



Precise ground motion measurements to support multi-hazard analysis in Jakarta

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Jakarta is the capital of Indonesia and is home to approximately 10 million people on the coast of the Java Sea. The Capital District of Jakarta (DKI) sits in the lowest lying areas of the basin. Its topography varies, with the northern part just meters above current sea level and lying on a flood plain. Subsequently, this portion of the city frequently floods.

Flood events have been increasing in severity during the past decade. The February 2007 event inundated 235 Km² (about 36%) of the city, by up to seven meters in some areas. This event affected more than 2.6 million people; the estimated financial and economic losses from this event amounted to US\$900 million [1][2]. Inundations continue to occur under any sustained rainfall conditions. Flood events in Jakarta are expected to become more frequent in coming years, with a shift from previously slow natural processes with low frequency to a high frequency process resulting in severe socio-economic damage.

Land subsidence in Jakarta results in increased vulnerability to flooding due to the reduced gravitational capacity to channel storm flows to the sea and an increased risk of tidal flooding. It continues at increasingly alarming rates, principally caused by intensive deep groundwater abstraction [3]. Recent studies have found typical subsidence rates of 7.5-10 cm a year. In localized areas of north Jakarta subsidence in the range 15-25 cm a year is occurring which, if sustained, would result in them sinking to 4-5 m below sea level by 2025 [3].

ALTAMIRA INFORMATION, company specialized in ground motion monitoring, has developed GlobalSARTM, which combines several processing techniques and algorithms based on InSAR technology, to achieve ground motion measurements with millimetric precision and high accuracy [4]. Within the RASOR (Rapid Analysis and Spatialisation and Of Risk) project, ALTAMIRA INFORMATION will apply GlobalSARTM to assess recent land subsidence in Jakarta, based on the processing of Very High Resolution COSMO-SkyMed data acquired from the second semester 2014. Those recent measurements will be analyzed and compared with results obtained previously within the ESA /World Bank EOWorld initiative [4]. An updated status of the situation in Jakarta will be derived of this analysis; this information will serve within RASOR for the assessment of future risk which is valuable for planning of flood protection.

[1] “News and Broadcast: Jakarta Urgent Flood Mitigation Project/Jakarta Emergency Dredging Initiative Project (JUFMP/JEDI Project)”,

<http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/>.

[2]http://www.who.int/hac/crises/idn/sitreps/indonesia_floods_map_affected_areas_5feb2007.pdf.

[3] Abidin, H. Z., Andreas, H., Gumilar, I., Gamal, M., Fukuda, Y. and Deguchi, T., “Land Subsidence and Urban Development in Jakarta (Indonesia)”, Proceedings of 7th FIG Regional Conference Spatial Data Serving People: Land Governance and the Environment – Building the Capacity (2009).

[4] European Space Agency and World Bank, Earth Observation for sustainable Development, Partnership report (2013).