

## **Abrupt change of the Atlantic Meridional Overturning Circulation: theory and monitoring**

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The Atlantic Meridional Overturning Circulation (MOC) transports warm water northward in surface layers with compensating southward flow at depth. Associated with this overturning is a northward heat transport, peaking at about 1PW in the subtropical North Atlantic. It is widely (though not universally) accepted that this heat transport is an important factor in determining surface air temperatures over much of the North Atlantic sector. Projections of greenhouse-gas induced climate change over the next century generally indicate a weakened MOC due to freshening of the subpolar ocean, although there is little consensus on the rate and magnitude of the projected changes.

In this talk, some of the basic dynamical processes controlling the MOC and its variability will be reviewed, in particular, the response of the MOC to changes in high latitude forcing and the subsequent response of the atmosphere. A key motivation for improving our ability to understand and model the dynamical response of the ocean to surface forcing is to aid the design and interpretation of an observing system for the Atlantic MOC.

Under the NERC RAPID programme, a prototype MOC monitoring system is being deployed to infer the overturning at 26°N and to monitor the communication of deep MOC anomalies along the western margin of the Atlantic between Grand Banks and Cape Cod. Together with several other international initiatives, this should provide an unprecedented view of the MOC and how it is evolving.