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Does ocean intrinsic variability impact ocean deep convection ? Answers from ensemble simulations of deep convection in the Northwestern Mediterranean Sea.

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Recent studies have shown the large modulation of ocean variability from daily to multidecadal scales by the intrinsic variability arising from eddying oceans. The deep convection phenomenon is known to be impacted by mesoscale dynamics which is a major source of intrinsic variability. However, to our knowledge the role of ocean intrinsic variability on deep convection hasn't been addressed so far.

In this study, we assess the impact of intrinsic variability on the deep convection phenomenon. For that, we use eddy-resolving (2km resolution) Northwestern Mediterranean Sea simulation ensembles with perturbed initial states from the regional configuration of NEMO called NEMOMED12 with the AGRIF refinement tool in the northwestern Mediterranean. The ensemble spread allows to quantify intrinsic variability, whereas its mean is a measure of forced variability. We focus on the well-documented 2012-2013 period and on the multidecadal timescale (1979-2013).

The properties and timescales associated with deep convection are analyzed. We address the impact of intrinsic variability at the event, interannual and climatological mean timescales. We find a large modulation of the deep convection spatio-temporal variability by intrinsic variability but a marginal impact on its climatological mean state. Our results suggest intrinsic variability is a key element of deep convection variability.