

OBSERVATIONS OF MICROWAVE BRIGHTNESS  
TEMPERATURE CONTAMINATION:  
A GLOBAL PERSPECTIVE

Kunkee, David  
The Aerospace Corporation

Abstract Submission Form  
2004 National Radio Science  
Meeting

Abstract: kunkee19698

Date Received: September 24, 2004

Earth observing systems depend on interference-free measurements of the microwave spectrum to support a wide range of critical activities including weather forecasting, climate monitoring, and Earth science investigations. The nature of these measurements is such that they must be global and can not be carried out just on a local or even regional basis. In many instances, space-based measurement of microwave brightness temperature is the only reasonable means of monitoring critical atmospheric and surface parameters in remote areas of the world where in-situ data can not be obtained. Adequate allocation and protection of frequency bands required for these measurements is paramount. Unfortunately, frequency management decisions can not be made with complete knowledge all future implications of proposed rule changes as it is not possible to predict the success, failure, or evolution of proposed systems with certainty. However, significant improvement in our overall insight regarding spectrum utilization is possible with a better understanding of how the RF environment has evolved and how the current RF environment impacts remote sensing products.

To illustrate this perspective, measured brightness temperature data from the Scanning Multi-channel Microwave Radiometer (SMMR) was revisited for the purpose of evaluating Radio Frequency Interference (RFI) during its period of operation from October 1978 until mid-year 1987. This data is compared with data from the currently operating Advanced Microwave Scanning Radiometer (AMSR). Global C-band and X-band images from these sensors provide a perspective on how radio services operating in each spectral region have developed and impacted remote sensing. Many characteristics can be observed in the images, including the disappearance of strong RFI over Germany and the emergence of Fixed Service (FS) terrestrial microwave links in the C-band region. Contamination of AMSR C-band measurements has significantly impacted development of soil moisture retrieval algorithms designed to support hydrology studies. At X-band, increased occurrences of contaminated brightness temperature is apparent over specific countries in Europe and the Far East but is not apparent in general over North America. Reasons for these differences, and potential impacts of the contamination to remote sensing products will be examined.

1. (a) David Kunkee  
The Aerospace Corporation  
PO Box 92957 MS M4-927  
Los Angeles, CA  
90009-2957 USA  
david.b.kunkee@aero.org
- (b) (310)336-1125
- (c) (310)563-1132
2. J - Radio Astronomy
3. (a) CORF
4. I - Invited Paper, Program  
chair: Davis/St. Germain
5. No special instructions