Geophysical Research Abstracts
Vol. 16, EGU2014-7234-1, 2014
EGU General Assembly 2014

The fate of Mediterranean lagoons under climate change

Georg Umgiesser (1,3), Christian Ferrarin (1,2), Andrea Cucco (2), Francesca De Pascalis (1), Michol Ghezzo (1), Debora Bellafiore (1), and Marco Bajo (1)

(1) ISMAR-CNR, Oceanography, Arsenale Tesa 104, Castello 2737/F, 30122 Venezia, Italy, (3) CORPI, Klaipeda University, H. Manto 84, 92294 Klaipeda, Lithuania, (2) IAMC-CNR, Oristano Unit, Loc. Sa Mardini, 09072 Oristano, Italy

A numerical model (SHYFEM) has been applied to 10 Mediterranean lagoons and a comparison study between the lagoons has been carried out. The lagoons are the lagoons of Venice, Marano-Grado, Varano and Lesina in the Adriatic Sea, the Taranto basin in the Ionian Sea, the Cabras lagoon in Sardinia, and the lagoons of Ganzirri and Faro in Sicily, the Mar Menor in Spain and the Nador lagoon in Morocco.
These lagoons give a representative picture of the lagoons situated around the Mediterranean basin. The lagoons range from a leaky type of lagoons to a choked type. The number of inlets ranges from just one in the Nador lagoon to 6 in the case of the Marano-Grado lagoons. Tidal range is from nano-tidal to micro-tidal. The depth ranges from an average depth of 1 m to up to 40 meters.
The model is a finite element model, especially suited to shallow water basins with complicated geometric and morphologic variations. The model can compute the basic hydrodynamics, dispersion of tracers, temperature and salinity evolution, sediment transport and ecological parameters.
Building on an earlier study that focused on the classification of Mediterranean lagoons based on hydrodynamics, exchange rates and renewal time, this study is concerned with the changes in physical parameters under climate change. Data from IPCC has been used to simulate the changes in renewal time, salinity and temperature of all lagoons, with respect to the control simulation. Whenever possible downscaled data for the Mediterranean basin have been used. Sea level rise scenarios are taken from the last IPCC report. The model has been applied in its 3D version and the chosen setup allows a comparison between results in the different lagoons.
Results indicate that the differences of renewal time between all studied lagoons become smaller. This means that leaky lagoons become less leaky and choked lagoons less choked. What concerns temperature and salinity, changes occurring in the sea are amplified inside lagoons. All lagoons show an increase of temperature higher than the one found outside in the sea. Salinity changes are also enhanced.
This study shows how numerical modeling can be a useful tool to study the hydrodynamic changes forecasted to happen in transitional water bodies like lagoons.