FIELD SURVEY OF THE 30 OCTOBER 2020 SAMOS (AEGEAN SEA) TSUNAMI IN THE GREEK ISLANDS

Costas Synolakis, Academy of Athens, costas@usc.edu
Nikos Kalligeris, National Observatory of Athens, nkalligeris@noa.gr
Vassilios Skanavis, Academy of Athens, vskanavis@academyofathens.gr
Marinos Charalampakis, National Observatory of Athens, cmarinos@noa.gr
Nikolaos Melis, National Observatory of Athens, nmelis@noa.gr
Evangelos Voukouvalas, Unisystems Luxembourg, vvoukouvalas@gmail.com
Alessandro Annunziato, Joint Research Centre, alessandro.annunziato@ec.europa.eu

INTRODUCTION

On October 30th, 2020, a magnitude 7.0 earthquake struck offshore from the northern coast of Samos, Greece, generating a tsunami that impacted the nearshore Greek islands and the Aegean coastline of Turkey. The 2020 Samos (Aegean Sea) tsunami is arguably the most significant event in the Aegean since the 09 July 1956 Amorgos earthquake and tsunami that produced runup values as high as 20 m on the south coast of Amorgos (Okal et al., 2009). Maximum runup reached 3.8 m along the Turkish coast (Dogan et al., 2021), and ~3 m on the north coast of Samos Island (Kalligeris et al., 2021).

TSUNAMI RUNUP FIELD MEASUREMENTS

We present detailed results from several post-event field surveys, and report first wave arrival timing and polarity information as well as tsunami height/runup measurements, from five islands. In Chios, wave runup reached 1.38 m, in Samos ~3 m, in Fourni 1.57 m, in Thimena 1.46 m, and in Ikaria 1.18 m (Fig. 1).

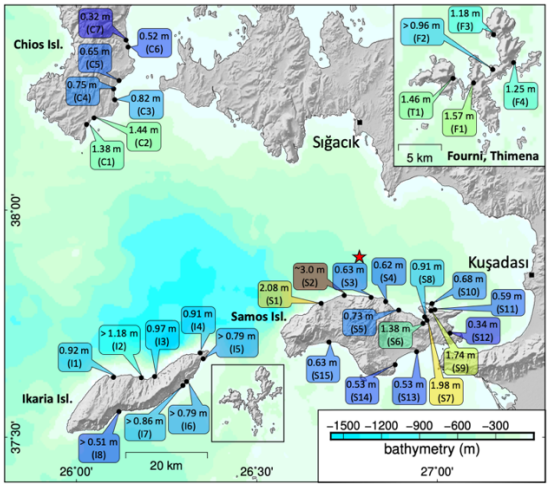

Figure 1 – Overview of the maximum runup and/or tsunami elevation measured in all locations visited in the post-tsunami reconnaissance missions to the Greek islands (source: Kalligeris et al., 2021).

VIDEO ANALYSIS

We were able to infer complete tsunami hydrographs for the first two floods in Vathi, Samos, through video analysis, which suggests that the water level rose to about 1 m overland flow depth in one minute (Fig. 2a). Free surface velocities were also inferred from the CCTV footage of Vathi through particle tracking velocimetry (Fig. 2b), suggesting overland flow speeds reached up to 2.5 m/s near the waterfront.

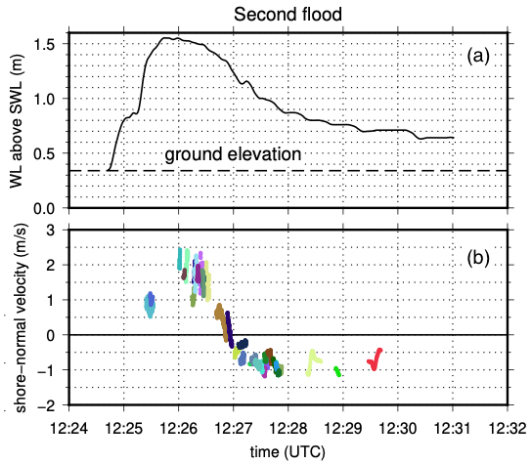

Figure 2 – The overland water level time histories during the second and largest tsunami-induced flood (a) and the overland free surface velocities (b) extracted through the analysis of CCTV footage in the town of Vathi, Samos (source: Kalligeris et al., 2021).

TSUNAMI WARNING MILESTONE

The Greek CPA disseminated a message through Greece's 1-1-2 Emergency Communications Service to cellphones in the eastern Aegean, marking an important milestone for regional tsunami warning. According to eyewitnesses, the message warning recipients to stay away from coastal areas was received prior to the second and largest flood in Vathi, as the first flood had not sufficiently alarmed local authorities to evacuate residents.

REFERENCES

Okal, Synolakis, Uslu, Kalligeris, Voukouvalas (2009): The 1956 earthquake and tsunami in Amorgos, Greece. Geophysical Journal International, 178(3), pp.1533-1554.

Kalligeris et al. (2021): Field survey of the 30 October 2020 Samos (Aegean Sea) tsunami in the Greek islands. Bulletin of Earthquake Engineering, pp.1-33.

Dogan, et al. (2021): The 30 October 2020 Aegean Sea tsunami: post-event field survey along Turkish coast. Pure and applied geophysics, 178(3), pp.785-812.