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An Idealized Isopycnal 2-Layer Model of the Alboran Sea

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We use a 2-layer numerical ocean model in isopycnal coordinates with 2-km horizontal resolution and idealized topography to study the dynamics of the Alboran Sea with a climatologically meaningful Mediterranean boundary condition. In an ensemble of model runs, we adjust interface height in dependence of lower layer density at the eastern boundary (located east of the Alboran Sea), to guarantee that each run in the ensemble has the same time-averaged buoyancy flux through the Strait of Gibraltar. In our modeling framework, we interpret this boundary condition as the 'western boundary' of a (black-) box model which sets reservoir conditions for the numerical model, as a function of varying mixing regimes at constant evaporative buoyancy loss in the Mediterranean basin. In an experiment with strongly idealized topography, we compare the solution of our model in the region of the Strait with available analytical results.