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Surface circulation variability and upwelling phenomenology in the western Sardinia

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The mean and turbulent surface circulation of the Sardinan Sea (the shelf-slope region west of Sardinia, western Mediterranean sea) was studied by analyzing an interannual simulation performed with a hydrodinamic 3D numerical model. The model (an implementation of the Princeton Ocean Model) was forced with realistic atmospheric and oceanic fields (analyses) for the quadriennium 2008-2011. The model assimilates along track Sea Level Anomalies by means of a 3D-variational software. Velocities (meridional and zonal components) were decomposed in their mean and turbulent part to investigate the mean and fluctuating surface flow. EOF decomposition was used to get further insight on the simulated dataset and throw light on the variability of the main circulation features. At surface the mean circulation is characterized by a southward current field getting closer to the coast in the southern corner of the Island where if flows over the shelf edge. Eddy momentum flux field suggests that this southward stream is accelerated by a transfer of momentum from the eddy to the mean field. The accelerated stream contributes to precontidition the coastal upwelling in the southern area. The phenomenology of such a coastal upwelling along the SW Sardinia is described for the first time. The upwelling in the southern part of Sardinia constitutes the main surface temperature signal of the modeled SST anomalies, as evidenced by EOF decomposition. A significant correlation both with wind directions and current intensity was found. This, jointly with synoptic satellite observations before and during an upwelling event, suggests that both current and winds participate in creating the upwelling: alongshore current preconditions the upwelling that is finally triggered by favourable NW winds.