Geophysical Research Abstracts, Vol. 8, 02494, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02494

Using ground-based GPS to quantify surface moisture

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Within the GNSS-community it is a well-known fact that multipath effects are an important and hardly to model site-specific error source. Normally one tries to eliminate multipath effects e.g. by means of choosing an appropriate antenna type and site location, and by observing during long time spans.

Within the project MESMERISE (Meteorological Soil Moisture Experiment Series; http://www.imk.uni-karlsruhe.de/seite_1932.php) different sensors and techniques were operated simultaneously for one week with the aim to quantify the soil moisture of a small area (0.01 km^2). Besides standard sensors some experimental techniques (e.g. GPS) were tested. The GPS experiment used ground-based multipath-related noise as a signal to monitor the surface moisture. The experiment itself as well as the evaluation strategy were presented e.g. at the EGU 2005. The results were encouraging (correlation between surface moisture and GPS signal strength) but preliminary (small amount of data).

Therefore we carried out a second experiment in October/November 2005 (time span: three weeks) and collected GPS data continuously (24 h per day, sampling rate: 10 s) under controlled surface water conditions (e.g. irrigation).

The results of this experiment will be presented in order to check finally, whether GPS multipath effects can be used to gather information about the state of the surface moisture.