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Remote hydroacoustic and infrasonic detection and characterization of eruptive activity leading to, during, and following the December 2018 major flank collapse and tsunami at Anak Krakatau

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A climactic eruption phase on December 22, 2018 triggered the collapse of the southwest flank and summit of Anak Krakatau stratovolcano, generating a tsunami which struck Sumatra and Java. We employ a selection of remote moored hydroacoustic (H08S, 3,307 km; H01W, 3,720 km) and infrasonic (IS06, 1,156 km; IS07, 3,475 km; IS52, 3,638 km) stations of the International Monitoring System (IMS) to investigate eruptive activity preceding, during, and after the climactic eruption phase. We observe 6 months of co-eruptive intermittent infrasound at IS06, and powerful infrasound from the climactic eruption on IS06 and IS52. The climactic eruption phase was not detected hydroacoustically, but we observe a ~12-day swarm of hydroacoustic signals beginning 24 days before the flank collapse event that we attribute to sustained submarine eruptive activity at Anak Krakatau. We perform waveform multiplet analysis to assess similarity of infrasound and hydroacoustic events. Impulsive infrasonic events recorded during the main infrasound-generating eruption are similar, indicating repetitive explosions at Anak Krakatau. Hydroacoustic event families at H08S are less similar, indicating a possible range of submarine eruption processes and signal types. This study further underscores the potential of remote acoustic technology for detecting and characterizing eruptions at submarine or partially submerged volcanoes.

Promotional text

We conduct a multi-technology analysis using infrasonic and hydroacoustic stations of the International Monitoring System (IMS) to remotely detect volcanic signals leading up to, during, and after the 2018 major flank collapse eruption of Anak Krakatau.

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