Sub-Snow GPS for the Point-wise Quantification of Snow Water Equivalent in Alpine Terrain

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GPS for the Point-wise Quantification of Snow Water Equivalent in alpine Terrain

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Extensive amount of water stored in snow covers has a high impact on flood development during snow melting periods. Early assessment of the snow water equivalent in mountain environments enhance early-warning and thus prevention of major impacts. The estimation and quantification of snow water equivalent based on sub-snow GNSS antennas is analyzed. This technique is affordable, flexible, and provides accurate and continuous observations independent on weather conditions.

The potential to quantify snow water equivalent above a GPS antenna placed underneath a snowpack is evaluated. Therefore, a measurement network is set-up at the WSL SLF test site "Weissfluhjoch" consisting of a GPS reference station above the snow pack and a geodetic as well as low-cost GPS antenna mounted on the ground underneath the snowpack. These measurements are analysed for the winter seasons 2015/16 and 2016/2017. The results are compared to the reference sensors provided by the WSL SLF. The preliminary results of this point-wise estimation of snow water equivalent agree with the reference sensors within 10 percent over the whole winter seasons, including the melting period.