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Integration of remote sensing and GIS for studying a short-term flashflood in the El Arish Catchment (Egypt)

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Wadi El Arish is the largest drainage system in Sinai Peninsula, Egypt. The Wadi was subject to severe thunderstorms on 17 and 18 January 2010 followed by an extreme and violent flood that had not been known in Sinai since 1980. The flood claimed six victims, injured tens of people, and devastated vital infrastructure and hundreds of houses. Hydrologic characteristics of the Wadi are not fully understood due to substantial lack of the detailed hydro-meteorological information. Hence, remote sensing and GIS techniques were used to provide better spatial understanding of rainfall characteristics and drainage basin response. The study was based on the analysis of the TRMM images and 6 hourly average HYDIS data of rainfall analyses. A hydrological model was constructed using ASTER DEMs. The empirical black box model was used depending on the curve number approach to predict stream runoff. Landcover and hydrological soil groups were identified from the Landsat ETM+ mosaic using multispectral supervised classification. The curve numbers were adjusted to ARC I (dry condition) as the total rain in a 5-day period preceding the storm were very low ($\leq$5 mm). We found, that the Wadi received a total rain volume of 665.4 x 10^6 m^3. Most of it fell on 17 January, when the rain intensity ranged between 4–8 mm/hr. The estimated total surface runoff $\boldsymbol{Q}$ was 123.3 x 10^3 mm and the total runoff volume was 124 x 10^6 m^3 that constitutes 18.8 % of the total rain volume. The results are in agreement with the observed values in the Wadi and highly required for many applications related to water harvesting and flood protection studies.