

Projection of the Change in Future Weather Extremes using Super-high-resolution Atmospheric Models

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Abstract

In this paper, I introduce our new project "Projection of the change in future weather extremes using super-high-resolution atmospheric models" under the "Innovative Program of Climate Change Projection for the 21st Century (KAKUSHIN Program)." We perform climate projections in the near future and at the end of the 21st century with unprecedented very high-resolution atmospheric models. We use a global 20-km mesh atmospheric general circulation model for climate change studies with emphasis on various extreme events including tropical cyclones and heavy precipitation during the East Asian summer monsoon season. Sea surface temperatures (SSTs) predicted by conventional coupled atmosphere-ocean general circulation models (AOGCMs) are given to a global 20-km mesh atmospheric to realize future climate projection (time-slice experiment). Furthermore, focusing on the local climate change over Japan, 5-km and 1-km mesh regional atmospheric models embedded in the global model are utilized to investigate the frequency change of heavy precipitation. This part will be covered by Dr. Kazuo Kurihara. Uncertainty of projected climate change are evaluated and quantified with multiple sets of ensemble experiments to provide information on reliability for the users of simulated results. In particular, uncertainty in future possible changes of tropical cyclones will be covered by Dr. Masato Sugi. With the output data from model projections, change of disaster environment regarding landslide, debris flow, flood, draught, storm surge and strong wind are evaluated over Japan. Moreover, flood risk assessment is extended to a global scale in view of cooperating with international projects on disaster mitigation.