

Role of Perturbing Ocean Initial Condition on Simulated Regional Sea Level Change

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Multiple lines of evidence indicate that the global climate is getting warmer since early 20th century. This warmer climate has led to a global mean sea level rise of about 18 cm during the 20th century, and over 6 cm for the first 15 years of the 21st century. Regionally the sea level rise is not uniform due to the internal climate variability. To better serve the community, the uncertainties of predicting/projecting regional sea level changes associated with the internal climate variability need to be quantified. Previous researches have been using large ensemble simulations to determine these uncertainties by perturbing the atmospheric initial conditions. Here we compared these uncertainties by perturbing both the atmospheric and oceanic initial conditions using a coupled climate model. We find that by perturbing the oceanic initial conditions, the uncertainties of regional sea level changes increase. Thus, in order for us to better assess the full spectrum of the impacts of such internal climate variability on regional and global sea level rise, approaches that involve perturbing both atmospheric and oceanic initial conditions are needed.

Keywords: perturbing ocean initial condition, sea level uncertainty