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Comparison of the oceanic deep convection in the Mediterranean and Irminger Seas

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Oceanic convection is an important process because it forms intermediate or deep waters that feed the global circulation. Convection is limited to a restricted number of sites in the world ocean. If deep convection in the north-western Mediterranean is well known, deep convection in the Irminger Sea (south-east of Greenland) has been established recently and its different phases (preconditioning, cyclonic circulation, buoyancy forcing) described only in the very last years. While the northwestern Mediterranean basin is known to be the site of the formation of the Western Mediterranean Deep Water (WMDW), the Irminger Sea participates to the formation of a certain amount of newly ventilated Labrador Sea Water (LSW). In both basins, intense surface heat loss is due to cold, dry and gale force wind events (respectively the northern Mistral and north-western Tramontane, and eastern tip jets to the east of Cape Farewell) during the autumn and winter periods. Cooling promotes the reinforcement of the circulation that leads to the increase of the north-western Mediterranean cyclonic gyre as well as the Irminger cyclonic gyre. Moreover elevated wind stress curl on the left side of the gale force wind pathways add to the preconditioning of the water column. These ingredients (surface cooling, reinforcement of the cyclonic circulation and Ekman pumping) may result, certain years, to intense convective overturning. In this presentation, we discuss the similarities and differences that characterize the different phases of deep convection that have affected the two basins during the last 15 years. Among the most striking differences, the Irminger Sea is an open basin directly influenced by its vicinity to the Labrador and the more northern seas, while the north-western Mediterranean basin appears more isolated: this difference may lead to distinct mechanisms in the preconditioning of the water masses.