Seminar “Ocean, Ice and Atmosphere”,
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North Atlantic Current pathways: two modes north of the Mann Eddy, 42°N

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Misconceptions about the AMOC’s role in climate often come from conflating the ‘great ocean conveyor’ conceptual view (millennial timescales) with human timescales (days to 100 years). Most current coupled ocean-atmosphere models show a discontinuity of AMOC transports in the Transition Zone (TZ), between the Atlantic subpolar and subtropical gyres. However, latitude ranges where AMOC variations are coherent differ between models and as a function of timescale (interannual, decadal, multi-decadal).
In the framework of the EU project ‘EPOC’ (Explaining and predicting the ocean conveyor), we present observation-based results assessing the coherence of transport variability in the North Atlantic Current (NAC), the surface limb of the AMOC. We reconstructed North Atlantic ocean transports in the TZ between 1993 and 2023 by applying the gravest empirical mode (GEM) technique using hydrographic profiles and satellite absolute dynamic topography.
We followed the NAC eastward and northward around the Great Banks of Newfoundland and the Flemish Cap. A discontinuity in the NAC transport variability south and north of the Mann Eddy (ME) indicates this as possible interface feature between the subpolar and subtropical gyres. Satellite data show that, as the ME gets strong and elongated, the NAC has a meandering and weak character north of it; on the contrary, at times when the ME is weak and small, NAC is stronger and more jet-like.
Preliminary results show a discontinuity of the NAC transport variability north of the Mann Eddy, indicating this as possible interface feature between the subpolar and subtropical NAC regimes.