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Large scale evaluation of SWE estimates

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Modelling studies are usually performed using data from field sites of a limited size for validation; validation of snow models on a large (e.g. continental or hemispheric) scale is more difficult as in situ data are sparse. The remote sensing of snow is therefore an important area of research to enable spatially and temporally continuous global datasets of snow extent and snow mass to be produced. While there are many products available that supply snow extent information, obtaining snow mass from space is more difficult. Data from the SSM/I instrument can provide passive microwave estimates of snow water equivalent (SWE), although the retrieval is sensitive to factors such as snow grain size and forest cover.

This work compares the distribution of SWE at the continental scale from SSM/I with that obtained from various general circulation models at different resolutions. Differences between the model mean fields and the observations are large, particularly over Siberia. Comparisons with reanalysis data and runoff data from major catchments support the values seen in the satellite data. By examining model runs assimilating various meteorological data, SWE anomaly fields can also be compared. These model-predicted anomalies show greater agreement with the remotely sensed data than was seen in comparing the simulation states. In order to produce realistic climate model fields for analysis and exploit any predictability that snow may provide, the differences between these datasets must be understood more fully.