Natural Hazards
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Discussions

Interactive comment on "Hydrometeorological analysis and forecasting of a 3-day flash-flood-triggering desert rainstorm" *by* Yair Rinat et al.

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Lorenzo Marchi, referee #2

We thank Lorenzo Marchi for the useful comments that helped us improve the manuscript. We addressed all comments in a revised manuscript we have prepared. The reviewer's comments are reported followed by our answers.

- The post-flood reconstruction of peak discharge is affected by several sources of errors, including measurement errors and uncertainties in the estimation of the roughness coefficient. The authors could consider assessing and presenting (Table 2 and

Fig. 5) the uncertainties bounds of post-flood peak discharge estimates. Indirect estimates of flash flood peak discharge, especially if validated by a rainfall-runoff model, like in this work, are of utmost importance for getting a better knowledge of these hazardous phenomena, also for comparison with other datasets. Reporting the uncertainties bounds increases the value of such flood peak data. Authors' answer: Uncertainty limits were added to Table 1 (previously Table 2) and Fig. 5 as suggested. Table 1 now contains 2 new columns: "Lower uncertainty limit" and "Upper uncertainty limit". Three types of data sets were used for all measured peak discharges: Type 1: six post event peak discharge estimates were derived by our team. For calculating the flood peak discharge, we surveyed post event high water marks such as drift wood and banks erosion lines. Topographic surveys of each of these reaches included the geometry of several cross-sections, longitudinal channel profiles and precise elevation measurements of the water marks. Discharge estimates were calculated by hydraulic modeling of the surveyed study reaches using HEC-RAS software. The uncertainties range of these estimations is now presented in the table. Type 2: three post event peak discharge estimates were derived by the Israel Hydrological Service and by the Soil and Erosion Research Station – both teams assess the uncertainty to be ∼10%. Type 3: ten peak discharge estimates were obtained from hydrographs produced by the Israel Hydrological Service from hydrometric station data. Uncertainty is also estimated here as 10%.

- Section 4.1.1, which reports field observations by two scientists who witnessed the flood at the Zafit sub-basin, could be extended, for instance by describing the main geomorphic effects of the flood. The title of this section could be modified for emphasizing that it contains direct observations of the flash flood. Authors' answer: Unfortunately, we do not have further insights from the observations, such as the geomorphic effects. The title has been changed as suggested to: "Using direct observations for spatial model validation and flash-flood initiation"

- Lines 54-56. Not only in arid regions: also under humid climates, the strong spatial

gradients of rainfall fields make the rain gauge network inadequate to represent flash flood triggering rainfall. Authors' answer: Corrected as suggested.

- Line 128. The area of the Zafit sub-basin (46 km2 - line 91) could be recalled here. Authors' answer: Thank you, the area was added

- Lines 136-137. The absence of rain gauges within the basin (cf. Fig. 1 and lines 169-170) should be clearly stated. Authors' answer: Thank you. The locations of all rain gauges were added to Fig1a as suggested, and a sentence was added for clarification: "Two rain gauges with temporal resolution of 10-min and eight rain gauges that provide only daily data monitor the basin"

- Lines 140-141. "however, only one of these monitors the area influenced by the storm's core": which one (cf. table 2)? Authors' answer: Corrected, the sentence has been changed to "however, only the Mamshit hydrometric station is situated at the area influenced by the storm's core (Fig 1b, Table 1)"

- Lines 374-376 and Table A1. Quite low values of Manning roughness coefficients for hillslopes. The works by Downer and Ogden (2002), Engman (1986), and Sadeh et al. (2018), which apparently support these values, are not reported in the references list. Authors' answer: Thanks, the reference list was corrected. Indeed, these numbers are quite low, but they are supported by several works including the ones listed above and Shmilovitz et al., 2020 (added to the reference list). Furthermore, the low hillslope roughness coefficient contributes to the fast runoff generation that is typical to arid areas and reported by eyewitnesses in this work.

- Line 335. "Rain gauges in desert areas fail to represent the spatial heterogeneity of convective rainfall". In general, this statement sounds rather convincing. In the case of the April 2018 flash flood in the Zin basin, however, the only rain gauge available was located outside the basin, so that no conclusion on the suitability of rain gauge data can be drawn. Authors' answer: Agree, and removed.

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- Line 337. "whereas"? Authors' answer: Thank you, corrected

- Lines 651-652. The final paper, instead of the discussion version, should be reported. Authors' answer: Thank you for the hint. The reference has been updated.

- Table 1 lists properties and flood response of 57 sub-basins that in which the flood of April 2018 was analyzed using the GB-HYDRO model. It is not clear why this table is cited in section 2.1, which describes the settings of the study region with a focus on past flood events. Authors' answer: Agreed. The cross reference was removed. Consequently, he places of Table 1 and Table 2 were swapped.

- Table 2: I suggest reporting the drainage basin area of the sub-basins Authors' answer: Thank you, added
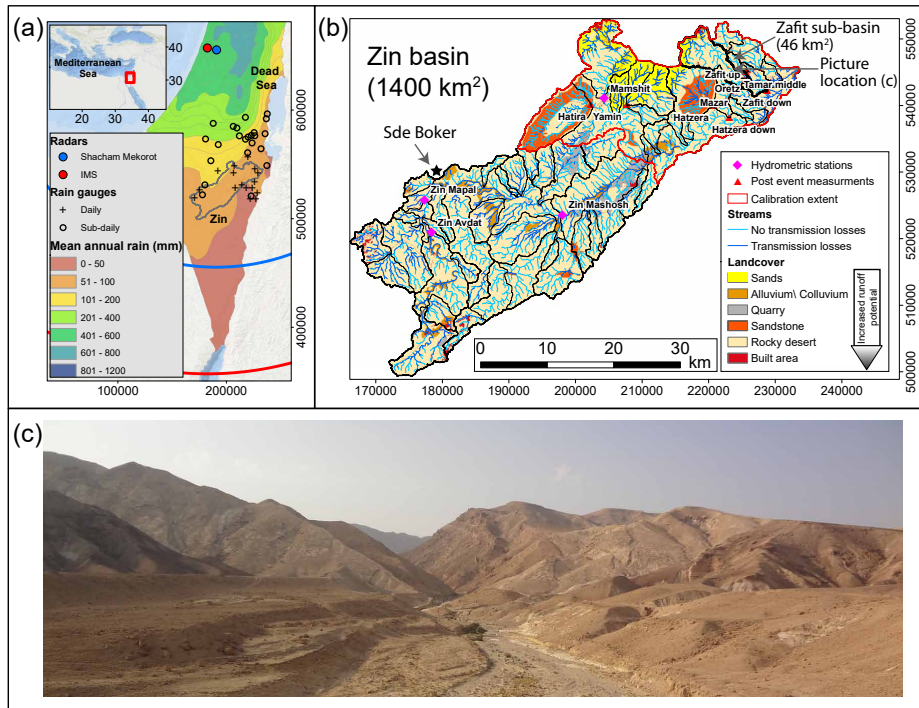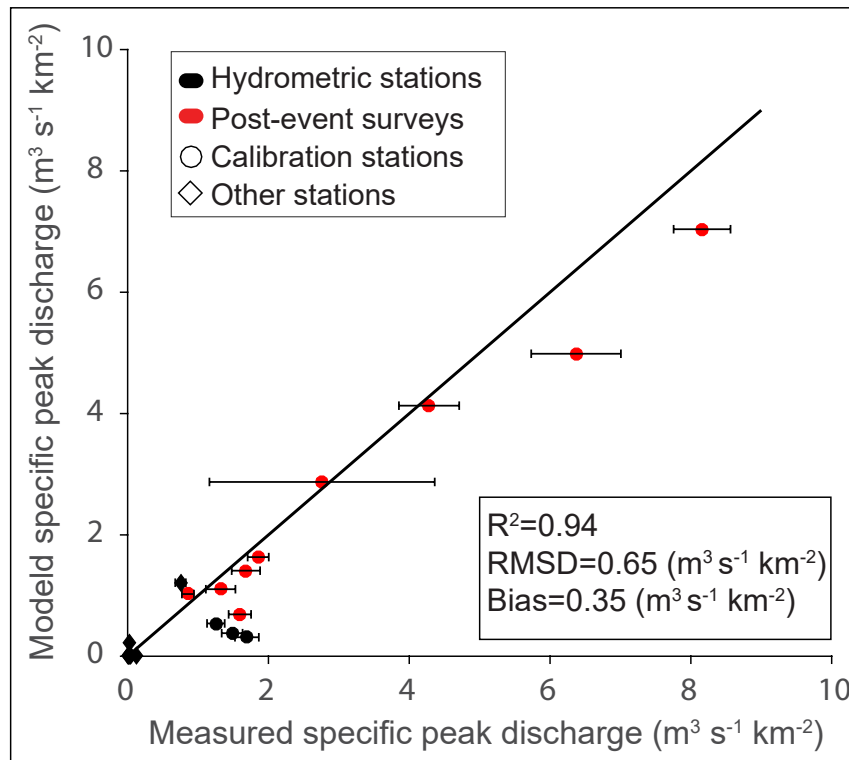
Fig. 1. The corrected Fig 1 in the manuscript

Fig. 2. The corrected Fig 5 in the manuscript