STREAM: STirring the ocean: the Role of ocean Eddies in the north Atlantic circulation, Mid-latitude climate prediction and impacts

Description

Ocean eddies, closed circular currents that form when the mean flow meanders, are fundamental for understanding the North Atlanticcirculation and, through it, the climate of the surrounding regions. In the Gulf Stream, eddies regulate the poleward energy transport asmuch as the mean ocean flow and drive intense extratropical cyclone formation thanks to the large temperature gradients between theircores and rims. In the subpolar North Atlantic, ocean eddies regulate the freshwater transport into regions of deep water formation in theLabrador Sea; they can also form in deep currents and therefore influence the downstream circulation. However, because of their smallsize (~10500 km), ocean eddies and their interactions with other climate components are coarsely represented in most state-of-the-artclimate models. This limitation affects the majority of climate experiments done within the context of CMIP, the Coupled ModelIntercomparison Project endorsed by the World Climate Research Program. This includes the projections of future climate change used toinform the IPCC and state-of-the-art decadal climate predictions. The extent to which ocean eddies influence the sensitivity of the NorthAtlantic to climate change and its predictive capacity is therefore still unknown. Thanks to the recent advances in computing power,nonetheless, a handful of modeling centers can now afford running climate projections with global models at resolutions that resolve oceaneddies.The STREAM project takes advantage of those advances to investigate the role of ocean eddies in future climate change, as well as in thedecadal prediction skill over the North Atlantic and Europe by conducting and analyzing pioneering simulations at eddy-resolvingresolutions, only within reach of a few modelling centers worldwide. Articulated around the overarching hypothesis that the ocean eddiesare an essential component of the ocean circulation and are thus crucial for the North Atlantic and European climate, STREAM proposesthree main objectives: 1) Quantifying the impact of ocean eddies on both the present-day and future North Atlantic ocean circulation; 2)Constraining how eddies shape the influence of the North Atlantic on the European climate and its future evolution; and 3) Ev

Barcelona Supercomputing Center - Centro Nacional de Supercomputación