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The South Adriatic observatory: towards a multidisciplinary seafloor and water column research infrastructure

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Continuous measurements are essential to assess the interannual variability of the thermohaline circulation, water masses properties and transports, and biochemical contents. The need for high-frequency sampling to resolve events and rapid processes (on different time scale) and the long-sustained measurements of multiple interrelated variables from the sea surface to the seafloor is provided by Southern Adriatic Node. It is formed by the observatory E2M3A located in the area of the Southern Adriatic Pit (Eastern Mediterranean) at 41°32'N, 18°04'E together with a system of moorings positioned along the Bari Canyon (mooring BB lat. 41°20.49'N long. 17°11.64'E at 605 m depth; mooring FF lat 41°48.35'N long 17°02.29'E at 751 m depth) and the open-slope. The Canyon is generally assumed to play an important role in dense water sinking and sediment transfer to the deep Southern Adriatic basin.

The dense waters of North Adriatic origin flow southwards, mostly intermittently, along the Adriatic shelf and sink into the basin, both along the open slope and, more markedly, through the canyon of Bari. Thus, the basin due to its morphology, is considered as a reservoir that collects these waters together with those formed in-situ by open deep water formation (DWF) processes, exiting the Adriatic as the ADW that feeds the thermohaline circulation of the Eastern Mediterranean.

Signals of transport through the canyon to the deep pit layer are evident, in particular environmental conditions as for winter 2012, from the physical and biogeochemical data measured simultaneously at high frequency by the various system components (E2M3A and BB and FF moorings). From BB's mooring data after this event until 2018 do not show us very significant events but are episodes of lower intensity that are not clearly identified in the E2M3A time series.

The intrusion of very dense waters of North Adriatic origin (cascading) evidenced at the E2M3A, occurred in late march 2014, January 2015 and winter 2016 is remarked from salinity homogenization at the 900 -1000 m depth. This has most likely contributed to enhance the lithogenic material fluxes at the bottom trap. However, this intrusion has not been clearly detected by BB mooring but might have sunk across the open-slope.

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