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On- and offshore tsunami traces around Actio Headland (NW Greece)

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The area between Lefkada and Preveza at the entrance of the Ambrakian Gulf (NW Greece) is exposed to the northernmost part of the Hellenic Arc. Here, the Kefalonia and Lefkada transform faults result in the recurrence of strong earthquakes. The region thus belongs to the seismically most active regions of the Mediterranean. During the last years, evidence for multiple tsunami impact was found in numerous on- and offshore geological archives between the cities of Preveza and Lefkada. This paper presents, for the first time, detailed offshore traces of extreme events and relates them to onshore terrestrial data. Onshore, sedimentological and geomorphological analyses of terrestrial vibracores and natural sediment outcrops between the Strait of Preveza and the Bay of Agh. Nikolaos show clear signs of tsunamigenic inundation. At many sites we encountered sedimentological characteristics of tsunami deposits such as (i) erosional unconformities, (ii) rip-up clasts from underlying stratigraphic units, (iii) fairly unsorted deposits out of coarse-grained material including shell debris and ceramic fragments as well as (iv) lamination structures within event deposits. We further detected dislocated blocks, up to 15 m^3 large, and fields of scattered stones from the littoral zone up to 15 m a.s.l. as well as washover fans and plains. Finally, allochthonous marine sediments found in near-coast freshwater Lake Voulkaria document tsunamigenic landfall. Offshore geophysical studies comprising sub-bottom profiling (“boomer”) and side scan sonar campaigns were carried out in summer 2007.

Results from the Bay of Agh. Nikolaos reveal an erosional unconformity at the base of Holocene deposits which, due to its landward dipping, may not be interpreted as a transgressive unit. Moreover, we located a system of steep erosion channels in the Strait of Preveza which are strongly inclined toward the inner Ambrakian Gulf. In the inner Bay of Agh. Nikolaos, dislocated blocks and stones as well as rubble ridges were discovered by means of scuba diving; these structures also must have been displaced by extreme events. Finally, underwater corings revealed sandy event layers in brackish-shallow marine mud. These offshore traces underline that the Preveza - Agh. Nikolaos coastal zones were subject to high-energy input and correspond to previous findings of tsunamigenic deposits on Actio Headland. Geochronological data, derived from radiocarbon datings and diagnostic ceramic fragments, were used to define terminae ad, post or ante quem for tsunami events. Available data indicate multiple tsunami impacts at 2800 BC, 1000 BC, 300 BC and around 1000 AD.