Using satellite-based rainfall estimates in identifying flash floods in Egypt

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Flash floods lead to huge damages and loss of life in various regions of the world. For example, Egypt suffers from occasional heavy rainfall leading to flash floods. Being critically sensitive to climate change, rural and urban areas in northern Egypt and arid zones in the east of the Nile River frequently suffered from flash floods following unexpected severe precipitation in recent years. Considering the lack of the gauge data, we investigated the utility of satellite-based precipitation data in estimating flash floods. Here we used Global Satellite Mapping of Precipitation (GSMaP) and Integrated Multi-satellite Retrievals for Global Precipitation Measurement (IMERG) rainfall products to estimate critical rainfall thresholds for flash floods. We compared the estimation results with the flood events during the last five years. Satellite imageries from Sentinel (1,2 and 3) and LANDSAT for the events when rainfall exceeded critical rainfall thresholds were analyzed to determine flood extents. By analyzing the GSMaP and IMERG data it was found that the intense flash floods happened in 2015 and 2016 were driven by heavy precipitation. Images from Sentinel showed flood inundation in areas where extreme rainfall occurred. Results indicate that satellite-based rainfall estimates (GSMaP and IMERG) can be used to identify flash floods and it will be of help in building the flash flood warning system in Egypt.

Keywords: flash flood, GSMaP, IMERG, rainfall satellite-based data, Egypt.