Monitoring of Global Microwave Land Surface Emissivities From Combined AMSR-E, MODIS and AIRS Observations

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1. Motivation
Microwave land retrieval performance as a function of a priori knowledge of surface emissivity (cloudy conditions)

2. Goal
• Derive high temporal resolution global AMSR emissivity database with sufficiently high accuracy for enabling useful retrieval of LST, cloud liquid water and water vapor over land from AMSR measurements
• Builds on previous work from C. Prigent on SSM/I and AMSU

3. Approach
• Use matched measurements from combined AMSR, AMSU/AIRS and MODIS to help specify atmospheric and surface state (LST, surface type) in AMSR field-of-view
• Take advantage of the high information content of MODIS imager and AIRS sounders as well as unique temporal/spatial co-location between those measurements to improve quality of emissivity product

4. Potential Applications of Emissivity Database

5. Quality Control: Regridding Errors
Simulated regridding errors in retrieved emissivity for a 30-km FOV. Errors are largest where emissivity is changing rapidly over short distances, such as coastlines, lakes and rivers. This is confirmed in the analysis with real AMSR-E data below.

6. Science Area

7. Case Study: Continental US, 2-8 July 2003
(continued)

Daily Emissivity Anomalies (10.65 GHz V-pol)
Positive anomalies are associated with cloudy regions and regions of active precipitation. The negative anomaly over Oregon on 8 July is due to increased soil moisture from a storm system that passed over the region prior to the Aqua overpass at 1030 UTC. (See radar-derived rainfall below)

Most of the areas of elevated variance in the weekly emissivity are associated with water bodies.

The soil moisture anomaly maps show a strong positive anomaly on 8 July over Oregon.
8. Summary and Future Plans:

- Quality control: effect of regridding, LST errors, clouds and precipitation.
- Currently processing other regions of interest: Amazon Basin and Sahara Desert.
- Eventually process one year of global Aqua data.
- Once initial emissivity database is established, process cloudy scenes using database statistics as constraint. Validate retrieved cloud amounts.

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