INMEDIATO

Influence of the Mediterranean Outflow on the Atlantic Ocean Climate: the role of local scale processes

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It is widely accepted that the Mediterranean Outflow (MO) has influence on deep water production in the North Atlantic (NA), and therefore on NA climate, but the extent of that influence remains controversial and closely linked to the dispute about preferred MO pathways to the northern seas: a direct advective pathway (strong influence) or an indirect one through mixing with NA Current waters (weak). The MO spreading pathways are quite well established in the vicinity of the Iberian peninsula from hydrographic data, unfortunately further north it is hard to estimate from observations what the direct/indirect contribution of MO to the warm saline inflow into the northern seas is. Climate models addressing this issue support the indirect hypothesis, however they are unable to resolve adequately the Strait of Gibraltar (SoG) and the Gulf of Cadiz (GoC) – key areas where local-scale processes may impact on MO properties and spreading – and fail to represent adequately the MO signatures in the NA as compared to observations, with higher salinities, mainly southward from the SoG and an exaggerated MO diffusive spreading pattern. Regional/process models with higher resolution present the disadvantage of prescribing open boundary conditions, short time-scale runs and the lack of feedback with larger scale circulation. Considering that tidally-driven processes might be relevant at the SoG and GoC, where the width of the MO plume is few tenths km, our goal is to investigate the effect of MO on the NA climate establishing: 1) how local-scale processes at SoG and GoC affect the MO properties and spreading; 2) the way the MO accesses the northern seas; 3) the relevance of that local-scale processes for the NA climate. We propose an integral approach allowing to resolve the local-scale processes at the SoG and the GoC as well as the larger-scale processes which may influence the NA climate, using an efficient ocean GCM (MPIOM) with regional high resolution allowing for long-term runs. The model is formally global. The placement of on pole in the center of Spain allows for regional high resolution (7 km) in the straight of Gibraltar and along the Iberian coasts. In a set of experiments with and without tides the spreading of the MO plume will be investigated.