

Lost in transition: the AMOC at the intersection of the North Atlantic subpolar and subtropical gyres

In the early part of this century, physical oceanographers largely abandoned the term “ocean conveyor belt” and opted instead for a term with more mathematical rigor to describe the ocean’s large scale overturning, namely the meridional overturning circulation, or MOC. Despite being intensively studied over the past decade, certain aspects of the MOC, defined as the zonally integrated northward flow at a particular latitude, remain elusive. In particular, the linkage between the subpolar MOC variability and the subtropical MOC variability on interannual to decadal time scales is unresolved. In this presentation, I will discuss whether our focus on this mathematical construct has impeded our understanding of the spatial and temporal variability of the water, heat and freshwater transports from the subtropical to the subpolar gyre and, conversely, from the subpolar to the subtropical gyre. In other words, I will examine the relationship between the MOC in each gyre, measured in the Eulerian frame, and the upper and lower limb throughputs, described in the Lagrangian frame. I will draw on output from the RAPID and OSNAP programs, as well as from modeling studies, in an effort to present an integrated view of the overturning circulation in the North Atlantic.