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Sensitivity of the Gulf Stream mixed-layer heat budget to atmospheric forcing in an eddy-permitting model

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The mixed-layer heat content is a key variable of the ocean-atmosphere coupled system as it influences the air-sea fluxes exchanges as well as the properties of the subducting water masses in late winter and spring. In this study, we focus on a region in the Gulf Stream centered around 55ºW/42°N. We provide a detailed analysis of the mixed layer heat budget during the mixed-layer deepening season i.e. September-March, from an eddy-permitting simulation of the North Atlantic (1/4º horizontal resolution). We investigate the temporal and spatial variability of the dominant heat budget terms in order to highlight the mechanisms at work. We focus on nonlinear terms such as advection and vertical diffusion (a 1.5 order closure model is used to determine the vertical mixing coefficients). Finally, we explore the sensitivity of the heat budget to the use of different atmospheric fields to force the model: we compare the impact of ERA40 versus CORE (Large and Yeager, 2004) products over the period of study.