

## Feedbacks between the AMOC and the carbon cycle: a present and future perspective

The ocean carbon sink currently mitigates the continuing build-up of carbon dioxide in the atmosphere by absorbing approximately 30% of all additional CO<sub>2</sub> derived from human activities. Within the Atlantic, the overturning circulation plays a key role, driving the carbon uptake associated with biological productivity (transporting nutrients to productive regions) and the physical carbon pump (heat fluxes changing CO<sub>2</sub> solubility of surface waters). It also transports surface waters replete with high levels of anthropogenic carbon to depth on climatically important timescales. While decadal variation in the overturning circulation has recently been linked to changing global carbon uptake patterns, knowledge about their correspondence over shorter timescales is in its infancy. Here we investigate what current observations show us about how the biological and carbon systems respond to circulation variability over multiple timescales, how models currently perform in replicating this, and what the future holds.