

# Snow Water Equivalent Climate Data Record of Northern Hemisphere Covering 30 Years

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One of the most important characterizations of seasonal snow cover in global scale is snow water equivalent (SWE). Until now the spatial distribution of snow mass and its evolution have been uncertain since traditional methods such as interpolation of ground-based measurements and algorithms applying only space-borne observations have shortcomings in this respect. The authors have applied an algorithm assimilating synoptic weather station data on snow depth with satellite passive microwave radiometer data and produced a 30-year-long time-series of seasonal SWE for the northern hemisphere [1]. Data on snow melt [2] are integrated on the product. The SWE estimates are validated using SWE data from Russia, the former Soviet Union, Finland and Canada. When  $SWE < 150$  mm the validation results show very good retrieval performance with RMSE below 40 mm. Comparison between assimilation algorithm and typical stand-alone satellite passive microwave algorithm demonstrates the advantages of assimilation approach. Assimilation also provides better estimates compared to interpolating ground truth data only. Example of trends and inter-annual variability of northern hemisphere snow mass during the 30 years are shown.

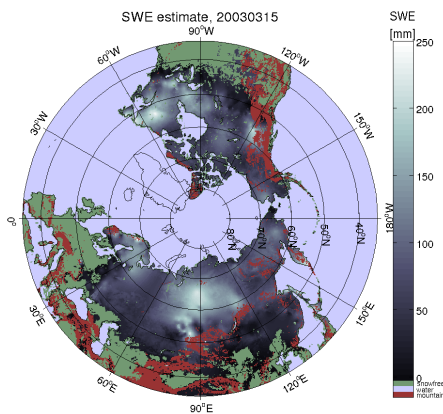


Fig 1. Example of Snow Water Equivalent map.

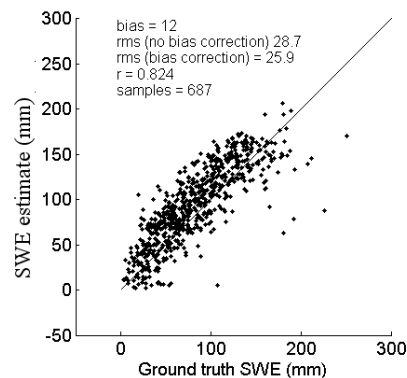


Fig 2. Validation results in Finland.

## References

- [1] Takala, M., Luojus, K., Pulliainen, J., Derksen, C., Lemmetyinen, J., Kärnä, J.-P., Koskinen, J. and Bojkov, B., Estimating northern hemisphere snow water equivalent for climate research through assimilation of space-borne radiometer data and ground-based measurements, *Remote Sensing of Environment* (2011), in press, doi:10.1016/j.rse.2011.08.014
- [2] Takala, M., Pulliainen, J., Metsämäki, S., and Koskinen, J. Detection of snowmelt using spaceborne microwave radiometer data in Eurasia from 1979 to 2007. *IEEE Transactions on Geoscience and Remote Sensing* (2009), vol. 47, issue 9, pp. 2996-3007. doi:10.1109/TGRS.2009.2018442