

Helicopter Gravity Measurements in the Tokai Coastal Zone and the Area around Miyake/Kozu Islands

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Since 1998 we have been engaged in the development of the helicopter gravimetry and the gravity measurements in the areas which are regarded as important ones from the view point of disaster prevention and exploitation of natural resources. We have so far surveyed Ibaraki Prefecture over to offshore Kashimanada, the Suruga Bay and the coastal zone in the Tokai District, the marine zone around Miyakejima, Kozushima and Niijima Islands. By helicopter gravity measurements we can get gravity data usually with the accuracy of 2 to 3 mgal, in the best case the accuracy being 1 mgal. The advantage of air gravimetry is in the survey of coastal/land-to-sea border areas from the domestic point of view, and in the survey of remote/inaccessible areas such as arctic and antarctic zones as well as south America and Africa etc.

This report deals with gravity surveys conducted in 2001 to study the distribution of sea floor active faults in the Tokai District and to study the marine gravity anomalies around Miyake, Kozu and Niijima islands. Among them the Miyakejima island is still actively erupting volcanic matters.

The gravimetric survey of sea floor faults in the Tokai District was conducted also in November 2000. In this case the helicopter flight was from the Shizuoka heliport to Atsumi Peninsula in the Ise Bay via Omaezaki Peninsula. This flight was a little too short from the geophysical point of view because of insufficiency of fuel. To improve this situation we made the second flight in the Tokai District from 25 to 29 October 2001. Different from the previous flight we used two heliports, i.e., Shizuoka and Tsu to supply fuel. In this way we could lengthen the tracks of flight to cover the necessary survey areas. Concerning this second flight in the Tokai District, however, there was another type problem which required further consideration in the data processings. The report of the results from the surveys in the Tokai District will be made while comparing the two surveys in 2000 and 2001.

The surveys in Miyake, Kozu and Niijima Islands were conducted from 17 to 22 December 2001. From the distribution of hypocenters of the earthquakes it is inferred that volcanic magma of Miyakejima Island is moving from Miyakejima toward Kozushima under the sea floor. If so, it is possible that there is significant gravity or magnetic anomalies around the area. Although there are some measurements of gravity in this area by surface ships the data are still sparse. So, by helicopter measurements, we flew two-dimensionally on 9 tracks perpendicular to the line connecting Miyake and Kozu. Each track is about 100 km long.

The Miyakejima volcano was emitting incessantly sulfuric gas so that it was important to pay attention to wind direction. The heliport used was an open heliport at the Kozushima island. No shelters were there so that the helicopter was always exposed to wind. The electric power and water were available. What was very beneficial at this time was that there was no time regulation: We could keep the gravimeter on always day and night. This made the gravimeter very stable which was helpful to get better gravity data.

The gravity measurements went smoothly thanks to comparatively good weather. The wind was not too strong during the observation and, fortunately, eastwards. If not, the helicopter might absorb sulfuric gas and its engine might be damaged.

The gravity results in this area is discussed by comparing previous data.