

Intense storm activity during the Little Ice Age on the French Mediterranean coast

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Understanding long-term variability in the frequency of intense storm activity is important for assessing whether changes are controlled by climate evolution. Understanding this variability is also important for predicting present and future community vulnerability and economic loss. Our ability to make these assessments has been limited by the short (less than 50 years) instrument record of storm activity. Storm induced deposits preserved in the sediments of coastal lagoons offer the opportunity to study the links between climatic conditions and storm activity on longer timescales. We present a record of these extreme climatic events that have occurred in the French Mediterranean coast over the past 1500 years. The identification of these extreme events is based on the analysis of sediment cores from Gulf of Aigues-Mortes lagoons that contain a specific sedimentary and geochemical signature associated with intense storms.

Overwash deposits do not show any evidence of intense storm landfalls in the region for several hundred years prior to the late 17th century A.D. The apparent increase in intense storms around 250 years ago occurs during the latter half of the Little Ice Age, a time of lower continental surface temperatures. Comparison of the sediment record with palaeoclimate records indicates that this variability was probably modulated by atmospheric dynamics. The apparent increase of the superstorm activity during the latter half of the Little Ice Age was probably due to the thermal gradient increase leading to enhanced lower tropospheric baroclinicity over a large Central Atlantic/European domain and leading to a modification of the occurrence of extreme wind events along the French Mediterranean coast.