Modelling tsunamis in the Eastern Mediterranean Sea. Application to the Minoan Santorini tsunami sequence as a potential scenario for the biblical Exodus

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Modelling tsunamis in the Eastern Mediterranean Sea. Application to the Minoan Santorini tsunami sequence as a potential scenario for the biblical Exodus

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Abstract

A numerical model which simulates the propagation of tsunamis in the Eastern Mediterranean has been developed. Several tsunami sources have been considered: earthquakes associated to geological faults, submarine landslides, entry of pyroclastic flows into the sea and the collapse of a volcano caldera. The model has been applied to different past events for which historic data or previous simulations exists, to test its performance. Then it has been applied to simulate tsunamis triggered by the explosion of Santorini volcano (17th century BC) in the Aegean Sea. While the model accounts for run-ups in the Aegean coasts, it fails to explain the isochronous tsunamigenic deposits reported in eastern Sicily and the levantine coasts. A scenario of a sequence of intense tectonics strain release triggering a series of tsunamis could better fit the whole dataset. Thus, a submarine landslide at the Gulf of Sirte may explain the Augias megaturbidite and the sedimentary deposits reported in Augusta Bay (Sicily). Similarly, a sequential tsunami in the eastern Nile Delta may explain the tsunamigenic deposits found in Israel and Gaza. Considering the former coastline at 3500 y BP, it could also provide a plausible scenario for the biblical sea crossing related in the Exodus.

Keywords: numerical modelling, Eastern Mediterranean, tsunamis, landslide, caldera collapse, Santorini, Nile Delta

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