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https://doi.org/10.2151/jmsj.2015-013

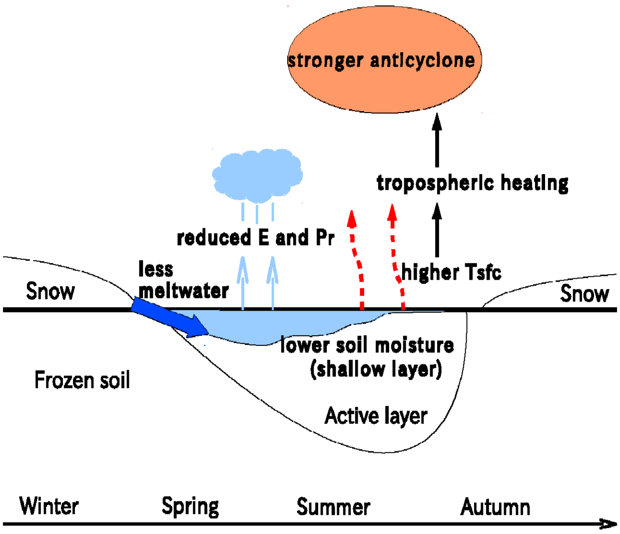

Figure 1. Schematic diagram of seasonal changes in early-snowmelt years from winter to autumn in eastern Siberia. E is evaporation, P_r is precipitation, and T_{sfc} is surface air temperature (Matsumura and Yamazaki 2012).

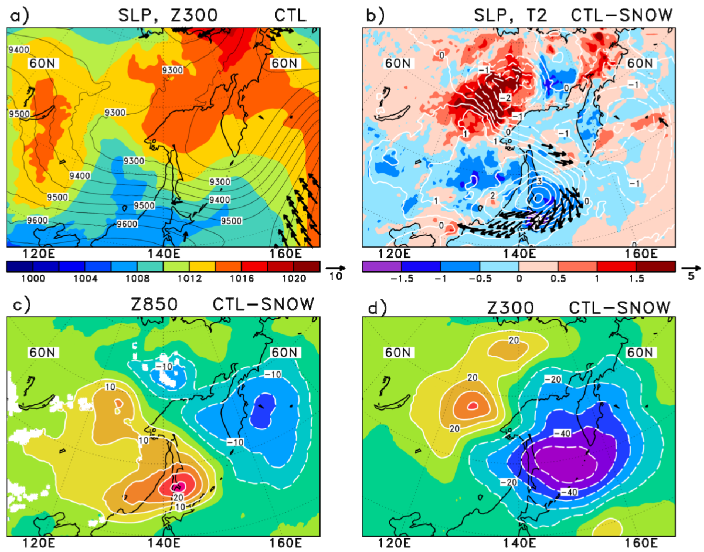

Figure 2. (a) Distribution of SLP (shadings; hPa), 10-m wind (arrows; m s^{-1}) and 300-hPa geopotential height for the period 9-15 August 2008 in the CTL run. (b) Differences in 2-m air temperature (shadings; ◦C), SLP, 10-m wind (arrows; m s^{-1}), (c) 850-hPa and (d) 300-hPa geopotential height between the CTL and SNOW runs.

- Snow cover in eastern Siberia plays a critical role in land-atmosphere climate system (Fig. 1). The snow-hydrological effect is prominent during summertime; i.e., less snow cover in spring results in less snowmelt water and correspondingly lower soil moisture in summer, resulting in turn in reduced cloudiness, evaporation and precipitation (higher surface air temperature).
- As a result of surface heating through the climate memory effect, in late summer, tropospheric heating is caused by condensation heating associated with ascending air masses and adiabatic heating of descending air masses, thereby forming a stronger upper-level anticyclone with a westward tilt.
- We examined the influence of springtime snow cover on the formation of the late summer Okhotsk High (OH) with the baroclinicity, using a regional climate model. The August OH in 2008 develops with a distinct baroclinic structure due to increased surface heating that is related to land-atmosphere coupling in response to reduced spring snow cover in eastern Siberia (Fig. 2). A reanalysis data also indicates that the formation mechanism of the OH clearly differs between early and late summer, because it changes from a nearly barotropic to a baroclinic structure. The land-atmosphere coupling can help to reinforce and maintain the baroclinic structure through surface heating, forming strong surface anticyclone to the southeast over the Sea of Okhotsk.