

**Interaction of dense shelf water cascading and open-sea convection in the northwestern Mediterranean during inter 2012.**

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The winter of 2012 experienced peculiar atmospheric conditions that triggered a massive formation of dense water on the continental shelf and in the deep basin of the Gulf of Lions. Multi-platforms observations enabled a synoptic view of dense water formation and spreading at basin scale. Five months after its formation, the dense water of coastal origin created a distinct bottom layer up to few hundreds of meters thick over the central part of the NW Mediterranean basin, which was overlaid by a layer of newly formed deep water produced by open-sea convection. These new observations highlight the role of intense episodes of both dense shelf water cascading and open-sea convection to the progressive modification of the NW Mediterranean deep waters.