

## **Linking coastal metocean processes to deep sea circulation: applications from the Adriatic “miniature ocean”.**

Due to its peculiar topographic and climatic conditions, the Adriatic Sea is a paradigmatic natural laboratory for the investigation of a number of meteorological and oceanographic processes, with important multi-disciplinary implications, spanning from coastal engineering to fishery, marine geology and deep sea ecology. Besides, by means of the mechanism of dense water formation, this relatively small basin is actually one of the “cold engines” of the Mediterranean thermohaline circulation, the large-scale current system that conveys water masses (as well as heat, nutrients, and pollutants) throughout the whole Mediterranean region, providing a fundamental contribution in controlling the climate in this area. By taking the Adriatic Sea as an example, this informal seminar will aim at providing an overview of the main principles of physical oceanography and a feeling of its relevance in different scientific and socio-economical contexts, as well as some deeper insight in the processes related with dense water dynamics.

The first part of the talk will thus introduce some basic theoretical and phenomenological framework, together as some information on the observational and numerical modelling approaches to the study of ocean dynamics. In the second part of the talk some results from an extensive characterisation of an intense cold air outbreak occurred on Winter 2012 will be presented, discussing the mechanisms controlling the formation of dense water and its migration along the continental shelf and through the continental margin, down to the abyssal plain. The main processes occurring at different scales will be described, from the air-sea interface exchanges of heat, humidity and momentum (and the possible strategies for their description within a numerical modelling system), to the drivers controlling the downflow of dense water towards the abyssal region. An outlook on the main results of recent studies will also open a window on how dense water dynamics contribute in controlling the continental margin morphodynamics and the functioning of deep-sea habitats.