



Influence of atmospheric pressure on the circulation of a submarine canyon

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This study addresses the vertical structure of currents in a submarine canyon (Jolúcar canyon, which is located in the deltaic width of the Guadalfeo river, southern Spain), by means of observations and analytical solutions. Observed data are analyzed by Empirical Orthogonal Functions and spectral analysis techniques. Our measurements reveal that the main two empirical orthogonal modes are related to wind forcing and atmospheric pressure gradients, as shown by cross-spectral analysis. In order to explore the dynamics associated with the observed results, the classical analytical solutions of wind-induced vertical current profile are extended to include the influence of barotropic pressure gradient, in particular of the atmospheric pressure, in a non-homogeneous water column. Although the theoretical model is simple, the current profiles appear similar to those observed in the field. Thus, we demonstrate that the circulation in the Jolúcar canyon can be influenced by atmospheric pressure gradients.