



Determination of the Optimal Sampling Depth for Calculating Soil Effective Temperature at L-band: Maqu Case

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Soil effective temperature T_{eff} is one of the basic parameter in passive microwave remote sensing for soil moisture. Meanwhile, the dedicated current and future satellite soil moisture monitoring missions use L-Band as the operating frequency. However, T_{eff} at L-Band is strongly affected by the soil moisture and temperature profiles. A two-layer scheme and its corresponding multilayer form were developed to accommodate such influence. In this study, the soil moisture/temperature data collected at Maqu Network are used to verify the newly developed schemes. The key findings are: 1) the new two-layer scheme is able to assess which site is relatively in higher accuracy for estimating T_{eff} . It is found that on average nearly 20% of the signal cannot be captured by Maqu Network, with the currently-assumed common installation configuration. It is important to know this since the spatial averaged value is used to retrieve soil moisture with the brightness temperature sensed by the satellite sensors; 2) With the developed method, it is able to identify that the observation pair at 5cm and 20cm is the optimal sampling depth for calculating T_{eff} for the core-site in Maqu Network. It is suggested that the newly developed method can provide an objective way in configuring an optimal soil moisture/temperature network and improve the representativeness of the existing networks, in terms of calculating T_{eff} , by identifying the optimal sampling depth.