Supplement of

Winds with destructive potential across a topographic and seasonal gradient in a Central Amazon forest

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Supplementary Material
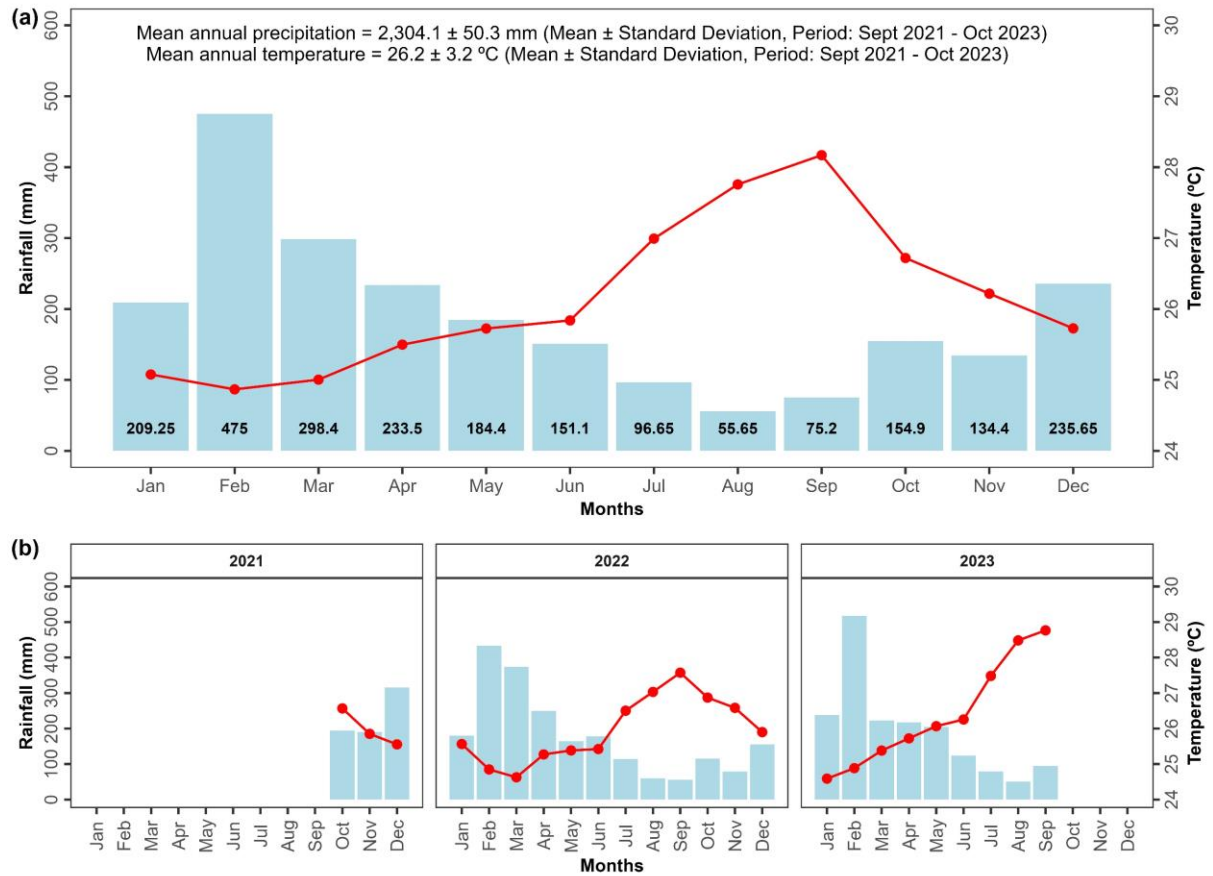
Figure S1. Rainfall and temperature recorded in the INVENTA from October 2021 to September 2023. (a) Monthly mean rainfall (mm) and temperature (°C). (b) Total rainfall (mm) and mean temperature (°C) over the 24-month period. In both panels, mean temperature is represented by red lines and points.
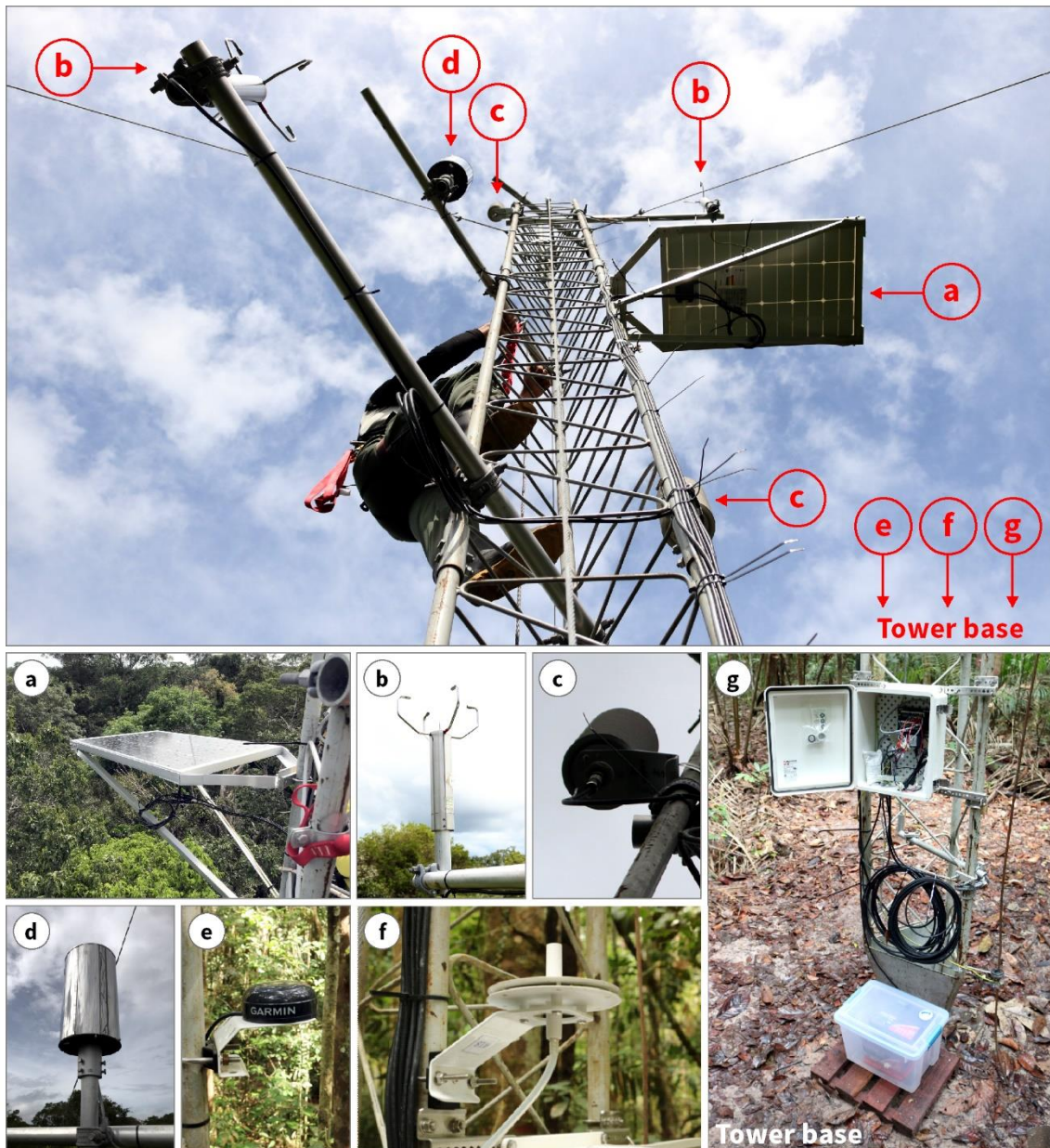
Figure S2. Tower instrumentation in the study area. (a) Solar panel model Campbell Scientific SP30 for energy supply; (b) 2D sonic anemometers model THIES 4.3830.22.300 placed at ~33 m and ~36 m height. In our study we used data from the 33-m anemometer; (c) Temperature-Humidity-Sensor model MELA IAKM00F placed at ~33 m and ~36 m height; (d) Tipping bucket rain gauge model THIES Clima 5.4032.35.007 placed at ~35 m height; (e) GPS model Garmin CS placed at ~6 m height for time and date synchronization among the instruments and the datalogger; (f) Pressure transmitter model Young 61302V with external pressure port; (g) All instruments are connected to the data logger model Campbell Scientific CR6, which is protected by a hermetic case against the weather. The data logger is supply by external battery for the periods without solar energy. The solar panel recharges the external battery during the day period. All these instruments are installed only in the plateau tower. The slope and valley towers are equipped only with one anemometer placed at ~33 m, GPS, solar panel, and data loggers model Campbell Scientific CR6.
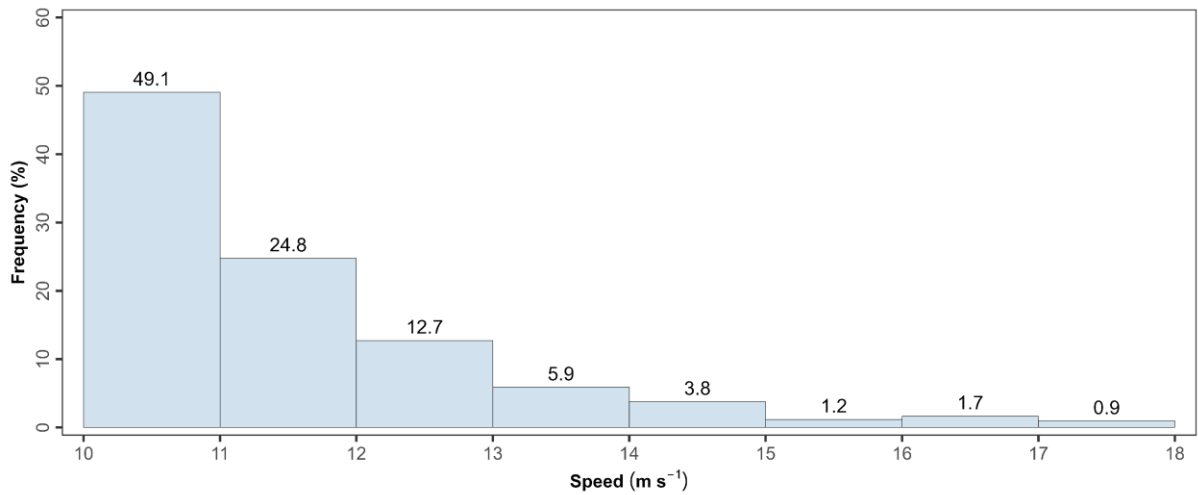
Figure S3. Speed distribution of the winds with destructive potential (WDP) recorded in INVENTA from Oct 2021 to Sep 2023.

Text S1. Linear models describing the relationship between wind speed and total duration and critical duration.

We evaluated the relationship between total duration and critical duration as a function of the speed of the WDP (Figure S4). Despite the statistical significance of both models, the total duration explained only 6% of the variability in speed (Figure S4a), while the critical duration explained 70% (Figure S4b). Therefore, the total duration was a weaker proxy than the critical duration to describe the speed and destructive potential of the wind gusts we studied.
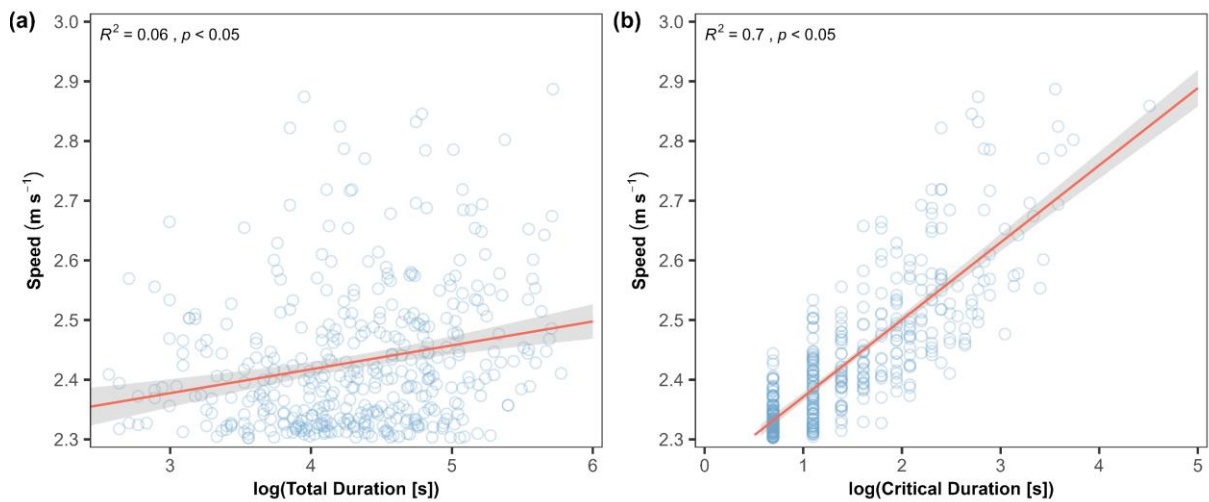
Figure S4. Linear log-adjusted models describing the relationship between total duration (a) and critical duration (b) as a function of speed of the winds with destructive potential (WDP) recorded in INVENTA from Oct 2021 to Sep 2023.
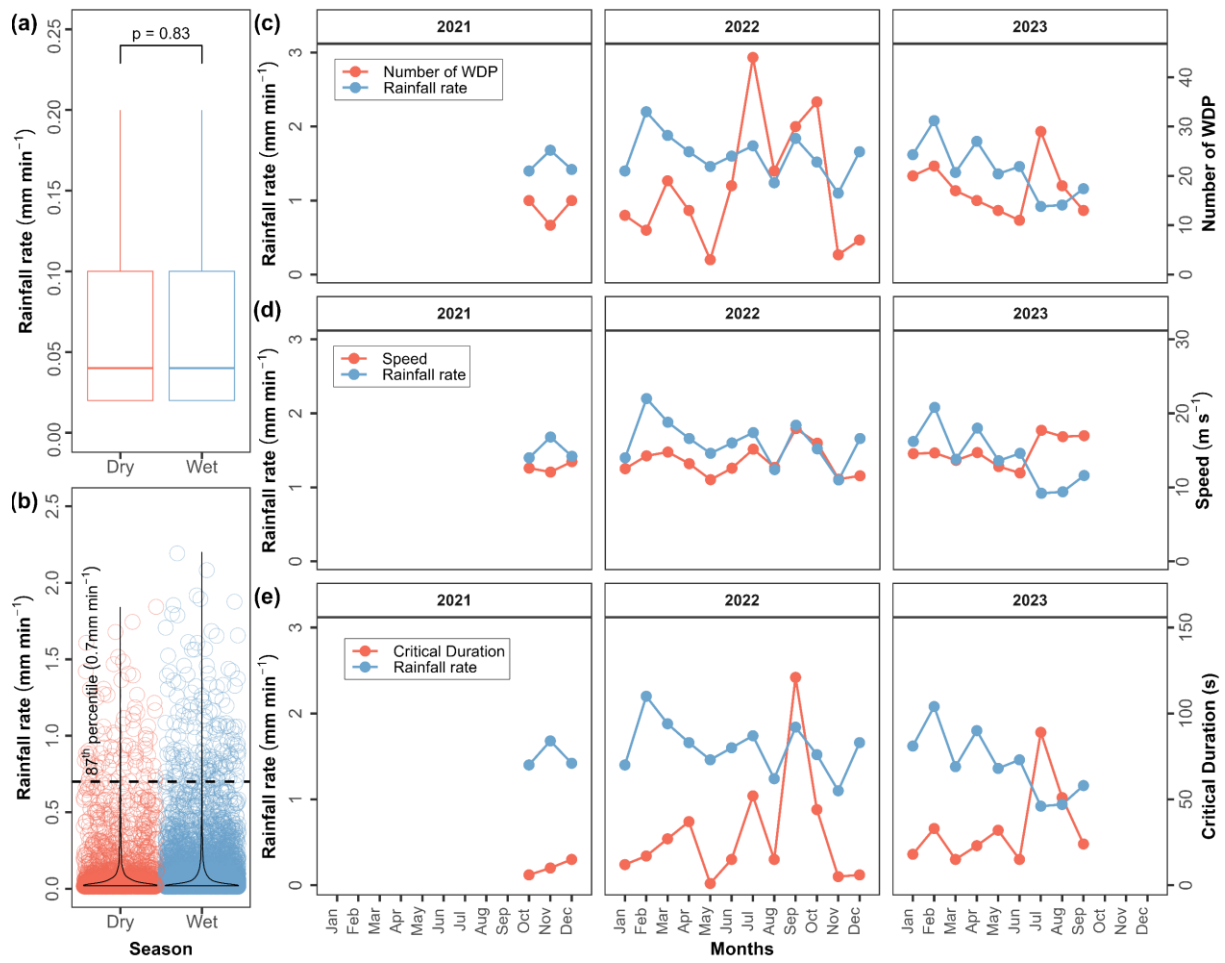
Figure S5. Maximum rainfall rates (mm min⁻¹) at dry and wet seasons recorded in the INVENTA between Oct 2021 and Sep 2023. (a) Boxplot for the median rainfall rates recorded in the dry and wet seasons. The bracket above boxplot shows the p-value of the Mann-Whitney-Wilcoxon test indicating no statistical differences between the median of the rainfall rate between the dry and wet seasons; (b) Violin plot showing the rainfall rates (hollow circles) between the dry and wet seasons. The dashed line indicates the 87th percentile (0.7 mm min⁻¹), which had the higher Pearson correlation with the number and critical duration of the WDP; (c) Maximum monthly rainfall rates and number of WDP; (d) Maximum monthly rainfall rates and maximum speed of WDP; (e) Maximum monthly rainfall rates and maximum critical duration of WDP.