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Crowd modelling: Launching an open gravity-modelling call to challenge the Balmuccia peridotite body

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Modelling of geophysical data is often subject to choices made by the researcher undertaking the work. The level of structural complexity in the model, the bounds on parameters imposed by *a priori* knowledge, the thoroughness and efficiency in exploring the parameter space may all lead to bias in determining what the best fitting models can be.

To avoid bias from our own ideas in constraining the subsurface shape of a given density anomaly, we hereby invite anyone interested to create their own models. This is planned by sharing the same gravity data measured in the field, the same digital elevation model, the main features of the local geological maps, and bounds on the encountered rock density values. These data will be shared openly, in the form of a modelling challenge: each participating researcher or group is expected to submit their solution(s). All these will be compared during a dedicated workshop, ultimately resulting in a joint publication.

The target of this modelling challenge is the world-famous Balmuccia peridotite body (45.84°N, 8.16°E) in the Ivrea-Verbano Zone (IVZ). Here mantle rocks are naturally exposed at the surface, in the broader context of the IVZ, a middle- to lower crustal terrain along the Europe-Adria plate boundary's eastern side. The surface exposure of the Balmuccia peridotite is ~ 4.4 km N-S by 0.6 km E-W, with outcrop elevation changes exceeding 1000 m. About 150 new gravity data points have been measured within a radius of 3 km from the centre of the peridotite body, along more or less accessible paths and slopes. The measurements have been carried out with a Scintrex CG-5 relative gravimeter, tied to a reference point, and all points located via differential GPS with typical vertical precision of a few cm. Farther away regional gravity data is available at few km spacing.

Beyond the modelling challenge, the interest in constraining the subsurface shape of the

Balmuccia peridotite body is its future target role in the ICDP DIVE continental drilling project (www.dive2ivrea.org).