Interannual variability of summer precipitation over northern Eurasia in multiple climate models: Part II.

*Manabu Abe[1], Hatsuki Fujinami[2], Tetsuya Hiyama[2]

1. Japan Agency for Marine-Earth Science and Technology, 2. Institute for Space-Earth Environmental Research, Nagoya University

Arctic sea ice extent has clearly decreased in recent decades. Also, the decreasing of Arctic sea ice extent has possibly affected hydrological cycle in the northern part of Eurasia (e.g., Fujinami et al. 2016, Hiyama et al. 2016). On the other hand, extreme events like heatwaves and heavy snow, which seems to be the influence of global warming, are also occurring in the middle and high latitudes. For reliable projection of such extreme events, it is important to understand the mechanism of interannual variability of the hydrological cycle.
We have been investigating interannual variability by the use of multiple climate models in order to understand the mechanism of the hydrological cycle in northern Eurasia. Last year, we reported that the mode of the east-west seesaw pattern, which is seen in the observation, included in the interannual variability of summer precipitation in northern Eurasia in many models (Abe et al. 2017). In addition, a frequency of such modes of the interannual variabilities in the models has not been modulated by recent Arctic sea ice reduction.
In this presentation, we report on the mode of the interannual variability with peaks of fluctuation in northern Eurasia or the Arctic coast area. Many models show this mode as EOF 1, the most outstanding variation pattern. This spatial pattern indicates the positive anomalies of precipitation in the Arctic coast region and negative anomalies in the southern part of Siberia (vice versa). Patterns of the atmospheric circulation at 850 hPa related to these anomalies are the low-pressure anomaly in the Arctic coast and the Arctic Ocean and the high-pressure anomalies in the south of the low-pressure anomaly. Furthermore, in relation to this atmospheric circulation pattern, latent and sensible heat fluxes from the ocean to the atmosphere show positive anomalies in the Barents Sea and the Kara Sea. Also, the atmospheric circulation pattern at 850 hPa is similar to that of the increasing trend pattern reported in Fujinami et al. (2016). However, there was no significant temporal trend in the EOF score of the pattern of the models. In the presentation, we would like to discuss both the relationship between this interannual variability and the Arctic sea ice change and why this interannual variability in the model does not have a temporal trend unlike the similar pattern in the observations.

References

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