

レーザー干渉計型重力勾配計の開発と桜島火山における試運転
Development of a laser-interferometric gravity-gradiometer and its trial operation on the volcanic island of Sakurajima

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We have been developing a laser-interferometric gravity-gradiometer for volcanological studies. The gravity gradiometer measures differential accelerations between two test masses that are in free fall at different heights. Because its detection principle is based on the differential measurements, measured values are insensitive to the motions of observation points. That is to say, the gravity gradiometer is expected to have a good resolution even when it were used on an accelerating vehicle, such as an airship, or in an active volcanic area. Therefore, the gravity gradiometer could be useful for, for example, resource explorations and studies on volcanic activities.

The gravity gradiometer, to be used on an airship, had been developed at the Institute for Cosmic Ray Research (ICRR) of the Tokyo University from 2009 to 2012. A prototype of the gravity gradiometer was built up and tested at the ICRR. Their laboratory test showed that its resolution of measuring vertical gravity gradients was about a few $\mu\text{Gal}/\text{m}$ in two second measurements. However, large unexplained disturbances were observed in longer term measurements. In order to understand the sources of the disturbances, the prototype was moved to the Aso Volcanological Laboratory (AVL) of the Kyoto University in July 2012. Since then, its further development, to be used at an observatory in a volcanic area, has been carried out at the AVL.

We will report the current status of the development for volcanological studies and results of trial measurements performed at the Sakurajima Volcanological Laboratory of the Kyoto University, on the volcanic island of Sakurajima, Kyusyu, Japan.

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