



HyMeX-SOP2, a field campaign dedicated to dense water formation associated with mistral and tramontane in the Gulf of Lion

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The second campaign of intensive measures (SOP2 - Special observation period 2) MISTRALS / HyMeX program was devoted to the observation and modeling of the formation of dense water and ocean convection in the Gulf of Lion, associated with intense air-sea fluxes produced during mistral and tramontana wind gusts. Indeed, the regional dry and cold winds during winter produce significant air-sea exchanges, including high evaporation and cooling increasing the density of upper-layer ocean waters. A progressive destabilization of the water column as a result of repeated and prolonged wind gusts can trigger ocean convection in late winter, with mixing affecting the entire water column. These few areas of ocean convection and dense water formation in Mediterranean are driving all the thermohaline circulation. Vertical mixing of the entire water column can also bring oxygen to the deeper layers, while the nutrients abundant in depth, are fed back to the surface layers. This phenomenon, the occurrence and amplitude are highly variable from year to year, but largely impact the dynamics of marine ecosystems, marine food chain and fisheries resources.

The SOP2 field campaign ran from February 1 to March 15, 2013 in the Gulf of Lion. During the month and a half, eight episodes of strong winds were observed. These conditions were conducive to the formation of dense water and ocean convection affecting the entire water column in the Gulf of Lion. The field campaign sought to describe in details the characteristics (spatial extension, temperature, salinity, current) of the zone of formation of dense waters and its exchanges with the atmospheric boundary layer. Seven gliders in turns scanned the area to make transects over the convection zone, 5 rapid-cycle argo floats have been added to the fleet of 10 floats already on site together with a dozen marisondes and SVP drifting buoys. During the field campaign, CTD and XBT measurements of ocean profiles were made by the research ship *Le Suroit* between the 2 and 22 February 2013 in the framework of the MISTRALS/MERMEX program and also during few days by the CNRS ship *le Tethys II* and the buoy tender *Le Provence* from Phares et Balises. Flux measurements by instrumented masts from the *Ocarina* platform and *Le Provence* were made, together with measurements of wave swell from *Le Provence* during its outings. One of the objectives of the campaign was also measurements of fluxes in the marine boundary layer by the SAFIRE/ATR42 aircraft and wave swells using the Kuros radar in the framework of an associated CNES project. The atmospheric boundary layer was in addition sampled using boundary layer balloons and radiosondes launched from the French coast and by the profilers network located along the French coastline, from Perpignan to the south of Corsica. The coordination centre of operations was located in the premises of the CNRM-GAME, where scientists had readily access to weather predictions from the Météo-France AROME-WMED model dedicated to the HyMeX campaigns and from operational models from Météo-France and ECMWF, to ocean forecasts from Mercator-Océan PSY2 and IBI36 operational models, MARS3D model from Prevismer and the SYMPHONIE research model from Laboratoire d'aérologie.

The presentation will provide an overview of the observation strategy and instruments deployed during the campaign, as well as the weather and ocean forecast component of the field operations coordination.