



## **Water Circulation in the Beagle Channel, a modeling study**

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The Beagle Channel is a strait in the “Tierra del Fuego” on the extreme southern tip of South America. This narrow and long channel is one of the three navigable passages connecting the Pacific and Atlantic Oceans and it is shared between Chile and Argentina. Within the framework of the ERANET Lac Project CLIMAR (<http://climar.cnr.it/index.php/contact/>) a modeling study was conducted to investigate the water circulation inside this Channel and in the surrounding areas in order to evaluate the effects of atmospheric forcing on the channel fluxes and main hydrodynamics. A high-resolution 3D hydrodynamic model based on the finite elements method was implemented to an extended domain covering the whole Patagonian Shelf, part of the Drake Channel and part of the South-Eastern Pacific Ocean. The model horizontal spatial resolution was varying between several km for open oceans up to 100 m for Ushuaia Bay inside the Channel. A full year simulation run was carried out to reproduce the circulation inside the channel as generated by tides, atmospheric and thermohaline forcing. Atmospheric and oceanographic model forcing were obtained from available operational prediction systems for the year 2016. Nudging procedures were adopted to reproduce the effects of outer circulation patterns on the channel main hydrodynamics. Tidal dynamics were reproduced in details in the whole area, with a good accuracy inside the channel established by comparing observed and computed diurnal and semidiurnal harmonics. The model results were also compared with data on water currents, salinity and temperature fields available for the eastern side of the channel. Numerical simulations were performed to investigate the seasonal variability of the water fluxes, residual circulation and water residence times inside the channel. The obtained results provide a preliminary overview of the Beagle Channel general circulation, which is an essential step to understand the effects of the climatic variability on the local hydrodynamics.