EGU22-4629
https://doi.org/10.5194/egusphere-egu22-4629
EGU General Assembly 2022

Marine heat waves: The added value of a high resolution, coupled atmosphere-ocean regional climate model

Marie Pontoppidan, Chiara De Falco, Priscilla A. Mooney, and Jerry Tjiputra
NORCE Norwegian Research Centre, Climate & Environment, Bergen, Norway (mapo@norceresearch.no)

Marine ecosystems are largely impacted by marine heat waves (MHWs). That includes coral reefs which are experiencing coral bleaching and subsequently loss of marine biodiversity because of MHWs. Such reefs are crucial habitat of fish stocks feeding the world's population. As ocean temperatures increase, the occurrences of MHWs become more frequent. A further solid mechanistic understanding is therefore urgently required for adaptation and mitigation of future changes in MHWs. Importantly, this knowledge is needed on a local-scale.

Here we use a coupled ocean-atmosphere regional modelling system (COAWST), consisting of the atmospheric model WRF and the ocean model ROMS, to dynamically downscale an area over the Caribbean Sea and the Gulf of Mexico. Compared to a global model with coarser horizontal resolution, our 12 km grid spacing resolves smaller scale phenomena and ensures a skilled representation of the air-sea interactions which are important for a correct representation of MHWs. We show the results of a 20-year regional climate simulation and compare the output with two global climate model simulations (NorESM2-MM and NorESM2-MH) to address the added value of the regional simulation. Our high-resolution simulation represents the temporal distribution (frequency and duration) of MHWs well compared to the coarser global models which produce too few, but too long heatwaves in the area.