



Assessment of the inter-annual variability of the surface coastal flow in front of the Venetian Lagoon (North Adriatic Sea) by the HF radar system

V. Kovačević (1), M. Gačić (1), I. Mancero Mosquera (1,2), A. Mazzoldi (3)

(1) Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS), Trieste, Italy,

(2) Escuela Superior Politécnica del Litoral, Guayaquil, Ecuador,

(3) ISMAR-CNR, Sezione di Venezia, Italy

vkovacevic@ogs.trieste.it

Abstract

The HF radar system in the coastal area outside the Venetian lagoon, has provided a long term hourly data on the surface circulation. The first phase of measurement (November 2001 – October 2002) conducted by two stations has been followed by the second one, June 2003 – December 2003. For the third phase, started in January 2004, the third station has been added, which has enabled monitoring of a wider area reaching all three lagoon inlets. More than a year long, the last phase provides data set for mapping of the principal tidal constituents, small scale dynamics analysis, and mean flow of that area. Even though the tidal signal is relatively weak (3-7 cm/s), it has been subtracted from the raw data, and such de-tided signal was used in order to study characteristic motions in the area. In particular, the attention has been paid to an inter-annual variability illustrated by comparison of the same periods (months) in different years. For instance, the three succeeding months of August (2002, 2003,

and 2004) show a typical form of the coastal flow toward south, being part of the cyclonic cell of the general circulation in the Northern Adriatic. During 2004, the monthly flow reveals a current inversion toward north in a narrow coastal strip. The corresponding distribution of the eddy kinetic energy, directly proportional to the flow variance, indicates higher variability in 2002 and 2004, than in 2003. On the contrary, the month of September shows quite similar mean monthly flow characteristic for all three years, while the corresponding eddy kinetic energy content is lower in the narrow coastal strip in 2002 and 2004, than at the margins of the study area. In 2003 the minimum variability is located in the central area, detached from the coast. This and other examples of the inter-annual flow fluctuations are examined in more detail and put in the relationship with the local meteorological conditions, considering mainly the fresh water discharge and wind variability.