Determination of Snow Depth Using Reflected GPS Signals

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Multipath causes a major problem on Global Navigation Satellite Systems/Global Positioning System (GNSS/GPS) applications, where precise positioning is required. For reaching precise positioning, the multipath effect should be eliminated from the GNSS signals. However, recent studies have been conducted to get the beneficial use of reflected signals using low elevation angles during the observation. GNSS antenna records direct and reflected GNSS signals, which interfere with each other. These interferences of GNSS electromagnetic waves that forms the multipath signals may be used to estimate the properties of the reflected surfaces. In this paper, two scenarios are planned. In the first scenario, we demonstrate to extract the multipath parameters by modelling the SNR and the SNR quantities which are collected by two GPS receivers and reported in RINEX file are used to estimate snow depth. A local test area is established and GPS observations are planned in two different epochs. The first epoch data was collected in December, 2017 when there was no snow on the surface to control the results to be estimated from second epoch data. By the way, to estimate the snow depth, the second GPS data will be collected in February 2018 (the actual date depends on the weather forecast). In the second scenario, two continuously operating reference stations data are analyzed to estimate the snow depth of the related ground surface.