Precise GPS Observation for Monitoring The Borobudur Temple Site

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Abstract : The maintenance of Borobudur temple as one of the world's important cultural monument is a complex task embracing many disciplines. GPS network for monitoring deformation of the Borobudur temple has been established through collaborated work between Gadjah Mada University and Borobudur's Conservation Board in 2000 and precise GPS observations have been carried out in 2002 and 2003 and incoming observation will be done in 2012.This paper describes the GPS observations procedure, strategy in processing GPS data and analyzing the horizontal and vertical displacement within the period. There are a number of clear trends that are apparent from 2002 and 2003 epoch. The first important point is that GPS is able to deliver precisions that are near 1 mm in the horizontal and 2-3 mm in the vertical relative to a regional fiducially control network. The second is that the level of redundancy and spatial coherence is very high enabling errors and outliers to be readily detected. This was used extensively as part of the quality assurance program adopted in this study. The third is that no alarming deformation of the temple has been detected. At this stage of study, the 95% confidence levels are quite large due mainly to only two epochs being observed but also in part to the way to the models. It is expected that the third epoch (2012) will improve the model of tectonic motion, and this will significantly improve the precision of the observation stations on the temple.

Keywords: *GPS observation, deformation monitoring, horizontal and vertical displacement.*