

Validation of soil moisture contribution to near surface temperature by numerical sensitivity experiment in Northeastern Asia

*Enkhbat Erdenebat¹

1. Hokkaido University

Variations of near surface temperature of June-August due to difference soil moisture (SM) product is investigated by numerical experiments utilizing WRF model in Northeastern Asia. A 30-year (1981-2010) numerical experiment has conducted using ERA-interim reanalysis data as an initial and boundary condition to clarify the importance of SM contribution to the JJA extreme temperature and heat wave (HW). SM is known to be an important parameter to influence temperature by regulating surface energy balance through latent and sensible heat fluxes. To evaluate SM contribution to JJA temperature under similar atmospheric circulation, two experiments, reanalysis-SM (R-SM) as a control and satellite-SM (S-SM), have been compared. Both experiments were conducted during 20th May through 1st September. The S-SM experiment used initial SM condition derived from European Space Agency-Climate Change Initiative (ESA-CCI) dataset. During the numerical integration, SM can evolve as a result of atmosphere-land interaction. The model experiment has successfully generated the increasing trend of HW for frequency and intensity in R-SM. The result shows that S-SM experiments have improved the maximum surface air temperature and HW by 1.1°C and 0.7 days year⁻¹ on average during 1981-2010 in Mongolia. The amount of rainfall is reduced due to using S-SM as an initial condition in comparison to R-SM. In addition to rainfall, enhanced interaction of land and atmosphere is simulated in S-SM run, which higher positive anomaly at 500 hPa has developed in S-SM than R-SM by major HWs. Therefore sensitivity experiments confirm that ERA-interim estimates more SM in Northeastern Asia which results underestimate temperature and overestimates rainfall by model.