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# Analysis of a severe storm resulting in a flash flood in Western Crete

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The objective of this study is to explore the dynamics of a severe storm that affected the northwestern part of Crete Island in 26th of October 2017, resulting in a flash flood. The severity of the extreme storm is verified by high-resolution MeteoSat satellite images and lightning maps as well. By 11:30 EST the northwest Crete was hit by about 1,300 lightning strikes, resulting in a flash flood, while in the mountainous areas of the Chania prefecture there was no recorded rainfall. The flood occurred in the wider rural area, where two hydro-meteorological stations recorded daily rainfall of 162.40 mm and 241.80 mm respectively, with the main precipitation amount occurring in five hours. Spatiotemporal correlation between lightning and precipitation is identified. The storm was associated with a low pressure system that developed in the Gulf of Sirte and moved northeastwards, combined with a surface anticyclone that centered over the Balkans extending southwards. This combination produced strong pressure gradient over the Central Aegean and intense northeasterly winds north of Crete, bringing humid air masses from the Aegean Sea over the examined area. At the upper levels, a deep trough has formed over the Ionian Sea that descended southwards over the Northern Africa, contributing to the intensification of the surface system. However, contrary to the surface winds, the wind regime at the upper levels is weak. Further analysis of the dynamics of the case with the aid of vorticity depicted that the precipitation pattern and intensity was greatly determined by the northeasterly moist flow prevailing in the windward side of the mountainous range of the examined area. Hydrological simulation for the rural area is performed with the HEC-HMS model, based on previously calibrated parameters. The downstream analysis of the watershed's stream is carried out, via the hydraulic 1D HEC-RAS flood simulation model by using a high resolution 5m x 5m digital terrain model. The output of the model produces dynamic mapping regarding the flood extent of the studied area, as well as the depths and velocities of the flood wave along the stream's cross sections. The results of the study indicate the need for more effective flood risk management, in case of short-lived high-intensity precipitation rates in the examined area.
Keywords: severe storm; intense precipitation; flash flood; hydrological/hydraulic simulation; flood mapping.