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Nonlinear features of nontidal flow in the inlets of the Venetian lagoon

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Different types of long-range correlation are studied using nonlinear fractal methods. Time-series of vertically averaged ADCP currents, ranging from 12 February 2002 until 5 October 2004, were detided via Harmonic Analysis. The Detrended Fluctuation Analysis (DFA) was applied to the nontidal component for measuring existence of long-range correlations in the non stationary fluctuation patterns in the inlets of the Venetian lagoon: Lido, Malamocco and Chioggia.

The DFA method computes root mean square fluctuation F(n) for the integrated and detrended series in various "time scale" n. The scaling in the time-series is indicated by a power law behaviour between n and F(n) i.e. a linear relation in log-log plots.

Preliminary results show that scaling coefficient is not independent of scale with a crossover point where time scales are on the same order of magnitude of the two most important seiches of Adriatic Sea (10.8h and 22h). For smaller scales there exists persistent long-range correlations in the three inlets, but for larger scales there is a noisy behaviour in Lido and Chioggia with no correlation on data, but some evidence of anti-correlation has been found in the Malamocco time-series.