**The International Snow Products Intercomparison and Evaluation Exercise - SnowPEx**

***T. Nagler1, G. Bippus1, C. Derksen2, R. Fernandes3, K. Luojus4, O.P. Mattila5,   
S. Metsämäki5, E. Ripper1, H. Rott1, R. Solberg6, B. Bojkov7***

***1****ENVEO IT GmbH, Innsbruck, Austria*

***2****Environment Canada, Toronto, Canada*

***3****Canada Centre for Remote Sensing, Ottawa, Canada*

***4****Finnish Meteorological Institute, Helsinki, Finland*

***5****Finnish Environment Institute, Helsinki,Finland*

***6****Norwegian Computing Center, Oslo, Norway*

***7****ESA / ESRIN, Frascati, Italy*

Terrestrial snow cover is one of the Essential Climate Variables recommended by GCOS to be operationally monitored by means of satellite data. For climate research the quality of the satellite-based snow cover products is critical. The Snow Products Intercomparison and Evaluation Exercise (SnowPEx) is an international collaborative effort, funded by the ESA under the Quality Assurance framework for Earth Observation (QA4EO) in response to requirements from the WMO Global Cryosphere Watch (GCW). SnowPEx compares and evaluates satellite-based snow cover products of hemispheric to global extent, assesses the product accuracy, and identifies discrepancies between the various products. Furthermore, in support of climate studies, trends in the hemispheric seasonal snow coverage and snow mass are documented, based on an ensemble of satellite based snow products. Within two international workshops held in 2014 and 2015, the community consolidated the protocols and discussed results of the intercomparison and validation of the products and of the multi-dataset snow cover trends from various products.

SnowPEx focuses on two parameters of the terrestrial snow cover, the snow extent (SE) from moderate resolution optical satellite data (MODIS, AVHRR, etc.) and the snow water equivalent (SWE) from passive microwave data (SSM/I, AMSR). Overall, 14 continental to global satellite SE products and 3 satellite based SWE products are participating in SnowPEx, with test areas spreading out over different environments and climate zones. For intercomparison, daily SE products from 5 years have been transformed to a common map projection and standardized evaluation protocols, developed within the project, are applied. The SE product evaluation applies statistical measures for quantifying the agreement between the various products, including the analysis of spatial patterns. Extensive validation of SE products is carried out using high resolution snow maps from about 450 Landsat scenes. In addition, in-situ snow reference data are used in North America and Eurasia. The comparisons reveal statistical differences between various SE products of up to 30%, depending on the land surface type and complexity of terrain. SWE products at coarse spatial resolution from passive microwave sensors are evaluated against in-situ networks of snow mass measurements. The SWE products are also compared with gridded snow products from land surface models driven by atmospheric reanalysis. In addition, multi-year trends of various products are evaluated. We provide an overview on the contributing snow products, the protocols and the results of the intercomparison and evaluation of snow products, and report on multi-decadal trends in the various data sets. Further information on SnowPEx is available at https://earth.esa.int/web/sppa/activities/qa4eo/snowpex.