Evaluation of the Snow Regime In Dynamic Vegetation Land Surface Models Using Field Measurements

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Snow, due to its properties and through its many interactions with the climate system, plays a prominent role in high latitudes. Over the past decades these regions have experienced a warming trend while the expansion of shrubs and warming of the permafrost provide additional evidence of change. Dynamic vegetation land surface models can offer insights to the multi-level interactions of such systems, as long as they include and correctly describe all the important processes involved, with the ultimate purpose of quantifying land-atmosphere carbon exchange and identifying potential sources and sinks.

This study focuses on snow related variables and processes in high latitudes and describes the use of field data (Former Soviet Union Hydrological Snow Surveys, 1966-1996) in assessing whether a variety of land surface models, some of them embedded in IPCC-standard climate models, correctly describe and quantify the snow regime in the Arctic and the boreal latitudes. A variety of snow variables and processes is considered including snow water equivalent, fresh snow density and snow density evolution.

Finally, a dynamic vegetation land surface model with embedded permafrost processes and organic soil parameterizations is driven with the snow regime derived from the field data in order to quantify how failings in quantifying snow variables and describing snow processes affect soil temperatures, soil carbon decomposition and permafrost distribution.