How Enhanced-Resolution Brightness Temperatures are Improving Algorithms for Snow Water Equivalent and Melt Onset

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ABSTRACT

Funded by NASA MEaSUREs, we have reprocessed the entire record of gridded SMMR, SSM/I-SSMIS and AMSR-E brightness temperatures using the radiometer version of Scatterometer Image Reconstruction (rSIR). Image reconstruction algorithms can be tuned to reduce noise or improve spatial resolution but cannot do both. Our Calibrated Enhanced-Resolution Brightness Temperature (CETB) Earth System Data Record (ESDR) includes conventional, low-noise, images at 25 km resolution, as well as enhanced- resolution images at up to 3.125 km. Input swath data comprise the newly available CSU Fundamental Climate Data Record (FCDR), with the entire, cross-calibrated SSM/I-SSMIS record from 10 sensors, some of which have never before been produced in gridded form. While these passive microwave sensors provide a 40-year observation record, previous algorithms to derive snow water equivalent and melt onset have been confounded by mixed-pixel effects in some regions. This restricted useful applications to locations distant from land/water boundaries, and regions with low topographic relief. The CETB data now provide new opportunities to revisit analysis in mountainous regions and near coastlines. We briefly describe the CETB data, and include promising examples demonstrating snow water equivalent and melt onset algorithm improvements, due to the improved spatial resolution of the CETB data.

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