MONITORING LAKE SURFACE HEIGHT CHANGES WITH A GROUND-BASED GPS REFLECTOMETRY RECEIVER

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To help solving important issues of climate change and sea level change and to understand the complex system Earth, climate models demand for ocean height data sets with increasing spatial and temporal coverage. Beside operational satellite-based active radar altimeters on ENVISAT and JASON, GPS space-based altimetric measurements can potentially densify ocean height data. Additionally, ground-based GPS receivers can monitor ocean heights in coastal areas where satellite altimetry data get coarse and decrease in quality.

Results from a GPS reflectometry experiment with a ground-based GPS receiver and a single patch antenna above two lakes in the Bavarian Alps are presented. The 12 channel receiver is based on the OpenSource GPS design and was modified to allow for open-loop tracking of reflected signals. In open-loop mode the receiver can measure the coarse/acquisition (C/A) code correlation function of the direct and the reflected signal of one GPS satellite simultaneously. The interference between the coherently reflected signal and a model signal, which is phase-locked to the direct signal, causes variations in the amplitude of the in-phase and quad-phase components of the correlation sums. From these amplitude variations the relative altimetric height of both lakes can be monitored within a precision of 2 cm.