A new land-based gravity data set for the Alps and adjacent regions – the AAGRG at work

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A pan-Alpine gravity data map, homogeneous regarding input data sets, applied methods and corrections as well as common reference frames, is not available yet. Therefore, all countries around the Alps have agreed to contribute with gravity data and/or gravity data processing techniques to a recompilation of the alpine gravity field in the frame of the AlpArray Gravity Research Group (AAGRG). Also to collaborate with other groups in AlpArray. In the last year group members met two times to set up guidelines for joint processing and homogenization of existing gravity data sets. Following the results and appointments of the last technical AAGRG meeting in Bratislava October 2018, the members of the 9 participating countries decided to present a first data set of the Bouguer gravity field in September 2019 on a 2km x 2km or 4km x 4km grid for the public. Other compilations will follow: maps of Free Air Gravity, regional field and the corresponding residual gravity field. These new data sets will be available to all AlpArray partners for interdisciplinary work and modelling.

This new Bouguer anomaly will be station completed with at least 1 point/4 km2 resolution and compiled according to the most modern criteria. In general, even though global models like SRTM1 perform well, the preference was given to local DEMs - if available. Two software packages for topographic corrections on the base of ellipsoidal heights are available: "TOPOSK", developed by Slovak colleagues, and the "adaptive mass correction" from the Kiel group. The results of both methods are being tested and compared. The geophysical indirect effect and its determination are also taken into account. Special emphasis is put on the lakes in the study area. They have a considerable effect on the gravity of stations that lie at their edges (for example, the partially very deep reservoirs in the Alps). In the Ligurian and the Adriatic seas ship data of the Bureau Gravimétrique Iinternational will be used. Although not unproblematic, these data got the preference over satellite data.

In the AAGRG, long discussions were centered on the calculation of long-distance effects of topography/bathymetry and its compensating masses (root). The first compilation of the AA Bouguer anomaly map will, however, be prepared WITHOUT taking long-distance effects in account. The group agreed to extend the correction radius to the Hayford zone O_2 (167 km). All topographic corrections will be calculated as mass corrections between the physical surface and the ellipsoidal reference. The group further discussed the necessity of a 3D interpolation of the gravity grid values. Although a 3D interpolation would be required from the methodological-theoretical point of view (the problem is the non-identical gravity and height grids), it was decided to perform a 2D interpolation in the first compilation - the method of Kriging shall be applied. The poster will visualize the mentioned correction effects and illuminate the necessity of a complete revision of the existing land based Alpine gravity data.