THE JULY 20, 2017 BODRUM/KOS EARTHQUAKE AND TSUNAMI: FIELD SURVEYS, LESSONS and MODELING

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1. INTRODUCTION

A magnitude (Mw) 6.6 earthquake occurred on July 20, 2017 (22:31 UTC) in between Bodrum, Turkey and Kos Island, Greece. Field surveys are conducted in the region (Yalciner et al., 2017) including southern and northern coastlines of Bodrum peninsula, Karaada, Akyaka town and Kos Island. A tide gauge located in Bodrum main port recorded the tsunami. The main objectives of these field surveys are to document tsunami effects along the coast, to obtain the available data on the wave height and inundation extent, and to understand and explain the tsunami source in details.

In addition, questionnaires were conducted during the field survey in order to understand evacuation behavior and have clearly shown that the disaster education and public awareness are still low in the region. Numerical modeling studies are carried out in order to investigate the tsunami generation mechanism by comparing model and survey results. It is seen that the source of the earthquake is at the south of Karaada-Black Island and the maximum subsidence of the sea bottom might be about 40 cm.

Lessons learnt from this event related to disaster education and public awareness in the region are also discussed. Furthermore, the tsunami warning issues under local short arrival time of tsunamis are commented.

2. REMARKS FROM FIELD SURVEYS and LESSONS LEARNT

Results of the field survey have revealed that the effect of the tsunami is observed at the southern coast of Bodrum peninsula in between 27.255E to 27.528E along the south of Bodrum peninsula and between 27.20733E and 27.34983E along the northeast coast of Kos Island. Gumbet Bay, Bodrum is the main hit area by the tsunami. The records from a security camera at the Gumbet Bay have shown that sea receded 5 minutes after the earthquake, and advanced up to 60 m inundation at the 13th minute. The maximum run-up is measured as 1.9 m in Gumbet along the small dry streambed (27.407924E, 37.029879N). There were no damages at the Bitez and Bodrum bays west and east of Gumbet, respectively. These observations indicate that the main impact of the tsunami was in Gumbet Bay. However, inundation is observed with varying distances along all the coasts at Bodrum and Kos. In the Kucuk Poyraz Bay at Karaada, run-up traces have found reaching up to 2 m elevation (27.461422E, 36.966323N). The tsunami has also been observed at Akyaka village at the eastern end of Gokova Bay (80 km west of the epicenter). A maximum amplitude of approximately 1.5 m has been documented at the old port of Kos Island according to eyewitnesses, tsunami traces and the analysis of a security camera video. Tsunami heights did not exceed 1.0 m along the coastline of Kos Island outside of the port.

3. NUMERICAL MODELING STUDIES

Tsunami numerical modeling is applied to the event using 30 m resolution topographic data and GEBCO 30 arcsec bathymetric data. Different rupture parameters and possible source distributions are tested in the modeling and the results are compared with the observations and field data. At the time of the submission of the abstract, it was found that the sea bottom at the south of Karada and the north of Kos Island subsided about maximum 40 cm with dimensions of about 12 km length and 6 km width of an approximate elliptical area whose long axis lies in the approximate direction 120^{o} clockwise from North. Further, better source mechanism will be achieved when seismic and GPS data are included.

4. DISCUSSIONS

This event has once more shown that tsunamis are real threats in the Mediterranean Sea. The results clearly showed that the event was local and caused unexpected run-up distribution. It is observed that short arrival time of local tsunamis cause difficulties in tsunami warning which necessitates awareness and education in coastal communities. The event increased the awareness of the general public; but, clearly still more awareness and education are required in the region.

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