

# **UK contributions and activities**

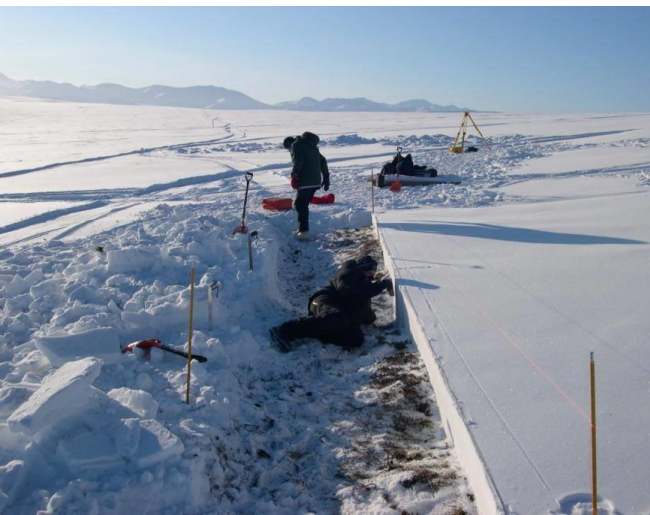


## Dr Nick Rutter WG1, WG2

Northumbria University,  
Newcastle upon Tyne, UK

## Snow hydrology & meteorology

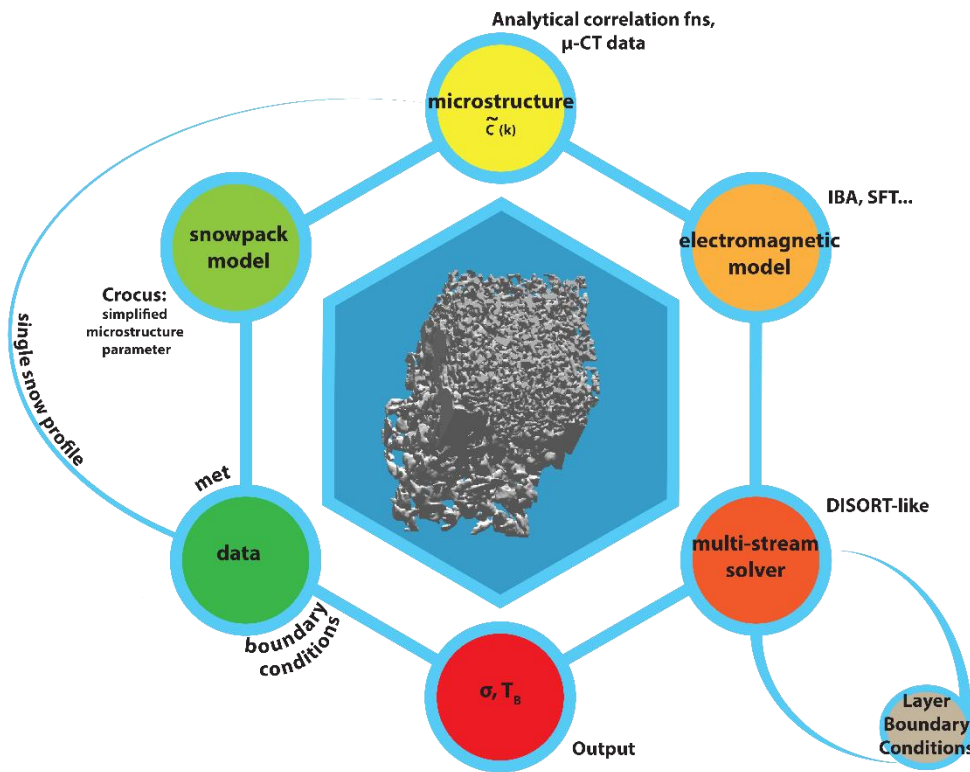
- Modelling snow-vegetation-atmosphere interactions.
- Evaluation of passive and active microwave radiative transfer models of snow.
- Snow on sea ice.



# Development of community snow microwave scattering model

Dr Mel Sandells **WG3**

(CORES + European consortium)



For future satellite missions /  
improve snow microstructure  
representation

European collaboration, ESA  
funded

New active/passive model + existing  
Modular, python

New microstructure = correlation  
functions, use IBA theory

Currently multiple angle solver,  
could include others e.g. 6-flux

Highly configurable but easy to use

Forcing: (met), SWE, density, depth, temperature, stratigraphy, micro-CT / SSA....  
Evaluation: backscatter / brightness temperature.

**Good quality, spatially & temporally concurrent**, preferably over season

- Assimilation of snow depth measurements to constrain the snow mass state variable in models relies on an accurate model background estimate of snow density
- Recent development of multi-physics snow and land surface models (e.g. FSM, NOAH-MP, SUMMA) allows implementation of multiple parametrizations for snow compaction
- Recent publication of datasets for multiple winters at snow research sites (e.g Col de Porte, Sodankyla, Weissfluhjoch) will allow development and evaluation of parametrizations

☐ Exchange of national snow data – thank you to those who have already given responses via the wiki: <https://agora.fmi.fi/display/HSC1404/Questionnaire+for+exchange+of+snow+observation+data>  
Please could others consider providing responses for their institution, or seeking information from the institution responsible for any national non-SYNOP snow network data?

☐ UK SYNOP network zero snow depth reports – we were aiming to provide reports of zero snow depth (for snow-free ground) for winter 2015/16. Unfortunately, the transition to full BUFR reporting is delayed, so we are now aiming for winter 2016/17 for 0cm reporting.

☐ WG3 questionnaire on using snow observation data in the modelling environment – distributed to the GCW Snow Watch Team on 15/2/16 for distribution outside Europe (Snow Watch members mostly from USA, Canada). Are there other routes we could use to distribute in Asia?

☐ COST Snow UK meeting – UK MC reps and substitute reps held a Skype meeting on 4/2/16, to coordinate UK involvement in the COST action. To be repeated before and after COST MC/WG meetings to coordinate UK input and feed back information from the meetings.



# Snow Observations availability in Europe

## For NWP

Operational snow observations on the GTS

SYNOP + **national BUFR data**

19 January 2016

Snow depth in m

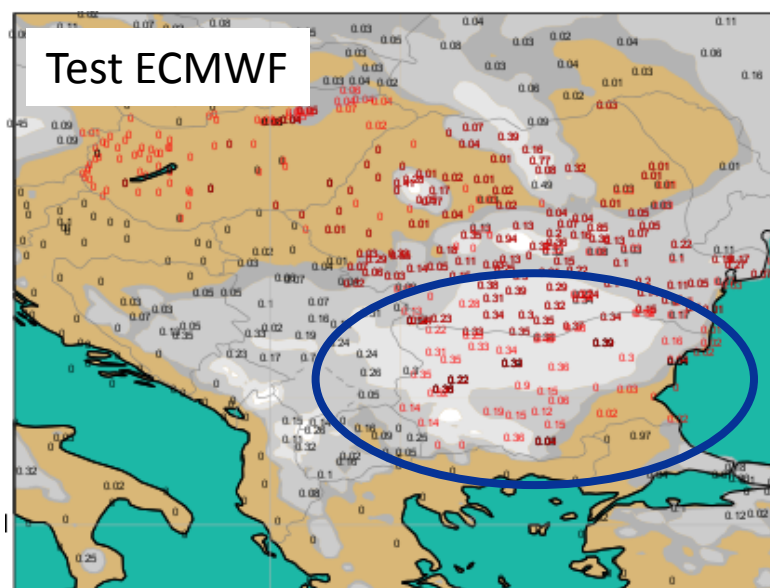
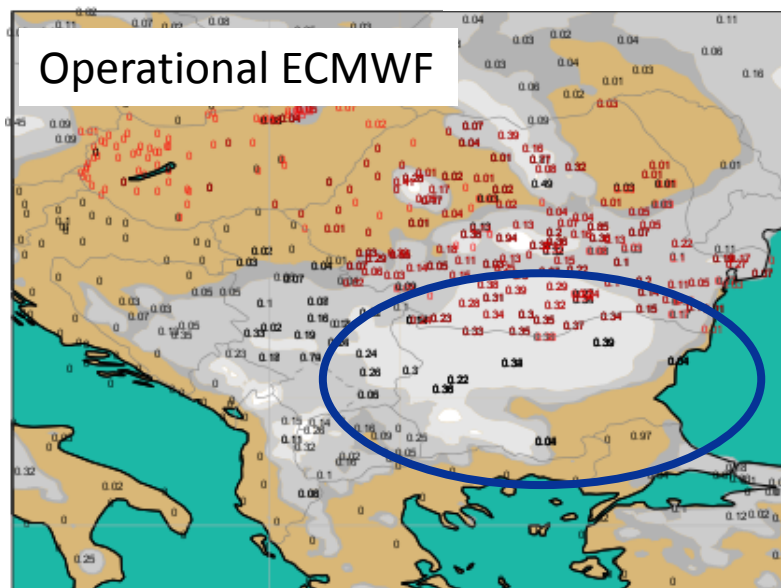
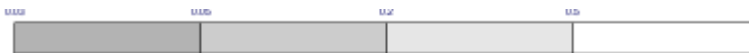
ECMWF

WG3

0.05

0.2

0.5



Lack of observations in Bulgaria  
Pointed out at the last meeting

39 more stations provided by NIMH,  
in the dedicated BUFR (more red obs values)

Contribution of the COST action to improve snow depth data exchange

- Action from ECMWF and NIMH following November 2015 meeting
- Tested in the ECMWF data Assimilation (1 month test in oper config)
- Suitable for operational use

P de Rosnay  
and I. Gospodinov

# Link with GCW Snow Watch

## GCW Snow Watch Activity on Snow reporting

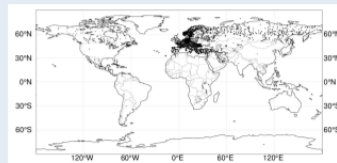


World Meteorological Organization  
Global Cryosphere Watch

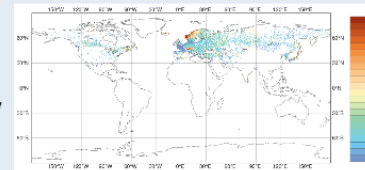
### Snow Reporting

#### A GCW Snow Watch Activity

One of the main goals of Snow Watch is to improve the reporting practices for in situ snow observations, to promote exchange of real-time observations between member states, and in particular to improve availability of in situ snow depth reports on the GTS.



Spatial distribution of in situ station reporting snow depth on the GTS (on 20 January 2015).



In situ snow depth observations are operationally monitored at ECMWF:  
<http://old.ecmwf.int/products/forecasts/d/charts/monitoring/conventional/snow/>

This map shows the standard deviation of ECMWF background departure (in cm of snow depth) for the period from December 2014 to February 2015. Large areas are blank, illustrating regions with observation gaps.

One of the key objectives of Snow Watch is to make the data from SYNOP and climate networks more widely available over the GTS.

## Snow Watch reporting Handout (ECMWF/UKMO)

<http://globalcryospherewatch.org/reference/documents/>