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How does mesoscale impact deep convection? Answers from ensemble Northwestern Mediterranean Sea simulations.

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Ocean deep convection is a major process of interaction between surface and deep ocean. The Gulf of Lions is a well-documented deep convection area in the Mediterranean Sea, and mesoscale dynamics is a known factor impacting this phenomenon. However, previous modelling studies don't allow to address the robustness of its impact with respect to the physical configuration and ocean intrinsic variability.

In this study, the impact of mesoscale on ocean deep convection in the Gulf of Lions is investigated using a multi-resolution ensemble simulation of the northwestern Mediterranean sea. The eddy-permitting Mediterranean model NEMOMED12 (6km resolution) is compared to its eddy-resolving counterpart with the 2-way grid refinement AGRIF in the northwestern Mediterranean (2km resolution). We focus on the well-documented 2012-2013 period and on the multidecadal timescale (1979-2013).

The impact of mesoscale on deep convection is addressed in terms of its mean and variability, its impact on deep water transformations and on associated dynamical structures. Results are interpreted by diagnosing regional mean and eddy circulation and using buoyancy budgets. We find a mean inhibition of deep convection by mesoscale with large interannual variability. It is associated with a large impact on mean and transient circulation and a large air-sea flux feedback.