Effects of the Interannual Variability in the Growing Season of Deciduous Needleleaf Forest in Siberia on the Local Climate

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Changes in vegetative growing seasons due to climate changes are very important to understand the interaction between the biosphere and atmosphere. Phenological phases of plants, from leaf emergence to senescence, influence on regional-scale climate through their impact on the partitioning of available energy between sensible and latent heat. In addition, seasonal and interannual variations in carbon, water, and energy cycles are affected by those in photosynthesis and evapotranspiration under the meteorological and climate changes. Thus, it is essential to represent well phenology of vegetation in the model – leaf area index (LAI) is able to represent growing season change. In this study, we have evaluated the effect of the realistic interannual variation of LAI on the biogeophysical process such as albedo, evapotranspiration, and heat flux in the WRF-Noah-MP model. Furthermore, the interannual variation of LAI could change the local climate (e.g., atmospheric circulation and snow amount) through the change in heat flux and albedo. We have examined in the Siberian region (90 – 160E, 50 – 70N). Noting that the deciduous needleleaef forests in Siberia have experienced significant warming over the past several decades, this study has the crucial impacts on finding the relationship of vegetation and atmosphere under the climate change.

Key words: growing season, LAI, deciduous needleleaf forest, local climate, WRF-Noah-MP