



FIO-ESM: the earth system model coupled with ocean surface waves

The Earth System Model (ESM), a numerical model for the quantitative description of the climate system, is the key tool for understanding and predicting climate change as well as assessing the impacts of humans on climate change. Its development is at the forefront of global change. Although the state-of-the-art ESMs have made great progress, they are still suffering from several common simulated problems. By incorporating the ocean surface wave model into ESM through the role of small-scale waves on the ocean vertical mixing and air-sea fluxes, two generations of FIO-ESM are innovatively developed by the First Institute of Oceanography (FIO), which can effectively reduce the simulation biases. Focused on the effects of ocean surface waves on the climate system, this talk will mainly review the background and history of the two-generation FIO-ESM development by introducing four distinctive physical processes including the wave-induced vertical mixing, the air-sea flux induced by Stokes drifts, the heat flux associated with sea spray, and the SST diurnal cycle scheme. The simulation ability and applications on climate change and short-term prediction are also introduced. Finally, the future development and suggestions of the ESM are discussed from the perspective of the role of ocean surface waves on the ESM.

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