

Variability of snow cover in Mongolia region and its impact to soil moisture and vegetation cover

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At verge region of northern Eurasian cryosphere, the snow cover can persist about 6 months of the year but characterizing by small snow mass. The variation of snow cover, thereby, is sensitive to climatic fluctuation. To clarify the inter-annual changing of snow cover in Mongolia region and its possible hydrological consequence, variability of snow cover, soil moisture and vegetation indices were investigated in region of N42-52°E, E88-120°E. Weekly snow cover, NDVI data from NOAA/NESDIS and conventional observation were used in this analysis. The results demonstrate large temporal variability of snow cover. The snow cover duration ranged of 77 to 134 days with average of 102.6 days. Three peaks and three valley values were found during 1973-2006 with roughly periodic cycle of 10 years. However, linearly regression analysis shows light positive of snow period of 0.26 d/yr. Similar trend has been deduced in changing in snow cover area as well. The snow cover area in target region has lightly increased since 1973 with the trend of $0.17 \times 10^4 \text{ Km}^2/\text{yr}$.

Snow disappearance timing is most important snow cover index to evaluate the role of snow cover playing in climatic system, which had been suggested to be associated to air temperature in earlier spring through ground surface soil moisture. Generally, temporal variability of snow disappearance timing is getting larger along latitude: southern target region, where snow is few, snow disappearance timing variable from year by year comparing to the northern region.

One of interesting findings is the break of snow cover period, implying such thin snow cover may be consumed over by drift even sublimation. The max break in snow cover period was about 4 weeks. However, the break has tended to fewer recently.

Anomaly analysis between snow cover disappearance Julian (SCD) days and surface soil moisture within 0-30 cm depth shows positive impact of SCD to soil moisture in April and August, but weak effect to soil moisture in other season. The snow cover period (SCP, days) show just weak positive impact to soil moisture in April and May.

Ecological consequence of snow cover variability was investigated by correlate NDVI data. There are positive relationship has been found between SCD anomaly and monthly NDVI except in September. However, SCP anomaly stress its negative impact to NDVI in entire summer, which is anticipated to be caused by complexity between SCD and summer precipitation.

Summarily, the hydrological consequence of snow cover in Mongolia, where snow is rather thin comparing other cryospheric region, shows different feature than previous results. The field still calling advanced works.