoning for separation has been the locus of measurement: on the ground (terrestrial) versus at some height above ground (atmosphere). This separation is now also reflected in WMO-No. 8, Vol I, Chap 6.1 “ ... measurement of snow on the ground and new snow are discussed in detail in Volume II, Chapter 2 of the present Guide.” Accordingly, the methods of in situ observation to which entries 260, 261, and 262 refer were recently defined, described and published in the Guide to meteorological instruments and methods of observation: WMO-No. 8, Volume II – Measurement of Cryospheric Variables (<https://library.wmo.int/doc_num.php?explnum_id=9870>). It would thus be natural to use those published definitions in addition to moving the above entries. Regarding names, it would be best to name a method rather than a device wherever possible, for example, ‘Ultrasonic ranging’ rather than ‘(Ultra)sonic ranger’.

Overall, the proposal makes sense and is supported by the community concerned. Indeed, the methods mentioned only apply to in situ measurements and observations of snow on the ground. Note that GCW will request correction of the erroneous use of notation 260 for measuring ‘Amount of precipitation’ at station 0-124-34000-KLRS.

In summary, following the proposal, observations and methods would be found in corresponding domains, which would make navigation and search simpler. Furthermore, from issue #[154](https://github.com/wmo-im/wmds/issues/154), ‘Laser ranging’ could be included in table 5-02-05 as well. In accordance with other entries in table 5-02-02 though, the new entries should rather look like: 260,\Terrestrial\Snow depth\In situ\...,...,

## Conclusion and Recommendation

It is recommended to move the existing entries from table 5-02-01 to table 5-02-05, rename them as needed, adapt the paths, add definitions, and add one new entry to table 5-02-05 (<http://codes.wmo.int/wmdr/ObservingMethodTerrestrial>) as follows (changes and additions in brownish color):

|  |  |  |  |
| --- | --- | --- | --- |
| **Notation** | **Name** | **Path** | **Definition** |
| 260 | Ultrasonic ranging | \Terrestrial\Snow depth\In situ\  | *Transmission of an ultrasonic pulse towards the target and listening for a return echo from that target.* |
| ?? | Laser ranging | \Terrestrial\Snow depth\In situ\  | *Emission of a modulated beam of light in the visible spectrum to determine the distance to a target by comparing the phase information from the reflected beam*. |
| 261 | Graduated device | \Terrestrial\Snow depth\In situ\ | *Manual measurement or observation made with a graduated fixed stake, a sturdy ruler, or an extendible graduated rod*. |
| 262 | Snow pillows and snow scales | \Terrestrial\Water equivalent of snow cover\In situ\ | *Weighing of snow-cover mass per unit area*. |