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Modeling the variability of the Antarctic Slope Current

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One of the main features of the oceanic circulation along Antarctica is the Antarctic Slope Current. This circumpolar current is westward and allows communication between the three major basins around Antarctica. The Antarctic Slope Current is not very well known due to difficult access and the presence of sea ice during several months, allowing in situ study only during summertime. Moreover, only few numerical studies of this current have been carried out.

Here, we investigate the sensitivity of this current to two different atmospheric forcing sets and to four different resolutions in a coupled ocean-sea ice model (NEMO-LIM). Two series of simulation are conducted. For the first one, global configurations are run at coarse (2°) to eddy permitting resolutions (0.25°) and, for the second one, simulations with two atmospheric forcing sets with a regional configuration (south of 30°S) at 0.5° resolution are performed. The first atmospheric forcing set is based on ERA40 reanalysis and CORE data, while the second one is based on a downscaling of the reanalysis ERA40 by the MAR regional atmospheric model. The MAR model is tuned for the Antarctic region in term of orography. This improvement allows stronger katabatic and easterly winds and a colder atmosphere over the ocean.

In the presentation, we will present a synthesis of the sensitivity experiments with a particular focus on seasonal and inter-annual variability of the Antarctic Slope Current between 0 and 2000 m along East Antarctica Coast and its response to atmospheric forcing and model resolution. Our results (i) question the ability of coarse-resolution models to accurately capture well the Antarctic Slope Current along East Antarctica and (ii) illustrate the impact of forcing fields on variability of this current.