PRACTICAL CONSIDERATIONS FOR ACHIEVING SI TRACEABILITY IN MICROWAVE REMOTE SENSING

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Microwave brightness temperature (T_b) observations by satellite sounders represent some of the most important input data for numerical weather prediction (NWP) models as well as providing vital records for climate trend detection. Each flight instrument, even if built to nominally identical specifications, has a unique calibration, typically based on the implicit assumption that the on-board black body target is well understood and characterized, but even more importantly that the transfer function between the T_b received at the antenna and the thermometry embedded in the target is well determined.

NIST demonstrated an SI-traceable brightness temperature calibration for passive microwave radiometers in 2012 based on a method that determines the transfer function between the T_b collected at the antenna and the physical temperature of the on-board black body target, all with well-characterized uncertainty estimates. The initial demonstration was made in a laboratory environment. Since then, we have continued research on various aspects of T_b calibration to better understand the physics of black body targets, how these targets interact with the radiometer and its environment.

Developing workable strategies for the practical transfer of a T_b reference calibration to a flight instrument is a primary goal of the project. In this talk, we'll describe our current plans for how this can be achieved practicably, discuss the tradeoffs involved, the achievable uncertainties, and our future plans.