

Development of airborne gravimetry: Its art and trend after 2000

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A similar report was made in 2006 at JPGU meeting: The 1st challenge and failure of airborne gravimetry after 1950's, further attempts using the LaCoste-Romberg Air-Sea gravimeter, an advance in accuracy using the 3-dimensional GPS positioning after 1985, a country-wide extension of aerogravimetry by John Brozena, Rene Forsberg and others over Greenland, Arctic and Antarctic. As for Japan Segawa's works (this author) were reported: Development of airborne gravimeter for helicopter use in 1998. The airborne rotatory gravity gradiometer developed by US Bell Aerosystems which it took more than 30 years to accomplish was also reported.

Achievement of airborne gravimetry since 2000

A: Japan

The only works made in Japan were by Segawa using the Segawa-Tokimec Model FGA-1.

1. The works by Segawa at land-sea boundary of Japan: Ibaraki Pref. to Kashimanada Sea April 2000; The Suruga Bay July 2000; Enshunada Sea Nov. 2000; Enshunada Sea Oct. 2001; Kozu-shima to Miyake-shima Islands Dec. 2001; Enshunada Sea June 2002. These works were made for the research of geoid, underground structures, active faults and so on.

2. The works supervised by public corporations for earthquake disaster prevention: Survey of the Median Tectonic Line Fault at Iyo-Nada, Seto Inland Sea, Nov. 2004; survey of active faults at the Noto Peninsula, March 2006; survey of the Wakasa Bay, Nov. 2006.

The length of flight time totals less than 100 hours for all the measurements so far carried out.

B: Abroad

1. Works by John Brozena of the Naval Res. Lab., USA: Attempted airborne gravity measurement in 1980's using the LaCoste-Romberg Airsea gravimeter on board the US Navy Patrol plane P3C-ORION. The accuracy of measurement at this time was 5-10 mgal because the navigation relied on radio and radar systems. Since the plane P3C-ORION is a huge plane with 4 engines it flies very fast. So, the long wavelength features of gravity are emphasized in the results from this plane. The accuracy of his measurements reached the level of 2-3 mgals according to the progress of GPS positioning system. After 2000 his works tended to the combination of gravity with sea state so that the monitoring of the earth environments may become possible through the repetition of air gravity measurements. Recently he studied the variation of such strong western boundary currents as the Gulf Stream and the Kuroshio through the observation of gravity/geoid and sea water temperature and salinity.

2. Works by Rene Forsberg of the Danish National Space Center: First he co-operated with John Brozena in the country-wide gravity measurement over Greenland. After that he tended to detailed measurements of gravity using his own gravimeter system. From 1998 to 2003 he made measurement along the littoral zones of Arctic and Greenland. At the same time he made measurement at the Baltic Sea in 1999, at Malaysia from 2002 to 2003 and in Mongolia from 2004 to 2006.

3. Works by Cheinway Hwang of National Chiao Tung University: he made airborne gravity measurements all over Taiwan including the surrounding seas using the gravimeter system similar to that of Rene Forsberg.