



Analysis of the oceanic diurnal cycle at the PIRATA sites using a 1D model and AMMA/EGEE3 observations

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High resolution oceanic and atmospheric measurements were collected on board the R/V L'ATALANTE in June 2006 during the EGEE3 cruise in the Gulf of Guinea (EGEE3 was one of the cruises carried out during the AMMA intensive observing period). These data are used to investigate the diurnal cycle of the mixed layer during stops at various PIRATA buoy sites, mainly along 10°W, at time of the development of the cold tongue. A one dimensional vertical ocean model is used with observed CTD and ADCP profiles as initial conditions, and surface forcing derived from data collected on board including 10 minutes radiative fluxes and standard atmospheric parameters. Additional CTD/XBT and ADCP casts and turbulence oceanic profiles are used to validate the model outputs. Numerous tests are performed in order to investigate effects of different turbulent heat flux parameterizations, the light penetration, the subsurface current shear, the diapycnal mixing and additional forcings to represent the effect of advection. The main findings are: (1) the ability of the model to reproduce most of the observations collected at sea including observed microstructure data; (2) the diurnal cycle is shown to be very important for all the mixed layer parameters and for the turbulence induced by the shear especially in the presence of the Equatorial Under Current; (3) the diurnal cycle in the mixed layer is largely modulated by the antagonist effects of the wind stress and the solar heat flux.