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The geomagnetic field at La Palma (Canary Islands) before, during and after the 2021 eruption at the Cumbre Vieja rift

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After almost 50 years of quiescence, the Cumbre Vieja rift in La Palma underwent a reactivation process that culminated in a volcanic eruption from September 19 to December 13, 2021, preceded by a seismic swarm that started just eight days before the eruption onset. Seismic unrest started in October 2017 and comprised ten seismic swarms in five years, with the last one in August 2021. In July 2021, a magnetic station (CFU) was deployed in Cumbre Vieja, 2 km away from the site where the eruptive vents would open two months later. In September 2021, a second magnetic station (SAN) was installed near the southern end of the Cumbre Vieja rift. Both stations are still in operation today and acquire the total geomagnetic field intensity (F) with a sampling rate of 1 measurement/minute with two Overhauser magnetometers. In this work, we present the results of the analysis of these geomagnetic time series, which led to the identification of several signals of presumed volcanomagnetic origin. Our data revealed a magnetic signal at CFU station with an amplitude of 10 nT and a duration of 10 days by mid-August, one month before the eruption onset. During the eruption, the SAN magnetic station registered a magnetic signal with an amplitude of 17 nT in the second half of October. We analysed possible correlations with other physical parameters and concluded that these signals are the result of changes in the magnetization of rocks beneath the volcanic edifice related with volcanic activity.

Citation

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