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Mass transports in the southern edge of the NW African Upwelling System

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An efficient method that analyses the circulation patterns in the southern edge of the NW African Upwelling System is the inverse box model (Wunsch, 1978). This model assumes that the ocean is hydrostatic and in geostrophic balance, allowing the exchange of properties between layers bounded by neutral density surfaces. It provides the geostrophic flow using the thermal wind equation that obeys conservation for mass and also for the anomalies of salt and heat into a closed volume. It also considers the adjustment of fresh water flux and Ekman transport at surface.

Here the inverse model is applied to a combined hydrographic set of CTD and XBT data from a survey carried out from July 10 to August 11 of 2017 in the area from 17.5 to 23ºN and from 18.5 to 26ºW. As well as this enclosed area includes the upwelling process in its eastern margin during its less active period, this area seems to be ideal to study the Cape Verde Frontal Zone which separates saltier, warmer North Atlantic Central Water and fresher, cooler South Atlantic Central Water.

The inverse model provides estimates of velocities referenced to a given neutral surface previously selected and analysed in deep. This solution is validated with the velocity profiles collected with the sADCP during the cruise. These transports, taking into account the causes of their potential imbalances, give us very valuable information about the dynamics at this active area.

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