Snow as a major part of the cryosphere is an important component of Earth’s hydrological cycle and energy balance. Understanding the microstructural, macrophysical, thermal and optical properties of the snowpack is essential for integration into numerical models and there is a great need for accurate snow data at different spatial and temporal resolutions to address the challenges of changing snow conditions.

Physical snow properties are currently determined by traditional ground-based measurements as well as remote sensing, over a range of temporal and spatial scales, following considerable developments in instrument technology over recent years.

Data assimilation (DA) methods are widely used to combine data from different observations with numerical model using uncertainties of observed and modeled variables to produce an optimal estimate. DA provides a reliable improvement of the initial states of the numerical model and a benefit for hydrological and snow model forecasts.
European efforts to harmonize approaches for validation, and methodologies of snow measurement practices, instrumentation, algorithms and data assimilation techniques were coordinated by the European Cooperation in Science and Technology (COST) Action ES1404 “HarmoSnow”, entitled, “A European network for a harmonized monitoring of snow for the benefit of climate change scenarios, hydrology and numerical weather prediction” (2014-2018).

One of the key objectives of the action was “Advance the application of snow DA in numerical weather prediction (NWP) and hydrological models, and show its benefit for weather and hydrological forecasting as well as other applications.”

One key result from COST HarmoSnow is a better knowledge about the diversity of usage of snow observations in DA, forcing, monitoring, validation, or verification within NWP, hydrology, snow and climate models. The main parts of this knowledge are retrieved from a COST HarmoSnow survey exploring the common practices on the use of snow observations in different modeling environments. We will show results from the survey and their implications towards standardized and improved usage of snow observations in various data assimilation applications.