Compound extremes: marine heat waves and acidification under two different AMOC states

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With the rising atmospheric CO2 concentration, the ocean is warming, acidifying (ocean acidification) and losing its oxygen content (ocean deoxygenation). An intensified hydrological cycle is expected to increase the intensity and frequency of extreme weather events, modulating variations in precipitation on land and, hence, freshwater inputs, which may impact stratification, and consequently, oxygen supply. The altered ocean-atmosphere heat exchange is expected to affect the wind patterns while intrinsic climate variability that maybe changing regionally will also play a role in enhancing these forced trends. As the background state changes, the likelihood of single extreme conditions is expected to increase, and so is the likelihood of the occurrence of compound events in the ocean. In this talk I will review historical trends in marine heat waves (MHW), acidification extremes (OAX) and compound events (MHW-OAX) from a climate model, the NASA-GISS Earth System Model. While the model agrees well with observations of marine heat waves, sparse observational data of sea water pH hinter the characterization of the model skill for such extremes. However, the model shows a clear (and disturbing trend) for increasing such compound events which are critical for regional ecosystem survival. In this presentation, we will discuss how extremes change under the same future climate scenario but different AMOC states.