

Supplementary Material S2: FRP_statistical and LavaFlow mapper results for the investigated cases

Article: A Near Real-Time and Free Tool for the Preliminary Mapping of Active Lava Flows during Volcanic Crises: The Case of Hotspot Subaerial Eruptions

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A. FRP_STATISTICAL RESULTS

Long-lasting eruptions:

Wolf 2015

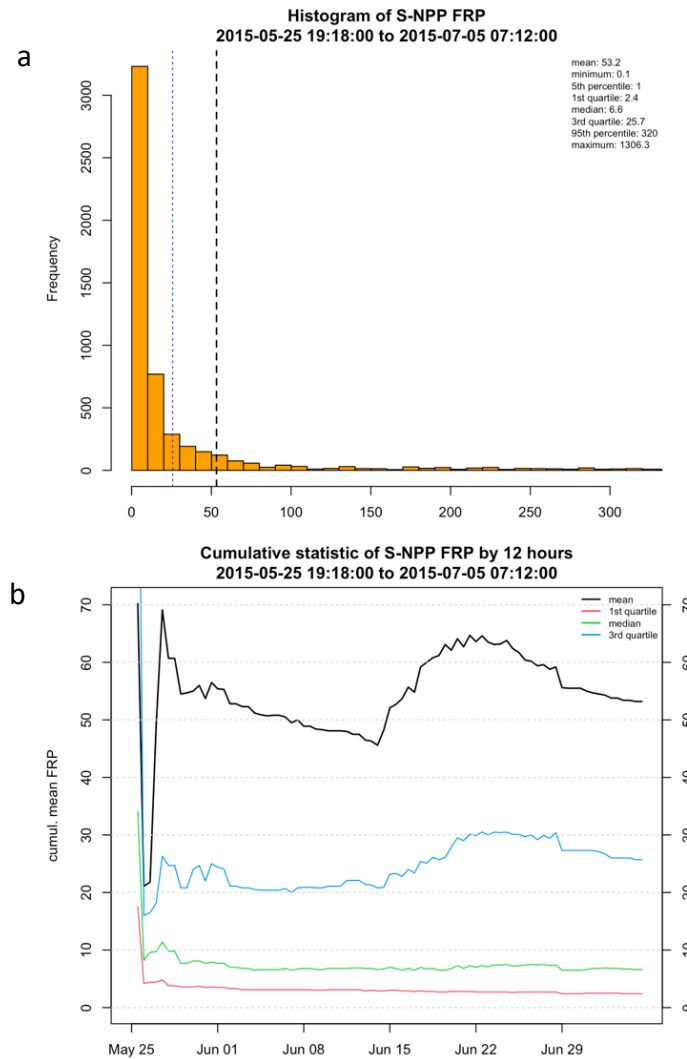


Figure S2-1: (a) Histogram of FRP data retrieved by the S-NPP satellite for Wolf volcano from 25 May to 05 July 2015. Black dashed line is the mean, blue dashed line is the 3rd quartile. (b) cumulative FRP variations every 12 hours for the mean, the 1st quartile, the 3rd quartile, and the median for the same eruptive period.

Kilauea 2018

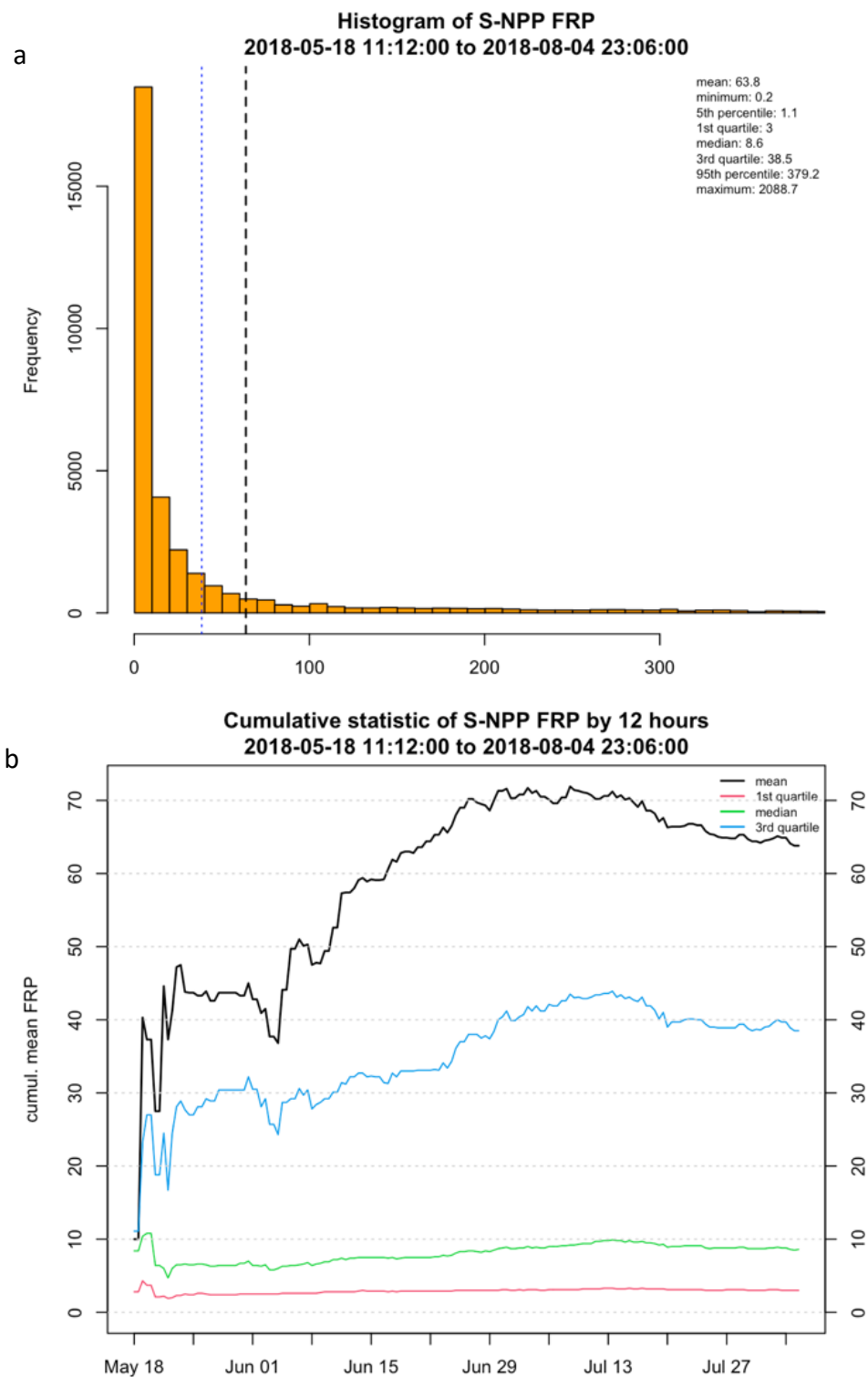


Figure S2-2: (a) Histogram of FRP data retrieved by the S-NPP satellite for Kilauea volcano from 18 May to 04 August 2018. Black dashed line is the mean, blue dashed line is the 3rd quartile. (b) cumulative FRP variations every 12 hours for the mean, the 1st quartile, the 3rd quartile, and the median for the same eruptive period.

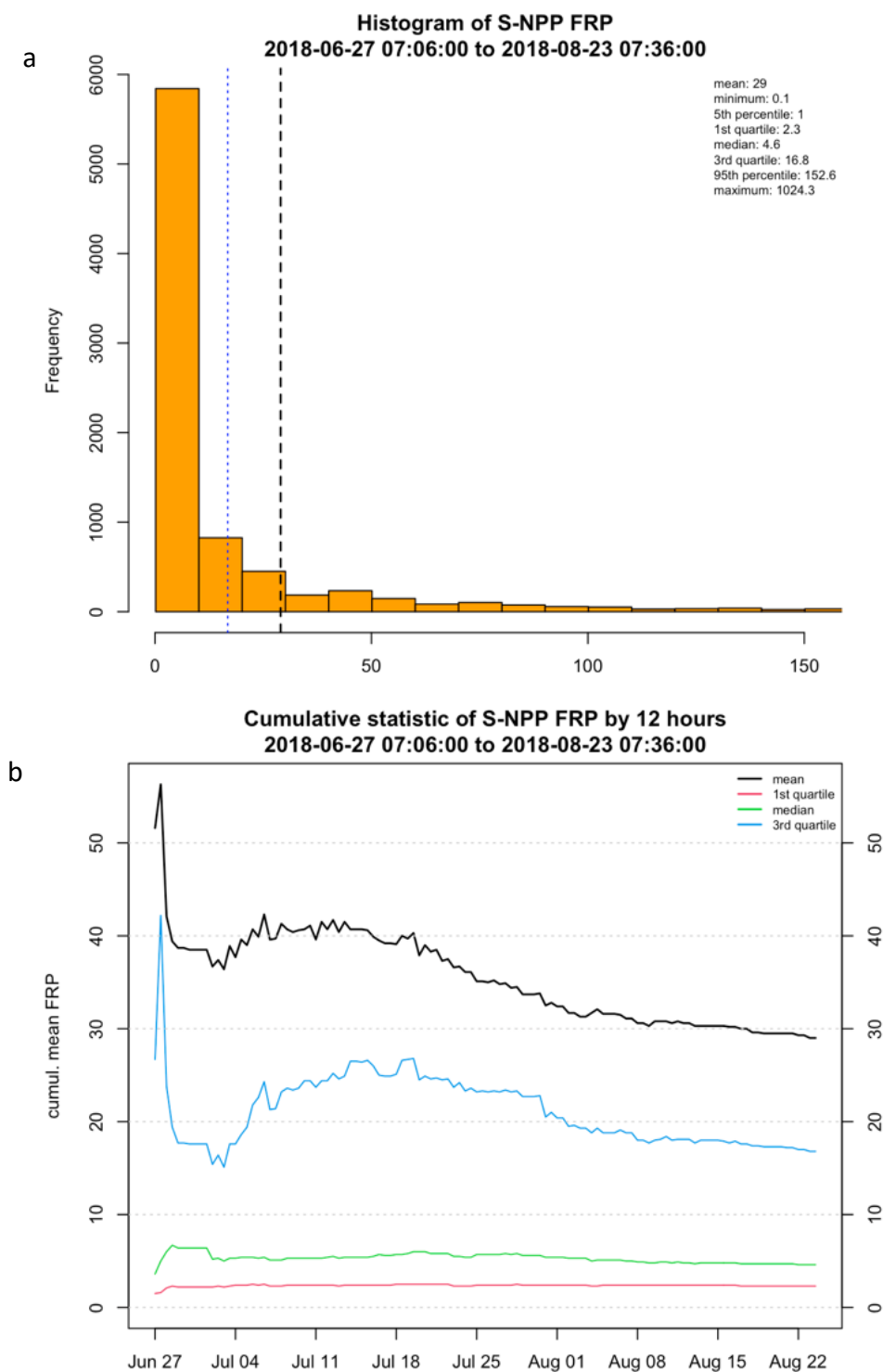


Figure S2-3: (a) Histogram of FRP data retrieved by the S-NPP satellite for Sierra Negra volcano from 27 June to 23 August 2018. Black dashed line is the mean, blue dashed line is the 3rd quartile. (b) cumulative FRP variations every 12 hours for the mean, the 1st quartile, the 3rd quartile, and the median for the same eruptive period.

Fagradalsfjall 2021

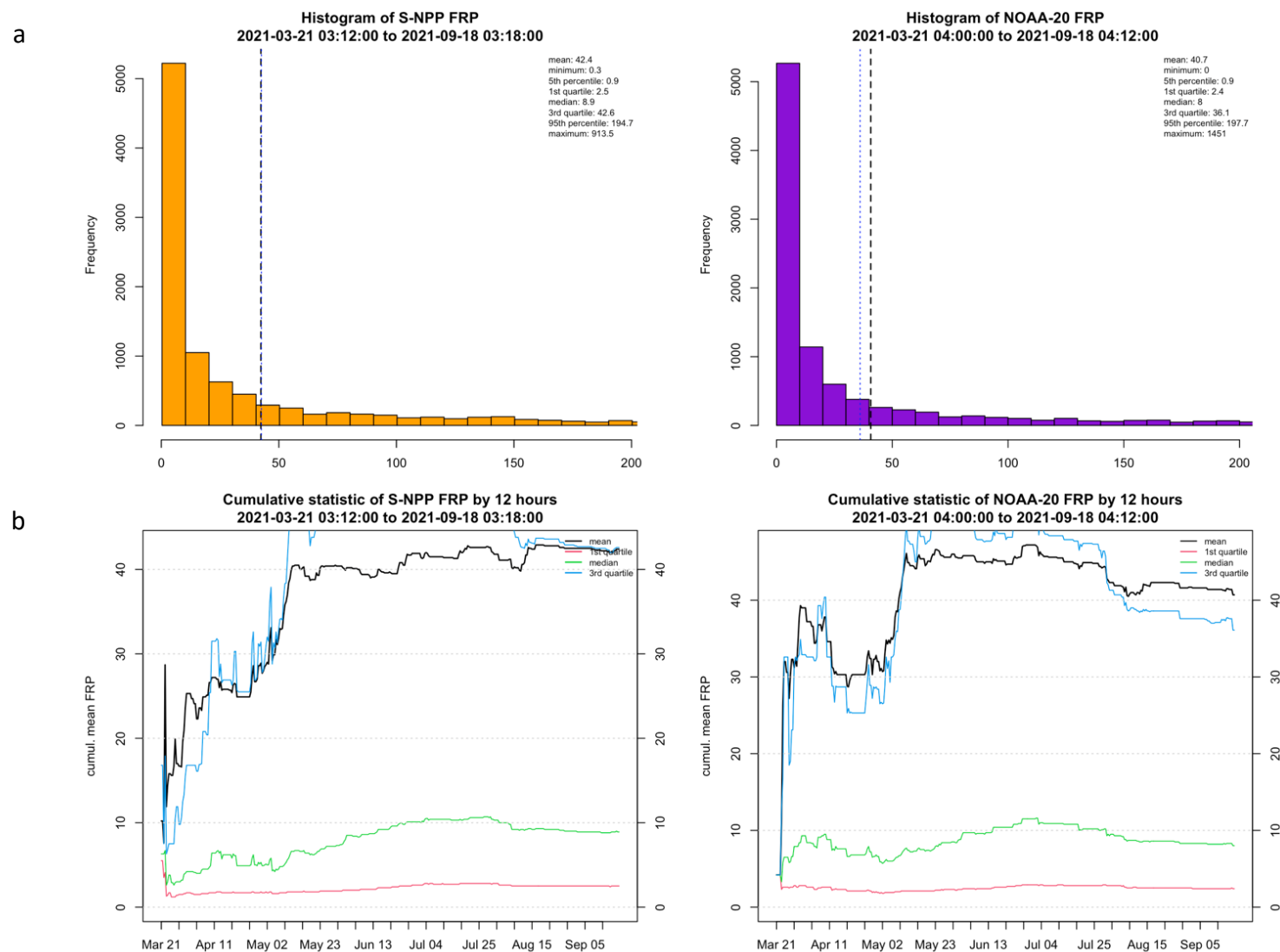


Figure S2-4: (a) Histogram of FRP data retrieved by the S-NPP (orange) and NOAA-20 (purple) satellites for Fagradalsfjall eruption from 21 March to 18 September 2021. Black dashed line is the mean, blue dashed line is the 3rd quartile. (b) cumulative FRP variations every 12 hours for the mean, the 1st quartile, the 3rd quartile, and the median for the same eruptive period.

Cumbre Vieja 2021

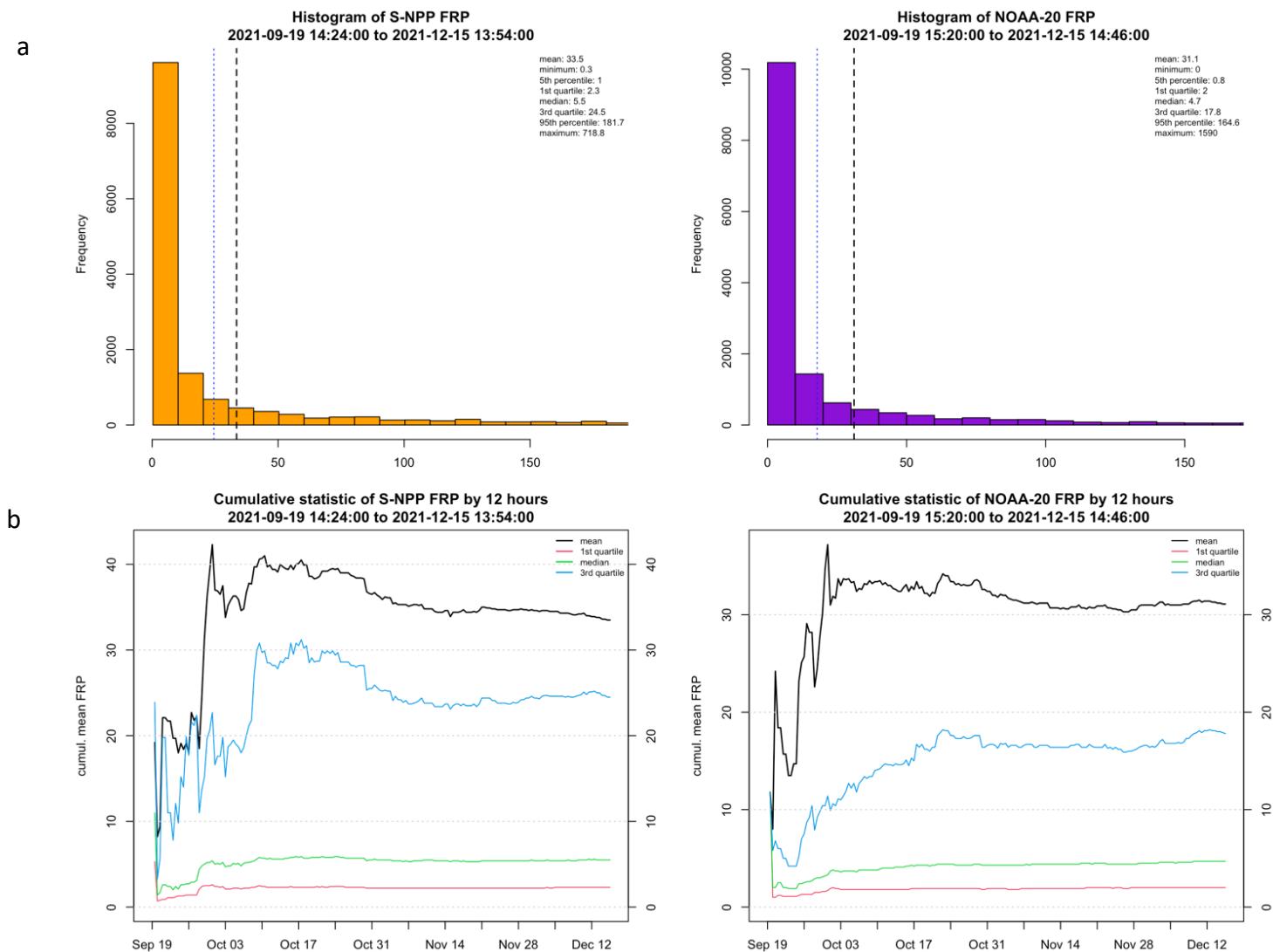


Figure S2-5: (a) Histogram of FRP data retrieved by the S-NPP (orange) and NOAA-20 (purple) satellites for Cumbre Vieja eruption from 19 September to 15 December 2021. Black dashed line is the mean, blue dashed line is the 3rd quartile. (b) cumulative FRP variations every 12 hours for the mean, the 1st quartile, the 3rd quartile, and the median for the same eruptive period.

Wolf 2022

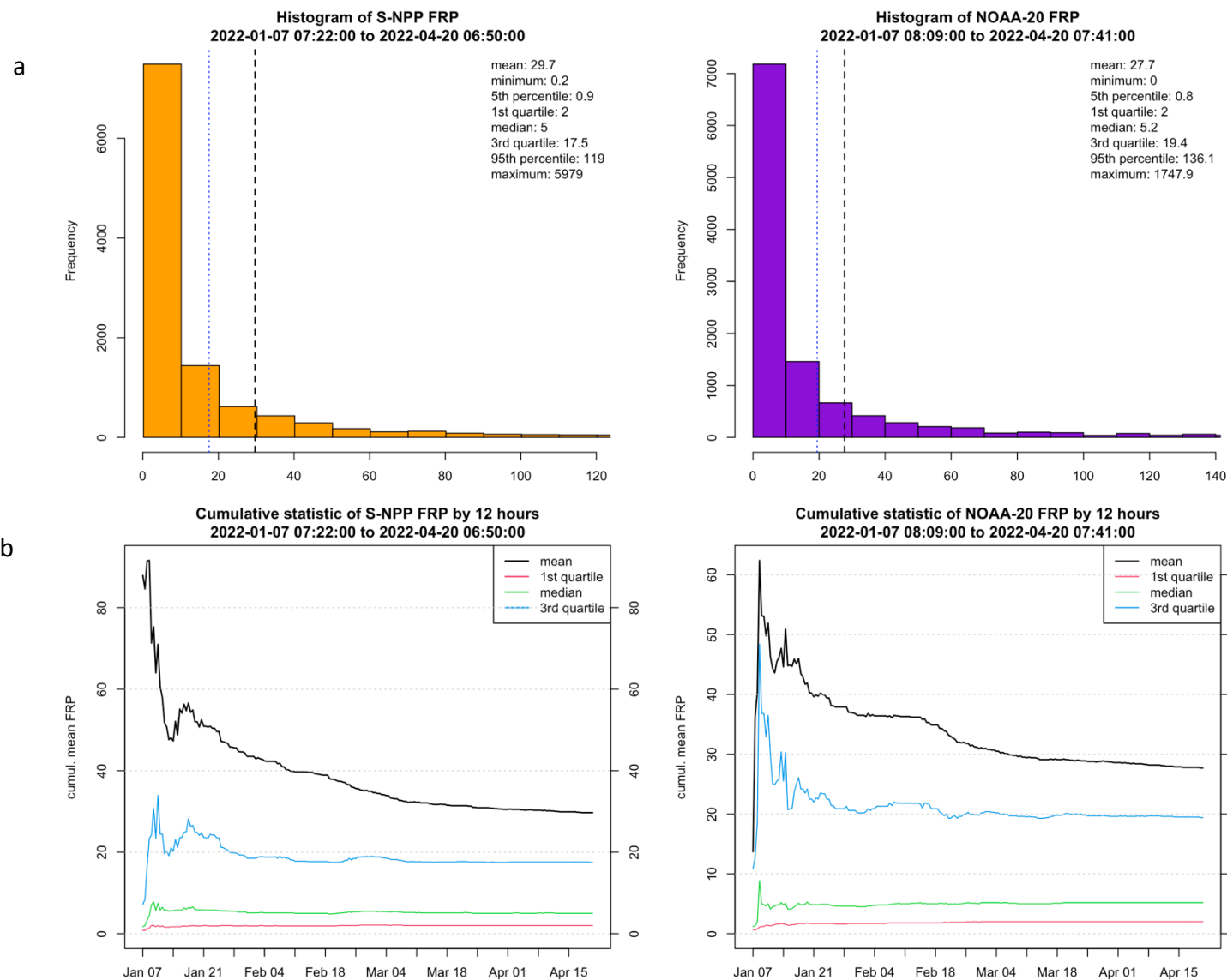


Figure S2-6: (a) Histogram of FRP data retrieved by the S-NPP (orange) and NOAA-20 (purple) satellites for Wolf volcano from 7 January to 20 April 2022. Black dashed line is the mean, blue dashed line is the 3rd quartile. (b) cumulative FRP variations every 12 hours for the mean, the 1st quartile, the 3rd quartile, and the median for the same eruptive period.

Short-lived eruptions:

Fernandina 2017

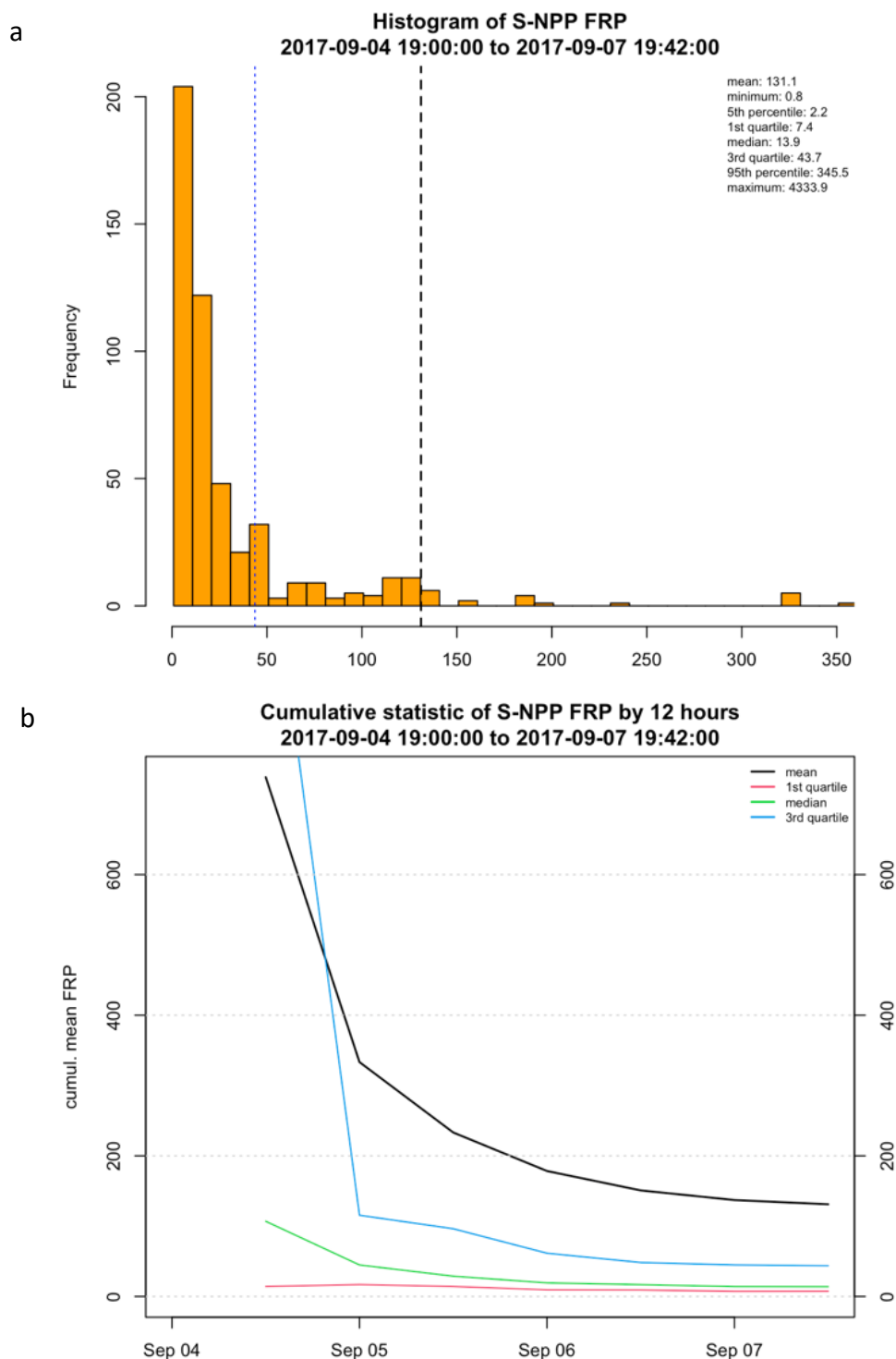


Figure S2-7: (a) Histogram of FRP data retrieved by the S-NPP satellite for Fernandina volcano from 4 to 7 September 2017. Black dashed line is the mean, blue dashed line is the 3rd quartile. (b) cumulative FRP variations every 12 hours for the mean, the 1st quartile, the 3rd quartile, and the median for the same eruptive period.

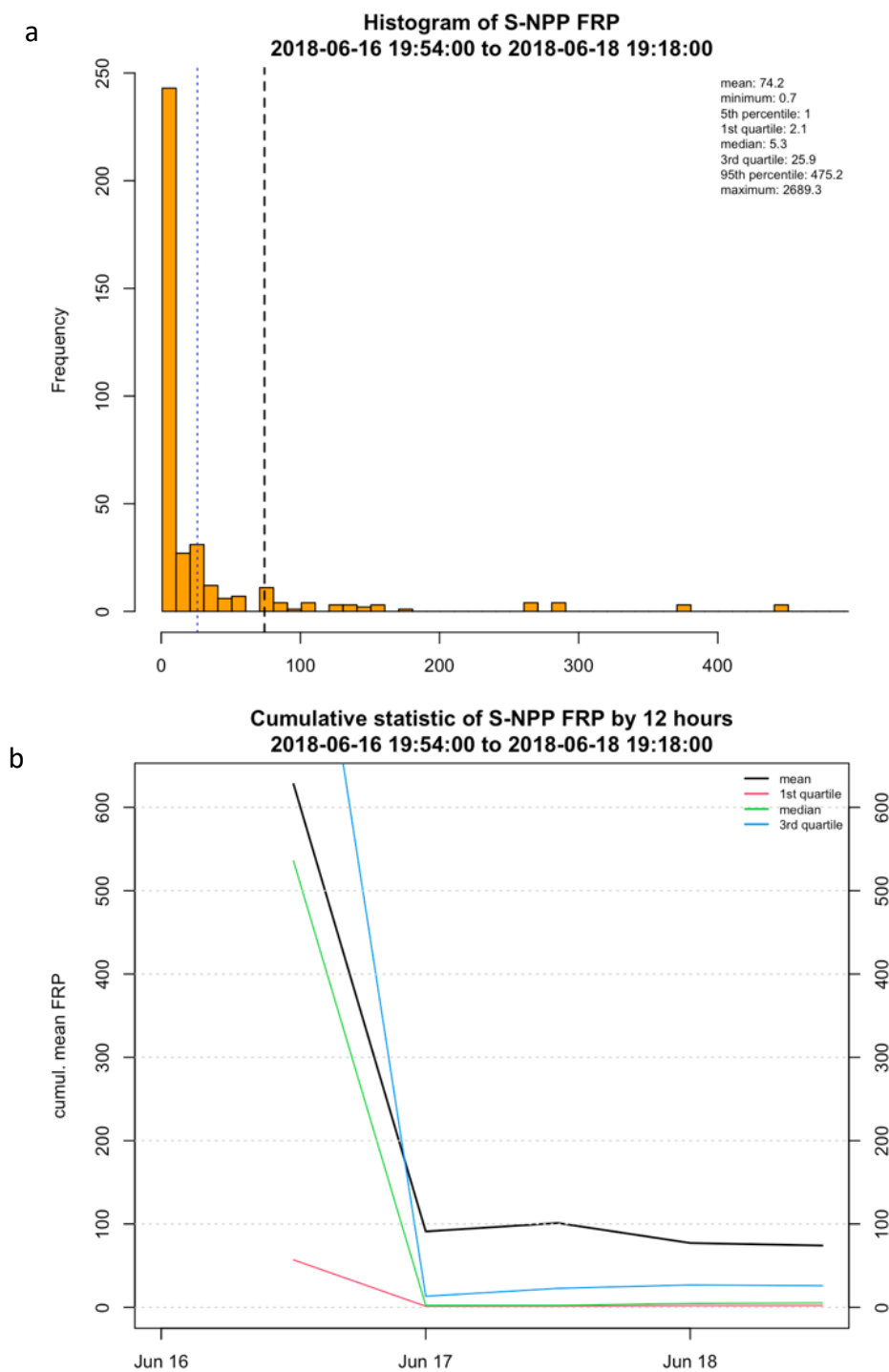


Figure S2-8: (a) Histogram of FRP data retrieved by the S-NPP satellite for Fernandina volcano from 16 to 18 June 2018. Black dashed line is the mean, blue dashed line is the 3rd quartile. (b) cumulative FRP variations every 12 hours for the mean, the 1st quartile, the 3rd quartile, and the median for the same eruptive period.

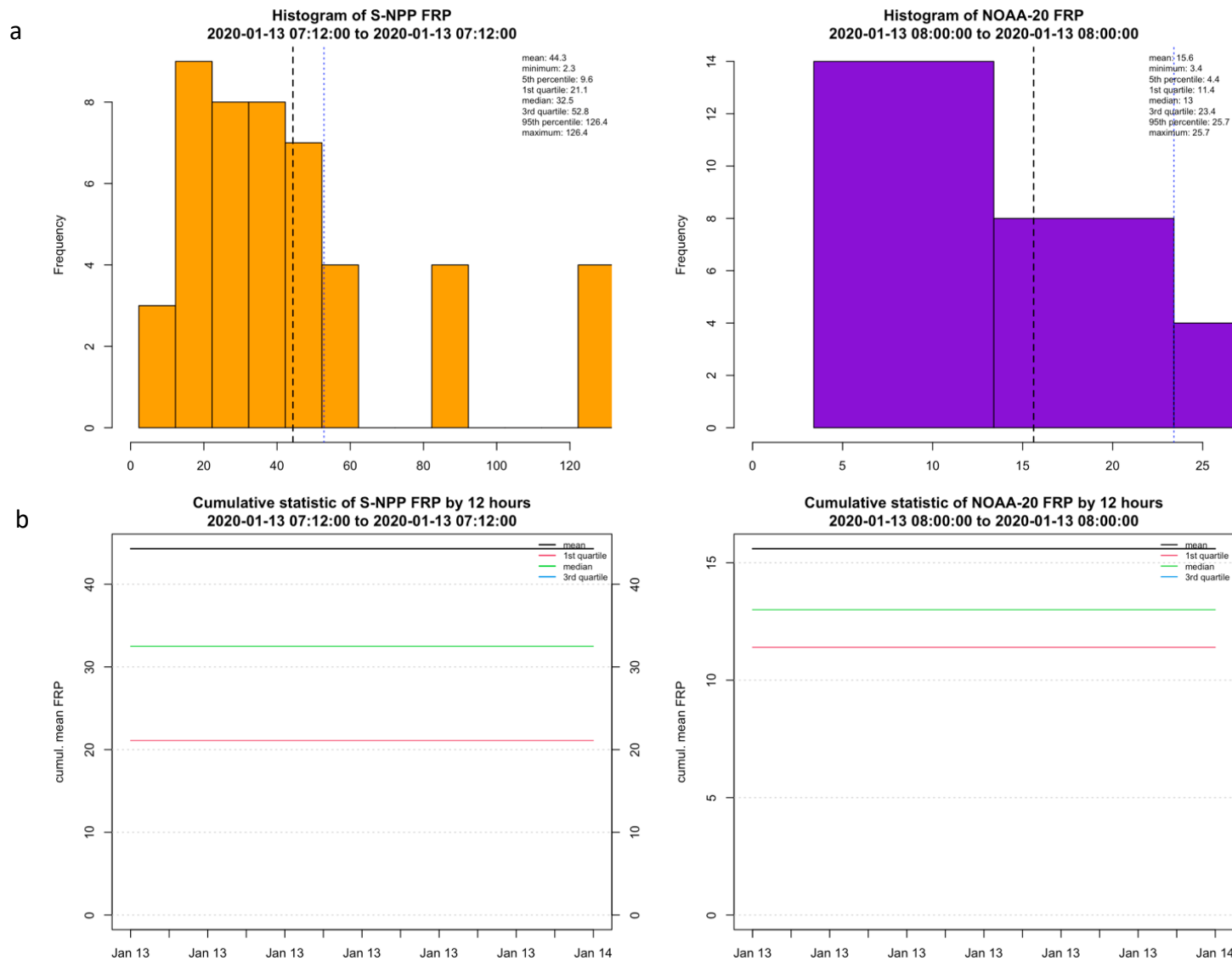


Figure S2-9: (a) Histogram of FRP data retrieved by the S-NPP (orange) and NOAA-20 (purple) satellites for Fernandina volcano for 13 January 2021. Black dashed line is the mean, blue dashed line is the 3rd quartile. (b) cumulative FRP variations every 12 hours for the mean, the 1st quartile, the 3rd quartile, and the median for the same day.

B. LAVAFLOW_MAPPER RESULTS

Long-lasting eruptions:

Wolf 2022 (Ecuador)

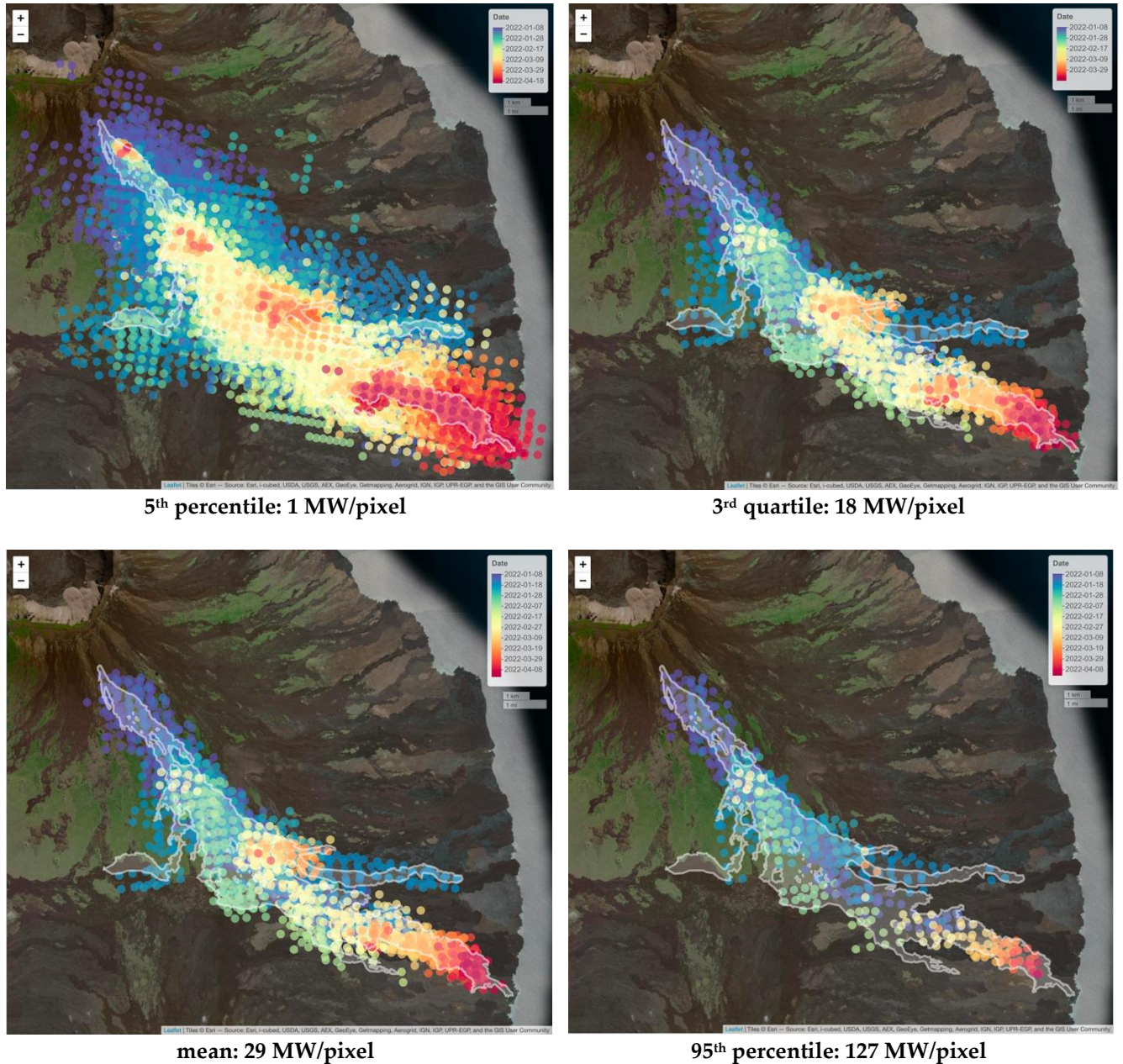
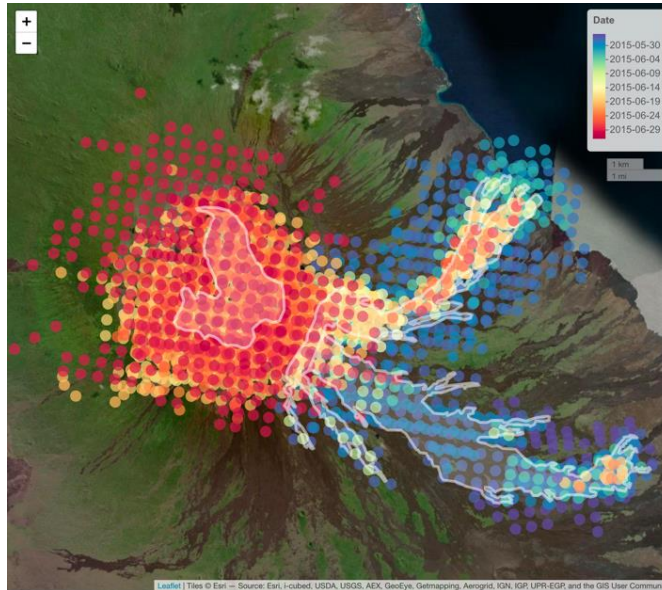
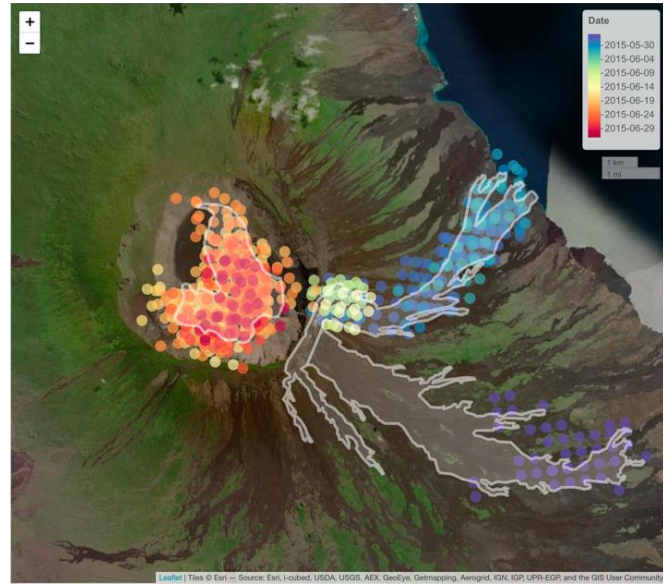


Figure S2-10: Map of thermal anomalies recorded for Wolf 2022 eruption between 7 January and 20 April 2022 applying the 5th percentile, the 3rd quartile, the mean and the 95th percentile of the FRP values as filters. The white polygon indicates the actual area covered by lava, according to the preliminary official lava flow map retrieved from a 3-meter resolution PlanetScope satellite image from 20 April 2022 (see Table 1). The colour code of the hotspots depicts the acquisition date, where violet ones are older than red ones.

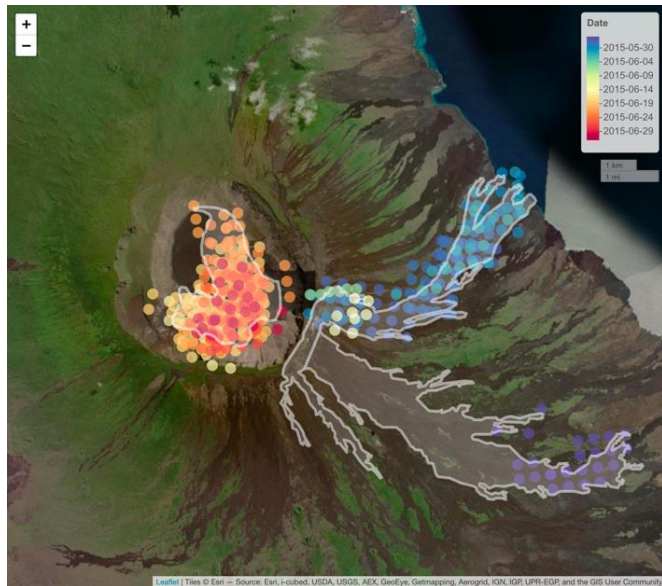
Wolf 2015 (Ecuador)



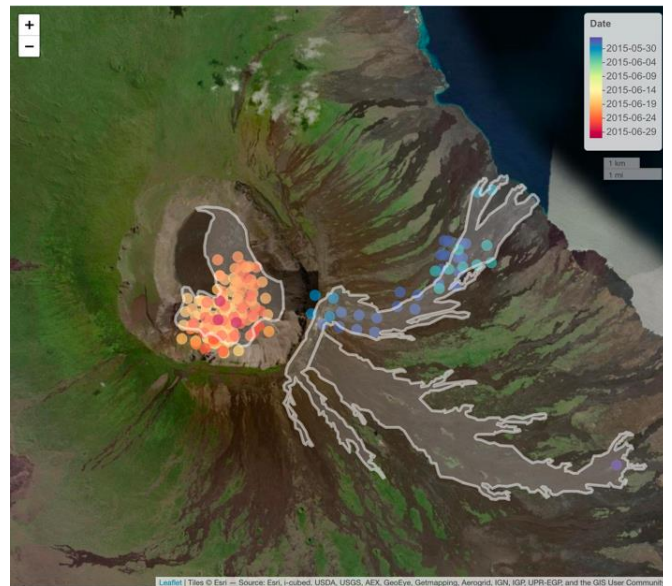
5th percentile: 1 MW/pixel



3rd quartile: 27 MW/pixel



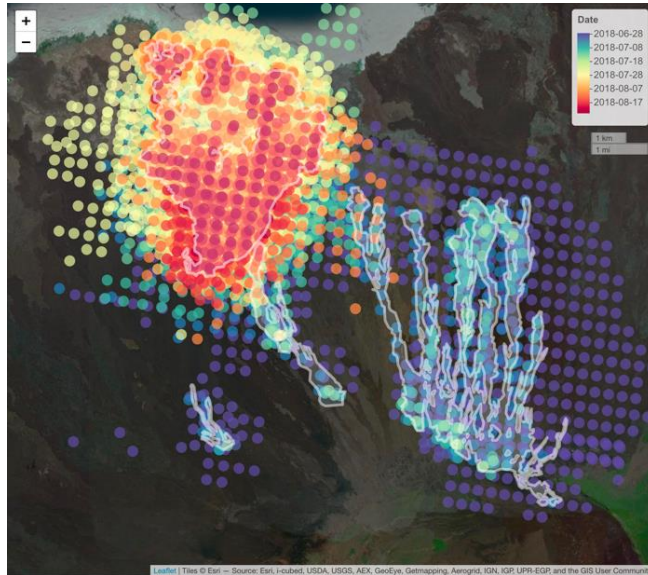
mean: 56 MW/pixel



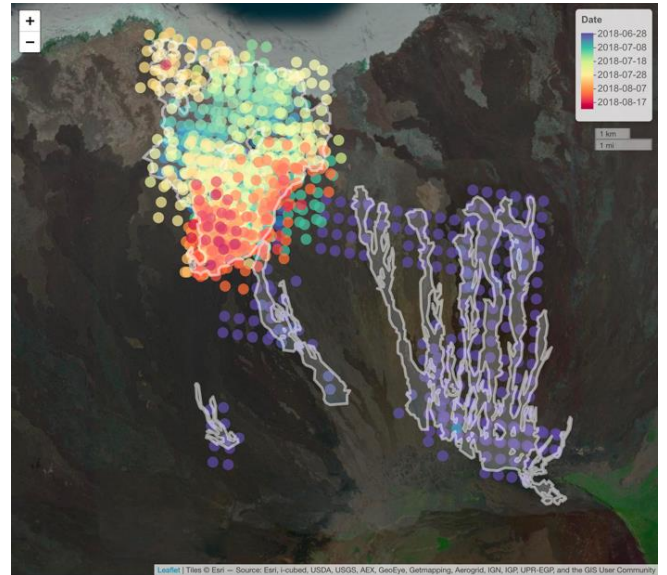
95th percentile: 337 MW/pixel

Figure S2-11: Map of thermal anomalies recorded for Wolf 2015 eruption between 25 May and 5 July 2015 applying the 5th percentile, the 3rd quartile, the mean and the 95th percentile of the FRP values as filters. The white polygon indicates the actual area covered by lava, according to the preliminary official lava flow map retrieved from Bernard et al., 2019 (see Table 1). The colour code of the hotspots depicts the acquisition date, where violet ones are older than red ones.

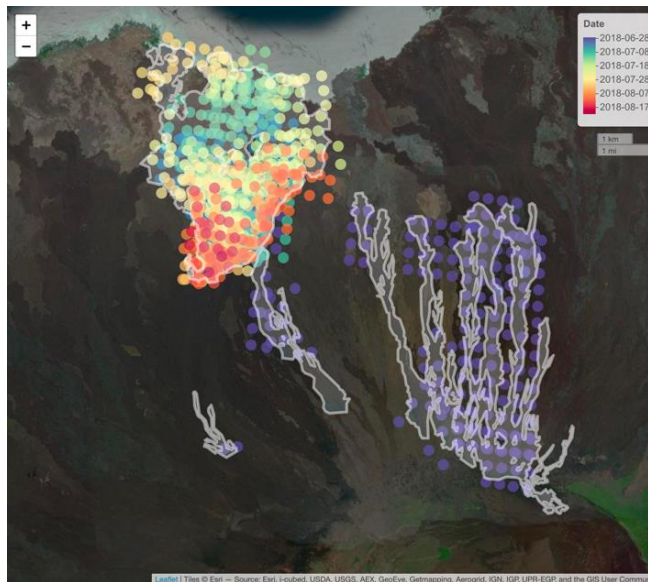
Sierra Negra 2018 (Ecuador)



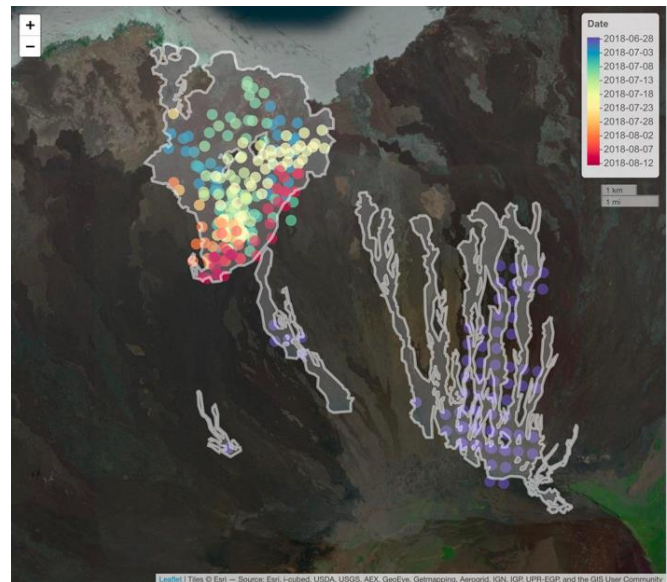
5th percentile: 1 MW/pixel



3rd quartile: 17 MW/pixel



mean: 29 MW/pixel



95th percentile: 153 MW/pixel

Figure S2-12: Map of thermal anomalies recorded for Sierra Negra 2018 eruption between 27 June and 3 August 2018 applying the 5th percentile, the 3rd quartile, the mean and the 95th percentile of the FRP values as filters. The white polygon indicates the actual area covered by lava, according to the preliminary official lava flow map retrieved from Vasconez et al., 2018 (see Table 1). The colour code of the hotspots depicts the acquisition date, where violet ones are older than red ones.

Cumbre Vieja 2021 (Spain)

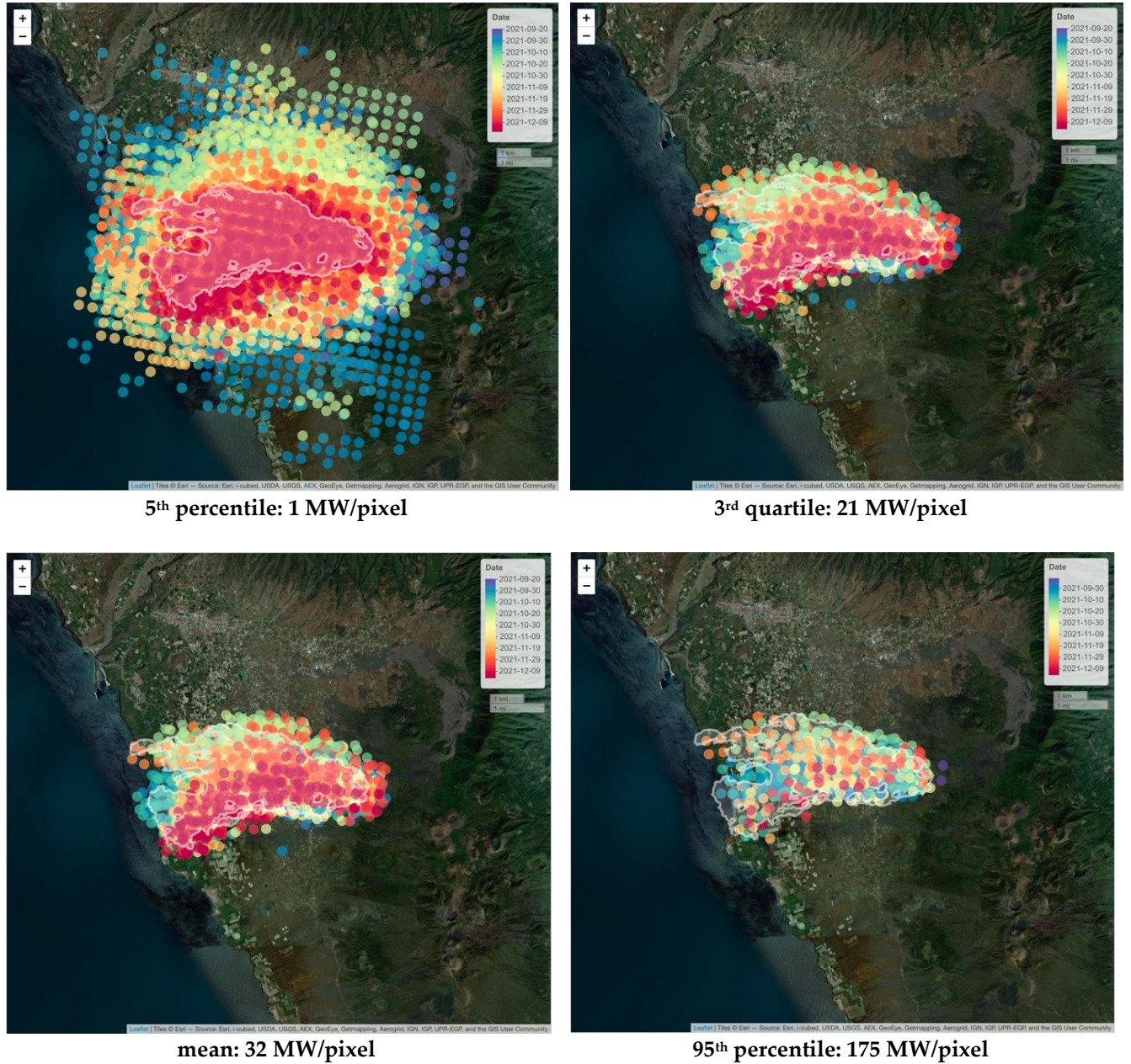


Figure S2-13: Map of thermal anomalies recorded for Cumbre Vieja 2021 eruption between 19 September and 15 December 2021 applying the 5th percentile, the 3rd quartile, the mean and the 95th percentile of the FRP values as filters. The white polygon indicates the actual area covered by lava, according to the preliminary official lava flow map retrieved from IGN & EMS (see Table 1). The colour code of the hotspots depicts the acquisition date, where violet ones are older than red ones.

Fagradalsfjall 2021 (Iceland)

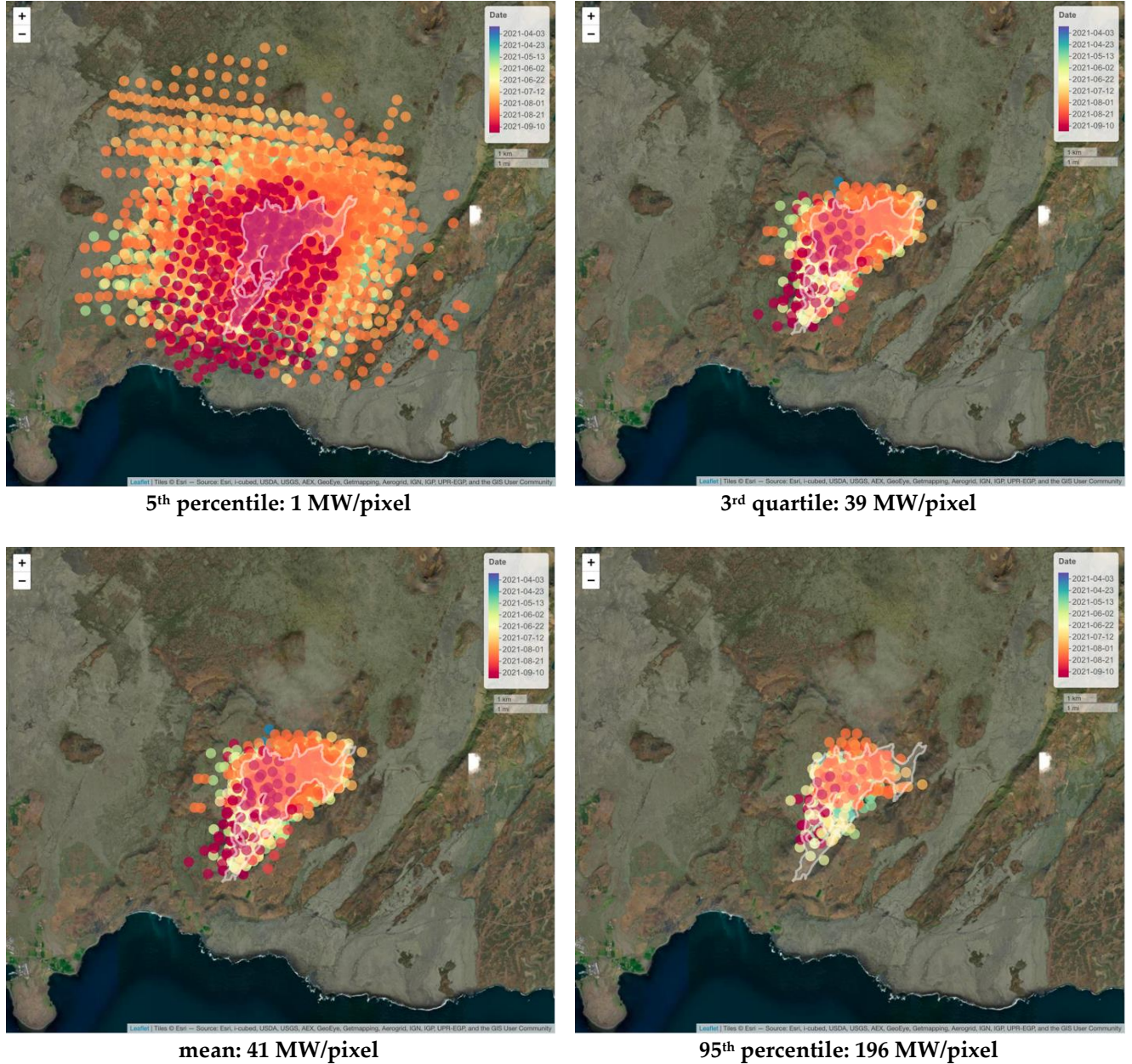


Figure S2-14: Map of thermal anomalies recorded for Fagradalsfjall 2021 eruption between 21 March and 18 September 2021 applying the 5th percentile, the 3rd quartile, the mean and the 95th percentile of the FRP values as filters. The white polygon indicates the actual area covered by lava, according to the preliminary official lava flow map retrieved from Pedersen et al., 2021 (see Table 1). The colour code of the hotspots depicts the acquisition date, where violet ones are older than red ones.

LERZ, Kilauea 2018 (USA)

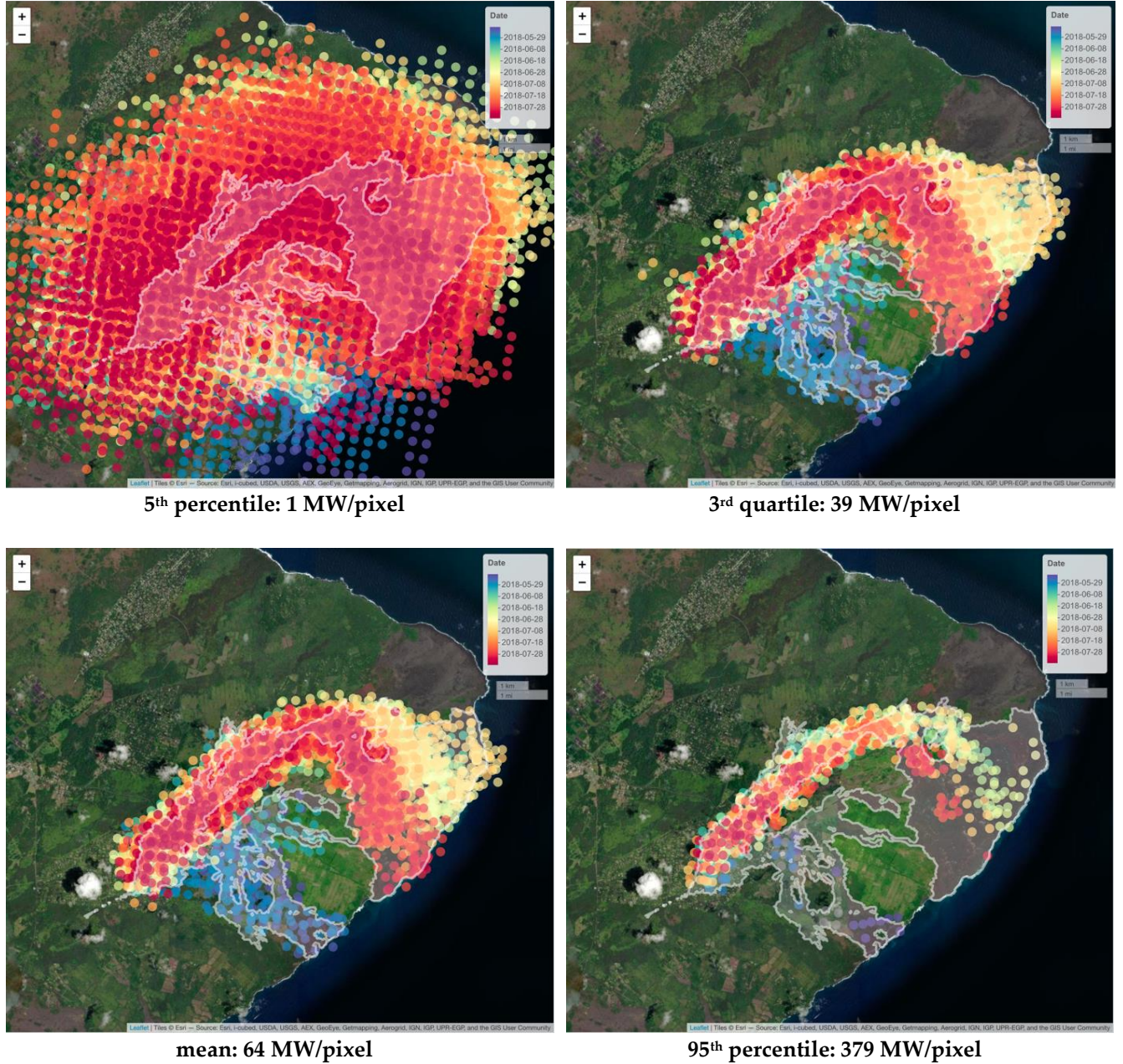


Figure S2-15: Map of thermal anomalies recorded for LERZ, Kilauea 2018 eruption between 18 May and 4 August 2018 applying the 5th percentile, the 3rd quartile, the mean and the 95th percentile of the FRP values as filters. The white polygon indicates the actual area covered by lava, according to the preliminary official lava flow map retrieved from Zoeller et al., 2020 (see Table 1). The colour code of the hotspots depicts the acquisition date, where violet ones are older than red ones.

Short-lived eruptions: Fernandina 2020 (Ecuador)

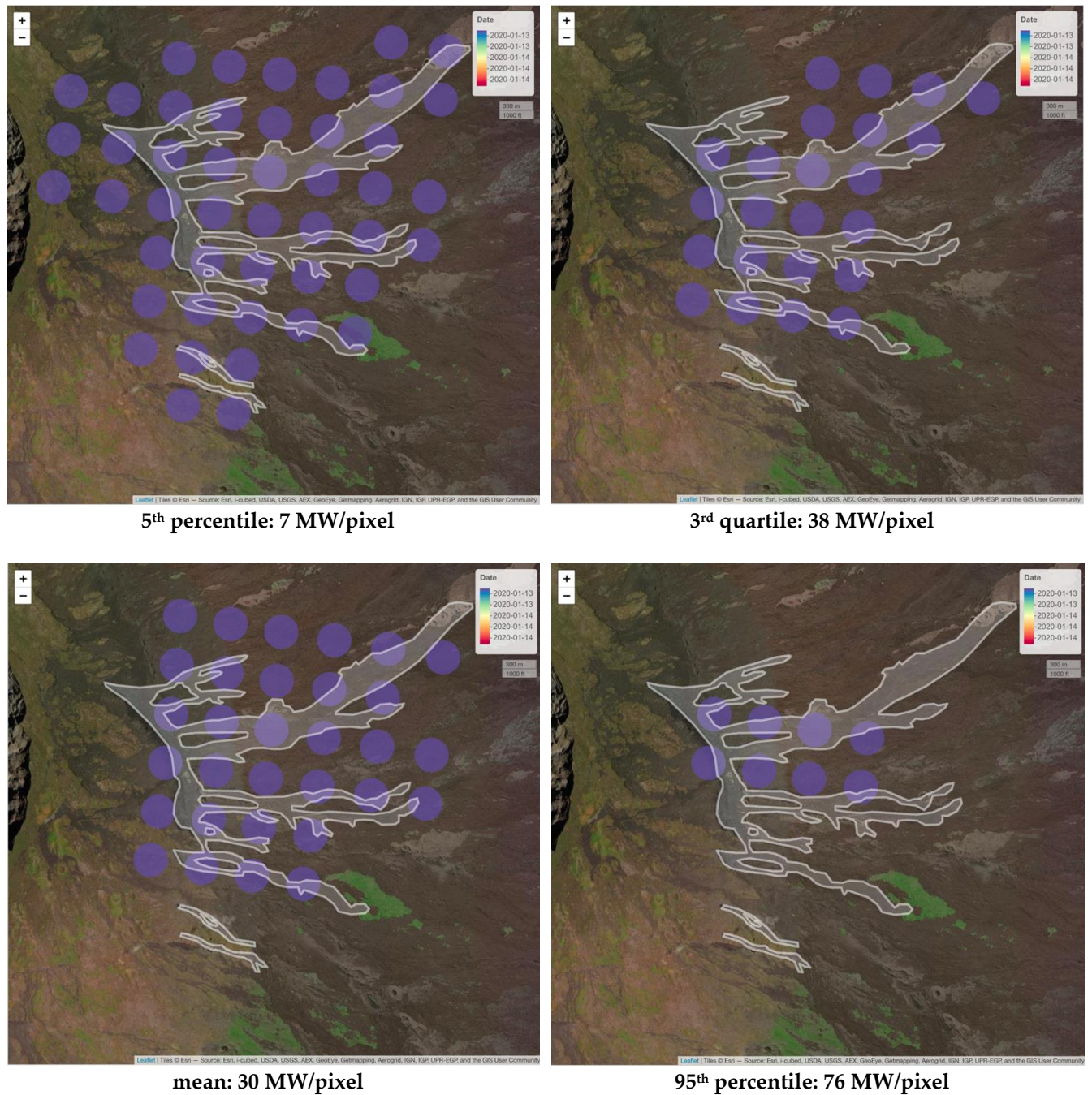


Figure S2-16: Map of thermal anomalies recorded for Fernandina 2020 eruption on 13 January applying the 5th percentile, the 3rd quartile, the mean and the 95th percentile of the FRP values as filters. The white polygon indicates the actual area covered by lava, according to the preliminary official lava flow map retrieved from a 10-meter resolution Sentinel-2 satellite image from 2 March 2020 (see Table 1). The colour code of the hotspots depicts the acquisition date, where violet ones are older than red ones.

Fernandina 2018 (Ecuador)

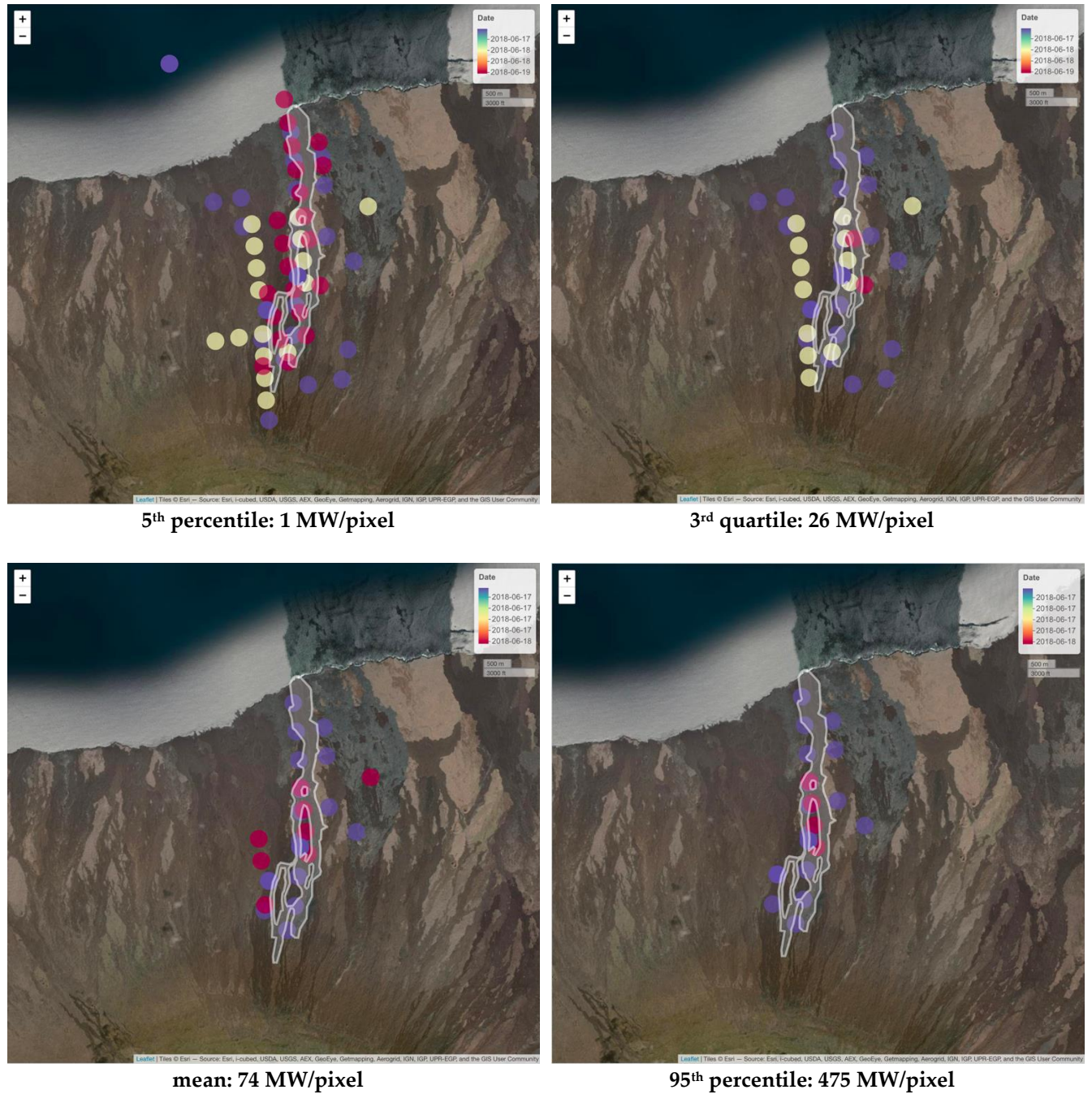
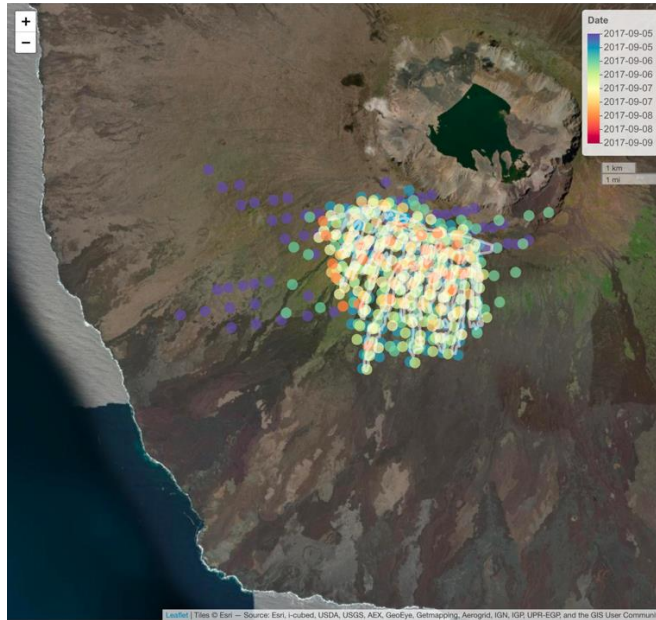
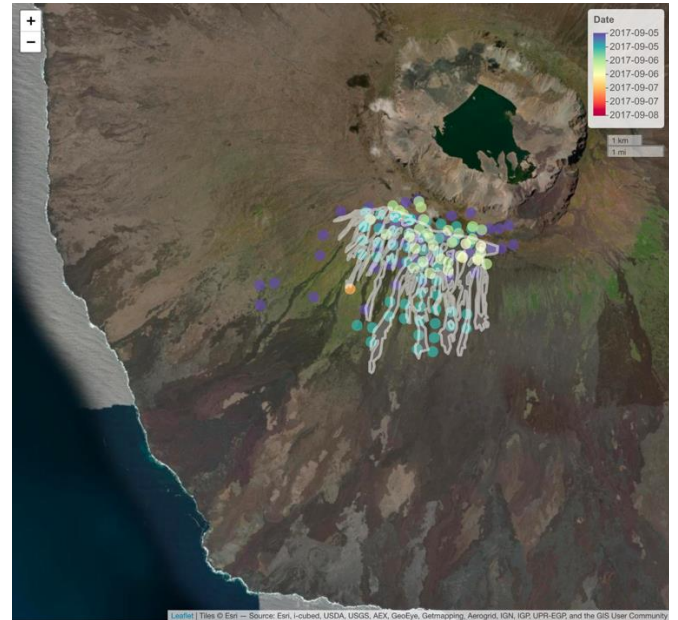


Figure S2-17: Map of thermal anomalies recorded for Fernandina 2018 eruption between 16 and 18 June 2018 applying the 5th percentile, the 3rd quartile, the mean and the 95th percentile of the FRP values as filters. The white polygon indicates the actual area covered by lava, according to the preliminary official lava flow map retrieved from Vasconez et al., 2018 (see Table 1). The colour code of the hotspots depicts the acquisition date, where violet ones are older than red ones.

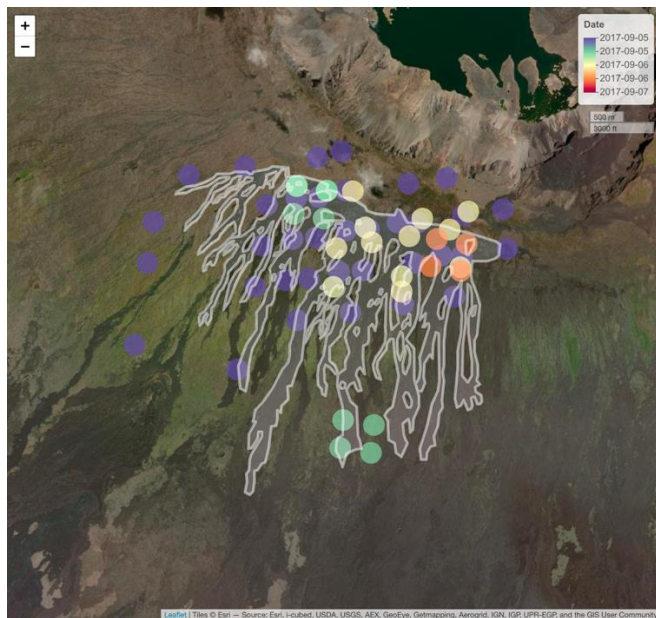
Fernandina 2017 (Ecuador)



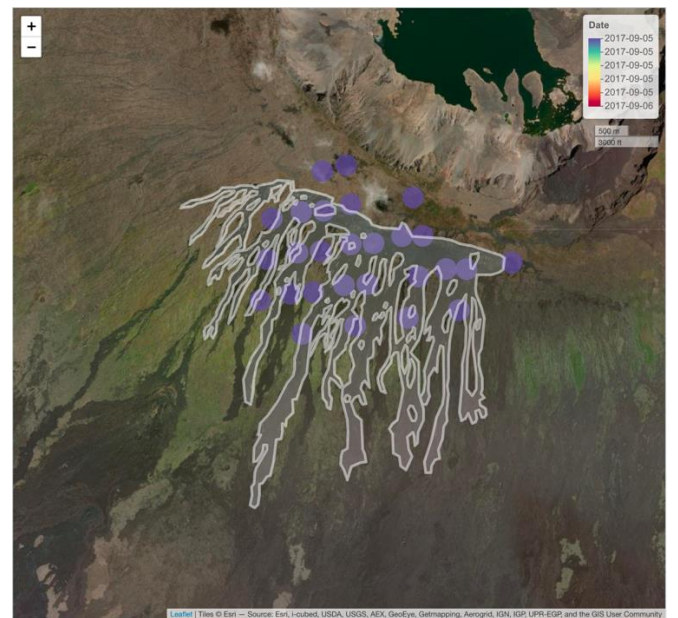
5th percentile: 2 MW/pixel



3rd quartile: 44 MW/pixel



mean: 116 MW/pixel



95th percentile: 346 MW/pixel

Figure S2-18: Map of thermal anomalies recorded for Fernandina 2017 eruption between 4 and 7 September 2017 applying the 5th percentile, the 3rd quartile, the mean and the 95th percentile of the FRP values as filters. The white polygon indicates the actual area covered by lava, according to the preliminary official lava flow map retrieved from Vasconez et al., 2018 (see Table 1). The colour code of the hotspots depicts the acquisition date, where violet ones are older than red ones.