

## Towards Pan-European wet snow mapping using SAR

Heidi Hindberg, Eirik Malnes, Hans Eilif Larsen  
*Nurut, Norway*

Wet snow can be mapped with C-band SAR using fairly standard change detection techniques (Nagler&Rott, 2000, Storvold et al., 2005). Previous SAR-missions such as ERS-1/2, ASAR and Radarsat-1/2 has shown potential for regional mapping, but limited coverage due to radar duty cycle issues and due to alternating SAR modes, have to a large extent prohibited larger scale (e.g. global or pan-european) mapping. Norut have together with KSAT run operational mezo-scale mapping of wet snow over Fennoscandia (Norway, Sweden and parts of Finland) since 2005 in the melting seasons (April-August) using Envisat ASAR. Since 2012 we shifted to using Radarsat-2 under the Norwegian Radarsat-2 agreement. This has ensured continuation of the service after the loss of Envisat.

For the Radarsat-2 service over Norway we use the RS-2 SCNA mode with dual polarization HH/HV. In the operational service we use single polarization HH data. However, we also demonstrate that combined use of HH and HV data can improve the accuracy of wet snow classification.

In this paper we also demonstrate the potential of pan-European wet snow mapping using Envisat ASAR WSM data over Europe for the melting seasons 2009 and 2010. Although, the SAR-coverage was somewhat limited and un-systematic, we clearly demonstrate that using SAR-data has a potential for this type of snow mapping. Thus these additional results can

be considered as a valuable contribution to optical mapping of snow cover fraction (e.g. Globsnow2).

Based on the use of Radarsat-2 in Norway and demonstrated pan-european wet snow mapping using ASAR in 2009/2010, we discuss the potential for the use of Sentinel-1 data for wet snow mapping. The main radar mode for Sentinel-1 over Europe will be the interferometric wide-swath mode (IW) with high spatial resolution (25m) and good temporal resolution (5 days and better in Europe). At high latitudes such as northern Norway we expect to have daily coverage with SAR (combined use of Sentinel-1 A/B, Radarsat-2 and Radarsat constellation), and this will lead to large improvements in the snow monitoring service.