Geophysical Research Abstracts
Vol. 21, EGU2019-16456, 2019
EGU General Assembly 2019

3-D gravity model of the Ivrea Geophysical Body: new data, local-density correction, and seismic constraints

Matteo Scarponi (1), György Hetényi (1), Théo Berthet (4), Ludovic Baron (1), Jaroslava Plomerová (2), Stefano Solarino (3), and AlpArray-Ivrea Working Group ()

(1) University of Lausanne, Institute of Earth Sciences, Geopolis, Lausanne, Switzerland (matteo.scarponi@unil.ch), (2) Institute of Geophysics, Czech Academy of Sciences, Prague, Czech Republic (jpl@ig.cas.cz), (3) Istituto Nazionale di Geofisica e Vulcanologia INGV, c/o DICCA University of Genova, Genova, Italy (stefano.solarino@ingv.it), (4) Department of Earth Sciences, Uppsala University, Uppsala, Sweden (theo.berthet@gmail.com)

The Ivrea-Geophysical Body (IGB) is a piece of Adriatic lower litosphere, detached during the European-African continental collision. It intrudes the inner arc of Western Alps at upper-crustal depths and it is mainly characterised by two geophysical anomalies: high density and high seismic velocity. Its North-Eastern portion exposes lower-crustal rocks at the surface in the so-called Ivrea-Verbano Zone, presenting a rock complex of unique extent and composition.

We here aim at refining the IGB structure by adding new and compiling old gravity data over the area. Additional constraints come from seismic data, local rock-densities and geological mapping. We collected 180 new relative gravity measurements, approaching the target surface coverage of 1 point every 4 to 9 km2. When merged with the existing data, this dataset provides new constraints on the IGB density distribution.

As the area exposes rocks typical of the lower crust, with high densities, we test the effect of using in situ rock densities in gravity corrections. To this end, density data from Khazanedari et al. (2000) and geological mapping (e.g. Brack et al. 2010) have been combined. This field is spatially variable and deviates clearly from the reference value of 2670 kg/m3, and it is used to compute a modified "Bouguer" anomaly. This can be regarded as a first step in creating a local density-structure model matching the geological information.

Combining high-quality data from different datasets allows us to obtain a new, detailed image of the IGB structure and a better constrained density model. Therefore, we also deployed 10 broadband seismic stations along a 50 km long linear West-East profile, crossing the Insubric Line and the Ivrea-Verbano Zone at the level of Sesia Valley. This seismic dataset provides us with higher resolution results than the most recent local earthquake tomography results (Solarino et al. 2018, Diehl et al. 2009) and highlights new IGB-constraning features by means of receiver function analysis. Preliminary migration images point to shallow seismic interfaces located well above the Moho discontinuity and their eastward deepening.

The results contribute to the development of the deep drilling project DIVE (Pistone et al. 2017, https://doi.org/10.5194/sd-23-47-2017).