Plinius Conference Abstracts,
Vol. 11, Plinius11-109, 2009
11th Plinius Conference on Mediterranean Storms


# Evolution of potentially eroding events along the northern coast of the Iberian Peninsula

D. RASILLA ÁLVAREZ and J.C. GARCÍA CODRÓN

Universidad de Cantabria, Grupo GIMENA, Departamento de Geografía, Urbanismo y OT, Santander, Spain (rasillad@unican.es)

The anthropogenic global warming is expected to result in a rise in sea-level, accompanied by changes in extreme climate events, such as the frequency and intensity of storms. Such scenario would result in an acceleration of coastal erosion.

The aim of the present study is to assess the temporal evolution of potentially eroding events along the northern coast of the Iberian Peninsula during the second half of the 20th century, and to investigate changes in forcing processes such as the frequency and magnitude of storm surges and high wave events. To characterize the potentially eroding events, the total elevation of the water level was selected, being calculated as the sum of the contributions of the average water level, wave run up and the storm surges. Potentially eroding events were identified and quantified following a two-step procedure. Through the first step the potential flood induced by a given storm was estimated by simulating its effects on a theoretical beach profile (intermediate) using an empirical parameterization for extreme run-up approach. The second step consisted on characterizing the maximum storm surge registered during a storm.

Those parameters were calculated from hindcasted data (storm surge, wave heights and period, wind speed and direction), retrieved from the SIMAR-44 database (Puertos del Estado), and validated against actual tide gauge measurements and buoy data (RedMar and RedExt networks).

Analyses of total water levels showed a long term increase since 1958, resulting from the increase of mean sea level; conversely, a reduction of the frequency and the intensity of the storm events were deduced from the analysis of meteorological records. Since the impact of the storms on macro- and meso- tidal coast closely depend on the tides, a storm impact index was computed taking into account the storm surge magnitude, the wave heights and time duration during which a predefined threshold was exceeded by the sea level.

The results are consistent with the analysis of the shoreline evolution on a specific sector of Cantabria (Oyambre) through the comparison of aerial photographs taken between 1957 and 2005. From the late 50´s to late 70's, the shoreline significantly retreated, in correspondence with the period of maximum storm activity. Conversely, shoreline retreat slowed down during the late 1980s and 1990s while storm activity considerably decreased. Thus long-term coastal erosion, due to the occurrences of high water levels embedded into a long trend term of sea level rise, has been balanced by the reduction of the frequency and intensity of the Atlantic storms.

Since relative sea-level will continue rising in the future, most of the coastal morphologies will probably be more frequently reached by the sea, increasing the flooding risk in low-lying sectors and promoting landslides along the cliffs.