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Climatic forcing on hydrography of a Mediterranean bay (Alfacs Bay)

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Time series of meteorological and hydrographic variables were analyzed using Huang's Empirical Mode Decomposition (EMD) to ascertain the relationships among climatic forcings and the hydrographic behavior in an estuarine bay. The EMD method allowed to separate the different characteristic oscillation patterns (or modes) of a 14 year-long time series of weekly hydrographic (water temperature and salinity) and meteorological (air temperature, pressure, wind and precipitation) data from Alfacs Bay (Ebre delta, NW Mediterranean). In order to explore the relations between couples of oscillation modes from different series, we developed a correlation index based on the phase differences between these modes. Common characteristic modes in the studied series were a seasonal pattern and an inter-annual oscillation. The comparison between the series of meteorological and hydrographic variables showed significant correlations of two modes (of one year and two-three year periods, respectively) of water temperature with the corresponding two modes of air temperature and air pressure. There were also significant positive correlations between wind speed and water temperature.