

Climate projections using high-resolution MRI-AGCM

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A high-resolution atmospheric general circulation model of the Meteorological Research Institute (MRI-AGCM), with a horizontal grid size of about 20 km, have been developed, and applied to climate projections for extreme weather events such as tropical cyclones and heavy precipitation. Given the observational sea-surface temperature (SST) as the lower boundary condition, the model can simulate not only global-scale climate of temperature and precipitation, but also climatic characteristics of small-scale phenomena such as geographical distribution and intensity of tropical cyclones, and seasonal march of the East Asian monsoon.

Under the KAKUSHIN program (2007-2012; sponsored by MEXT), giving SST changes from atmosphere-ocean coupled models, time-slice experiments with this model have been performed to investigate detailed and localized changes as a consequence of global warming. The uncertainty of the change has been also evaluated, using many ensemble experiments with 60 km version of the model. The simulation results has been used for many purposes, including impact accessments of disasters, water resources, and agriculture, as well as analyses from meteorological point of view. The results has been also provided to the researchers worldwide, for the researches of regional climate changes of their own countries. Over Japan area, dynamical downscaling experiments have been performed using a regional climate model with horizontal grid sizes of 5km and 2km.

Under the SOUSEI program (2012-2017; sponsored by MEXT), in order to evaluate and reduce the uncertainty of the climate projections, ensemble experiments with the 20-km model with different geographical patterns of SST changes are being performed, using results of CMIP5 coupled models.

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