EGU21-8618, updated on 06 Jul 2022
https://doi.org/10.5194/egusphere-egu21-8618
EGU General Assembly 2021

Role of Regional Ocean Dynamics in Dynamic Sea Level Projections by the end of the 21st Century over Southeast Asia

Dhrubajyoti Samanta[1], Svetlana Jevrejeva[2], Hindumathi K. Palanisamy[2], Kristopher B. Karnauskas[3], Nathalie F. Goodkin[1,4], and Benjamin P. Horton[1]

[1]Nanyang Technological University, Singapore (dhruba@ntu.edu.sg)
[2]Centre for Climate Research Singapore, Singapore
[3]University of Colorado Boulder, USA
[4]American Museum of Natural History, USA

Southeast Asia is especially vulnerable to the impacts of sea-level rise due to the presence of many low-lying small islands and highly populated coastal cities. However, our current understanding of sea-level projections and changes in upper-ocean dynamics over this region currently rely on relatively coarse resolution (~100 km) global climate model (GCM) simulations and is therefore limited over the coastal regions. Here using GCM simulations from the High-Resolution Model Intercomparison Project (HighResMIP) of the Coupled Model Intercomparison Project Phase 6 (CMIP6) to (1) examine the improvement of mean-state biases in the tropical Pacific and dynamic sea-level (DSL) over Southeast Asia; (2) generate projection on DSL over Southeast Asia under shared socioeconomic pathways phase-5 (SSP5-585); and (3) diagnose the role of changes in regional ocean dynamics under SSP5-585. We select HighResMIP models that included a historical period and shared socioeconomic pathways (SSP) 5-8.5 future scenario for the same ensemble and estimate the projected changes relative to the 1993-2014 period. Drift corrected DSL time series is estimated before examining the projected changes. Due to improved simulation of heat, salt, and mass distribution in the ocean, HighResMIP models not only reduce mean state biases in the tropical Pacific (such as cold-tongue sea surface temperature bias), but also near Southeast Asia including DSL. Despite intermodel diversity, there is an overall agreement of increasing sea-level over Southeast Asia. The multimodel ensemble of HighResMIP models suggests a rise of 0.2 m sea level in dynamic sea level (combined with thermosteric component) over Southeast Asia by 2070. Sea-level rises further up to 0.5 m by the end of the 21st century. Further, we found regional heat and mass transport changes have a major role in the projected sea-level pattern over Southeast Asia. For example, heat convergence to the east of Vietnam can account for most of the sea-level rise in the region. Our study can provide better insight into the contribution of regional ocean dynamics to DSL projections and useful to suggest for further ocean modelling studies.