Accurate soil moisture mapping using SMAP and ALOS PALSAR-2 SAR sensors

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Abstract: The implementation of sustainable agricultural and environmental management requires an improved understanding of the soil moisture. Different methodologies have proven that radar remote sensing allows the rapid, accurate and relatively inexpensive measurement of soil moisture. The soil moisture active passive (SMAP) mission will combine L-band radar and radiometer observations to provide frequent, global measurements of surface soil moisture and surface freez/thaw state. SMAP will provide measurements of near-surface soil moisture (0-5cm depth) over 1000km swath with global revisit of 2-3 days providing three soil moisture products: i)High resolution radar only (~3km), ii) low-resolution radiometer only (~36km) and iii) intermediate-resolution combined radar-radiometer(~9km). ALOS PALSAR-2 Full polarimetric SAR sensor will provide high resolution 1mx3m imagery globally, with a revisit time of 14 days. ALOS PALSAR-2 data can be used to produce high resolution and accurate soil moisture maps. Through this research the application of SMAP is evaluated with its limitations and solutions to improve the accuracy and reliability of soil moisture data by improving the ancillary data parameters used in the soil moisture computation models. Use of ALOS PALSAR-2 data to improve and validate the SMAP products is also investigated. The a soil moisture measurement volumetric accuracy is expected to be improved by $0.03 \text{m}^3 \text{m}^{-3}$.