INTERPRETING TREMOR CHANGES DURING 2011-2012 EL HIERRO ERUPTION (CANARY ISLANDS)

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One of the most informative geophysical signals that can be recorded on a volcano is the tremor, which has been used as a precursor of eruptive activity as well as a marker of changes of the eruption dynamics. In this contribution we analyse the strong tremor signal that was observed during the 2011-2012 El Hierro eruption and use it to correlate with variations in the eruption dynamics caused by stress and petrological changes of the plumbing system. This continuos seismic signal appeared at the onset of the eruption and finished at the end of it, showing significant variations in intensity, frequency and dynamical parameters during the whole episode. There was no tremor signal during the unrest episode that preceded the eruption, so in this case it was not possible to use this seismic signal as an eruption precursor. However, the comparison of its analysis with other geophysical data recorded during the eruption and the petrological and geochemical composition of the erupted products reveals that there is a strong coincidence between time variations observed in the tremor signal and those observed in tectonic seismicity and magma composition during the eruptions. This suggests that the tremor signal was highly sensitive to changes in the stress conditions of the plumbing system, dimensions of the conduit and vent, intensity of the explosive episodes, and rheological changes of the erupting magma. The results obtained show how the tremor signal was strongly influenced by stress changes in the host rock and rheological variations of the erupting magma, so we conclude that tracking real-time syn-eruptive tremor signals may provide an effective tool to interpret (and forecast ?) eruption dynamics in terms of plumbing system and magma physics variations.