

Influence of Springtime Eurasian Snow Cover Retreat on Atmospheric Circulation over East Asia

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According to the 5th Assessment Report of the Intergovernmental Panel on Climate Change, springtime snow cover extent over the Northern Hemisphere (NH) is greatly retreating since 1990's. Recent study also pointed out that vanishing cryosphere may affect extreme summer weather in NH mid-latitudes. In this study, we investigate impacts of springtime Siberian snow cover fraction (SCF) change on atmospheric circulations in Northern mid-latitudes, especially over the East Asia, using a new satellite-observed SCF product by JAXA and the Japanese 55-year Reanalysis dataset.

Composite analysis suggests that, when the SCF over Western Siberia is significantly low in April, upper and middle tropospheric jet stream over Japan shifts southward in April and the following June. Land surface temperature significantly increases and soil moisture significantly decreases over southern part of Western Siberia and Central Asia in June. In addition, sensible heat flux from the surface to the atmosphere significantly increases in May and June, and significantly warms the atmosphere over there. These results suggest that the reduction of snow melted water suppresses evaporation of soil moisture when snow vanished, and causes warmings of the land surface, increases in the sensible heat flux, and warmings of the middle and upper air, which may affect the atmospheric circulation changes.

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