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Lightning and rain dynamic indices as predictors for flash floods events in the Mediterranean

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Abstract. The FLASH EU funded project aims to observe, analyze and model lightning activity in thunderstorms for use in short term forecasting of flash floods in the Mediterranean region. Two new indices, aimed to assess the potential for heavy precipitation and flash-floods, are proposed and evaluated. The first is a lightning index – the MKI, which is a modified version of the KI-index. The applied index gives more weight to the lower- and mid-level relative humidity. The second is a new rain index, the RDI, which is the integrated product of specific humidity and vertical velocity. With the aim to contribute to the aforementioned objectives, 3 flash flood events, two in Israel and one in Greece are analyzed in the present study, using the 2 proposed indices.

The NCEP/NCAR reanalysis database, of 2.5°×2.5° resolution, failed to resolve the meso-scale features of the observed flash flood events. Therefore, the ECWMF database, of 0.5°×0.5° resolution, was used for calculating and displaying the two indices. Comparison between the observed rain and lightning and the respective indices for the two pieces of data was performed for the flash flood events. The results show good concordance of both indices with timing and spatial distribution in 2 of them, while in one of them is displaced by more than 50 km. The good agreement in locating the maximum between the MKI and RDI suggests that the proposed indices are good predictors for both intense lightning activity and torrential rain and consequently, for potential flash floods.

Full Article in PDF (PDF, 3593 KB)

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