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The impact of an observationally based surface emissivity dataset on the simulation of Microwave Sounding Unit Temperatures

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Relatively few studies have attempted to simulate synthetic MSU temperatures with use of a radiation model. Most employ the simpler and computationally less-expensive method of applying a static, global-mean weighting function to three-dimensional profiles of atmospheric temperature. Both approaches require a number of key assumptions. One of the major assumptions relates to surface emissivity. To date, two different strategies have been used for prescribing surface emissivity values. The first assumes a fixed global surface emissivity, while the second specifies separate (time-invariant) emissivity values for land and ocean.

In this research, we introduce space- and time-dependence to the specified emissivity fields, using recent observationally-based estimates of surface emissivity changes over 1988 to 2000. We use a radiative transfer code to explore the impact of this more complex treatment of surface emissivity. This sensitivity analysis is performed with monthly-mean fields of surface temperature, atmospheric temperature, and moisture taken from multiple reanalyses. Our goal is to quantify the possible impact of emissivity changes on global-scale estimates of tropospheric temperature trends (*e.g.*, trends estimated from MSU channel 2 and MSU 2LT), and to document the sensitivity of synthetic MSU temperatures to a variety of input data and processing choices.

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