Geoid determination using airborne gravity data in the Kanto area of Japan

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The Geospatial Information Authority of Japan (GSI) has been conducting nation-wide airborne gravity surveys over Japan since 2019, with the aim of updating the gravimetric geoid model. In this project, GSI aims to develop the 3-cm accurate geoid model over Japan. Airborne gravity surveys were carried out over the Kanto area of Japan between December 2019 and June 2020, and airborne gravity data useful for improving the accuracy of the geoid model were obtained there. In this study, we made the preliminary computation of the gravimetric geoid model over the Kanto area using the existing satellite and surface gravity data sets, and the airborne gravity data collected in the surveys. The computation results suggested that the airborne gravity data were particularly effective along the coastal areas, and showed a difference of up to 15 cm in the calculated geoid height before and after the incorporation of the airborne gravity data. The consistency between the computed geoid model and the GNSS/level geoid height in the Kanto area was improved from 3.54 cm to 2.34 cm in standard deviation by incorporating the airborne gravity data. In the future, more accurate gravimetric geoid model is expected to be developed with the addition of new airborne gravity data.