Hydro-climatology of Eurasia Snow Cover Derived from Satellite Datasets

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To clarify the inter-annual changing of snow cover in Eurasian continent and its possible hydrometeorology consequence, variability of snow cover and monthly snow water equivalence, soil moisture, heat fluxes at ground surface and vegetation indices were investigated in region of N20-80^o, E30-180^o by using satellite data from multiple dataset. Weekly snow cover and monthly snow water equivalency (SWE), NDVI, soil moisture, Palmer Drought Severity Index (PDSI) were used in this analysis. The data were confirmed by conventional observation that we could achieved.

Both weekly snow cover and monthly SWE is quoted from dataset of the National Snow and Ice Data Center (NSIDC); soil moisture gained from dataset of soil moisture databank; NDVI data is come from databank of JAMSTEC, Japan; PDSI is achieved from dataset of Climate & Global Dynamics climate analysis project. Furthermore, reanalysis products of the ground heat fluxes, soil moisture and others from NOAA reanalysis are used this work as well.

Corresponding to the feature of snow cover persisting and SWE, tempo-spatial temporal variability of Eurasian snow cover was investigated by several sub-regions in accordance with their persisting and SWE. Western and eastern Siberia (N60-80^o, E30-120^o; N60-80^o, E120-180^o); mid-latitude (N40-60^o, E30-180^o) and region of N20-40^o, E30-180^o. Both of snow covered period and SWE in Siberia was tending to decrease during 1972-2006 with trend of -0.08 to -0.33 week/10a for snow covered period and of -0.13 to -0.48 mm/10a for SWE; the maximum SWE, an indicator of water cycle, was decreased in western Siberia but increased Eastern Siberia.

Larger temporal variability of snow cover has deduced in mid-latitude including Mongolia. The snow covered period 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. Linearly regression analysis shows light negative of snow period of 0.18 week/10a. Similar trend has been deduced in changing in snow cover area as well. SWE has lightly decreased since 1979 with the trend of 0.30 mm/10a.

Snow cover of Tibetan is characterized by free-snow interrupt in winter, even if there were evident snow cover in beginning and ending period. Such snow covering 'break' could be elucidated by snow sublimation and drifting by wind. The maximum and mean snow break period was 11.6 and 3.3 weeks in the period. There is no significant of trend can be deduced in the snow covered period time series, but of -0.31 mm/10a in SWE time series.

Hydrological and climatological consequence of snow cover variability was investigated by correlate NDVI, heat fluxes, soil moisture and PSDI data. The effect of snow cover extent and water mass to spring hydrological water cycle were clarified by regression on their temporal and spatial corresponding variability.