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Operational coupled atmosphere - ocean - ice forecast system for the Gulf of St. Lawrence, Canada

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A fully interactive coupled atmosphere-ocean-ice forecasting system for the Gulf of St. Lawrence (GSL) has been running in experimental mode at the Canadian Meteorological Centre (CMC) for the last two winter seasons. The goal of this project is to provide more accurate weather and sea ice forecasts over the GSL and adjacent coastal areas by including atmosphere-oceanice interactions in the CMC operational forecast system using a formal coupling strategy between two independent modeling components. The atmospheric component is the Canadian operational GEM model (Côté et al. 1998) and the oceanic component is the ocean-ice model for the Gulf of St. Lawrence developed at the Maurice Lamontagne Institute (IML) (Saucier et al. 2003, 2004). The coupling between those two models is achieved by exchanging surface fluxes and variables through MPI communication. The re-gridding of the variables is done with a package developed at the Recherche en Prevision Numerique centre (RPN, Canada).

Coupled atmosphere – ocean – ice forecasts are issued once a day based on 00GMT data. Results for the past two years have demonstrated that the coupled system produces improved forecasts in and around the GSL during all seasons, proving that atmosphere-ocean-ice interactions are indeed important even for short-term Canadian weather forecasts. This has important implications for other coupled modeling and data assimilation partnerships that are in progress involving EC, the Department of Fisheries and Oceans (DFO) and the National Defense (DND). Following this experimental phase, it is anticipated that this GSL system will be the first fully interactive coupled system to be implemented at CMC.