



GNSS reflectometry simulation studies within GITEWS and comparison between simulated and scanned waveforms at Lake Walchen

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After the Sumatra tsunami in 2004 the GFZ and its partners were commissioned to establish the German-Indonesian Tsunami Early Warning System (GITEWS). One task is a feasibility study on tsunami detection and warning from space using GNSS reflectometry (GNSS-R). GNSS-R uses GNSS signals reflected from the sea surface as a measure of altitude of the reflecting surface. GNSS-R may be applied as a multistatic altimeter that observes the sea surface searching for tsunami wave signatures. One main topic of this study is the mission design for a GNSS-R receiver constellation at a low earth orbit (LEO). Therefore studies on swath width with respect to elevation, height and transmitter system (GPS, GLONASS, GALILEO) have been carried out. Another topic is the principle usability and expectable altimetric accuracy of a LEO GNSS-R system. To determine how the waveforms of the reflected GPS signals will be altered by the reflection process waveforms are simulated by a scattering model provided by IIEEC, Barcelona. A GNSS-R measurement campaign has been carried out in 2007 at the top of Mount Fahren, Bavarian Alps using the GNSS occultation, reflectometry and scatterometry (GORS) space receiver prototype, a modified new generation JAVAD GNSS receiver board. High precise lake levels and meteorological parameters have been recorded at Lake Walchen throughout this campaign as reference. The meteorological measurements show a distinct change of wind conditions between day and night. When applying measured geometries and wind conditions to

the model the simulated waveforms show a significant change of shape. These results are compared to scanned waveforms of the GORS receiver prototype.