

Supporting Information for “Silent Very Long Period Seismic Events (VLPs) at Stromboli Volcano, Italy”

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Method to estimate depth to VLP from VLP Dip Angle The dip angle (θ) is the angle from the horizontal x, y plane to long axis of the particle motion show in Figure 4. To estimate the depth from that dip angle, we extend the line of the long axis of the particle motion to a vertical line through the center of the crater terrace. Then we estimated the distance from the crater terrace surface to the point where the two lines intersect.

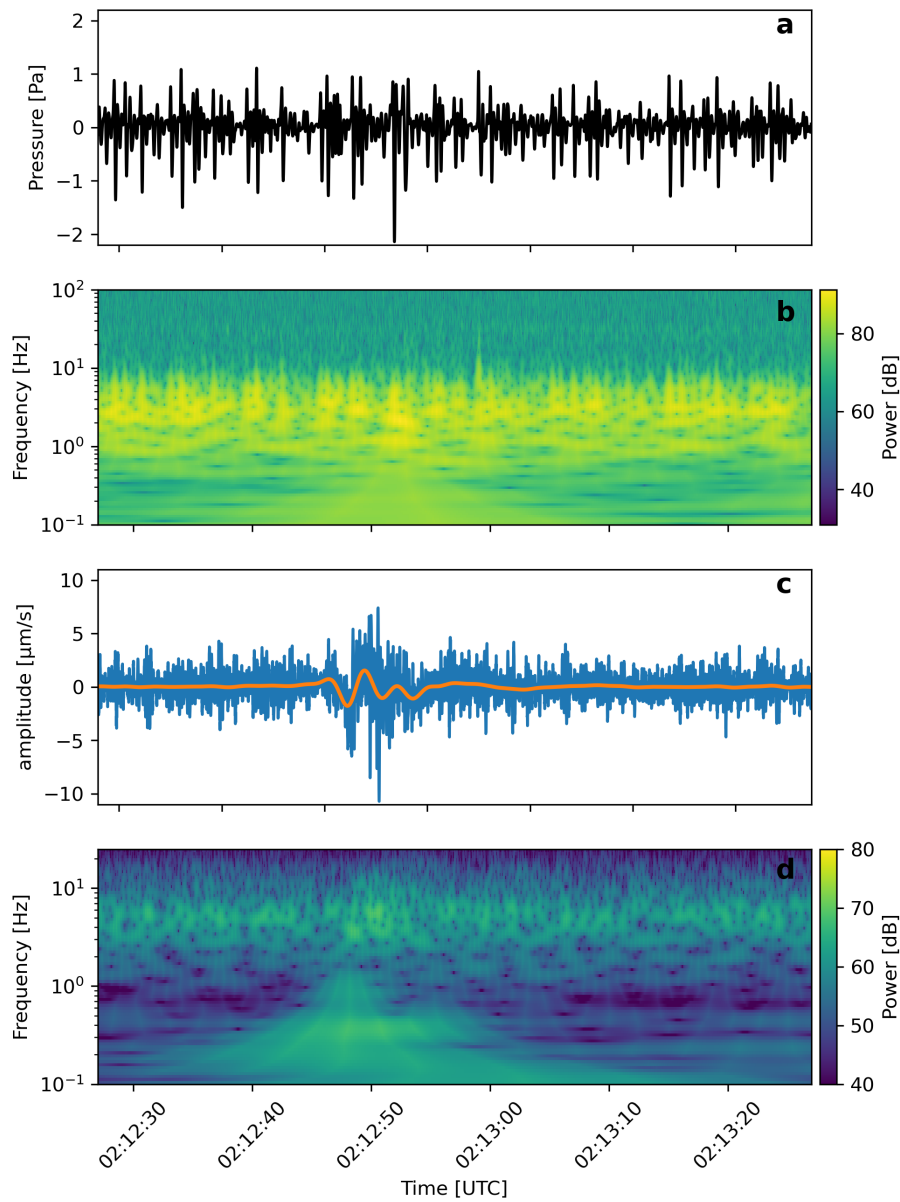


Figure S1. a) Infrasound trace from station SIEP band-pass filtered from 0.5 to 10 Hz. b) Spectrogram of infrasound data. c) Seismic trace from station SBCP filtered between 0.5 to 49 Hz in blue and 2 to 100 s in orange to highlight the VLP. d) Spectrogram of seismic data.

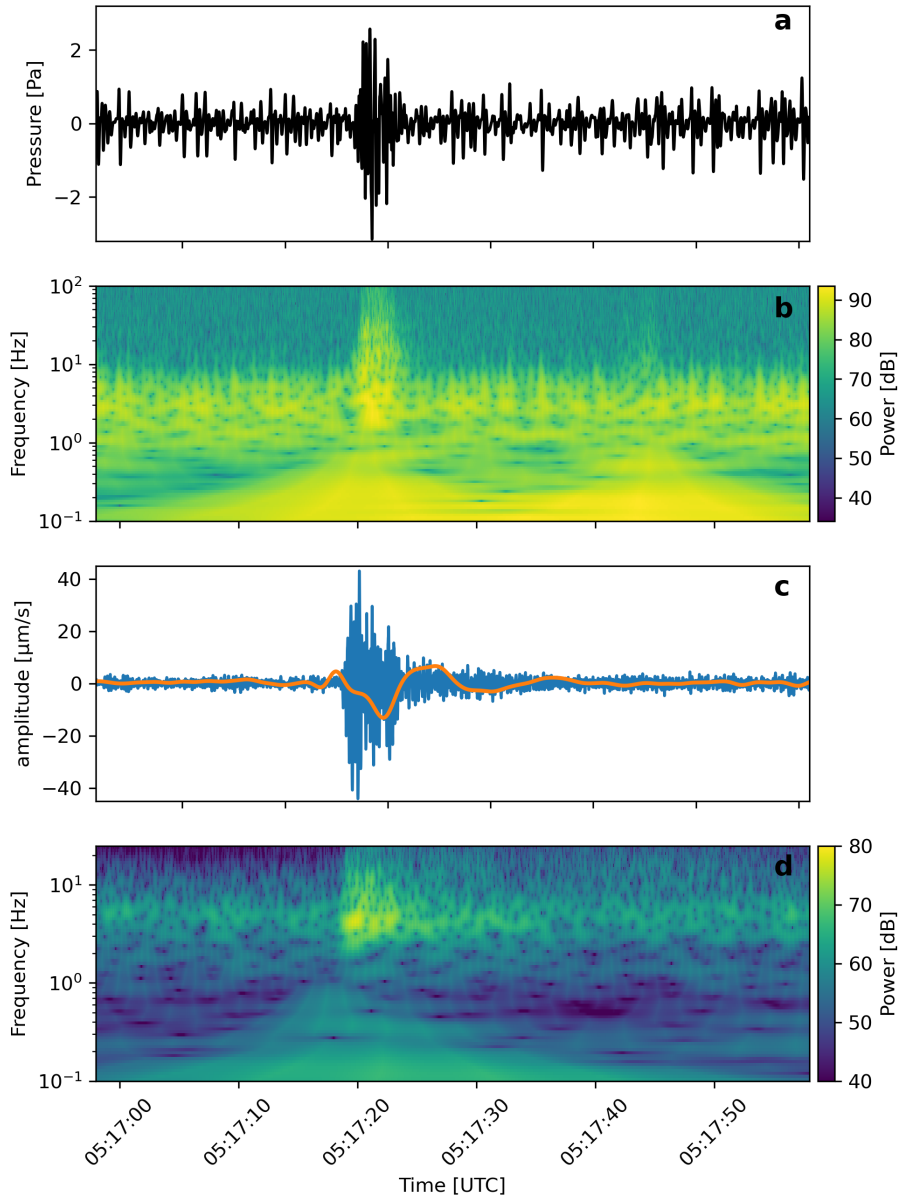


Figure S2. a) Infrasound trace from station SIEP band-pass filtered from 0.5 to 10 Hz. b) Spectrogram of infrasound data. c) Seismic trace from station SBCP filtered between 0.5 to 49 Hz in blue and 2 to 100 s in orange to highlight the VLP. d) Spectrogram of seismic data. The magnitude of the VLP has been multiplied by ten to improve viewing comparison.

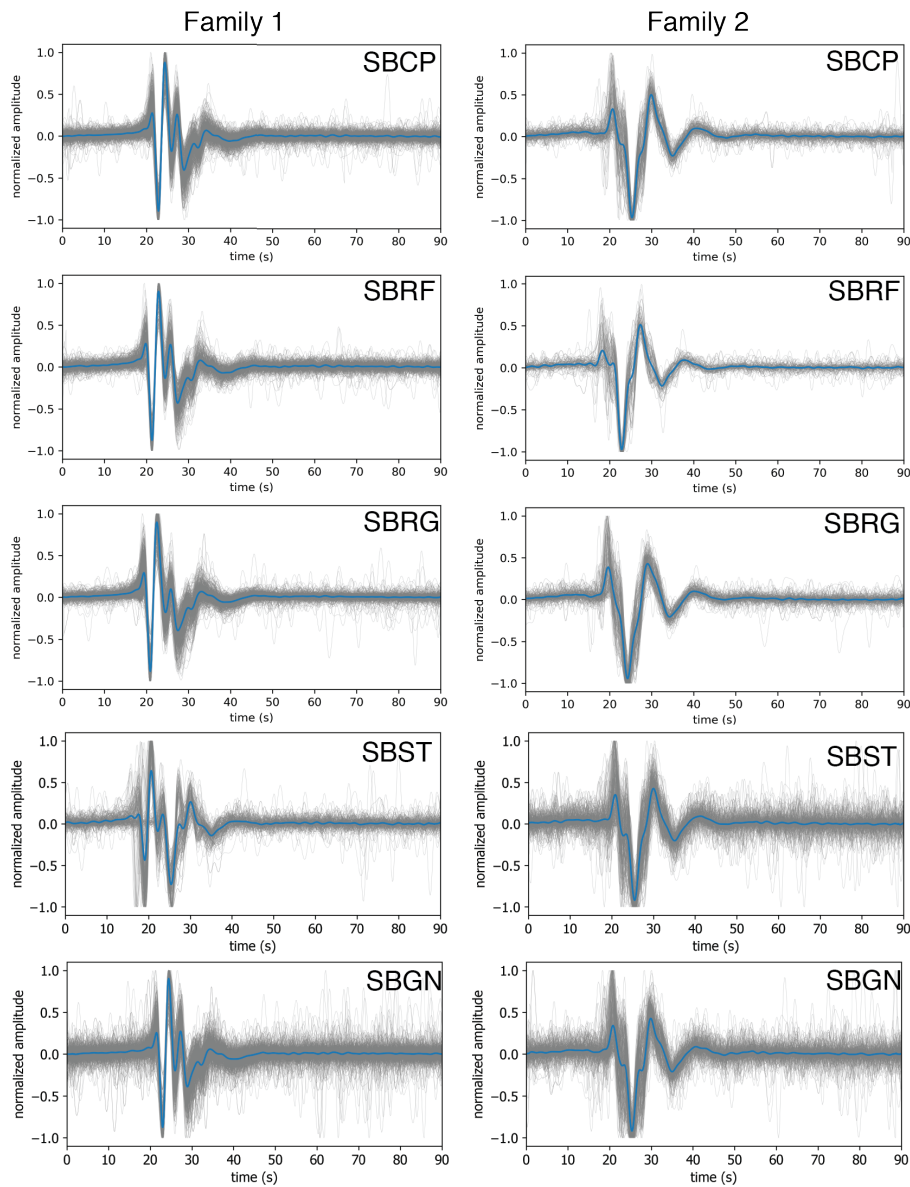


Figure S3. Column 1) time-aligned and stacked vertical component waveforms of Family 1, which repeats 500+ times over 7 days. The VLPs are plotted on top of each other in gray and their average in blue. Similar plots for Family 2 are shown in Column 2, which occurs about 200 times over the same period. The station names are notes in the upper right corner of each subplot. Waveforms are normalized and stacked. The stack amplitude is an average.

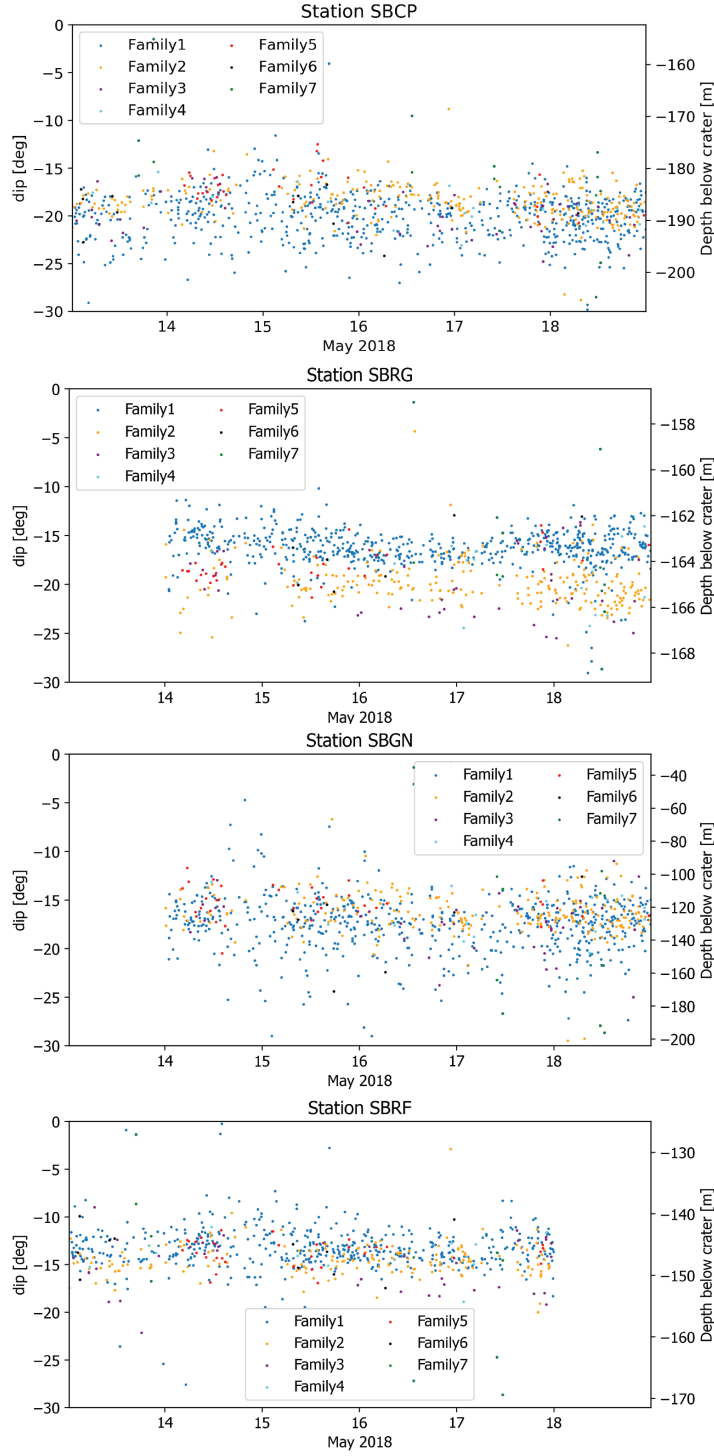


Figure S4. Here we show the dip of the VLP particle motion for the first 7 families found in the multiplet analysis. The right axis show the estimated depth assuming the VLP source centroid is below the crater terrace.

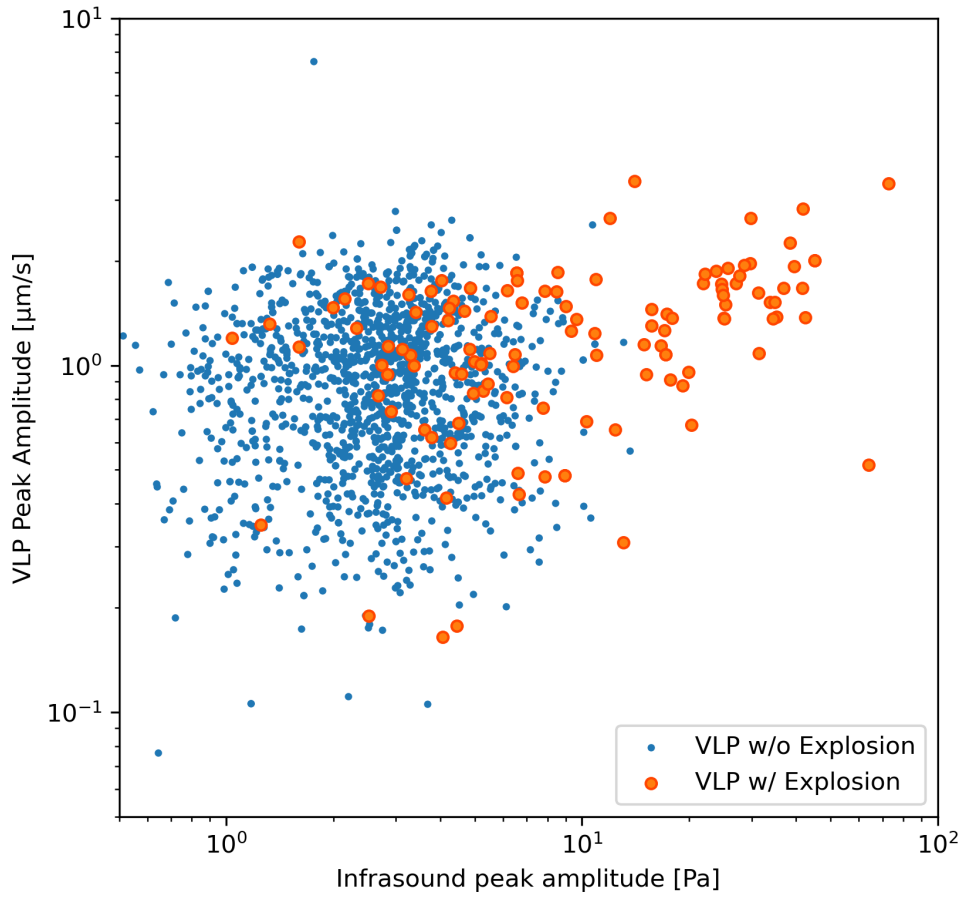


Figure S5. VLP peak amplitude from station SBCP versus infrasound peak amplitude in the window ten seconds prior to twenty seconds after the VLP onset. VLPs and infrasound amplitudes with an associated explosion signal detected in the infrasound data are in orange.