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Coastal floods and decadal changes: the climate factor

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Observation has widely shown for nearly all last century that the Spanish (Dynamic) Maritime Climate was following around 10 to 11 year cycles in its most significant figure, wind wave, despite it being better to register cycles of 20 to 22 years, in analogical way with the semi-diurnal and diurnal cycles of Cantabrian tides. Those cycles were soon linked to sun activity and, at the end of the century, the latter was related to the Solar System evolution. We know now that waves and storm surges are coupled and that (Dynamic) Maritime Climate forms part of a more complex "Thermal Machine" including Hydrological cycle. The analysis of coastal floods could so facilitate the extension of that experience.

According to their immediate cause, simple flood are usually sorted out into flash, pluvial, fluvial, groundwater and coastal types, considering the last as caused by sea waters. But the fact is that most of coastal floods are the result of the concomitance of several former simple types. Actually, the several Southeastern Mediterranean coastal flood events show to be the result of the superposition within the coastal zone of flash, fluvial, pluvial and groundwater flood types under boundary condition imposed by the concomitant storm sea level rise.

This work shall be regarded as an attempt to clarify that cyclic experience, through an in-depth review of a past flood events in Valencia (Turia and Júcar basins), as in Murcia (Segura's) as well. The Valencia case study has been specifically studied in relation to the FP7 SMARTeST Project. The historical records of the Turia/Jucar River basins floods are highly large, most of them affecting to Valencia City or surroundings. The following years are considered as having registered great major floods: 1321, 1328, 1340, 1358, 1406, 1427, 1475, 1476, 1487, 1517, 1540, 1546, 1555, 1557, 1577, 1581, 1589, 1590, 1610, 1651, 1672, 1731, 1737, 1766, 1770, 1776, 1783, 1793, 1845, 1860, 1864, 1870, 1897, 1949, 1957, 1982 and 2000. There is no information about the sea level in most of events, but it is possible to think that the flood was due, as currently, to a cold drop phenomenon so that the high sea level, preventing the drainage, collaborated to maintain high the flood waters.

The analytical problems in these areas are not just on climatic effects and associated Sea Level Rises, but on subsidence and isostasy, which are exacerbated by land transformation and settlement evolutions. Cities have spread in every case onto areas below the threshold, if not originally founded there. The current climate change is generating besides an upward trend in average sea level.
As the accuracy of most of the available information is poor, this document will mainly focus on 3 major events in Valencia, 1776, 1957 and 1982. Through a revision and analysis these case studies costal floods have been sorted out in this work, putting particular stress to distinguish coastal from maritime floods, and so coastal flood nature, types and cycles will be described.