Satellite-tracked drifters data, AVISO (Archiving, Validation and Interpretation of Satellite Oceanographic data) sea level anomalies and CCMP (Cross-Calibrated, Multi-Platform) winds are used to assemble a time averaged map of near-surface geostrophic velocity field in the Mediterranean Sea, for the period spanning 1992-2009.

The wind data, linearly interpolated to locations and times of drifter observations, are used to compute the Ekman currents, which are then subtracted from drifter velocity measurements. The resulting drifter geostrophic velocities are therefore combined with satellite geostrophic velocity anomalies, to obtain an unbiased description of the Mediterranean near-surface mean geostrophic circulation field.

Maximum Ekman speeds of 7-10 cm/s are located in the regions of strong winds. The removal of Ekman currents from drifter velocity field produces a reduction of 5% in the mean kinetic energy and of 15% in the eddy kinetic energy. Pseudo-Eulerian maps of unbiased mean geostrophic flow, eddy variability and energy levels are produced and compared with the statistical results of the drifter biased mean geostrophic flow. The unbiased and biased fields are similar in terms of spatial structures but diverge in terms of mean values; the unbiased velocities are less intense than biased ones, with a mean reduction of 3-5 cm/s.

Pseudo-Eulerian maps for the Western Basin show the main cyclonic pathway of Atlantic Water, characterised by intense along-slope currents (typical speeds of 20-30 cm/s) and sub-basin scale eddies (Tyrrhenian and Algerian seas). In the Eastern Basin the maps emphasize seasonal variability and interannual reversals of surface circulation.