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INFLUENCE OF SUB-DAILY VARIATIONS IN METEOROLOGICAL FORCING AND TURBULENT MIXING ON OCEAN CARBON DYNAMICS

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Using a 1-d bio-geochemical ocean turbulence model we assess the impact of short-term variations in physical forcing on the ocean carbon system. The air-sea flux of CO2 is driven by the difference between the partial pressures of CO2 in the ocean and atmosphere and scaled by the gas transfer velocity. The gas transfer velocity varies due to its dependence on wind sea surface temperature (SST), while the oceanic pCO2 depends upon SST, sea surface salinity, solar radiation, chemical and biological interactions and turbulent mixing through the water column. Many of these variables change on a diurnal time scale and many of them are highly correlated. These short time scale variations and covariations are ignored when monthly or daily averaged forcing data are used. Here we present a thorough analysis of the effects of sub-daily processes on ocean carbon dynamics using a 1-d general ocean turbulence model (GOTM) coupled with the Hadley centre Ocean Carbon Cycle (HadOCC) model. The model is forced with high frequency meteorological data from a number of locations with diverse meteorological/oceanic conditions to demonstrate regional differences in errors due to temporal averaging.