



Tsunami and seismic risk in a world cultural heritage site: the little known earthquakes and tsunamis of 1585 and 1905 in Mount Athos (North Greece)

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Mount Athos, northern Greece, is a ~60 km long and 8-12 km wide peninsula running NW-SE. It is a UNESCO World Cultural Heritage Site worldwide renowned for its monastic community with tradition from 10th century AD. This community consists of 20 monasteries and many smaller monastic units, all being of great religious and historic value. Every year Mt Athos attracts thousands of visitors from all over the world. Treasures and archives of uncountable value have been accumulated there through the centuries. Historically at least 13 strong earthquakes are known to have hit Athos peninsula. Therefore, the seismic risk is particularly high there. We reviewed the seismic activity of the area and searched in various archives for new material useful for the evaluation of the seismic and tsunami risk in Mt Athos. A Greek report on an unknown earthquake event that destroyed the town Thyssos of Athos in 458 BC was found. However, more research is needed to judge about the reliability of this report. Key earthquake event with source likely situated to the east of the peninsula was that on 8th of November 1905 with estimated magnitude ranging from 7.0 to 7.5. However, very little is known about the impact of this earthquake. To obtain further information unpublished material was collected from contemporary archives stored in Mt Athos and in the National Observatory of Athens. The collection included also a set of contemporary press reports and Mt Athos archives published in religious books but not used in the seismological literature so far. Examination of the collected material revealed many details about the 1905 earthquake perceptibility area and the damage caused in various monasteries and in nearby towns away from the monastic community. Seismic intensity level has been assigned to several observation points, while the earthquake magnitude was determined from intensity data. Also, it was found that in the eastern side of the peninsula the earthquake triggered extensive ground failures, including landslides, rock falls, opening of new water springs and ground subsidence. It was also revealed that the landslides caused a local tsunami 3 m high. At least 11 persons were killed by both the landslides and the tsunami. One of the unpublished archives supplied information about the 1585 AD large earthquake and revealed that a local tsunami was triggered in this case as well. It is the first time to learn that tsunamis, even local ones, were observed in the Mt Athos coasts. Therefore, a plan for the seismic risk assessment in Mt Athos may include not only seismic shaking parameters but also risk associated with secondary effects such as tsunamis, landslides and rock falls. I acknowledge support of this research by the project "GEORISK – Developing Infrastructure and Provision of Services through Actions of Excellence to Reduce the Impact of Geodynamic Hazards" (MIS 5002541), "Action for the Strategic Development of Research and Technology Organizations", funded by the Operational Programm "Competitiveness, Entrepreneurship and Innovation" (NSRF 2014-2020) co-financed by Greece and the European Regional Development Fund.