Geophysical Research Abstracts
Vol. 19, EGU2017-5886-2, 2017
EGU General Assembly 2017

Assessment of the uncertainty in future projection for summer climate extremes over the East Asia

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Future projections of climate extremes in regional and local scales are essential information needed for better adapting to climate changes. However, future projections hold larger uncertainty factors arising from internal and external processes which reduce the projection confidence. Using CMIP5 (Coupled Model Intercomparison Project Phase 5) multi-model simulations, we assess uncertainties in future projections of the East Asian temperature and precipitation extremes focusing on summer. In examining future projection, summer mean and extreme projections of the East Asian temperature and precipitation would be larger as time. Moreover, uncertainty cascades represent wider scenario difference and inter-model ranges with increasing time. A positive mean–extreme relation is found in projections for both temperature and precipitation. For the assessment of uncertainty factors for these projections, dominant uncertainty factors from temperature and precipitation change as time. For uncertainty of mean and extreme temperature, contributions of internal variability and model uncertainty declines after mid-21st century while role of scenario uncertainty grows rapidly. For uncertainty of mean precipitation projections, internal variability is more important than the scenario uncertainty. Unlike mean precipitation, extreme precipitation shows that the scenario uncertainty is expected to be a dominant factor in 2090s. The model uncertainty holds as an important factor for both mean and extreme precipitation until late 21st century. The spatial changes for the uncertainty factors of mean and extreme projections generally are expressed according to temporal changes of the fraction of total variance from uncertainty factors in many grids of the East Asia.

ACKNOWLEDGEMENTS
The research was supported by the Korea Meteorological Administration Research and Development program under grant KMIPA 2015-2083 and the National Research Foundation of Korea Grant funded by the Ministry of Science, ICT and Future Planning of Korea (NRF-2016M3C4A7952637) for its support and assistant in completion of the study.