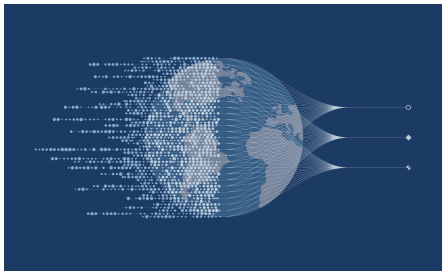

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Signature of the 25 August 2024 Nqweba Meteorite, Eastern Cape, South Africa

On 25 August 2024, at approximately 06:50 UTC, several stones from an achondrite meteorite fell around the town of Nqweba, Eastern Cape, South Africa, following a widely observed meteor fireball and detonation. The infrasound station I47ZA, located in Boshof, South Africa (about 590 km north-northeast of Nqweba), detected an atmospheric disturbance generated by an energy release between azimuths 180° and 200°, roughly towards Nqweba. This study analyses seismic signals recorded at three seismic stations in the region of the sightings to detect seismic signatures from the meteorite's atmospheric entry. Clear seismic arrivals were observed at stations SVILL (10 km from Nqweba), BUFB (100 km), and BFKLF (195 km) at 06:53 UTC, 06:54 UTC, and 06:57 UTC, respectively. The seismic signals exhibited a two-stage pattern typical of meteor-related events. The first arrival, the air-coupled ground wave, is a train of dispersive Rayleigh waves generated by shock waves interacting with the ground. The second arrival, a stronger W-shaped pulse, is the directly-coupled airwave, corresponding to a positive overpressure from a ballistic shock. This secondary arrival will be used to constrain the meteorite's trajectory through arrival time, particle motion, and polarization analyses.

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