

ALOS/PALSAR image processing using DInSAR and log ratio for flood early detection in Jakarta based on land subsidence

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Abstrak

Flood that occurred in Jakarta is not only influenced by rainfall, urban planning system and drainage alone, but also may be involved land subsidence (LS). LS is possible in because Jakarta stands on top of layers of sediments and the presence of ground water consumption in very large quantities. In this research, the Advan

anced Land Observing Satellite (ALOS)/Phased Array type L-band Synthetic Aperture Radar (PALSAR) data was processed to determine the level of LS in Jakarta area and its relation to flood potential area.

Differential interferometry method (DInSAR) was performed on two PALSAR data with different acquisition years, i.e. 2007 and 2008, respectively. DInSAR processing generated images containing information that can be converted into LS. To find the elevation changing area, log ratio algorithm was applied to those images as the additional analysis. The log ratio image is superimposed on the DInSAR result and Jakarta inundation map of 2009, to acquire the relationship between LS and the flood and flood vulnerability map of Jakarta based on LS. It is found that lands on the flooded area of 10.57 cm on the average, with a minimum and maximum of 5.25 cm and 22.5 cm, respec

tively. The greater the value of LS, inundation area also tend to widen, except in a few areas that have special conditions, such as reservoirs, river flow solution, water pump system and sluices.

Accuracy of DInSAR result image is quite high, with the difference of 0.03 cm (0.18%) to 0.55 cm (3.37%) as compared to those from GPS measurements. These results can be recommended to the local government of Jakarta to minimize the potential risk of flood, as well as the subject of city planning for the future.