The Relationship Between Snow Cover Fraction and Snow Depth over Different Land Cover Types

Rui Shi (1), Xiaodan Guan (1), Zong-Liang Yang (2), Jieru Ma (1), Yangyang Xu (3), and Haiyan Huang (4)

(1) Key Laboratory for Semi-Arid Climate Change of the Ministry of Education, College of Atmospheric Sciences, Lanzhou University, Lanzhou, China, (2) Jackson School of Geosciences, University of Texas at Austin, Austin, Texas, USA, (3) National Center for Atmospheric Research, Boulder, Colorado, USA, (4) Geospatial Science Center of Excellence, South Dakota State University, Vermillion, South Dakota, USA

Seasonal snow has received much attention in the community because of its sensitivity to global climate change and obvious effect on regional energy and water balance. Most previous studies focus on the change of seasonal snow variables under global warming, but less work on its inner principle. In this study, we analyzed the variability of snow cover fraction (SCF) and snow depth (SD) over three typical land cover types of open shrubland, evergreen needleleaf and mixed forest, which have widely distribution in Northern Hemisphere (NH). The results demonstrated that there is different annual variation between SCF and SD over all selected regions, which results that the curves of relationship between monthly SCF and SD are not overlapping between the stages of accumulation and ablation. Meanwhile, SCF and SD showed different characters over selected regions, leading to the curves of relationship between SCF and SD taking different shapes in these regions. Such relationship is an effective tool in the simulation of snow processes in model. However, the relationship is not fully considered in the CMIP5, which always has an underestimate in accumulation stage and an overestimate in ablation stage. Therefore, the different relationship between SCF and SD of snow parameterization scheme in the model over regions is a potential improvement topic to the ability of simulation in the future.