COST ACTION ES1404 and Lake2015 Workshop: cooperation for snow and lakes in NWP

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EWGLAM/SRNWP Meeting
05-08 Oct. 2015, Belgrade

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Lake2015 Workshop

- Progress in use of lake parameterizations
- Ideas for monitoring
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COST ACTION ES1404: HarmoSnow

A EUROPEAN NETWORK FOR A HARMONISED MONITORING OF SNOW FOR THE BENEFIT OF CLIMATOLOGY, HYDROLOGY AND NUMERICAL WEATHER PREDICTION

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Why?

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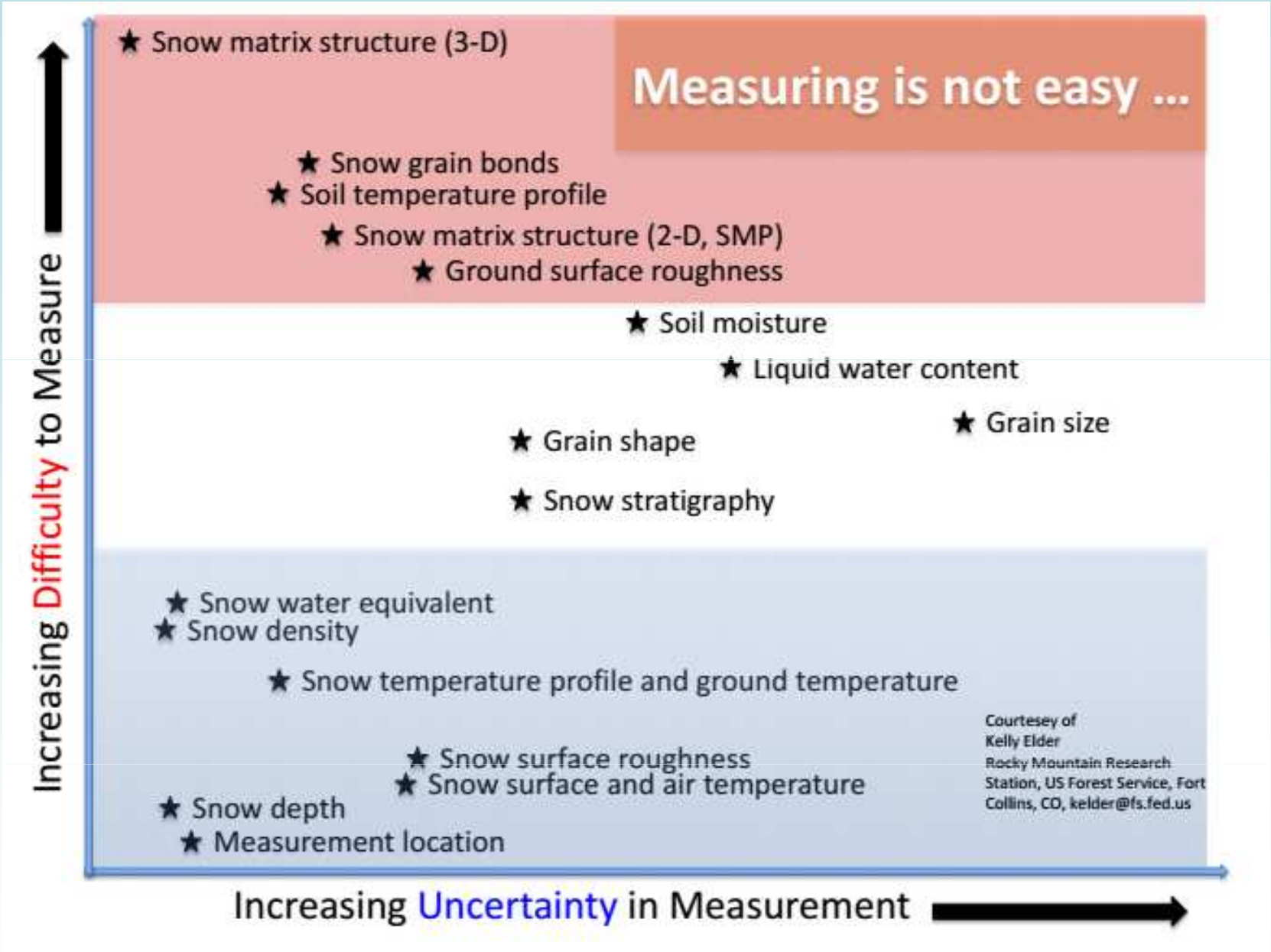
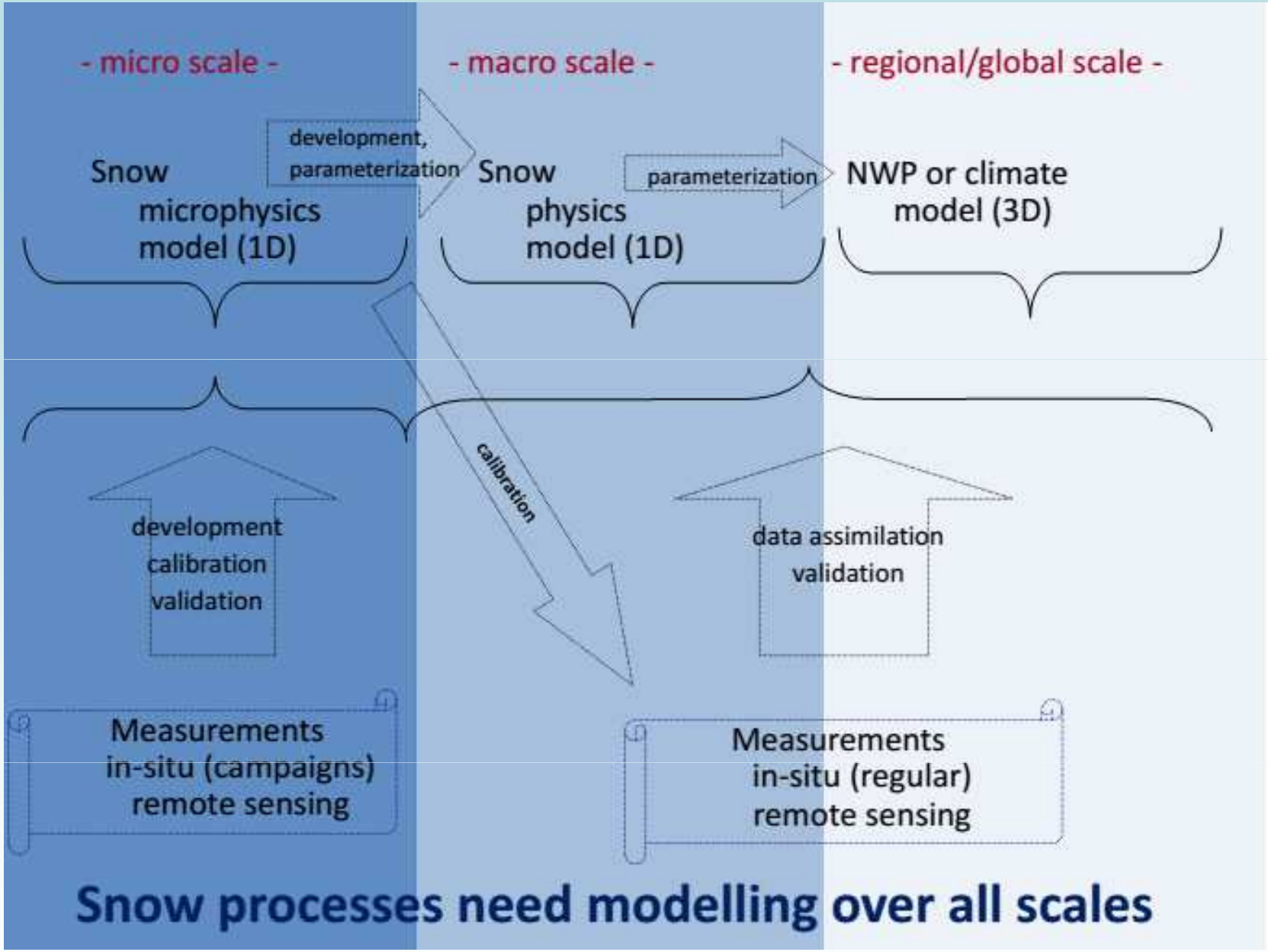

Snow matrix structure (3-D)
Measuring is not easy ...
Snow grain bonds
Soil temperature profile
Snow matrix structure (2-D, SMP)
Ground surface roughness
Soil moisture
Liquid water content
Grain size
Grain shape
Snow stratigraphy
Snow water equivalent
Snow density
Snow temperature profile and ground temperature
Snow surface roughness
Snow surface and air temperature
Snow depth
Measurement location
Courtesey of
Kelly Elder
Rocky Mountain Research
Station, US Forest Service, Fort
Collins, CO, kelder@fs.fed.us
Increasing Difficulty to Measure
Increasing Uncertainty in Measurement


- micro scale -
- macro scale -
- regional/global scale -
development, parameterization
parameterization
Snow microphysics model (1D)
Snow physics model (1D)
NWP or climate model (3D)
calibration
development
calibration
validation
data assimilation
validation
Measurements
in-situ (campaigns)
remote sensing
Measurements
in-situ (regular)
remote sensing
Snow processes need modelling over all scales

HarmoSnow: Aim

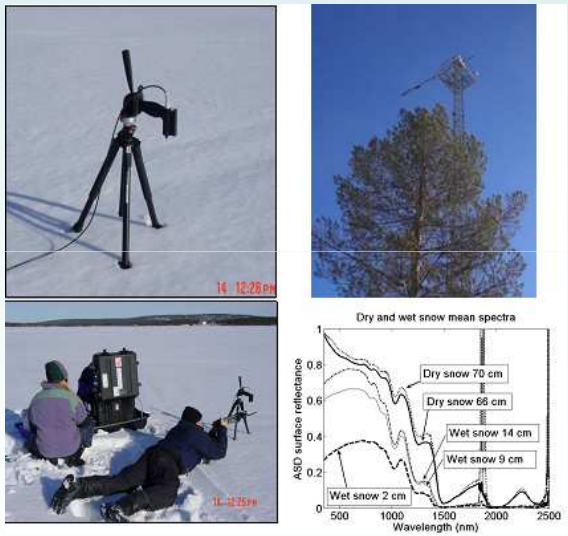
Building a better connection between

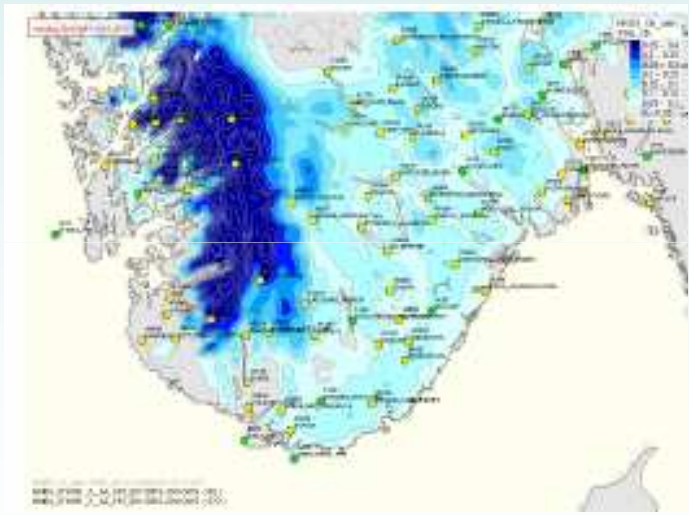
- different snow observers
- snow measurements and models (physical, NWP, climate, hydrological)
- researchers and forecasters
- researchers and decision making people

Support: workshops, meetings, short-term missions; 2 measurement campaigns

HarmoSnow: Structure

- WG1: Physical Characterization of Snow
- WG2: Instruments and Methods Evaluation
- WG3: Snow data assimilation and validation methods for NWP, climate and hydrological models





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HarmoSnow: Benefit for NWP

- Only snow depth from SYNOP stations and/or snow extent from satellite data
- Data from national networks are not used
- Problem of non-reporting zero snow depth
- OI or even Cressman method;
  no analysis in physical space

Support in solving these issues!

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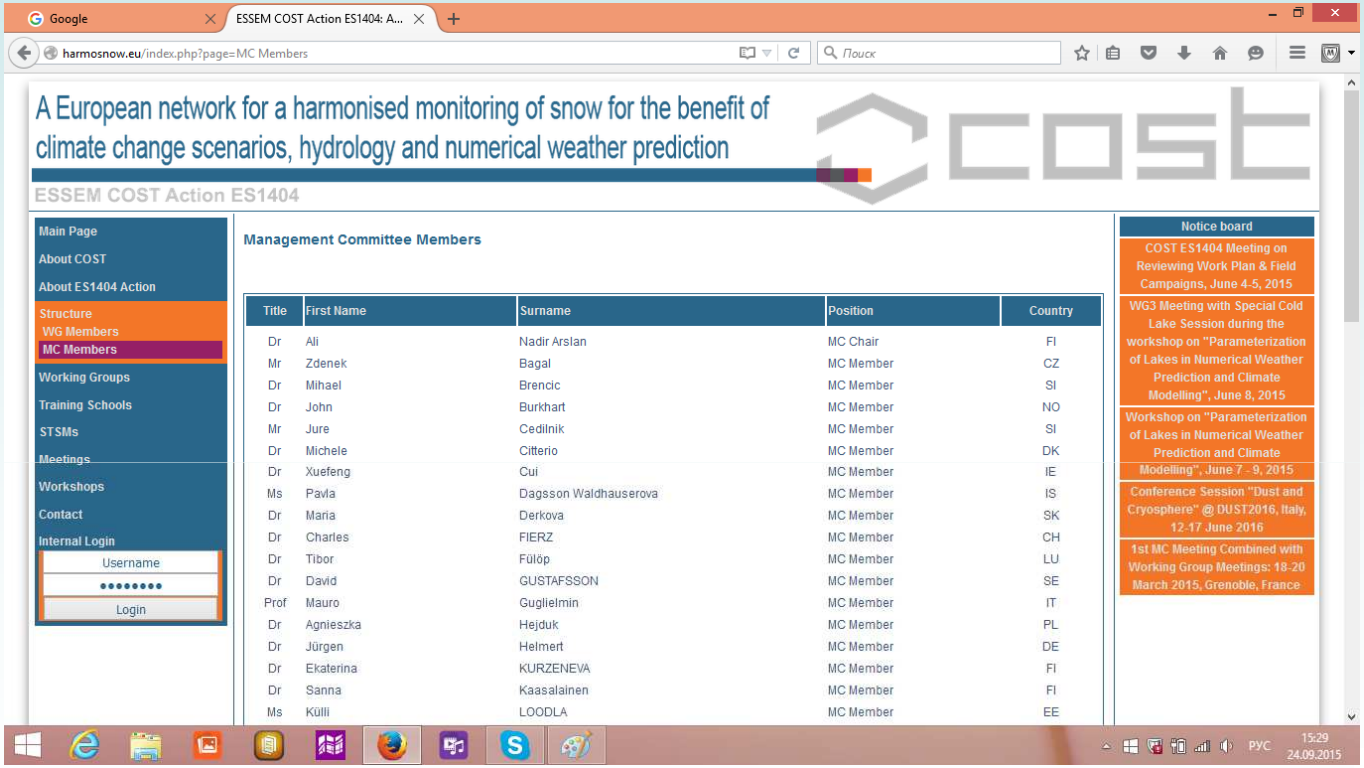
HarmoSnow: People

- 24 COST countries
- Potential participants: Near Neighboring countries, Non-COST countries



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HarmoSnow: Activities

- 1st MC Meeting Combined with Working Group Meetings: 18-20 March 2015, Grenoble, France
- WG3 Meeting with Special Cold Lake Session during the workshop on "Parameterization of Lakes in Numerical Weather Prediction and Climate Modelling", May 8, 2015, Évora, Portugal.
- Meeting on Reviewing Work Plan & Field Campaigns, June 4-5, 2015, Brussels, Belgium
- Questionnaire about snow observations and data assimilation methods
- Coming 2nd Working Group Meeting: 2-4 November 2015, Helsinki, Finland

HarmoSnow: Grenoble meeting

1st MC Meeting Combined with Working Group Meetings: 18-20 March 2015, Grenoble, France

- Presentations of instrumentations and instrumentation sites
- Overview presentations of DA systems
- Lists of snow properties to be measured
- Lists of instrumentations
- Ideas for the questionnaire …

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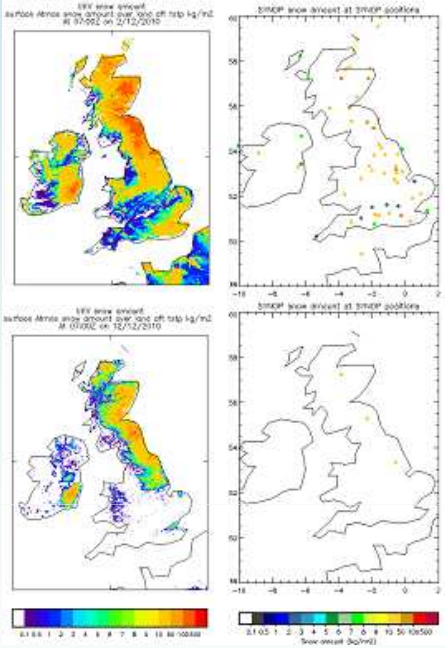
HarmoSnow: Grenoble meeting

Efforts to improve SYNOP snow-reporting practices

The problem…

Met Office



- Snow depth reported only when snow is present – no zero snow depth reports.
- Missing data could mean no snow, technical problem, station out of service – ambiguous – cannot be used
- For assimilation, obs of zero snow are as important as obs of snow, for informing model snow extent

Actively reporting zero snow depth would provide the data user community with a huge amount of valuable additional data, providing positive observations of snow-free conditions.

What is happening

Met Office

Achieving a WMO CBS guideline change is a long process

Gain support from international community, make representations to WMO

→ Official WMO guideline change

→ Adoption of changed practices by nations

→ Uptake of new data by users

- ET on Surface-based Observations – proposal for change to reporting guidelines – changed guidance material going in Oct 2015
- IPET DRMM – proposal for coding change to enable 0cm reporting
- Parallel efforts by GCW Snow Watch group
- September 2016 – anticipate CBS approval – NEW GUIDELINES sign-off

- by Samantha Pullen, Met Office

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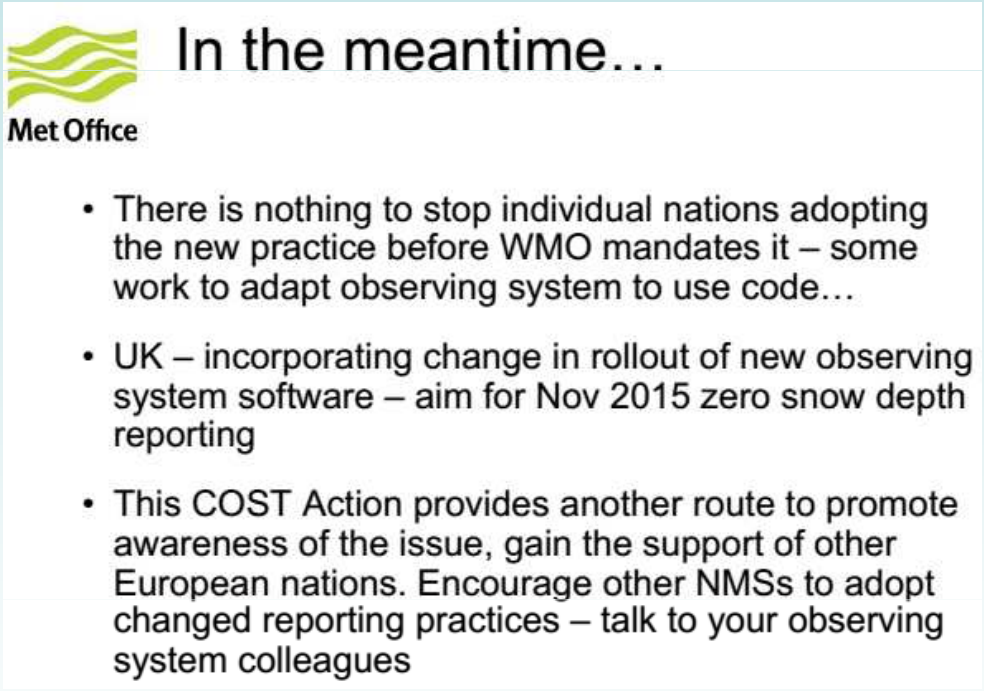
HarmoSnow: Grenoble meeting

Efforts to improve SYNOP snow-reporting practices



What can you do?

1)You can begin active reporting of zero snow depth now. No need to wait for a CBS policy change.
2)If you have a national snow station network in addition to your SYNOP network, please consider making your data available in near real time on the GTS.
3)Report additional snow variables you are already observing.

For more information contact Samantha Pullen (UK Met Office) or Patricia de Rosnay (ECMWF).

- by Samantha Pullen, Met Office

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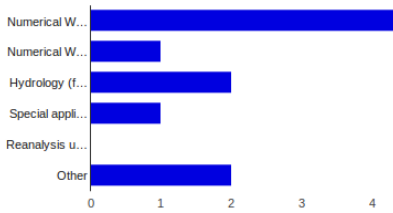
HarmoSnow: Questionnaire on using snow observation data in the modeling environment

7 responses
View all responses Publish analytics

Summary

Modeling environment

In which modeling environment you are using snow observation data?



Numerical Weather Prediction with snow data assimilation	5 71.4%
Numerical Weather prediction without snow data assimilation	1 14.3%
Hydrology (forcing using snow data)	2 28.6%
Special application (e.g. road model with snow data)	1 14.3%
Reanalysis using snow data	0 0%
Other	2 28.6%

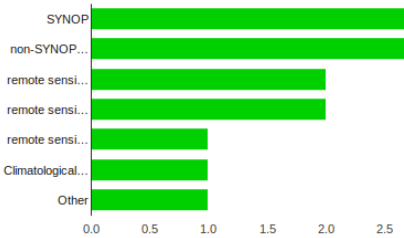
- thanks to J. Helmert!

Observation data

Further questions on snow observation data

Snow observations and products used in the modeling system

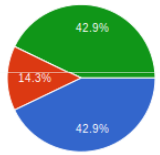
Snow observations and products



SYNOP	3 42.9%
non-SYNOP ground based	3 42.9%
remote sensing ground based (utrasonic, laser)	2 28.6%
remote sensing satellite (radiances)	2 28.6%
remote sensing satellite (preprocessed product - SAF)	1 14.3%
Climatological data sets	1 14.3%
Other	1 14.3%

Model resolution

Please specify the model horizontal resolution.



Below 1 km	3 42.9%
Between 1km and 5 km	1 14.3%
Between 5km and 10 km	0 0%
Between 10 km and 20 km	3 42.9%
Between 20km and 50 km	0 0%
Larger than 50 km	0 0%
Other	0 0%

http://harmosnow.eu/

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Lake2015 Workshop

Parameterization of Lakes in Numerical Weather Prediction and Climate Modelling

07-09 May 2015, Évora, Portugal

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Lake2015 Workshop

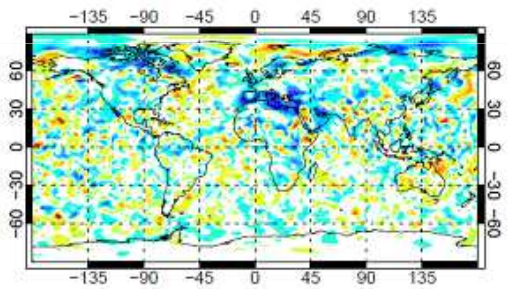
- Progress in using lake parameterizations within operational NWP models in Europe: ECMWF IFS, UM, COSMO, ICON and HIRLAM (planned in HARMONIE and ARPEGE). ECMWF plans to run a version of IFS with parameterized lakes for the ensemble forecasts.

Impact of lakes in NWP analysis cycles (II)

Summer experiment

(Temperature scores)

T+48; 1000hPa

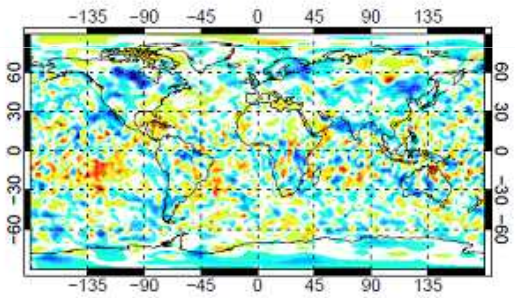


15-Jun-2013 to 5-Jul-2013

Winter experiment

(Temperature scores).

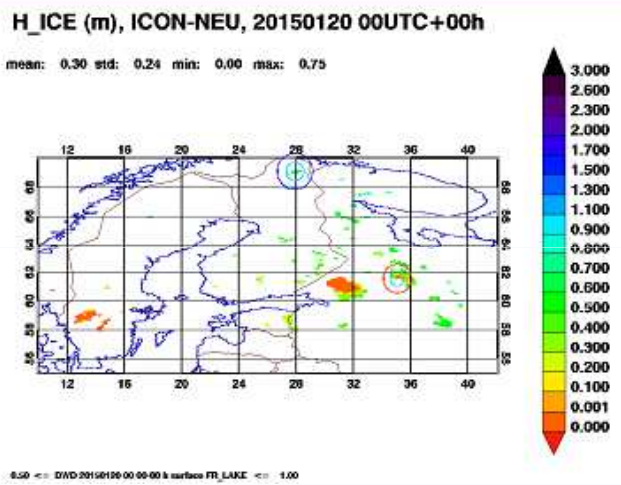
T+48; 1000hPa



1-Dec-2013 to 31-Dec-2013

- Forecast of 2m temperature are improved in proximity of lakes and coastal areas
- In summer The impact is estimated in 2-3% relative improvement in RMSE of T1000hPa significant up to 7 days
- Winter RMSE impact is positive as well but of around 1%

ICON-NWP Results



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- Parameterizations of lakes in research models (WRF and Meso-NH)
- Parameterizations of lakes in climate models. On regional scales, lakes influence the screen level temperature, cloudiness, and precipitation. On the global scale, lakes represent an important greenhouse gas source. The representation of CO2 and CH4 transport in lake models is recognized to be important.
- The LakeMIP project makes considerable progress, being strengthened by the co-operation with the ASLO community.

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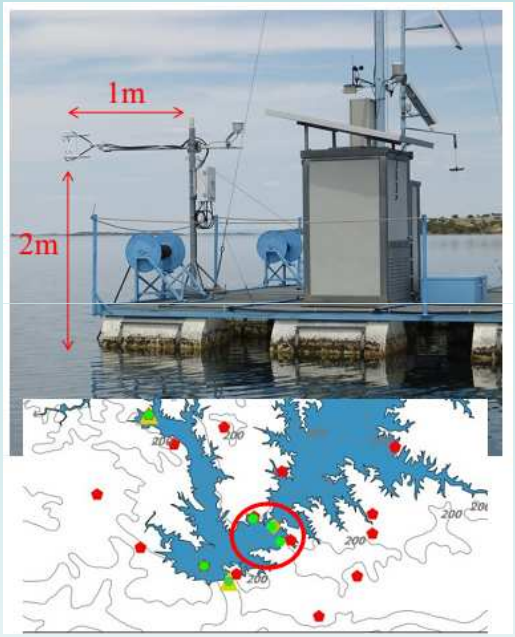
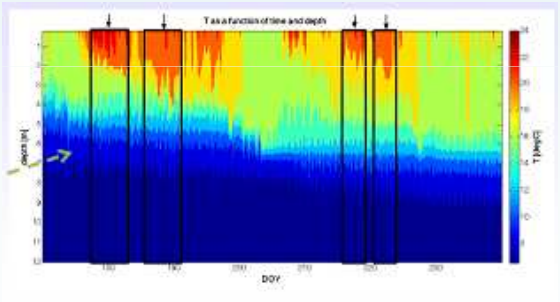
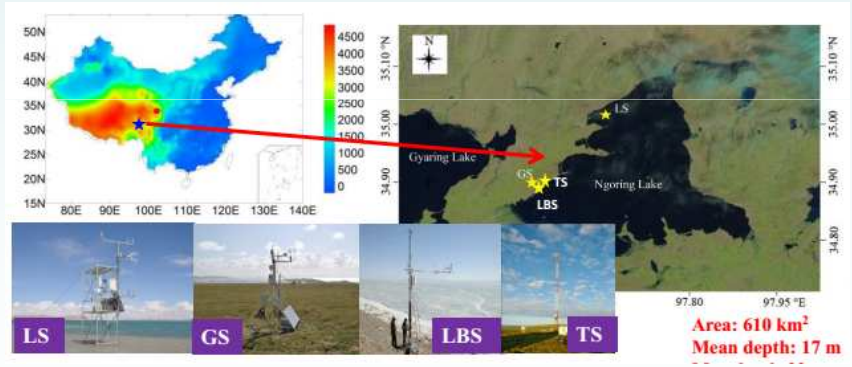
Lake2015 Workshop



- Monitoring the performance of lake schemes within operational NWP models. To provide operational results regularly for several observational lake sites. Possible candidates are Alqueva Reservoir, Lake Kuivajärvi, Lake Ngoring sites



Lake Kuivajärvi



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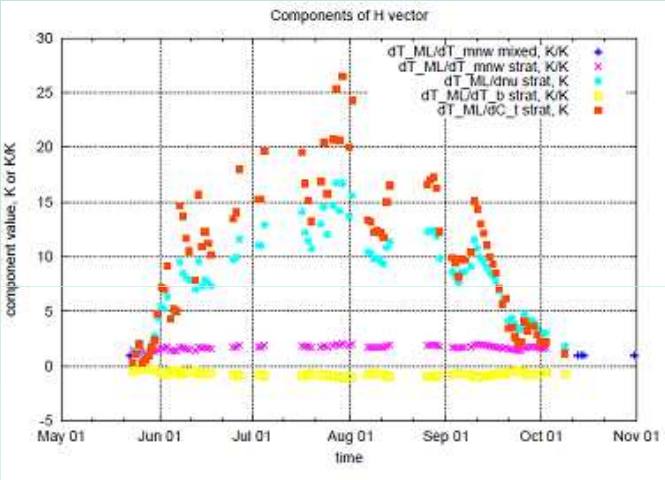
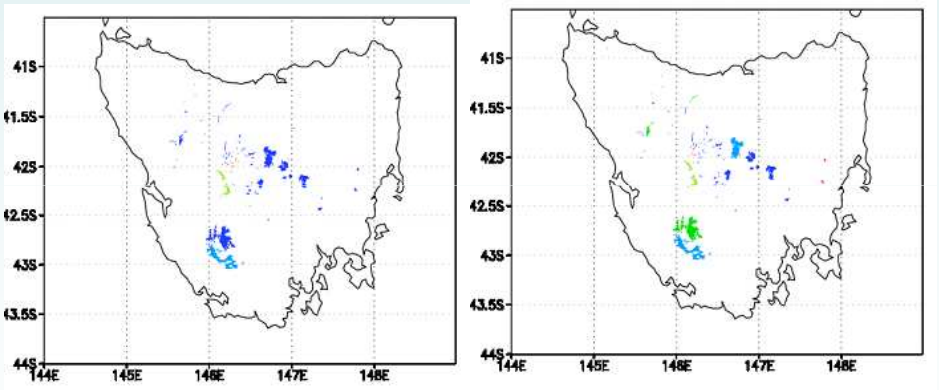
Lake Inarijärvi, 14.3 m

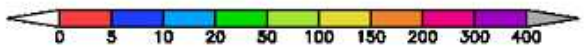


- Further development of data assimilation systems for lakes is important. ECMWF operationally uses nudging to assimilate OSTIA data. Experiments with the EKF with in situ measurements show high potential.

GLDBv2 and GLDBv3



Tasmania



- Global lake database: in progress, version 3 released. First steps towards the sub-km resolution.

In 2015, the support from LACE. Then - ?

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Thank you!

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