Geophysical Research Abstracts
Vol. 17, EGU2015-13045, 2015
EGU General Assembly 2015

Coastal morphodynamic impacts induced by main storm phenomena on the Central East Tyrrhenian Sea

Marco Marcelli, Francesco Paladini de Mendoza, Simone Bonamano, Sergio Scanu, and Riccardo Martellucci
University of Tuscia, DEB, Department of ecological and biological sciences, Civitavecchia, Italy (marcomarcell@unitus.it)

The coastal area is a major dynamic systems of the Earth and in particular the sandy beaches are very sensitive to waves energy variation which mainly force morphological changes. Waves drive beaches morphological changes particularly when they exceed a determined threshold. In a short term (from hours to days) of storm conditions, intense erosion phenomena occur. They generate overwash, dunal erosion, loss of lands, damage to engineering structures and coastal ownerships. Several hazardous weather events take place every year in the Mediterranean region and cause relevant economic losses. The western Mediterranean Sea is an area subjected to cyclonic activity. In winter and during the negative phase of North Atlantic Oscillation (NAO), cyclonic activity generates extreme events as intense precipitation, the highest waves, landslides and surges. The study area is the Latium coast, eastern side of Central Tyrrhenian Sea.Wave data were measured by three wave buoys. In order to obtain a better spatial coverage useful to take into account the waves variability over the study area, wave data also has been calculated by WAM model.
On the basis of storms events selected by a threshold criteria of events greater than 2 m for a period more than 6 hour, the Mean Sea Level Pressure (MSLP) field was analysed through Empirical Orthogonal Function and cluster analysis obtaining 3 classes of barometric events. The storms are always induced by the lows of Gulf of Genoa to be formed in the Mediterranean region triggered from the middle latitude storms which center is located in the northern atlantic and scandinavian region. The different classes, with a probability of 28%, 23% and 49%, generate different circulation driving waves from different directions. The classes of storms show spatial differences in terms of main directions but show similar behavior in terms of distribution of wave direction. In this study the wave and wind field induced by the different barometric condition are used as input of morphodynamic model Delft-3D. The model domain was built along the delta cusps of Tevere river (Latium region), which is the largest river basin of the Central Italy. This area is a very attractive coast for the natural resources and touristic activities; since the 1960's is interested by strong erosion trend due to the important decrease of Tevere solid transport and becoming particularly sensitive to erosive effect of storms. The morphodynamic parameters setting were obtained by simulations reproducing seasonal measurement of submerged beach performed in 2007. The correlation between model results and observations of shoreline position (2005 -2011) confirms the validation of the method. The identification of macroscale features driving local processes is a fundamental topic in the climate change perspective.