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## The Phoenician settlement of Cerro del Villar (Málaga, southern Spain) and its natural vulnerability

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Tsunamis and other extreme wave events draw a severe threat to coastal populations today and in historic times. The ancient settlement of *Cerro del Villar* located in present-day Málaga, southern Spain, was built by Phoenicians around the second quarter of the 8<sup>th</sup> century BCE on a small sand bar (island) in the wide estuary of the Guadalhorce River. Later, the sand bar connected to the southern river bank and alluvial plane. Due to the low height above mean sea level, the site has been prone to river floodings, as well as extreme wave events of the Mediterranean Sea. In order to understand the palaeoenvironmental evolution and settlement history, as well as its vulnerability, it is important to analyse the nature of the events by dating and interpretation of the sedimentary record.

Here, we present first results of a short field campaign carried out in October 2019 at the western end of the Guadalhorce River palaeo-estuary, outside the boundaries of the archaeological zone. Two sediment cores (MAL-CV-1; ca. 3.70 m length and MAL-CV-2, ca. 4.69 m) were drilled southwest of the Phoenician site. A total of eight non-invasive ground-penetrating radar (GPR) profiles were carried out in the surroundings of the cores, and additional GPR profiles close to the beach were taken to understand the changes in the depositional environment along the coast. The cores cover a stratigraphy of three different sediment units: a basal sand unit representing a palaeo-beach, followed by a large silt and clay unit developed in a lagoon environment, and topped by another silt and clay unit representing floodplain conditions. At MAL-CV-1 two possible high-energy event units (Ey and Ez) interrupt the low-energy silt and clay units. At MAL-CV-2 event unit Ey is preserved as well, the other event unit Ez is concealed by an anthropogenic unit rich in ceramic, brick and glass fragments. GPR profiles show the same stratigraphy and allow a lateral continuation of the different units and event deposits. With the help of these GPR profiles, event unit Ez can be traced in-between the anthropogenic unit of MAL-CV-2. In terms of chronology, two radiocarbon dates establish the transition between the basal palaeo-beach and the lagoon at 4352-4325 cal. BC (6274-6301 cal. BP) and the anthropogenic layer to be younger than 2201-2126 cal. BC (4075-4150 cal. BP). The establishment of coastal freshwater lagoons with plentiful *Hydrobia* gastropods and ostracods resembles the last stage of post-glacial sea level rise in the Mediterranean. In the future, these promising first results will be extended by additional

radiocarbon dates and a palynological study to better understand the climate and palaeoenvironmental evolution.