Supporting Information to:

Orographic effect on extreme precipitation statistics peaks at hourly time scales

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Table S1: Synoptic systems in the semi-automatic classification by Alpert at al. (2004) and corresponding use in this study, as follows: (1) Mediterranean cyclones, (2) other types of system, (3) labelled as Mediterranean cyclones if occurring up to two days after a Mediterranean cyclones wet day.

Code	*Alpert et al. (2004)*	*Class*
1	Red Sea Trough with the Eastern axis	2
2	Red Sea Trough with the Western axis	2
3	Red Sea Trough with the Central axis	2
4	Persian Trough (Weak)	3
5	Persian Trough (Medium)	3
6	Persian Trough (Deep)	3
7	High to the East	3
8	High to the West	3
9	High to the North	3
10	High over Israel (Central)	3
11	Low to the East (Deep)	1
12	Cyprus Low to the South (Deep)	1
13	Cyprus Low to the South (Shallow)	1
14	Cyprus Low to the North (Deep)	1
15	Cyprus Low to the North (Shallow)	1
16	cold Low to the West	1
17	Low to the East (Shallow)	1
18	Sharav Low to the West	2
19	Sharav Low over Israel (Central)	2

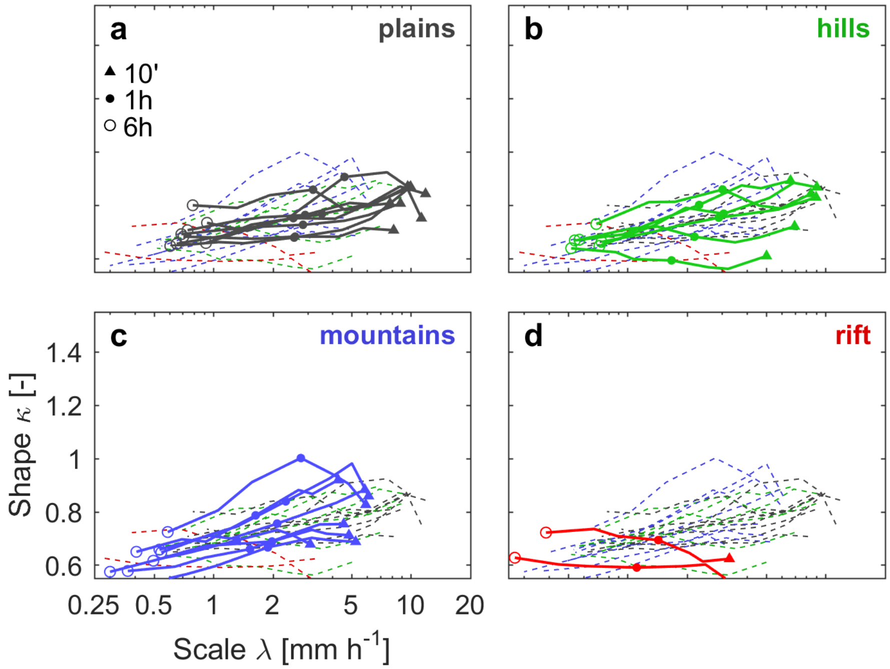

Figure S1. Same as Figure 2 (a-d), but computed using all the precipitation events which are not associated to Mediterranean cyclones. Served as control case since the interaction of these events with orography is less systematic (wind directions can be non-perpendicular to the mountains, and clouds are not restricted to low levels; e.g., Alpert et al., 2004; Armon et al., 2019). Indeed, the orographic impact (panel c in Figure 1) on the shape of hourly intensities is less marked and all the groups but the rift show a mild decrease of the shape with duration.

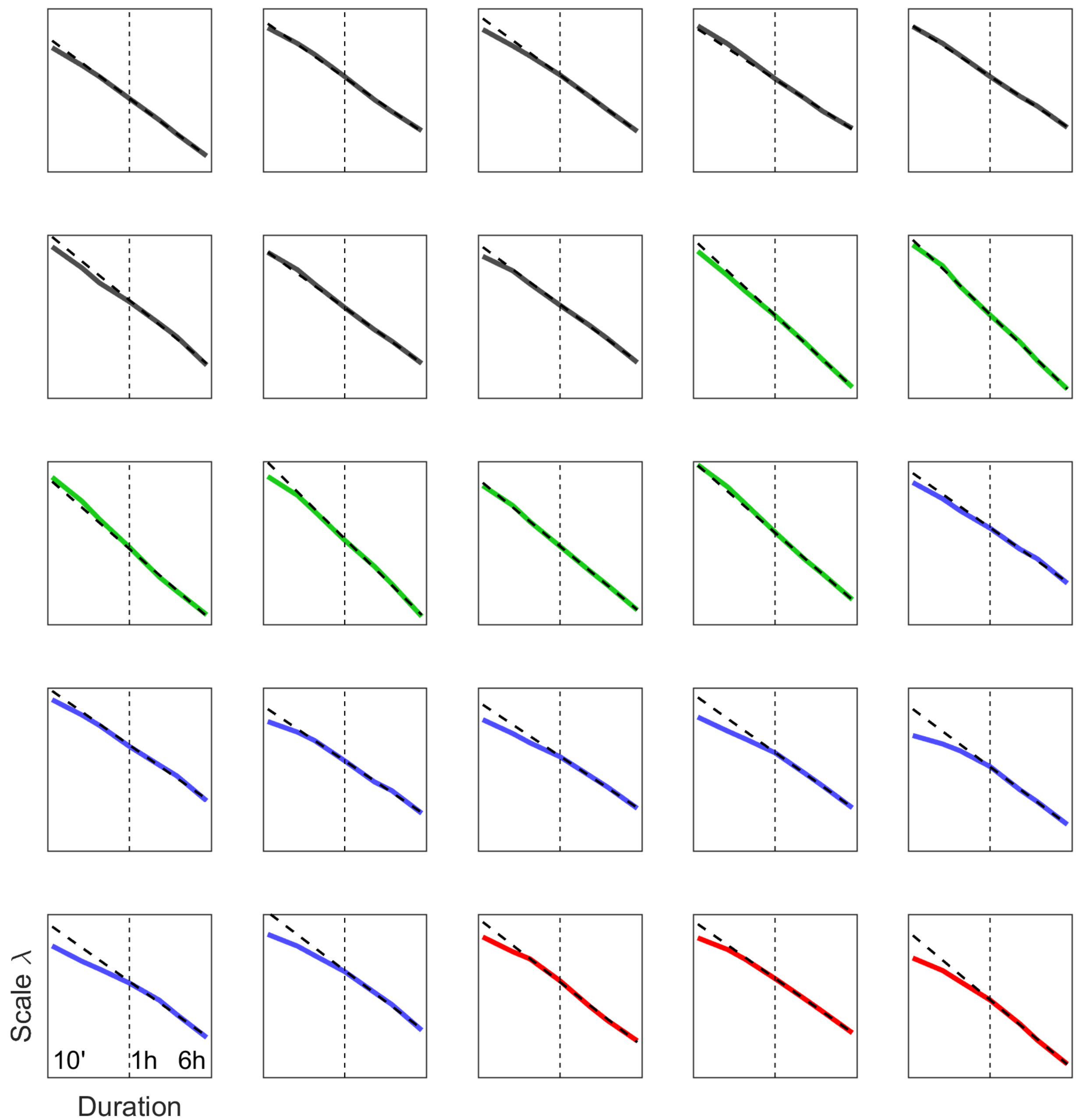

Figure S2. Scale parameters (90% confidence interval region) of the ordinary events as a function of duration at each station colored according to the physiographic region as in Fig. 1. Note that the y-axes differ between regions and that both x and y axes are log-transformed. Power law (simple scaling) relations computed for durations above 1 hour are shown as dashed black lines. The power law scaling holds for all duration at most stations; however, following the non-monotonous behavior of the shape reported in Fig. 2 and Fig. 3, a break for sub-hourly durations is observed in the most orography-affected regions.

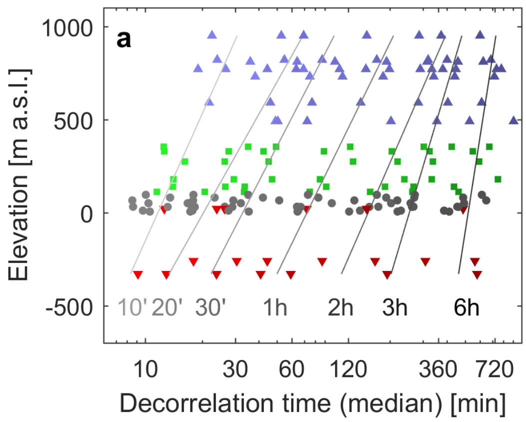

Figure S3. (a) Median decorrelation time of the ordinary events (x-axis) as a function of elevation (y-axis); darker shading refers to longer durations, colors refer to the physiographic region as in Fig. 1. The autocorrelation function A of coarse resolution timeseries obtained aggregating the original 10-min timeseries to blocks of the duration of interest is computed for each ordinary event of each station and for each duration of interest. The decorrelation time is quantified estimating the scale parameter b of the fitting three-parameter exponential in the form: $A(t) = a \cdot e^{-\left(\frac{t}{b}\right)^c}$ (Marra and Morin, 2018). (b) Mean wet fraction for the right-tail ordinary events (x-axis) as a function of elevation (y-axis). The wet fraction is computed as the fraction of non-zero 10-min time intervals observed within each ordinary event

References

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