Working Group 3

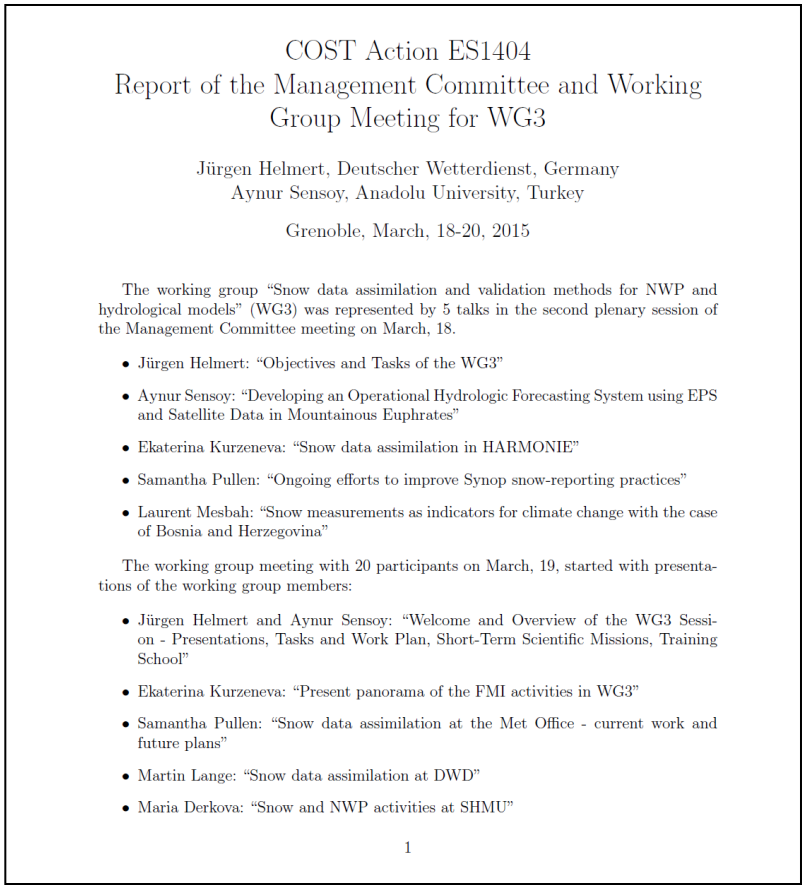
Snow data assimilation and validation methods for NWP and hydrological models

in

COST ES1404

History of the WG3

- Established in the framework of the COST ES1404
- First meeting of the WG3 in Grenoble, 18-20 March, 2015



COST Action ES1404
Report of the Management Committee and Working Group Meeting for WG3

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Aynur Sensoy, Anadolu University, Turkey

Grenoble, March, 18-20, 2015

The working group "Snow data assimilation and validation methods for NWP and hydrological models" (WG3) was represented by 5 talks in the second plenary session of the Management Committee meeting on March, 18.

- Jürgen Helmert: "Objectives and Tasks of the WG3"
- Aynur Sensoy: "Developing an Operational Hydrologic Forecasting System using EPS and Satellite Data in Mountainous Euphrates"
- Ekaterina Kurzeneva: "Snow data assimilation in HARMONIE"
- Samantha Pullen: "Ongoing efforts to improve Synop snow-reporting practices"
- Laurent Mesbah: "Snow measurements as indicators for climate change with the case of Bosnia and Herzegovina"

The working group meeting with 20 participants on March, 19, started with presentations of the working group members:

- Jürgen Helmert and Aynur Sensoy: "Welcome and Overview of the WG3 Session - Presentations, Tasks and Work Plan, Short-Term Scientific Missions, Training School"
- Ekaterina Kurzeneva: "Present panorama of the FMI activities in WG3"
- Samantha Pullen: "Snow data assimilation at the Met Office - current work and future plans"
- Martin Lange: "Snow data assimilation at DWD"
- Maria Derkova: "Snow and NWP activities at SHMU"

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- 20 participants
- 5 talks in plenum, 12 talks in WG
- Minutes of the meeting available

WG3 Observations

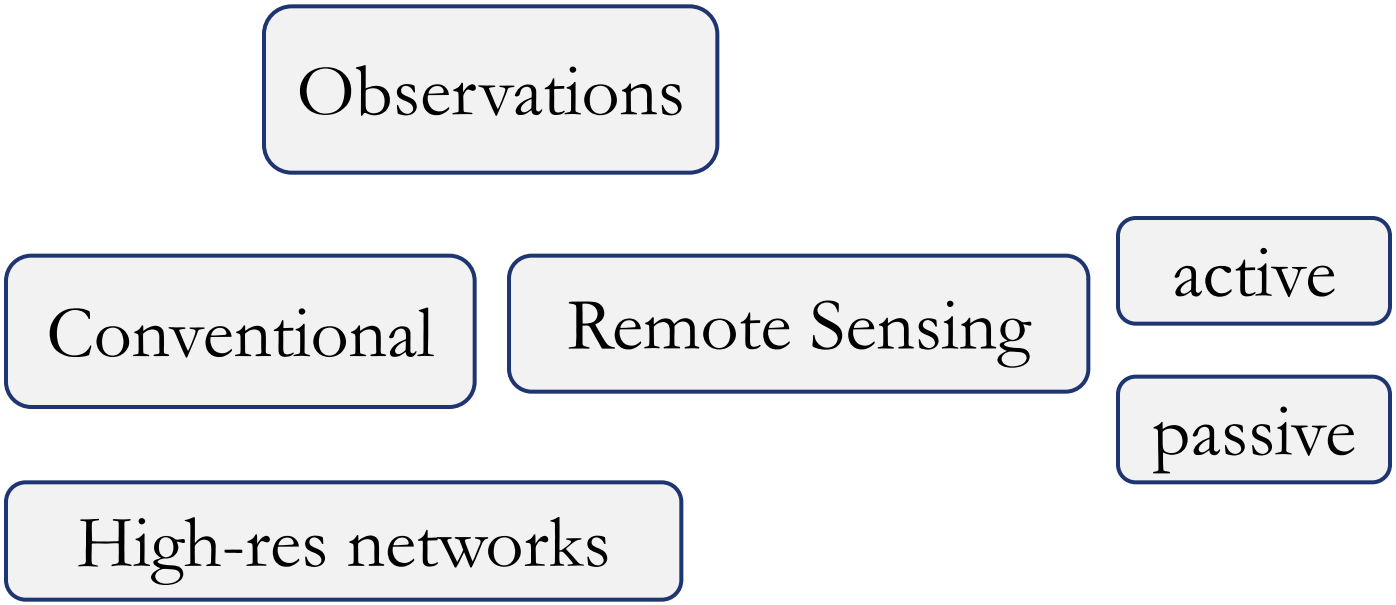
Field site Falkenberg of the Richard Assmann observatory Lindenberg (Picture: G. Hollaz)

WG3

Models

CRAY XCE at DWD

Observation related tasks



- Summary of observations
- Consistent observation product (remote sensing + conventional)
- Improve usage of high-res networks
- Link to WG1 and WG2

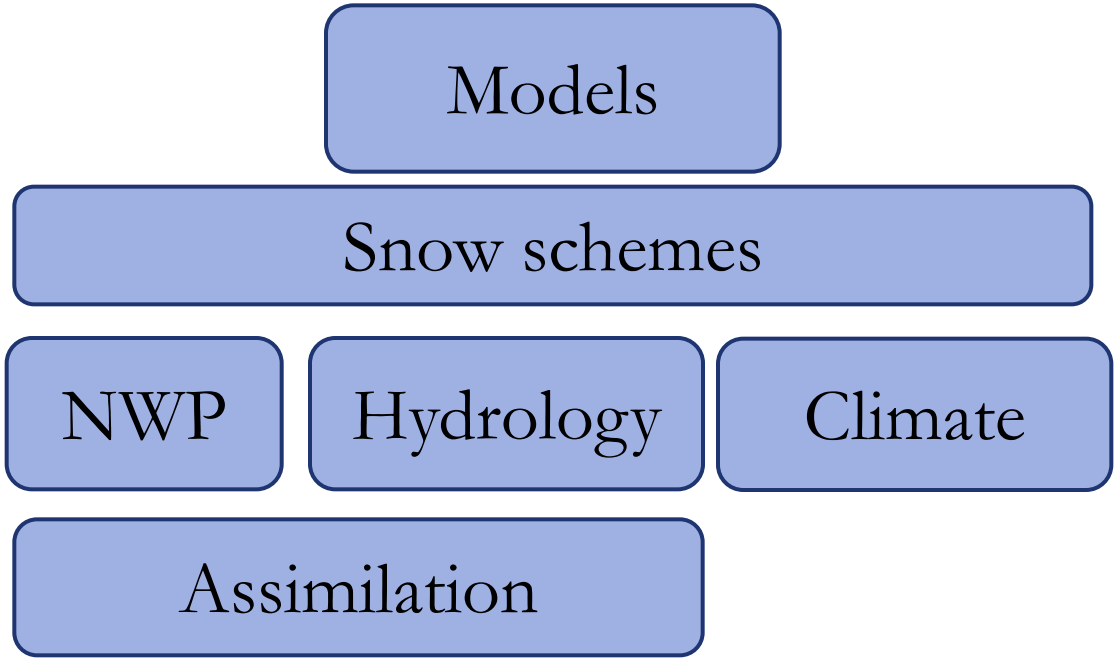
Models

Snow schemes

CROCUS | TERRA | JULES | Snowpack | SNTHERM

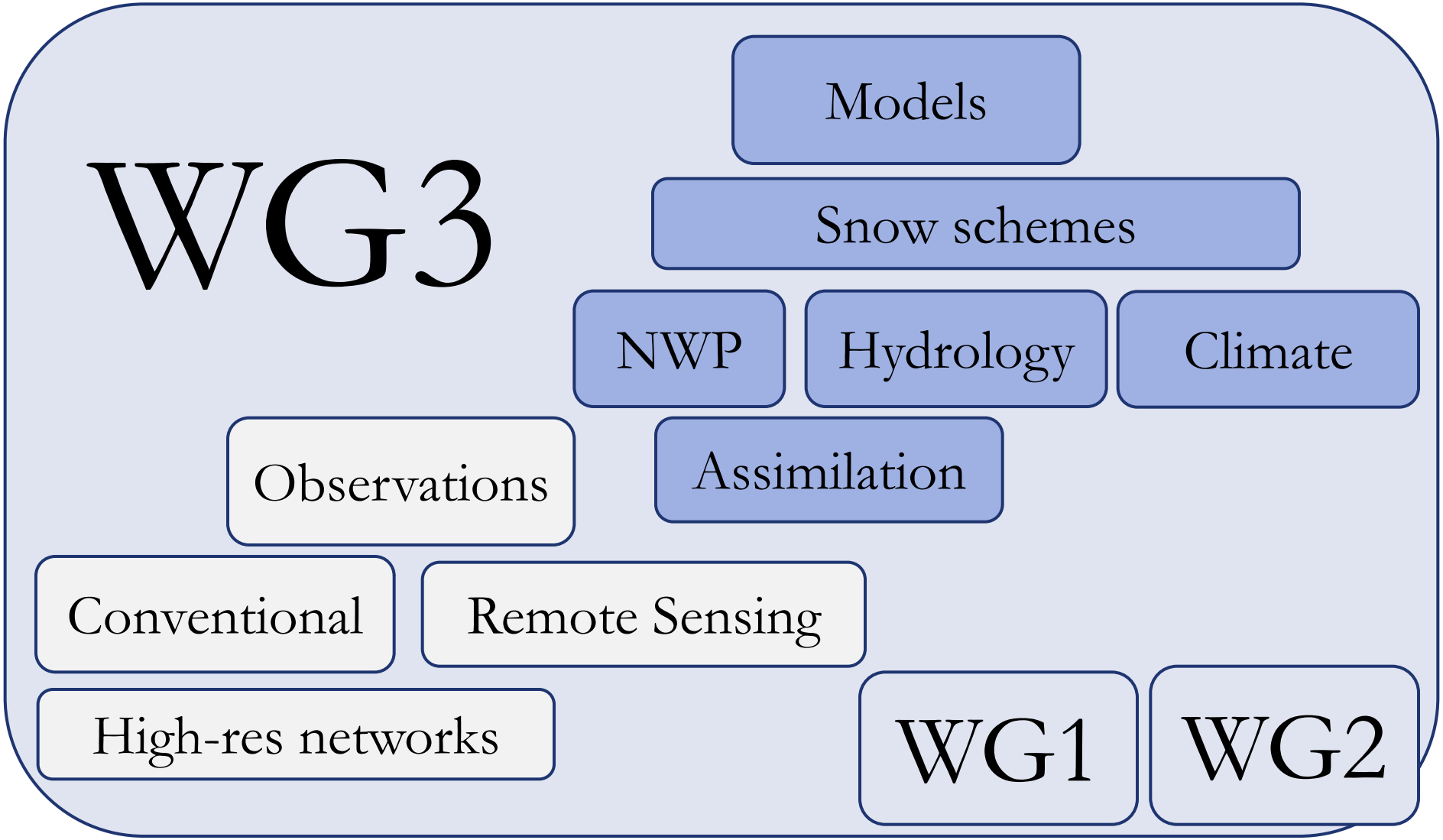
- Treatment of snow processes (metamorphism, liquid water)
- Considered complexity (one-layer, multi-layer schemes)
- Grid-scale and subgrid-scale features (snow tiles)
- Interaction with other land-surface properties (e.g. vegetation)

Model related tasks



- Summary of data assimilation methods for snow obs
- Review of snow models
- Model validation using consistent observations)
- Advanced assimilation, impact studies
- Obs error estimation, links to WG1 and WG2

Tasks


WG3
Models
Snow schemes
NWP
Hydrology
Climate
Observations
Assimilation
Conventional
Remote Sensing
High-res networks
WG1
WG2

Key questions for 2015:

- How many and which kind of snow observations are assimilated in numerical weather prediction and hydrological models?
- What are the data assimilation methods used in meteorology and hydrology for snow observations?

Tasks

- *Overview* of the various *snow observations* used in NWP, hydrology and climate studies for *different purposes* including validation and data assimilation (e.g. different snow observations are used in different environmental applications).

  Decision: Preparing a questionnaire for snow observations in meteorology and hydrology communities (categories of data types, parameters, frequency, scales, format, demands).

- For *data assimilation*, different methods are used in NWP and hydrology. The overview will allow to *assess* the current situation and to understand future *perspectives*.

  Decision: Preparing a questionnaire for data assimilation in meteorology and hydrology, Short description of methodology, example of application will provided.

Tasks

Questionnaire on snow observations in working group 3

Overview of the various snow observations used in NWP, hydrology and climate studies for different purposes including validation and data assimilation (e.g. different snow observations are used in different environmental applications)

* Erforderlich

In which modeling field you are using snow observations? *
- [ ] Numerical Weather Prediction
- [ ] Hydrology
- [ ] Climate Simulations
- [ ] Special Snow model
- [ ] Sonstiges:

In which component of your modeling process you are using snow observations? *
- [ ] Data assimilation
- [ ] Validation
- [ ] Verification
- [ ] Calibration
- [ ] Sonstiges:

Which observations are used in your data sets. *
- [ ] SYNOP
- [ ] non-SYNOP ground-based
- [ ] Remote sensing ground-based
- [ ] Remote sensing satellite

Questionnaire on snow data assimilation in working group 3

Overview of the various snow data assimilation systems

* Erforderlich

In which modeling field you are using snow data assimilation? *
- [ ] Numerical Weather Prediction
- [ ] Hydrology
- [ ] Special Snow model
- [ ] Reanalysis
- [ ] Sonstiges:

Please give a short description of your modeling environment. *
Examples: Full NWP system with data assimilation, stream flow model.

Please specify the model domain used in your snow data assimilation. *
- [ ] Global
- [ ] Limited area
- [ ] Sonstiges:

Please specify the model horizontal resolution in your snow data assimilation. *

Tasks

- A critical review of *snow models* utilizing physical snow *parameters* as input and used as parametrization schemes or for downstream applications (CROCUS, Snowpack, SNTHERM) will be included.

  Preparing a questionnaire, using existing model intercomparison experience (e.g. SNOWMIP2), investigating interoperability of snow models with data assimilation, consider model sophistication.

- Establish *links* between different *communities* of users of snow observation.

  Two-way feedback between working groups, preparing a guide for end users.

Tasks

Key question for next phase of the project :

- How could the assimilation of snow observations be improved?

Tasks

- Finding a *new* method for combining *satellite* observations with *conventional* in-situ snow measurements and *modelling* results: Microwave satellite observations are combined with conventional in-situ observations in some products (Hydro-SAF), while optical satellite observations together with conventional in-situ observations are assimilated into NWP models.
  Will be considered in a later stage of the project.

- *Sustainable* principles to *combine* all types of information should be found. This will allow *advanced assimilation* of new and forthcoming satellite observations of different snow properties (snow-melt, snow extent and SWE).
  Will be considered in a later stage of the project.

- This approach will also need *new methods* to update *non-observed* simulated physical snow variables (such as snow wetness, density profiles and mechanical properties) based on the observed ones (such as snow depth and extent).
  Will be considered in a later stage of the project.

Tasks

- Looking for *strategies* towards a more *extended usage* of *conventional* snow observations to include observations from high-resolution *national networks* into NWP, hydrological and climate models, as the use of data from national networks is currently very limited.

  Considering a Web-Portal solution for data exchange (e.g. similar to OPERA for radar data); taking into account zero snow height information; Inform national and international institutions about COST action needs.

- Their *impact* will be assessed and *recommendations* how to increase their availability will be given.

  Will be considered in a later stage of the project.

- *Acquiring* more information about *observational errors* relevant for DA by establishing *links* between the *modelling* and *measurement* communities via *WG1* and *WG2*. These links will also provide the *users' feedback* to the measurement community by reporting about the *quality of data* and potential problems.

  Exchange of information about representativeness of data, making realistic estimation of observation errors, managing deficiencies of observations.

Tasks

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

DWD

WG3

Models

Snow schemes

NWP

Hydrology

Climate

Observations

Assimilation

Conventional

Remote Sensing

High-res networks

WG1

WG2

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