

Time Varying Crustal Anisotropy at Whakaari/White Island Volcano

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Abstract : Whakaari/White Island has been the most active New Zealand volcano in the 21st century, producing small phreatic and phreatomagmatic eruptions, which are hard to predict. The most recent eruption occurred in 2019, tragically claiming the lives of 22 individuals and causing numerous injuries. We employed shear-wave splitting analyses to investigate variations in anisotropy between 2018 and 2020, during quiescence, unrest, and the eruption. We examined spatial and temporal variations in 3499 shear-wave splitting and 2656 V_p/V_s ratio measurements. Comparing shear-wave splitting parameters from similar earthquake paths across different times indicates that the observed temporal changes are unlikely to result from variations in earthquake paths through media with spatial variability. Instead, these changes may stem from variations in anisotropy over time, likely caused by changes in crack alignment due to stress or varying fluid content.

Keywords : background seismic waves, fast orientations, seismic anisotropy, V_p/V_s ratio

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