

TIDAL MODULATION OF VOLCANIC TREMOR IN FOGO ISLAND, CAPE VERDE

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We identify and investigate volcanic tremor amplitude modulation at tidal frequencies recorded at several seismic stations in Fogo Island. After band-pass filtering the continuous digital traces, the rms was computed on a 2-minute long window advancing by increments of 1 minute. The Fourier transform of a 2-month long time series obtained in this way displays a prominent peak at 1.93 cpd, which is often the highest in the spectrum. The relative importance of this peak is strongest in the E-W seismic components. The solar frequencies of 1.00 cpd and 2.00 cpd are also observed in the spectra, but are less clear. The modulation is in phase at all seismic stations, and the comparison with synthetic tides shows that tremor amplitude lags behind g by about 1 hour. We compare these results with the spectral analysis of temperature and air pressure data from the network's meteorological station. Air and soil temperatures present mainly diurnal and also semi-diurnal modulations, but with solar periodicities. For air pressure, the semi-diurnal modulation dominates over the diurnal, but the frequency is 2.00 cpd. Radon concentration does not show any clear modulation, indicating that a variation of degassing is an unlikely cause.

Tidal influence on volcanic seismicity is in general difficult to establish or dismiss, due to the vicinity of the frequencies that may be related to main tide components (1.932 cpd for M2, 0.929 cpd for O1 and 1.003 cpd for K1) and the diurnal and semi-diurnal periodicities of environmental variables such as temperature or air pressure (Neuberg, 2000). This task is particularly hard when the seismic time series are derived from catalogues of discrete events (Emter, 1997). Because our analysis concerns a continuous time series sampled at 1-minute intervals, and continuous meteorological data is available, our results are not affected by such limitations.

SCE-2 The Interrelations between seismicity and other fields

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