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MEASURING THE BOTTOM LAYER DYNAMICS OF THE MEDITERRANEAN OUTFLOW IN THE STRAIT OF GIBRALTAR

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Abstract: Since 2004 a monitoring station located at the western exit of the Strait of Gibraltar (Espartel Sill), maintained with the joint efforts of the Physical Oceanography Group of the University of Málaga, the Spanish Institute of Oceanography laboratory of Cádiz and the Marine Science Institute of Andalusia, has been providing the longest series of water column current profiles ever collected in such a strategic site. The line is equipped with an up-looking long range current profiler capable to sample the water column up to few tents of meters from the surface. However, for both physical limitations of the line structure and electronic constraints of the instrument, the profiles miss the first 30 meters above the seafloor, a significant concern for a precise calculation of the Mediterranean outflow and the bottom layer dynamics. Since September 2016 a new high frequency down-looking current profiler has been included in the line, with the aim of covering the missing portion of the water column and precisely assessing the closure profile of the flow above the seafloor. The preliminary results are very encouraging and show a remarkable agreement between the profiles measured by both instruments: the boundary layer profile not only matches the closure curve suggested by the overhead profile, but even confirms the near-bottom diurnal modulation of the current suggested by previous observations, a feature that is expected to modify earlier estimations of the outflow. The resulting boundary layer is only few meters thick, revealing the high energy of the Mediterranean outflow in the strait, with flow speeds exceeding 1 m s^{-1} at only 3 m above the seafloor.

Key words: Strait of Gibraltar, Mediterranean outflow, Bottom layer dynamics, Acoustic Doppler Current profiler

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