

An investigation of fault and structural boundary in the northern part of the Ibaraki Prefecture by Airborne Gravity Gradient survey

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Specifying the positions and lengths of faults existing around the Atomic Power Plants should be made based on the scientific foundations. It is very important to investigate the positions and lengths of faults existing in the borders of land and sea for assuring safety, since many of the Atomic Plants are built close to the shore.

Airborne Gravity Gradient (AGG) survey with simultaneous measurements of the laser scanner data was conducted to investigate the fault structure in the northern part of the Ibaraki Prefecture, Japan, with special reference to the existence of faults assumed to extend thorough land from sea. The survey was flown in February 2016 at an altitude of 150m above terrain along north-south survey lines and east-west tie lines, spaced 250m and 2,500m apart, respectively. A differential GPS system was employed for flight path recovery.

The observed gravity gradient data were processed and vertical and horizontal derivation gravity maps were created. The characteristics of the distribution of vertical and horizontal derivation gravity anomalies were summarized as follows: (1) A border of the between high and low vertical derivation gravity anomalies is clearly distributed in the central northern part of the study area extending toward the sea. Considering geological studies (Geological survey of Japan, 1957; JAPC, 2015), the distribution of this border of the between high and low vertical derivation gravity anomalies is consistent with that of the Komagi fault and F12 fault with dipping to the southeast direction. There is anomaly found continuously from land through sea, it is suggested that Komagi fault and F12 fault are the series of faults. (2) A steep negative vertical derivation gravity anomaly, which is intercalated by positive vertical derivation gravity anomalies, is situated in the central part of the study area from land through sea. Comparing with the geological maps (Kubo et al., 2007; Yoshioka et al., 2001), this negative vertical derivation gravity anomaly may be implied the existence of fault and structural boundary, which is located at the border of the Hitachi metamorphic rock and the Abukuma metamorphic rock.

In this AGG survey, we succeeded to find the fault and the structural boundary in the borders of land and sea lying continuously, which has been previously considered to exist separately in land and sea.

Keywords: Airbornrne Gravity Gradient survey, gravity gradient, fault, structural boundary, coastal region