Geophysical Research Abstracts
Vol. 16, EGU2014-6896-1, 2014
EGU General Assembly 2014

Potential use of radar QPE for hydrological design

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Intensity-duration-frequency (IDF) curves are commonly used for flood management design, and are identified from rainfall records analyzing maximum intensity values for a set of given durations. This approach applies to raingauge measurements even if usual design applications would prefer catchment scale curves. Weather radar provides distributed rainfall estimates with high spatial and temporal resolutions; in this way it is able to exploit the dynamics and variability of extreme rainfall events over wide areas. Two main objections usually restrain this approach: the length of radar data records and the reliability of radar quantitative precipitation estimations (QPE). This work aims to explore the feasibility of using radar QPE for the identification of IDF curves by means of a long length radar data archive and a combined physical- and quantitative- adjustment of radar rainfall estimates.
Two C-Band weather radars are located in the eastern Mediterranean area (Tel Aviv, Israel) and are operational since 1990 and 1997 respectively, providing relatively long-term records. Radar measurements are elaborated using physically-based correction algorithms and are then adjusted by removing the mean field bias with respect to ground observations. Accuracy of radar QPE is assessed by comparison with raingauge measurements using a bootstrap technique.
IDF curves are calculated for a set of reference raingauges using different sources of rainfall information: i) raingauge data record ("true" IDF), ii) data record of the closest raingauge and iii) radar QPE obtained excluding the examined raingauge from the adjustment procedure. Accuracy of radar-based IDF compared to close by-raingauge IDF is assessed. Results of this on-going study will be presented leading to conclusions on the potential use of radar QPE for IDF estimation.