Three airborne gravity surveys at altitudes 15000 and 5000 m have been made around Taiwan, covering the main island, offshore islands, Taiwan Strait, Kuroshio Current and part of northern South China Sea. The accuracy of the airborne gravity anomalies is about 2 mgal, with spatial resolutions ranging from 4 km to 10 km. About 5000 new point gravity values on land were collected at a 0.03 mgal accuracy. Shipborne gravity values using small vessels around the major tide gauge stations (within 50 km) were collected and have accuracy of few mgal and spatial resolution of few hundreds of m. The reduction of free-air gravity anomalies considered the observed gravity gradients and the height datum differences between the main island and the offshore islands. An elevation model of Taiwan was used to downward-continue the airborne gravity. These gravity data were optimally combined to compute a regional geoid model around Taiwan using FFT-based methods and band-limited least-squares collocation. Important results are: (1) the geoid errors ranges from few cm to 10 cm, and increase with elevation, (2) observed gradients and datum differences improve the geoid accuracy, (3) GPS data at tide gauges and the geoid model show that the height datum differences between Taiwan and offshore islands range from 13 cm to 53 cm (4) the geoid model will be used for the height modernization of Taiwan and for disaster mitigation programs involving Lidar survey and orthometric height control of photogrammetric terrain mapping.

Keywords: airborne gravity, geoid, gravity gradient, shipborne gravity, Taiwan, vertical datum