FINNISH METEOROLOGICAL INSTITUTE

Status of activities

WG2: Instrument and method evaluation

Ghislain Picard and Leena Leppänen

WG meeting
19 September 2017
Smolenice, Slovakia

Scientific focus of WG2

The Action will conduct a detailed study of instrumental characteristics and methodologies to assess the physical characterization of essential snow parameters (e.g. precipitation, **depth, density**, grain size, snow temperature).

The study will rely on the already running Solid Precipitation Inter-Comparison Experiment (SPICE) of WMO.

SoG: comparison of automatic SWE and snow depth measurements, and calibration with manual measurements in Caribou Creek and Sodankylä

The **newest** snow instrumentation will be tested and inter-calibration promoted.

Automatic: SPICE has already tested snow depth and SWE instrumentation

Manual: existing instruments tested in two field campaigns

Satellite data and retrieval algorithms will be assessed, calibrated and inter-compared **through other planned campaigns** involving Action's partners.

- Related STSMs: Tom Watts, Esteban Alonso González, Marion Leduc-Leballeur

A guideline for snow observations will be drafted for uptake by WMO through cooperation with the WMO Global Cryosphere Watch observational programme CryoNet and the International Arctic Science Committee.

- For manual observations

Deliverables related to WG2

D1 Review report on identifying and assessing the essential snow variables.

D2 Summary of physical characterization and harmonized definition of snow variables.

D3 Priority assessment of snow characteristics for various applications.

D4 Handbook on standardized methods for snow data quality control.

D5 Assessment of measurement errors and inter-calibration of measurement techniques.

D9 Report on spatial and temporal representativeness errors of snow measurements for DA in NWP and hydrological models.

D11 Measurement reports and manuals to standardize measurement protocols will be issued based on the field campaigns results.

D12 *Two topical workshops for addressing the different focuses of the Action (1. Emphasis on characterization and measurements, 2. Emphasis on snow data assimilation in NWP and hydrology models).*

D13 Training school on snow measurements and DA.

D14 Each of the three working groups will produce a review paper by the end of the Action.

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Timetable items related to WG2

1/Q2 Design and identification of addressees for the questionnaire on measurements and instrumentation practices

1/Q3 Plans for participation to 1st field campaign in Year 2.

1/Q4 End of Year 1's review and short reports from WGs meetings, workshop and STSMs

2/Q1 Analyses of the questionnaires (D1, D2)

2/Q1 Essential snow variables identified

2/Q2 1st Workshop (D12) with emphasis on characterization and measurements of snow

2/Q2 1st Field campaign of snow measurements

2/Q3 Review report on 1st field campaign (D11)

2/Q3 Plans for the training school on snow measurements and data assimilation in Year 3

2/Q4 Preparing plans for 2nd field campaign in Year 3

2/Q4 End of Year 2's review and short reports from WGs meetings, workshop and STSMs

3/Q1 Physical characterization of essential snow variables completed

3/Q2 2nd field campaign of snow measurements

3/Q3 Review report on 2nd field campaign including guidelines for in-situ snow measurement techniques and protocol (D11)

3/Q4 Training school on snow measurements and data assimilation (D13)

3/Q4 End of Year 3's review and short reports from WGs meetings, workshop and STSMs

4/Q2 Report on instrumental and representativeness errors of snow measurements for data assimilation in NWP and hydrological models (D9)

4/Q3 Measurement reports and manuals to standardize measurement protocols will be issued based on the field campaign results (D11)

4/Q4 Final reports, guidelines, training or dissemination materials from each WGs (D14)

WG2 tasks
Task 1

A review of existing space-borne and ground-based sensors/instrumentation applied for measurement of different snow characteristic, estimation of their uncertainties.

- Review of space-borne sensors/instrumentation (Ali Nadir Arslan + Simon Gascoin)
- Review of ground-based sensors/instrumentation
  - Based on report of questionnaire
- Estimation of their uncertainties (manual instruments)

WG2 tasks
Task 2

Guidelines for in-situ snow observations and related training: Accuracy of various methods and instruments; Error sources for different variables under various weather and snow conditions; Representativeness of point measurements of the different variables; Need for measurement lines with recommended length and sampling resolution.

- Leena Leppänen, Nacho Lopez Moreno, Bartek Luks

WG2 tasks
Task 3

Spectroradiometry for snow studies: How to make consistent field spectrometer measurements of snow pack (environmental parameters including viewing and illumination geometry, snow cover characterization including grain size characteristics of the top-snow-layer). How to process the data in a harmonized way (e.g. spectral sampling, geo-rectification in case of airborne measurements, filtering techniques for continuous spectra).

- Roberta Pirazzini (First draft of the white paper before November)

WG2 tasks
Task 4

Methods to measure snow grain size: The methods for snow grain size detection are under development worldwide, and currently the definition of grain size varies greatly depending on the method used. The increasing number of grain size measurement techniques has reached a stage where their thorough assessment and inter comparison is mandatory.

- Ghislain Picard and anyone else?

WG2 tasks
Task 5

Methods to measure mechanical properties of snow: Mechanical properties are of relevance to snow stability, and consequently to snow avalanche formation. Field tests of snow stability should be harmonized within the European avalanche services, as well as the testing of snow properties using modern snow penetrometry (SnowMicroPen).

- Charles Garcia Selles and Pavol Nejedlik

Coming activities

All of the workshops should have a report!

What should be done in Smolenice:

- General: Discussion on undone deliverables
- Task 1: How to proceed with estimation of uncertainties of satellite- and ground-based measurements? Review of space-borne sensors/instrumentation kick-off.
- Task 2: Discussion on draft version of guidelines.
- Task 5: Discussion and kick-off.
- Deadlines will be decided for the all actions.