

Lecture 26, Friday, May 30, 14.30-15.30

Modeling Lagoon ecosystem. A case study: Venice, Italy

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The Lagoon of Venice covers an area of about 550 square kilometers. Oblong and arched in shape, the lagoon is 50 Km long and 8-14 Km wide. The ecosystem comprises three distinct and inter-connected natural entities. They are: a drainage basin, which brings rainwater and river water into the lagoon, the lagoon itself, and the northern Adriatic sea with the continual ebb and flow of its tides in and out of the three lagoon entrances. This is an environment that is full of variables, full of movements, with a wealth of resources, but particularly vulnerable.

The water dynamic inside the lagoon is presently very active because of human intervention carried out in the past and in more recent time through different hydraulic works. Focusing on the dynamics of the sea exchange, one has to consider how strong are the driving winds and tides in the Adriatic. Another peculiar phenomenon to be considered is the frequent return of the surges in the days following the first one: it is related with a kind of bouncing of the Adriatic after the first hit. The so-called seiches, or free oscillations of the sea, are the cause of it. Since surges and ordinary tides add up, the total observed effect can be occasionally be worse after the windstorm has been forgotten. Last but not least pollution of the lagoon water is one of the relatively most recent but also the most serious problem.

The presentation will focus on the scientific problems related to the description and understanding of the Venice Lagoon ecosystem and its modeling approach. Long-term nonlinear effects induced by the wind stress and geographical morphology on the Venice Lagoon hydro-dynamical circulation and physical properties correlated will be discussed. Recent results of numerical simulations will be shown in order to illustrate the methodology used.