

Quantifying the air-sea CO₂ flux at a time-series in the Eastern Tropical Atlantic

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Hourly fCO₂ is recorded at a time-series at the PIRATA buoy located at 60S 100W in the eastern tropical Atlantic since June 2006. This site is located south and west of the seasonal Atlantic cold tongue and is affected by its propagation from June to September. Using an alkalinity-salinity relationship determined for the eastern tropical Atlantic and the observed fCO₂, pH and the inorganic carbon concentration are calculated. The time-series of fCO₂ exhibits strong intraseasonal, seasonal and interannual variability. On seasonal timescales, the variations of fCO₂ and pH are mostly controlled by sea surface salinity. At interannual timescales, some important differences appear in 2011-2012: lower fCO₂ and fluxes are observed from September to December 2011 and are explained by higher advection of salty waters at the mooring. In early 2012, the anomaly is still present and is associated with lower sea surface temperatures. No significant long-term trend is detected over the period 2006-2013 on CO₂ and any other physical parameter. However, as atmospheric fCO₂ is increasing over time, the outgassing of CO₂ is reduced over the period 2006-2013 as the flux is mainly controlled by the difference of fCO₂ between the ocean and the atmosphere. A longer time-series is required to determine if any significant trend exists in this region.