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Gravity data collection with a CG5 gravimeter for densification of the gravity data around the AUT1 IHRF station

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Within the GeoGravGOCE project, funded by the Hellenic Foundation for Research Innovation, a main goal has been the densification of the available land gravity database around the eastern part of the city of Thessaloniki, Greece, where the core International Height Reference Frame (IHRF) station AUT1 is located in order to improve regional geoid and potential determination. Hence it was deemed necessary to densify the available gravity data within radiuses of 10 km, 20 km, 50 km and 100 km from the AUT1 core IHRF site. In that frame, and given the geological complexity of the region surrounding Thessaloniki and the significant variations of the terrain, gravity campaigns were appropriately designed and gravity measurements were carried out in order to densify the database and cover as much as possible traverses of varying altitude. The measurements have been carried out with the CG5 gravity meter of the GravLab group and dual-frequency GNSS receivers in RTK mode for orthometric height determination. In this study we provide details of the gravity campaigns, the measurement principle and the finally derived gravity and free-air gravity anomalies. The mean measurement accuracy achieved was at the $\sim 20 \mu\text{Gal}$ level for the gravity measurements and $\sim 3 \text{ cm}$ for the orthometric heights. In all cases the final derived gravity value was based on the absolute point established by the GravLab team at the AUTH seismological station premises with the A10 (#027) absolute gravity meter.