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Inter-annual Variability of the Upper Ocean Carbon Cycle in the ESTOC station

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Surface waters in the subtropical gyres have persistently absorbed anthropogenic CO_2 at a rate such that their inorganic carbon concentrations have shown a clear upward trend. We report a 10-year time series of upper-ocean inorganic carbon observations from the North-Eastern subtropical Atlantic at ESTOC which indicates significant variability in the inorganic carbon fluxes produced by variations in the Winter mixed-layer depths, induced by sea surface temperature anomalies. This variability reflects fluctuations relating to the NAO for both sites of the sub-tropical gyre, with the Eastern part showing a closer correlation with a 3-year NAO delay. The response to inter-annual variations in the meteorological forcing to the extra-tropical carbon cycle can be predicted to clarify effects on future climate change.