



Sensitivity of a model of the Ross Ice Shelf Polynya to different atmospheric forcing sets

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Because most of coastal polynyas are a direct consequence of the wind effect on sea-ice, and because polynyas have a very strong influence on air-sea exchanges, representation of their properties in operational and climate ocean models is certainly very sensitive to the atmospheric forcing used. The sensitivity of the Ross Ice Shelf Polynya (RISP) to two different sets of atmospheric variables is investigated in a full primitive equation regional ocean/sea-ice model of Ross Sea (20 km resolution). The first forcing set is extracted from ERA40 reanalysis and the second one is a downscaling of ERA40 with a regional atmospheric model (40 km resolution). The downscaling produces air masses that are colder and dryer than in the reanalysis, and drives a RISP of smaller extent. However this polynya is much more productive in terms of volume of sea ice formed and export of High Salinity Shelf Water. Water mass properties within the RISP are consequently strongly modified. The mixed layer is deeper, and mixed layer waters are saltier and colder in the simulation forced by the downscaling. However, comparison with satellite observations indicates that, independently of the forcing set that is used, the model still underestimates several important properties like sea ice extent and production.