Soil moisture monitoring with GPS reflected signals.

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In the context of necessary reductions of inputs in agricultural practices (fertilizers, sanitary treatments, irrigation), monitoring of low level atmospheric water vapor and soil moisture has become a major issue.

Nowadays, it is well known that GPS positioning with a network of receivers can also yield estimates of tropospheric parameters which in turn provide reliable estimates of atmospheric water vapor. Furthermore, when a dense network of GPS stations exists, GPS signals can be used to perform tomography in order to retrieve the three dimensional distribution of water vapour density. A more recent aspect of the GPS applications is also to investigate the technique of reflectivity (i.e., the monitoring of ground reflected rays) to monitor and retrieve the soil moisture variations.

In this work, we will present preliminary results of a dedicated campaign to study low level water vapour retrieval and, more particularily, soil moisture variation identification and estimation as demonstrated in the figure below. A strong correlation exists between soil humidity and GPS reflected signal phase variations, while we also pursue ways to investigate the most influential factors which help determine the most suited satellite passage to potentially provide ways to estimate the soil moisture content fluctuations.