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## Seismic insights into the structure of the Balmuccia Peridotite within the Ivrea Verbano Zone

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In the Ivrea Verbano Zone (IVZ) Italy, which is characterized with lower-crustal rocks and fragments of upper mantle rocks, a high-resolution seismic survey is conducted across the Balmuccia Peridotite. This study is in preparation of a proposed deep scientific drilling project which focuses on targeting mantle rocks and understanding the region's complex geology. Specifically, we target characterizing structures within the peridotite body.

The seismic survey employs a fixed spread of 200 vertical geophones and 160 3C-sensors, spaced at ca. 10 m along three sub-parallel receiver lines spaced 40-80 m apart. Vibroseis source points are at 22 m stations along a 2.2 km line utilizing a 12-140 Hz 10 s linear sweep with 3 s listening time. The survey aims to explain the seismic characteristics of the peridotite body and its relation to the surrounding geological structures.

The P-wave travelttime tomography reveals a range of seismic velocities within the peridotite from 6 to 8 km/s, with a mean velocity of ca. 7 km/s. These variations reflect the heterogeneity of the peridotite, influenced by the presence of fractures and faults. Notably, the higher velocities observed are consistent with findings from laboratory studies on small-scale samples from the area. The reflection seismic analysis shows subvertical reflectors that coincide with the peridotite boundaries mapped at the surface. These reflectors come together at a depth of 0.175 km b.s.l., suggesting that the peridotite has a lens-like structure. In addition, several features within the peridotite suggest a highly fractured body. Nevertheless, limitations in the imaging process do not allow for a thorough interpretation of the area below the imaged lens-shaped body. A deep reflector is identified at approximately 1.3 km depth. This feature potentially marks the top of the Ivrea Geophysical Body (IGB), aligning with previous geophysical estimations.