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A dynamic snow cover classification for the snow cover parameterization in GCM

S. Gromov, K.G. Rubinstein

Hydrometeorological Centre of Russia (gromov@mecom.ru, rubin@mecom.ru / Phone: +7 495 2552139 / Fax: +7 495 2551667)

The parameterization of snow cover in some global circulation models (GCM) is often implemented by using one or few layers of snow cover without consideration of snow stratigraphy and structure; it is partly caused by savings of the computational resources at the expense of snow physics simplification. Nevertheless there is a potentiality to take proper account of snow structure in one-layer modeled snow using a snow cover classification system. An attempt to estimate the ability of utilization of M. Sturm (1997) Seasonal Snow Cover Classification System in snow cover parameterization has been made. Mentioned classification allows the snow class characteristics (such as albedo, thermal conductivity, grain size etc.) to be assigned to snow cover in each point of its origin with relation to the history of formation based on the consideration of the meteorological conditions only. The algorithm of snow cover class deriving has been examined for adequate reproduction of snow class spatial distribution reconstructed with the use of ERA and NCEP reanalysis data compared with original Sturm Classification spatial class distribution built on the Legates-Willmott climatic data. The spatial correlation coefficient between reconstructed distribution and original snow distribution has an 88% to 93% over the Northern Hemisphere. Also the snow cover class deriving algorithm was adapted for receiving a snow cover temporal classification which is suitable for application to snow cover parameterization in GCM. Developed dynamic classification demonstrates an adequate reproduction of snow characteristics such as conservation and seasonal change of snow covered area and snow mass integrals in comparison with NOAA satellite snow cover data and reanalysis snow reproduction. However there are still uncertainties related to complex topography and correct description of spring snow melting period. Examined dynamic snow cover classification will be implemented in snow parameterization in Russian

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