Geophysical Research Abstracts
Vol. 19, EGU2017-4718, 2017
EGU General Assembly 2017

Intensity-Duration-Frequency curves from remote sensing datasets: direct comparison of weather radar and CMORPH over the Eastern Mediterranean

Efrat Morin (1), Francesco Marra (1), Nadav Peleg (2), Yiwen Mei (3), and Emmanouil N. Anagnostou (3)

(1) Hebrew University of Jerusalem, Institute of Earth Sciences, Jerusalem, Israel (marra.francesco@mail.huji.ac.il), (2) Institute of Environmental Engineering, ETH Zurich, Switzerland, (3) Department of civil and environmental engineering, University of Connecticut, Storrs, CT, USA

Rainfall frequency analysis is used to quantify the probability of occurrence of extreme rainfall and is traditionally based on rain gauge records. The limited spatial coverage of rain gauges is insufficient to sample the spatiotemporal variability of extreme rainfall and to provide the areal information required by management and design applications. Conversely, remote sensing instruments, even if quantitative uncertain, offer coverage and spatiotemporal detail that allow overcoming these issues. In recent years, remote sensing datasets began to be used for frequency analyses, taking advantage of increased record lengths and quantitative adjustments of the data. However, the studies so far made use of concepts and techniques developed for rain gauge (i.e. point or multiple-point) data and have been validated by comparison with gauge-derived analyses. These procedures add further sources of uncertainty and prevent from isolating between data and methodological uncertainties and from fully exploiting the available information.

In this study, we step out of the gauge-centered concept presenting a direct comparison between at-site Intensity-Duration-Frequency (IDF) curves derived from different remote sensing datasets on corresponding spatial scales, temporal resolutions and records. We analyzed 16 years of homogeneously corrected and gauge-adjusted C-Band weather radar estimates, high-resolution CMORPH and gauge-adjusted high-resolution CMORPH over the Eastern Mediterranean. Results of this study include: (a) good spatial correlation between radar and satellite IDFs ($\sim$0.7 for 2–5 years return period); (b) consistent correlation and dispersion in the raw and gauge adjusted CMORPH; (c) bias is almost uniform with return period for $\sim$12-24 h durations; (d) radar identifies thicker tail distributions than CMORPH and the tail of the distributions depends on the spatial and temporal scales. These results demonstrate the potential of remote sensing datasets for rainfall frequency analysis for management (e.g. warning and early-warning systems) and design (e.g. sewer design, large scale drainage planning)