



Volume transports comparison between recent observations and numerical modeling simulation at the strait of Gibraltar

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Seasonal and tidal volume transport variability through the strait of Gibraltar has been evaluated by mean of a high resolution numerical model. The model uses a coastal-following curvilinear orthogonal grid, that includes the Gulf of Cadiz and the Alboran Sea, with very high resolution in the Strait (less than 500 m). It is forced by imposing the six major semidiurnal and diurnal tidal constituents (M_2 , S_2 , N_2 , O_1 , K_1 , P_1) along the Atlantic and the Mediterranean open boundaries. The experiment covers two entire semidiurnal tidal cycle (29.58 days). Model results, in terms of cotidal elevation maps and major and minor axis of the current tidal ellipses were compared with all historical observed data as well as very recent data collected in Espartel Sill, at $35^{\circ}51.7'N$ $5^{\circ}58.6'W$, within the frame of the Spanish-funded INGRES project. This station consists of an uplooking moored ADCP at 20 m above seafloor (360 m) with a bin-size of 8 metres. It was installed in September 2004 and it is still collecting information. In September 2006 it was visited for the last time so that the presently available time series is two year long. For this work, just the 2005-year data is used. At this location, a more detailed comparison has been performed. Amplitude and phase vertical profiles of the main diurnal and semidiurnal tidal constituents were compared and volume transport was estimated taking the maximum horizontal velocity shear, between the Atlantic and Mediterranean waters, as the interface depth. Differences found between the mean observed transport and the modelled one are lower than 10%, whereas the mean interface depth obtained is just a few of metres deeper within the model results. An alternative method, based on the particle tracking simulation, has been also applied to model results to evaluate, in a more objective way, the volume

transport through the strait.