

Corresponding Author: Antoine Hochet

Affiliation/Country: LOPS, CNRS, Ifremer, IRD, France

Presentation Type: Remotely, Oral

Topic: Open Ocean Processes

Title: The Role of Large-Scale Seasonal Cycle Advection in Maintaining the Mean Ocean Salinity Distribution

Abstract: Anthropogenic climate change is projected to intensify the global hydrological cycle, posing increasing risks to human societies. Monitoring these changes remains challenging, particularly over the oceans. Since long-term shifts in the hydrological cycle are expected to alter ocean salinity—making it a useful indicator of hydrological cycle changes—understanding the processes governing salinity distribution is essential. The salinity distribution results from a balance between freshwater fluxes, which broaden it, and mixing processes, which narrow it. Using a novel diagnostic based on the mean salinity variance budget applied to the Estimating the Circulation and Climate of the Ocean (ECCO) state estimate, we find that large-scale salinity fluxes—primarily driven by the seasonal cycle—contribute approximately 23% to the mixing processes. Our framework also enables us to understand regional balances and identify key regions. Our results underscore the importance of accurately representing the seasonal salinity cycle in climate models to simulate the ocean salinity distribution realistically.

Author 2: Florian Sévellec

Author 3: Nicolas Kolodziejczyk