

The extreme rainfall events of the 2020 typhoon season in Vietnam as seen by seven different precipitation products

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Supplementary Material

S1. Probability density function (PDF) of the precipitation: focus on the lowest values

The rain/no-rain threshold for categorical analysis, set at 0.2 mm/h, was determined based on observations of the PDF curves in the range of very low rain rates (Figure S1). These curves indicate that all products effectively measure or estimate rain rates for intensities surpassing the chosen threshold. However, at lower intensities, susceptibility to sampling limitations is notable, particularly for Rain Gauges and GPM-DPR. Therefore, setting a lower threshold could potentially have introduced bias into the analysis.

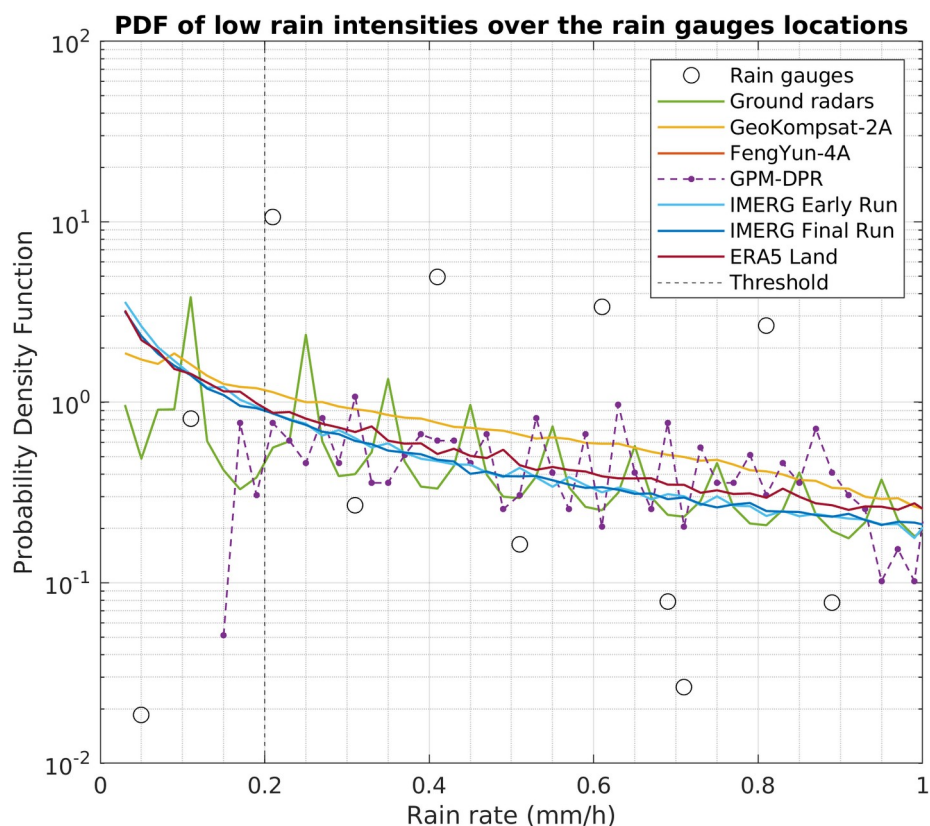


Figure S1: Probability density functions of the rain intensity from the seven examined products and the reference, sampled every 0.02 mm/h. The rain/no-rain threshold for the categorical analysis, set at 0.2 mm/h, is shown with the vertical dashed line.

S2. Orography of Vietnam mainland

Mountains are present in the Vietnam, especially in the North-West and along the border with Laos (see Figure S2). A sensitivity analysis has been carried out to assess the impact of orography on rainfall rates and Products, dividing the domain in four elevation classes (0-200 m; 200-600 m; 600-1000 m and above 1000 m). In Table S2 are reported the averaged and maximum recorded values of rainfall rate, showing very little impact on the averaged figures and both averaged and maximum values decrease slightly with increasing altitude, indicating that probably other mechanisms are more impacting on the precipitation structure than orographic enhancement, namely the typhoon development and landing regions.

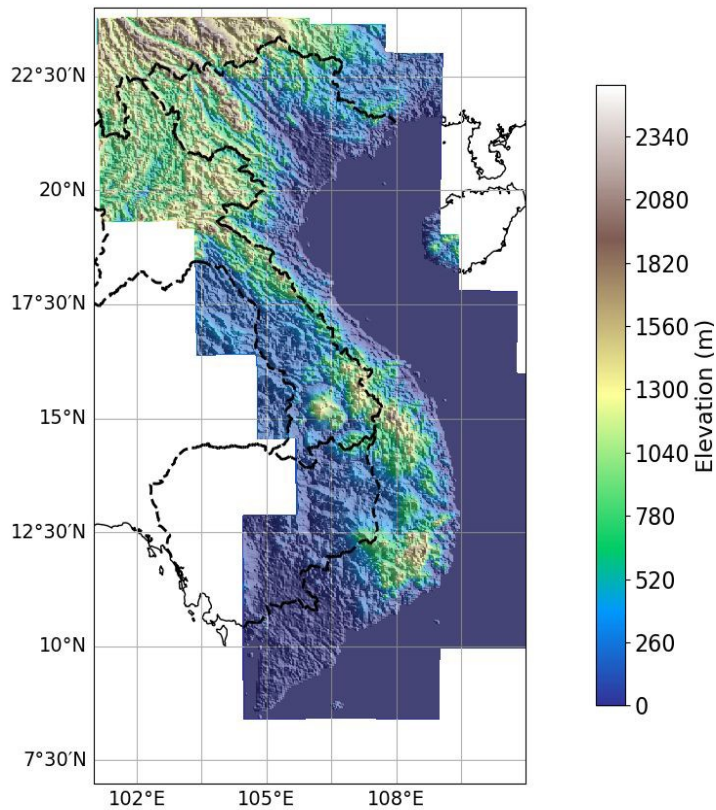


Figure S2: Elevation map in meters above sea level for Vietnam mainland and neighboring areas covered by the Radars product.

Elevation (m)	Fraction of total samples in this class	Ratio between wet and total samples	Mean rainrate (mm/h)	Maximum rain-rate (mm/h)
0-200	0.44	0.21	2.2	22.3
200-600	0.29	0.19	2.0	17.6
600-1000	0.18	0.19	2.0	17.4
>1000	0.09	0.15	1.9	15.6

Table S1: Distribution of the Rain gauges precipitation between four altitude classes.

S3. Typhoon tracks of the 2020 storm season

The motion of the typhoon center cores followed the represented tracks from the right side (East) to left side (West) of the image. Northernmost and southernmost regions are not interested by the tracks.



Figure S3: Map of nine tropical storm tracks from the 2020 typhoon season (Ortiz Vargas et al., 2021).

References

Ortiz Vargas, A.; Sebesvari, Z. Technical Report: Floods in Central Viet Nam. *Interconnected Disaster Risks 2020/2021*. United Nations University - Institute for Environment and Human Security (UNU-EHS) **2021**. <https://doi.org/10.53324/TNAE9416>