

Application of A10 absolute gravimeter for monitoring land subsidence and crustal movement in Indonesia

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In order to detect the gravity changes associated with the land subsidence in Jakarta and Bandung, and the Lembang fault activities as well, we have conducted gravity measurements with a field type absolute gravimeter.

In many of the urbanized cities in Indonesia, one of the urgent problems is land subsidence mainly due to excess pumping of groundwater. In Jakarta, for instance, the recent GPS surveys conducted by ITB (Abidin et al., 2008) have revealed the significant subsidence along the northern coastal area with the rate of more than 10 cm/yr. It has been also reported that more than 10 cm/yr land subsidence is in progress in some areas in Bandung. In West Java, there are some active faults (e.g. Lembang fault) whose tectonic activities may cause crustal movements. These land movements can be measured by present-day space geodetic techniques, such as GPS and InSAR. In addition, precise gravity measurements can provide useful information to understand the mechanism of the movements, because they reflect the underground density changes or mass movements. Therefore we have conducted the precise gravity measurements by using a portable absolute gravimeter, Micro-G LaCoste Inc. (MGL) A10. As for the absolute gravity measurements, FG-5 of MGL is well known. A10 has been recently come into practical use and only few studies have been reported so far. But it is smaller than FG-5 and can be operated with 1.2VDC power. Since A10 is optimized for outdoor field surveys, it is much suitable for this study. The gravity points in Jakarta have been selected from the GPS points of ITB so that they cover both the areas with large subsidence along the coastal line and the relatively stable area in the southern part. In Bandung, GPS points with large subsidence have been selected as the gravity points in the southern sedimentary basin. In addition, the gravity points have been newly set up across the Lembang fault to monitor its activities. We conducted the first gravity survey in August 2008 and the second survey in July 2009. Mainly due to the instrumental troubles during the 2008 surveys, we have not obtained enough reliable data yet. Nevertheless the result obtained so far suggested the gravity increases in the coastal area in Jakarta where the large subsidence has been observed. We plan to conduct the same measurements in 2010 and then we expect to obtain more definite results. In this talk, we reports the outline of the surveys, in particular the field measurements of the absolute gravimeter.

Keywords: Absolute Gravimeter, land subsidence, crustal movement, Indonesia