

# Development of Gravimetric Geoid Model of Japan Using Airborne Gravity Data Covering Japan Archipelago

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**Key words:** GNSS/GPS; Reference frames; Height Reference Frame; Airborne gravity; Gravimetric geoid

## SUMMARY

GNSS positioning has been utilized not only in the field of surveying, but also in newly emerging various applications, such as autonomous vehicle/machine control, IT construction, smart agriculture and etc. Highly accurate geoid model, which enables users determine accurate orthometric heights only by GNSS positioning, becomes more important to broaden areas of such applications. High quality dense gravity data is a key enabler to achieve realization of such highly accurate gravimetric geoid model. The Geospatial Information Authority of Japan has been conducting airborne gravity measurement covering the whole territory since 2019 and using the airborne gravity data to develop accurate gravimetric geoid model of Japan. The measurements in almost western half of the main island of Japan west of the Kanto area has almost finished by the end of 2020 and the other areas will be covered by 2023. The measurements provide dense gravity data in areas where the gravity data do not exist or are sparse. Especially the spatial density of the gravity data will be greatly improved in areas along coast lines and above high mountains. Along the experimental flight lines in the Kanto area, consistency between land and marine gravity data was largely improved by integrating the airborne gravity data with already available land/marine gravity data. We also started to develop beta geoid model using the data obtained in the Kanto area. We also adopted one of the best modeling methods of gravimetric geoid model, which was evaluated through the international comparison experiment of gravimetric geoid modeling under IAG/GGOS. The beta model shows improvement in accuracy by about 1 cm and the accuracy of the model achieves about 2 cm in comparison with GNSS/leveling geoid heights. The recent progress and evaluation of airborne gravity measurement and geoid model development will be reported in the presentation.

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