Plain Language Summary: The performance of the Meteorological Research Institute-Atmospheric General Circulation model version 3.2 (MRI-AGCM3.2) in simulating precipitation is compared with that of state-of-the-art global atmospheric climate models. As for the global distribution of seasonal and annual average precipitation, monthly precipitation over East Asia, and the seasonal march of rainy zone over Japan, MRI-AGCM3.2 models perform better than or equal to other climate models.
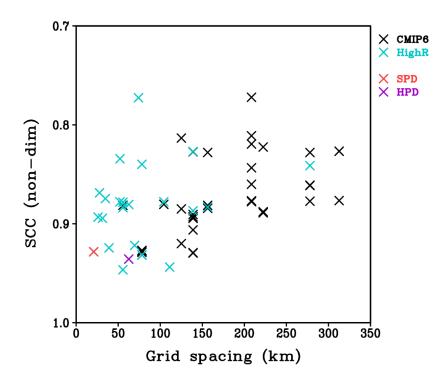
Figure 1. Dependence of model skill on grid spacing (km) of global atmospheric climate models. Black crosses denote 36 CMIP6 models. Blue crosses denote 23 HighResMIP models. Red cross shows the 20-km mesh MRI-AGCM3.2. Purple cross shows the 60-km mesh MRI-AGCM3.2. The skill measure is the Spatial Correlation Coefficient (SCC) for the global distribution of annual precipitation. Vertical axis is reversed. The correlation coefficient between SCC and grid spacing is −0.441 which is greater than the 99 % significance level.

- The 20-km mesh MRI-AGCM3.2 is the highest horizontal resolution climate model used in global warming projection.
- Higher horizontal resolution models are better than lower resolution models in simulating the global distribution of seasonal and annual precipitation (Fig. 1) and the global distribution of intense precipitation, and the local distribution of summer precipitation over East Asia.