

## Integrated Research Program for Advancing Climate Models - Theme B: national research program in Japan on earth system modeling

\*Michio Kawamiya<sup>1</sup>, Tomohiro Hajima<sup>1</sup>, Kaoru Tachiiri<sup>1</sup>, Jun'ichi Tsutsui<sup>2</sup>, Tokuta Yokohata<sup>3</sup>, Takashi Arakawa<sup>4</sup>, Takahiro Inoue<sup>4</sup>

1. Japan Agency for Marine-Earth Science and Technology, 2. Central Research Institute of Electric Power Industry, 3. National Institute for Environmental Studies, 4. Research Organization for Information Science and Technology

The Integrated Research Program for Advancing Climate Models, or TOUGOU (abbreviation taken from its Japanese name), is a national project for projection of global change. Its aim to provide information for adaptation and mitigation, based on scientific evaluation of changes including those in extreme events and carbon cycle. The project was launched in April, 2017. While the entire program deals with a wide range of physical aspects and consequent impacts of climate change, Theme B (TOUGOU-B) focuses on the development of a state-of-the-art Earth system model (ESM) incorporating biogeochemical processes, such as sophisticated carbon and nitrogen cycles, as well as its application to exploring future socio-economic pathways of climate change mitigation. MIROC-ESM, an ESM developed under TOUGOU-B (and the previous SOUSEI-B) has been significantly improved since the 5<sup>th</sup> phase of coupled model intercomparison project (CMIP5), and has started to be run for CMIP6. During the three years since TOUGOU was launched, results have been obtained that may contribute to 6<sup>th</sup> Assessment Report (AR6) of Intergovernmental Panel on Climate Change (IPCC) including those on impacts of pyrogenic iron on oceanic ecosystem, assessment of the outcome of labor productivity change due to warming, and effects of high dust amount on surface temperature during the Last Glacial Maximum. Besides, efforts to secure ways to disseminate projection data are ongoing under TOUGOU-B. Specifically, collaboration has been established between climate modeling community in Japan and Data Integration and Analysis System (DIAS), a national IT project for environmental data, have been continuing, in order for Japan to participate in Earth System Grid Federation (ESGF). ESGF is an international cooperative activity to construct a data distributing system for climate related data such as CMIP6 outputs. Some of the details of these results will be explained in the presentation.

Keywords: IPCC, Earth system model , carbon cycle, socio-economic scenario, CMIP6, climate mitigation