



## **Imaging the shallow and deep oceanic thermohaline structure at the Madeira Abyssal Plain**

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The ocean at the Madeira Abyssal Plain (MAP) surface and intermediate levels comprises three main Water Masses, from top to bottom; the Central Atlantic water down to  $\sim 700$  m, the Mediterranean Outflow water (MOW) down to  $\sim 1700$  m, overlying the Subarctic Intermediate Water. The ocean dynamics in the region of study are influenced by the Azores Current and multiple mesoscale structures, vortices and fronts associated with the Mediterranean Outflow, the Azores current vortices shed in the lee of Madeira island, among others. Profiting from the multichannel seismic (MCS) reflection data acquired by EMEPC (Estrutura de Missão para a Extensão da Plataforma Continental) using conventional seismic processing methods we could image with unprecedented horizontal detail the thermohaline structure at the MAP. Particular attention in the processing of the MCS data was given to the shallow structure that is dominated in the recordings by the strong direct arrival in the water. We applied a modified version of the Horizontal Median Filter with Subtraction technique to image the oceanic layers up to  $\sim 75$  m water depth. For the deeper interfaces imaged ( $\sim 2000$  m depth) clear reflections in the water layer were identified up to the full length of the recording streamer (7950 m).

The top and base of the MOW are clearly identified by continuous banded reflectors. This band is tentatively interpreted as resulting from double diffusion. An elliptical mesoscale feature delimited by banded reflectors is clearly seen inside the MOW layer that is interpreted as a possible Meddy. The top 500 m show a more complex structure where a few linear reflectors and elliptical unreflective bodies are seen. The complex structure and linear features may be associated to the dynamics of Azores Current and the Azores Counter-Current, while the unreflective bodies could be the result of homogenization by turbulence.