Simulation of Snow Cover Evolution by means of the model SNOW4

Uwe Böhm, Thomas Reich, and Gerold Schneider

Deutscher Wetterdienst, Hydrometeorology, Berlin, Germany (uwe.boehm@dwd.de)

SNOW 4 is a model to simulate accumulation and depletion of snow cover on a regular grid. The physical core of the model consists of modules to compute snow cover energy and mass balance. Available melting heat is calculated as the balance of the energy fluxes between snow cover, atmosphere and soil considering radiation and heat fluxes as well as heat conduction in the snow pack. Depending on the resulting melting heat, melting of snow or freezing of liquid water within the snow layer takes place. Retention, aging and regeneration are taken into account.

SNOW 4 is forced by observation in an analysis phase which covers the last 30 hours and by numerical weather prediction model results in the forecast phase for 72 hours ahead.

The model computes snow cover water equivalent and precipitation supply formed by melting water and precipitation not retained in the snow pack. The internal time step and the output interval is one hour. Grid resolution is on square kilometer. Model simulations are updated every six hours.

Model evaluation demonstrates the ability of the model to provide high-quality results for use in flood warning and water management in most of the German federal states and surrounding countries.