

Séminaire

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Salle Louis Lliboutry, LGGE

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Using Eulerian and Lagrangian approaches to investigate the Southern Ocean abyssal circulation

Changes in the Southern Ocean abyssal circulation are linked with dramatic climate events, yet the associated dynamics are poorly understood. Using a variety of global ocean eddy-permitting models, we explore the roles of wind stress, buoyancy fluxes, and mesoscale eddies on the abyssal transport. Lagrangian particle analyses are used to identify the major export pathways of Southern Ocean abyssal waters, and reveal an increase in the export to the subtropics from source regions around Antarctica in response to enhanced wind forcing. Both equatorward and poleward flows within similar abyssal density classes are enhanced by increasing wind stress, making it difficult to diagnose changes in the abyssal export in a Eulerian meridional overturning circulation framework. Both the Lagrangian particle and Eulerian analyses identify transients as playing a key role in the abyssal export of water from the Southern Ocean. Wind driven modifications to the potential energy component of the vorticity balance in the abyss are found to impact the Southern Ocean barotropic circulation. The climate impacts of large Weddell Sea polynyas, and the role of planetary waves in the global propagation of Southern Ocean disturbances will also be discussed.