

Aeromagnetic constraints on the subsurface structure of the Ishikari Depression, Hokkaido Japan

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An aeromagnetic map of the Ishikari Depression and its surrounding area (total magnetic intensity, 1:200,000) (Okuma and Nakatsuka, 2014) has been made as a compilation of the Digital Geoscience Map of the area (GSJ, 2014). The total magnetic intensity anomalies within the area have been extracted from the aeromagnetic anomaly database (Nakatsuka and Okuma, 2009) on a smoothed surface 1,500 m above terrain. The reduced to the pole anomalies have been also calculated from the total magnetic intensity anomalies on the surface and compared to the geology (Ozaki and Komatsubara, 2014) of the area.

An obvious magnetic high chain, called as the Kitakami-Ishikari magnetic belt is dominant in Ishikari Depression. By comparing with the lithology of core samples from oil exploration wells, granitic rocks as well as mafic igneous rocks can account for the magnetic belt but the details remain unknown.

3D imaging (Nakatsuka and Okuma, 2013) was applied to the magnetic anomalies to better understand the subsurface structure of the area. A chain of deep seated magnetic sources was imaged in the Ishikari Depression, corresponding to the Kitakami-Ishikari Magnetic Belt. Depths of the magnetic sources range from ~5km (north) to ~10km (south) below ground, whereas their widths range from 10km (north) to 25km (south). Their magnetization intensities (~1 A/m) imply that they are composed mainly of granitic rocks which were confirmed by drilling at a depth of 4,600m in the Tomakomai area.

A high-resolution aeromagnetic survey has been also conducted to better understand the subsurface structure of the Tomakomai area. Two regional magnetic highs occupy offshore Tomakomai and the eastern one is edged by a NNW-SSE trending marine topographic step, suggesting that this step might have worked as a dam to trap sediments which contain magnetic minerals.

Keywords: aeromagnetic survey, magnetic anomaly, Kitakami-Ishikari Magnetic Belt, Ishikari Depression, Tomakomai, 3D imaging