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Investigating marine heat waves with a coupled atmosphere-ocean regional climate model

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Marine heat waves (MHW's) exert a substantial impact on human life and ecosystems in the ocean. In the western part of the tropical Atlantic basin, coral reefs are impacted by such events, resulting in coral bleaching and subsequently loss of biodiversity. To mitigate future changes in MHW's it is detrimental to increase our mechanistic understanding of these events, and this must be investigated on a local scale to understand the smaller scale driving processes of the heat waves, e.g. air-sea interactions, and the spatio-temporal extent on environmental drivers essential for the ecosystem processes.

Here we use a coupled ocean-atmosphere modelling system (COAWST), which includes the atmospheric model WRF and the ocean model ROMS (including the Fennel ecosystem module), to dynamically downscale an area consisting of the Caribbean Sea and the Gulf of Mexico. Our 12 km grid spacing resolves (at least partly) smaller scale phenomena and in combination with the coupling of the ocean and the atmospheric model, it ensures a skilled representation of the air-sea interactions which are important for MHW's. We will show the results of this decadal climate simulation with regards to generation, evolution and persistence of the MHW's.