Session: C34 Poster: W246A

Parametric uncertainty in allowable carbon emission for RCP4.5 concentration scenario

Kaoru Tachiiri[†]; Julia Hargreaves; James Annan; Michio Kawamiya
[†] Japan Agency for Marine-Earth Science and Technology, Japan
Leading author: tachiiri@jamstec.go.jp

Following the recommendation by CMIP5, some world climate centers are running experiments with Representative Concentration Pathways (RCP) concentration scenario, and will present allowable carbon emission in the future. As allowable carbon emission is determined by combination of climate response and feedback of ecosystem, there should be significant inter-model uncertainty, and the result is not necessarily perfectly agreed with RCP emission scenario. In this study, parametric uncertainty in allowable carbon emission for RCP4.5 concentration scenario was investigated by perturbing important physical and biogeochemical parameters and aerosol forcing in a loosely coupled earth system model, after confirming that the parameter perturbation results in comparable dispersion in climate response and ecosystem's feedback properties to those of C4MIP models. The result showed that allowable carbon emission for our ensemble mean is smaller than the RCP4.5 emission scenario, but the magnitude of the difference is dependent on the data for constraint. The most influential parameter to the allowable emission was climate sensitivity, followed by the Gent-McWilliams thickness parameter. The physical parameters have more contribution than biogeochemical ones, although some the latter also have statistically significant contribution. The possibility of negative averaged emission in 2151-2200 is 0-20%, depending on the constraint data.