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A fast refill of the Mediterranean after the Messinian salinity crisis? Looking for independent evidence

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One of the main competing scenarios proposed for the termination of the Messinian salinity crisis consists of a geologically-rapid refill of the Mediterranean after a km-scale drawdown of the Mediterranean Sea level. The main evidence supporting this Zanclean Flood scenario is a nearly 400 km long and several hundred meters deep erosion channel across the Strait of Gibraltar. This erosion channel extends from the Gulf of Cadiz to the Algerian Basin and implies the excavation of ca. 1000 km3 of Miocene sediment and older bedrock. However, additional evidence supporting this catastrophic flood hypothesis is missing, other than the fast transition from MSC deposits to open-marine facies. Here we test two consequences that an outburst flood of the Mediterranean should imply: First, an excavated channel similar to the one across the Gibraltar Strait should be present in the old sill separating the east and west Mediterranean domains (none has been yet reported). A second smoking gun would be finding the present emplacement of the materials eroded during the Zanclean flood (but quantitative predictions of where to look for them are still missing).

In a first attempt to predict the distribution of those flood deposits, we show results from a 2D numerical model of water flow to simulate the transport of material eroded from the Strait of Gibraltar. We estimate the areas of sediment deposition in the Mediterranean Sea depending on the grain size. Suspended load is deposited in areas sheltered from the jet of incoming water by the local topography and areas where water currents abruptly decrease due to a sudden increase in water depth. Bed-load sediment, in contrast, follows water streamlines and deposits are much more localized than in the case of suspended-load. We compare the results with seismic profiles that may exhibit flood-related deposits in the eastern Alboran Sea.
Furthermore, we make use of a preliminary interpretation of multichannel data in the western Ionian Basin to identifying a chaotic body of up to 760 m in thickness and 2400 km3 in volume. The location of these deposits next to the Cassibile theatre-shaped canyon (SE Sicily margin) suggest that this may have been excavated by a large flow event in the geological past, a hypothesis that we discuss by comparing to other well-known, subaerial megaflooding scenarios.