Shipboard Observations

The Strait of Gibraltar is the choke point for the water mass exchange between the Atlantic Ocean and the Mediterranean Sea. The Algeciras-Ceuta section was intensively observed, here the interface fluctuations are much smaller than at the Camarinal Sill, where measurements traditionally were made. Data collected on two cruises with 101 XBT, 134 CTD/ADCP casts and several vmADCP sections covering the complete M2 tidal cycle were combined with long time series (over four years) from moorings to analyse the structure of the flow.

- quasi-synoptic vmADCP sections were used to describe the mean flow in the upper 300 meters at the sill and at the eastern section
- rapid CTD-yoyo casts and a vmADCP allowed us to observe the physical properties and evolution of the internal bore
- simultaneous ADCP and CTD time series over one tidal cycle give estimates of the composite Froude number for spring and fall
- along-strait vmADCP sections contribute to the understanding of the transmission zone between the Atlantic Ocean and Mediterranean Sea

Inverse Model

Inverse modeling provides a tool to combine long timeseries from moorings with shipboard observations providing high spatial resolution, which allows it to extract the temporal as well as the spatial information from the measurements. This means that also the locations with an insufficient temporal sampling can be taken into account and complemented with information from adjacent locations.

Model results:

- description of the flow and interface motion as a function of time and 2D-space.
- accurate water mass transport estimates for upper and lower layer ($Q_U = 0.81 \pm 0.07$ Sv, $Q_L = -0.76 \pm 0.07$ Sv)
- analysis of amplitude and phase of the most important tidal constituents

Acoustic Measurements

Two weeks of acoustical data were collected during spring 1996 to test the suitability of 2kHZ transceivers for monitoring the Strait of Gibraltar. Two-way measurements of the sound travel time allow to form the sum and the difference of travel time for resolved sound paths.

Applications:

- measuring mean current of lower layer with high precision
- recording temperature and salinity for both layers
- monitoring depth of the interface between the Atlantic and Mediterranean Water
- register the longperiodic variations of the interface slope along the strait.

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