

THE 1894 APRIL 20 AND 27 ATALANTI EARTHQUAKES: 100 YEARS AFTER - LESSONS LEARNT

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Abstract

A hundred years ago (April 20 & 27, 1894) two consequent destructive earthquakes occurred in Atalanti (Lokris, central Greece), at distances of approximately 90 and 75 km from Athens, with magnitudes 6.7 and 7.0 (epicentral intensity X) and evidence of surface faulting 55 km in length (Galanopoulos, 1960). The isoseismal lines of these two events had a direction NW-SE, reaching intensity VI in Athens. Had these earthquakes occurred today, their consequences on the capital of Greece are examined in the present study.

The sources referring to the two earthquakes are collected and re-evaluated and the distribution of damage is reconstructed through the recently introduced European Macroseismic Scale (EMS), in an effort to re-evaluate the intensities of these historical earthquakes. The contribution of these events to the seismic hazard of Athens is finally determined, taking into consideration the present building situation in the area, i.e. the high degree of vulnerability of modern structures and the large expansion of the metropolis in unfavorable soil conditions, as well as the instrumentally recorded major earthquakes of the area in the 20th century.

Introduction

The area of Atalanti had been a seismically quiescent area for several centuries until 1894. Although it is surrounded by areas well known for their high or moderate seismicity, such as Thivai, Volos, Maliakos gulf, etc., it was not known to have produced any significant earthquakes since 551 or 552 AD. Even after 1894, when the two destructive earthquakes studied here occurred, the seismicity of this area remained at a relatively low level.

On April 20 and 27 1894 two destructive earthquakes, separated by a time interval of one week only, struck the area of Atalanti causing considerable death toll (253 people dead), extended damage in almost all the villages and towns in and around the Lokris area and economic problems for the country. Had the area been more densely populated, these effects would have increased at a serious degree for the whole country.

At that time Greece was already equipped by seismoscopes and macroseismic observations were in some cases quite well organized. Apart from local reports concerning these earthquakes, and due to the existence of long surface ruptures and earthquake related geological effects mainly after the second earthquake, detailed field observations were carried out by the seismologists and geologists shortly after the events.

From the damage reports and the extent of the felt area, as well as from reports from the European seismological stations, it was assumed that the first event was a foreshock and the latter was the mainshock ($M=6.7$ and 7.0 , after Papazachos and Papazachou, 1989), both followed by numerous aftershocks that continued for several days and months. Due to the vicinity in time between the two events, the macroseismic intensities assessed from them in many cases are considered to be cumulative. It is also noteworthy that no foreshock activity was observed.

In the present study an attempt is made for the assessment of the macroseismic intensities of these two earthquakes, using the EMS92 scale, from localities in which detailed and specific

