Event attribution using large ensemble model simulations by MIROC5-AGCM, MRI-AGCM, and NHRCM

*Yukiko Imada[1], Hiroaki Kawase[1], Hideo Shiogama[3], Masato Mori[4], Chiharu Takahashi[2], Miki Arai[5], Masahiro Watanabe[2], Izuru Takayabu[1]

1. Meteorological Research Institute, Japan Meteorological Agency, 2. Atmosphere and Ocean Research Institute, the University of Tokyo, 3. National Institute for Environmental Studies, 4. Research Center for Advanced Science and Technology, the University of Tokyo, 5. Japan Agency for Marine-Earth Science and Technology

There are many evidences of connections between long-term trends of extreme events and the human influence. However, specific extreme events can not totally be blamed on the past human activity, because extreme events can be happened only due to the natural variability. In this study, we examine whether human influence has largely affected the probability of extreme events by comparing large-ensemble climate model simulations under the "factual" conditions and the "counterfactual" ones in which influences of anthropogenic climate drivers were omitted. Such an attempt is called "Event Attribution" (EA).
We conducted large ensemble simulations for the factual and counterfactual experiments using two atmospheric general circulation models: MIROC5-AGCM and MRI-AGCM3.2. The MIROC5 dataset is superior for consideration of the range of uncertainty, whereas the MRI-AGCM3.2 dataset, so called d4PDF (the Database for Policy Decision making for Future climate change), focuses on high-resolution simulations with ~60 km horizontal resolution along with downscaled products produced by a regional climate model NHRCM with ~20km horizontal resolution which covers the East Asian region.
Here, I will introduce our recent works using the large ensemble simulations focusing on how much anthropogenic global warming contributed to increased occurrence of recent extreme events around the globe when compared to the inter-annual and decadal variability.

Keywords: Event Attribution, Large ensemble simulation, Extreme event

