Variability in the marine environment at the Sub- Antarctic Prince Edward Islands

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The sub-Antarctic Prince Edward Islands (PEIs) (47°S,38°E) are classified as isolated, hostile, impoverished regions, in which the terrestrial and marine ecosystems are relatively simple and extremely sensitive to perturbations. Their location between the Sub-Antarctic Front (SAF) and the Antarctic Polar Front (APF), bordering the Antarctic Circumpolar Current (ACC) provides an ideal natural laboratory for studying how organisms, ecological processes and ecosystems respond to a changing climate in the Southern Ocean. Recent studies have proposed that climate changes reported at the PEI may correspond in time to a southward shift of the ACC and in particular of the SAF. This southward migration in the geographic position of major ocean fronts is likely to coincide with dramatic changes in the distribution of species and total productivity of this region. However, there are other sources of variability in the hydrodynamic conditions around PEI : upstream of the islands, a region of high eddy kinetic activity produces mesoscale features that directly irrigate the PEIs and may impact their marine environment. In order to understand better this mechanism of variabilty, we develop a high-resolution (1/12°) two-way nested simulation of the ocean circulation around PEI. A comparison between the model results and observations available at the islands shows that the nested model reproduces quite well the mesoscale signatures.