

AMSR-E Land/Coast Algorithm Research Status

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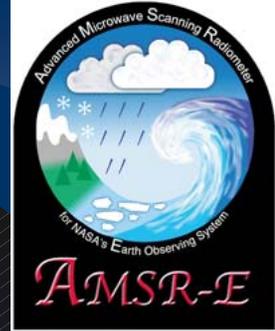
CICS/ESSIC-NOAA

University of Maryland

College Park, MD

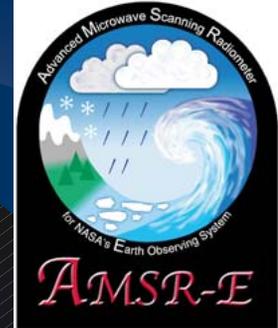


Summary

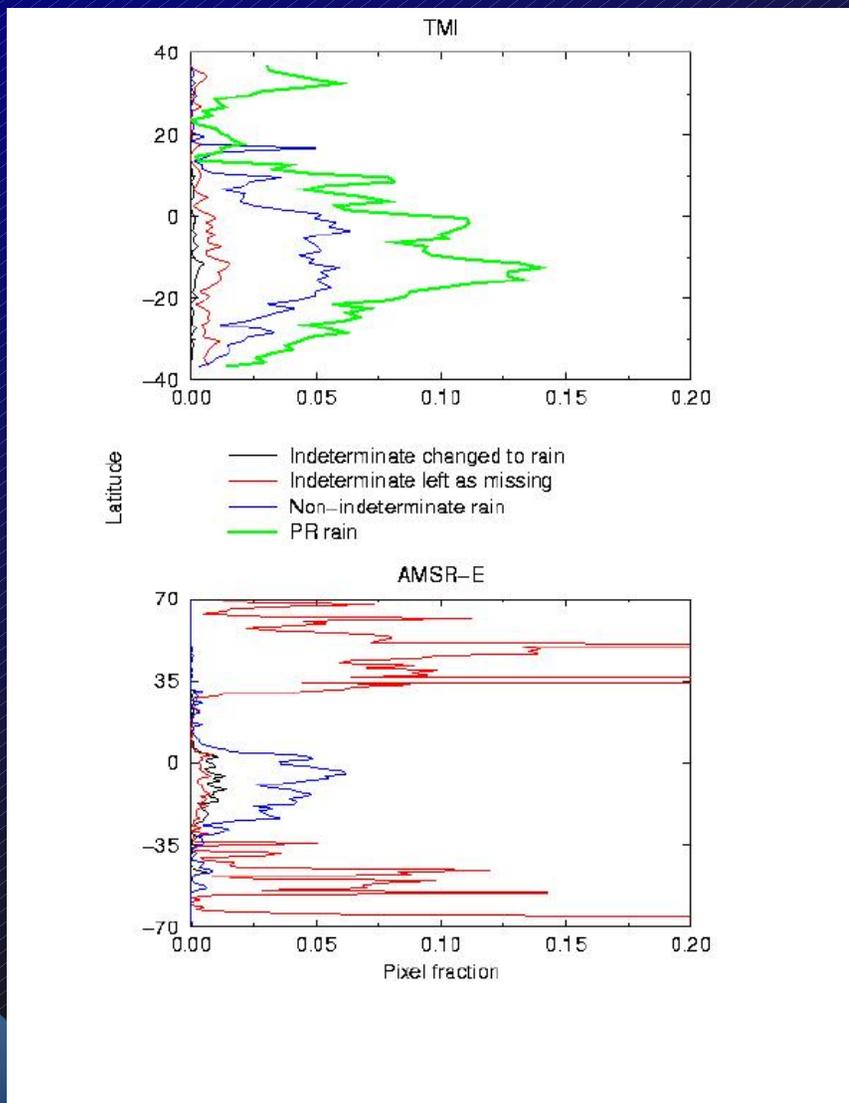


- **Rain over land component unchanged since Nov. 1 2003 submission**
- **Coast component changed for both March 1 and June 1 2004 submissions**
 - **March 1 modification to cancel some of Nov. 1 changes causing false rain signatures in cold season coast**
 - **June 1 modification makes attempt at cold season but is more conservative than Nov. 1 submission**
- **We've done more validation using Iowa gauge network**





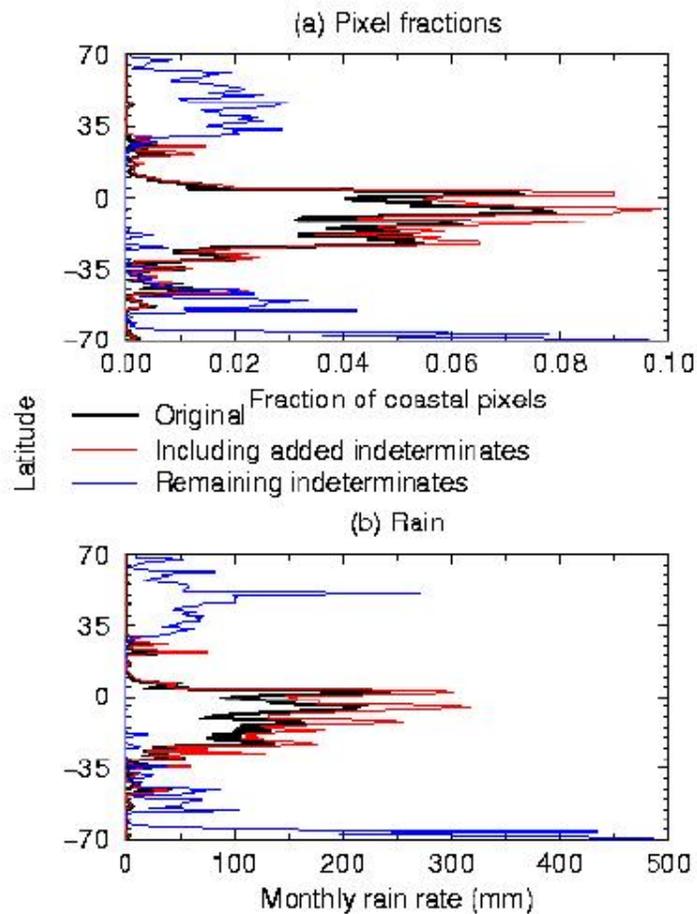
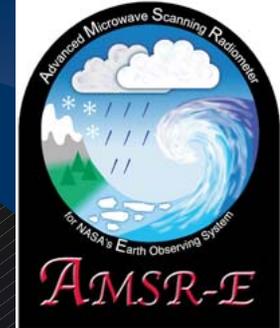
Problem with Nov. 1 submission



- **‘Indeterminate’ pixels**
 - Defined as cases where brightness temperatures could result in rain or no-rain
 - For TMI most should be rain
 - For high latitudes most should not be rain
- **Additional tests were needed to further distinguish rain from no-rain pixels**

Left: Zonal distributions of relative fractions of total coastal pixels falling into different classifications. The mutually exclusive classifications include pixels classified as positive rainfall (but not indeterminate) and the two categories of indeterminate classifications, those changed to rainfall and those left as indeterminate.

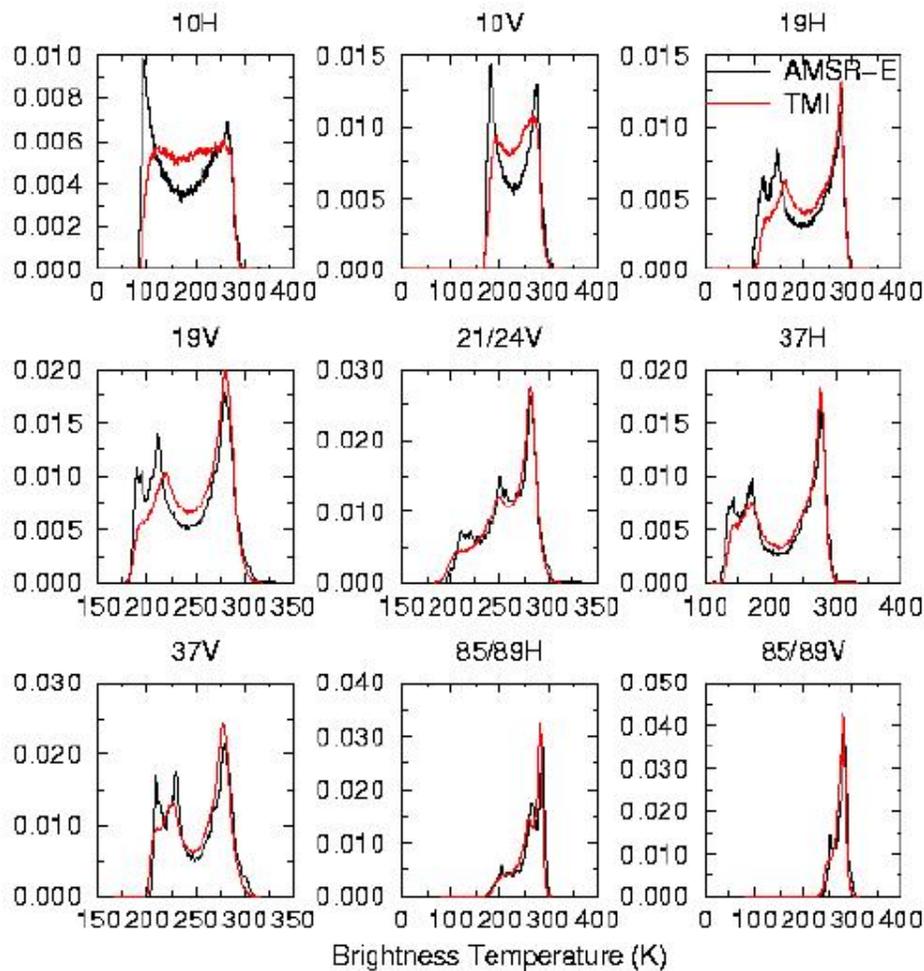
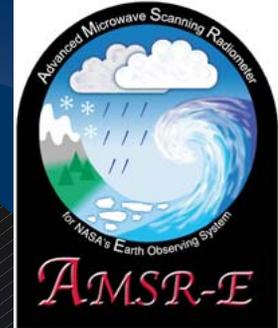




At high latitudes, the indeterminate pixels should be left as 'no estimate' and not changed to rain > 0 .

AMSRE zonal profiles of coastal pixels for different classifications. The upper panel shows fractions of the total coastal pixels for each classification, the lower panel shows the corresponding mean rainfall contributed by the pixels of each classification.





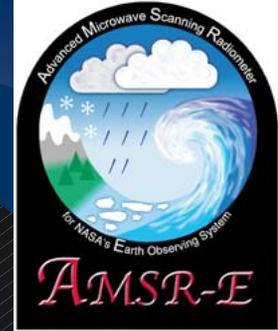
Higher spatial resolution for AMSR-E may also cause differences using the same thresholds as with TMI

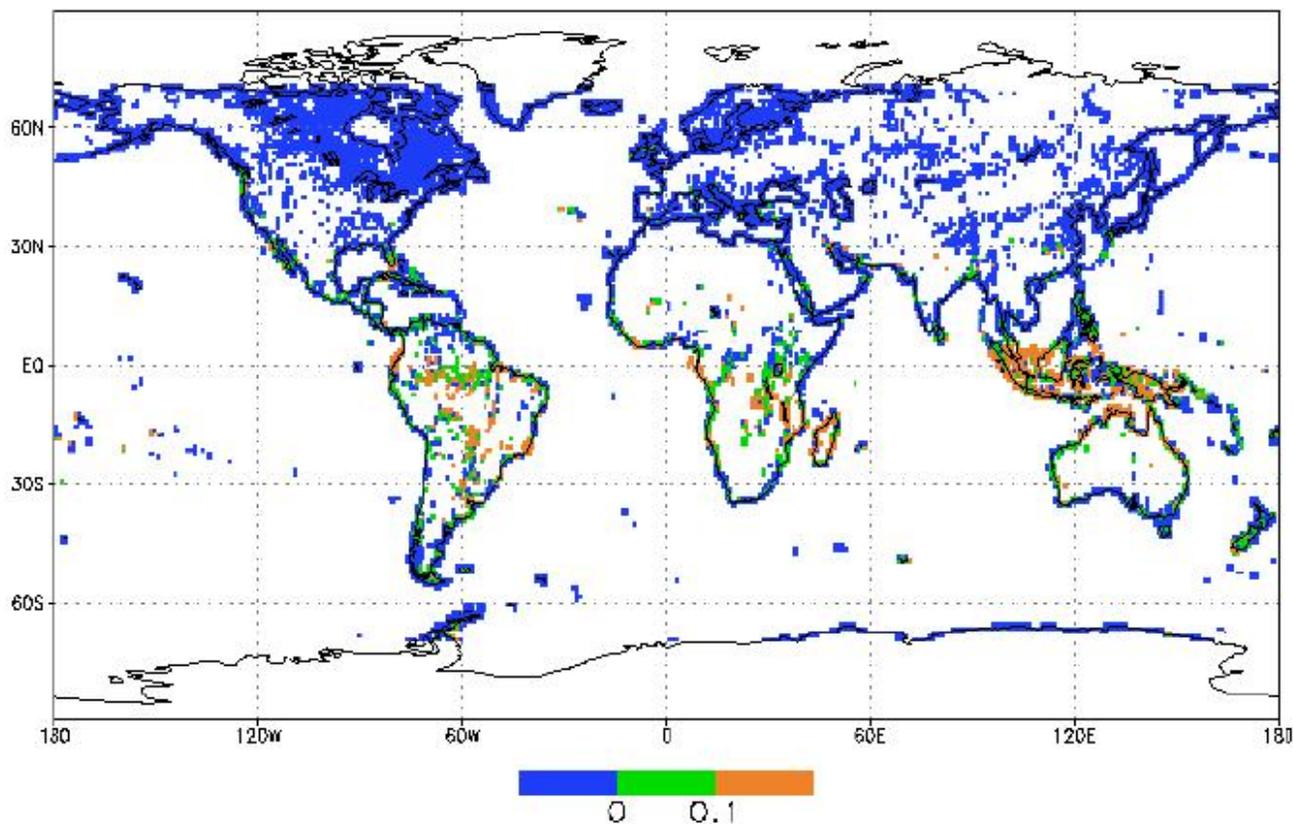
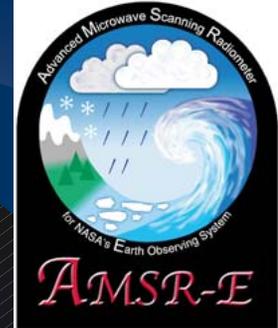
TMI and AMSR-E TB distributions of coastal pixels from Africa, South America, and Australia. TMI pixels are from Dec. 2003 through Feb. 2004, AMSR-E pixels are from February 24, 2004.



Modifications for June 1 submission

- Indeterminate coastal pixels with elevations greater than 2 km remain indeterminate
- Indeterminate pixels with elevation > 2 km between 30° N and 30° S are assigned their positive rain values
- The initial criterion of the coastal rain/no-rain decision tree is changed from a rain possible condition to a no-rain condition
- New criteria of brightness temperatures far from the cutoff threshold are applied after the decision tree to convert some of the pixels previously classified as indeterminate to rain

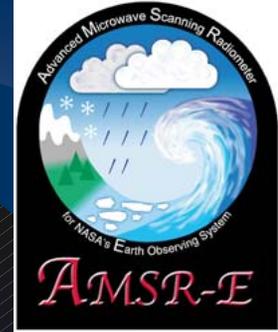




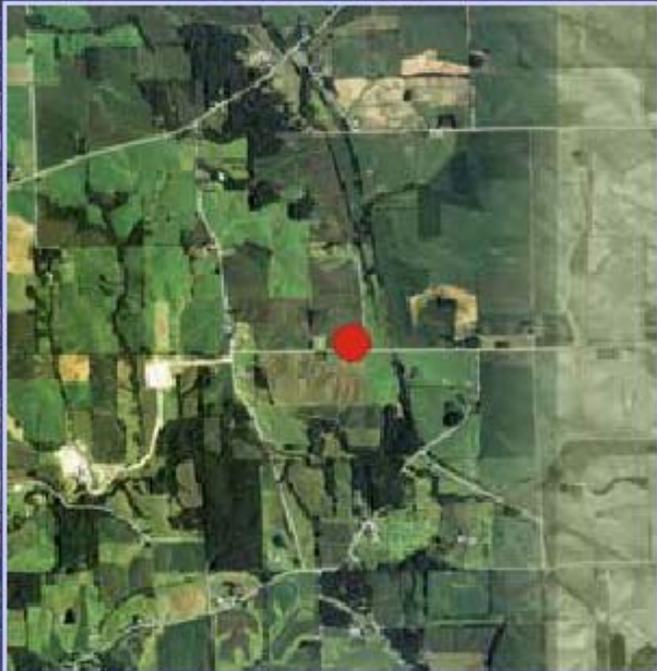
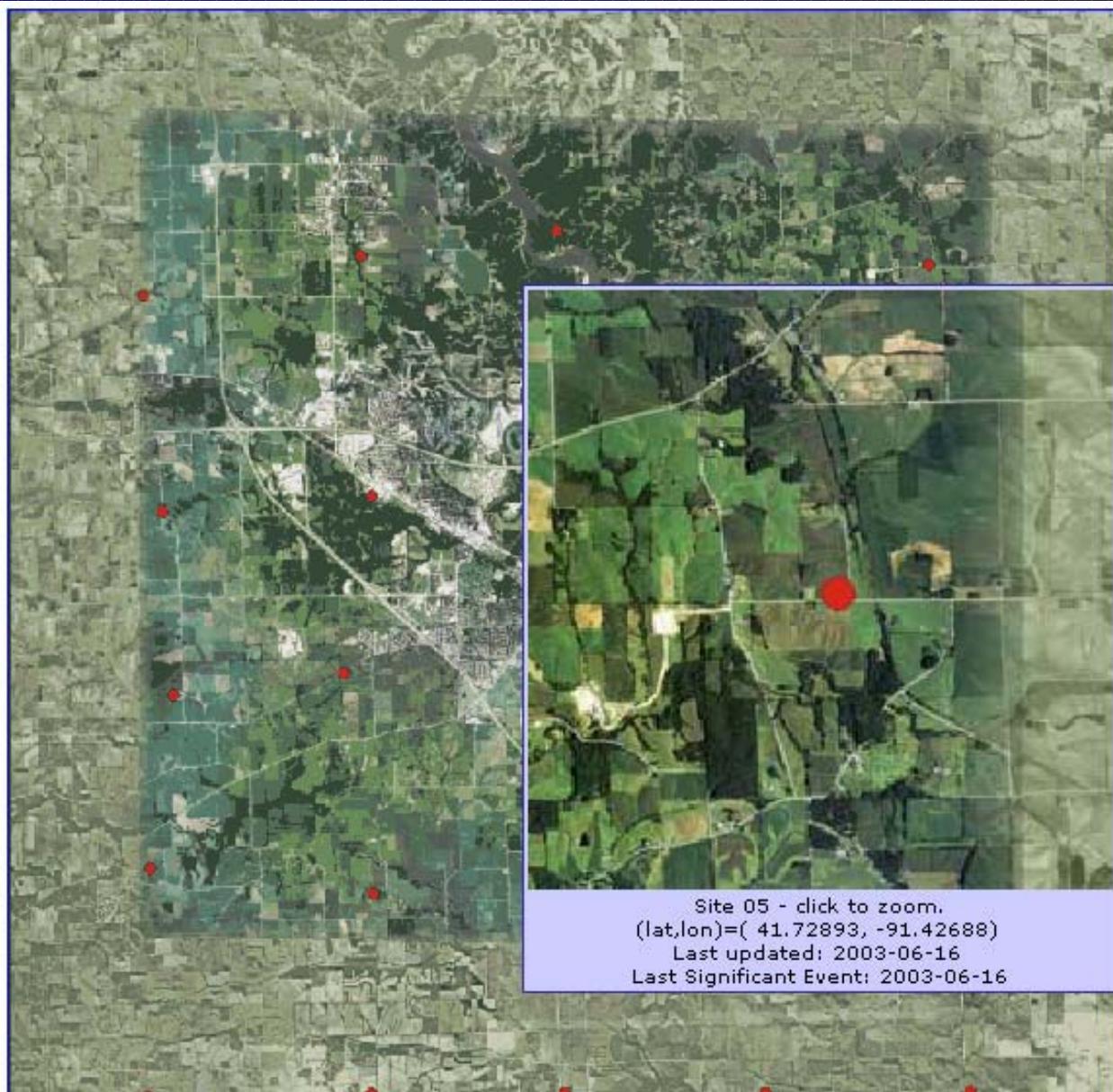
Mean global coastal rainfall (mm/h) from the modified algorithm for Jan. 3, Jan. 17, Jan. 31, and Feb. 10, 2003. Only coastal pixels are shaded; the predominant lightest shade indicates estimates of 0 mm/h.



Land algorithm validation using Iowa rain gauge network (web site connected to AMSR-E validation web site)

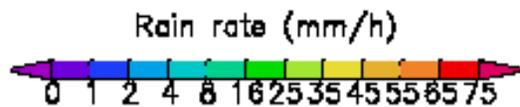
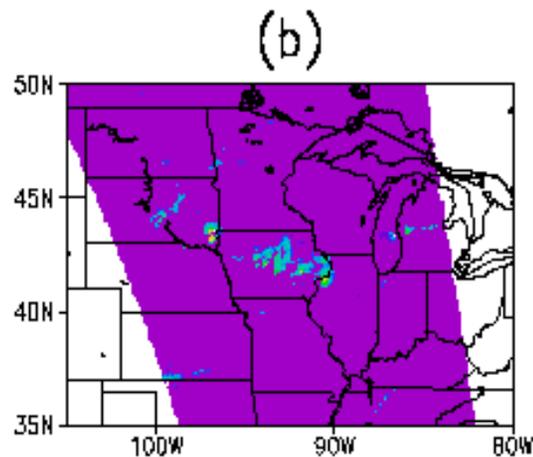
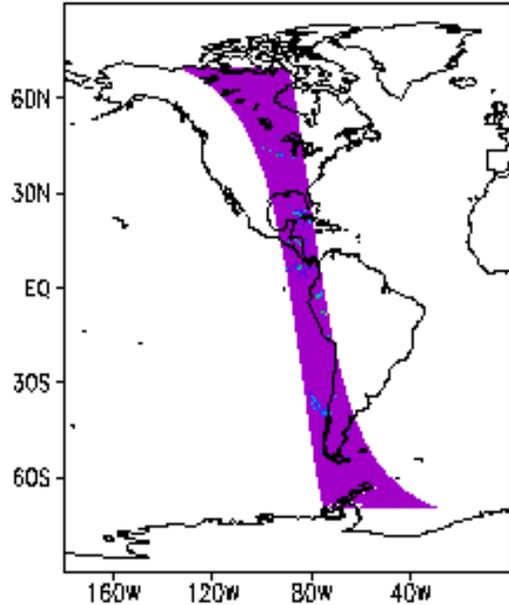
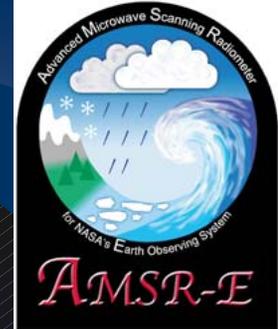


Set up in summer
2002, data since
fall 2002

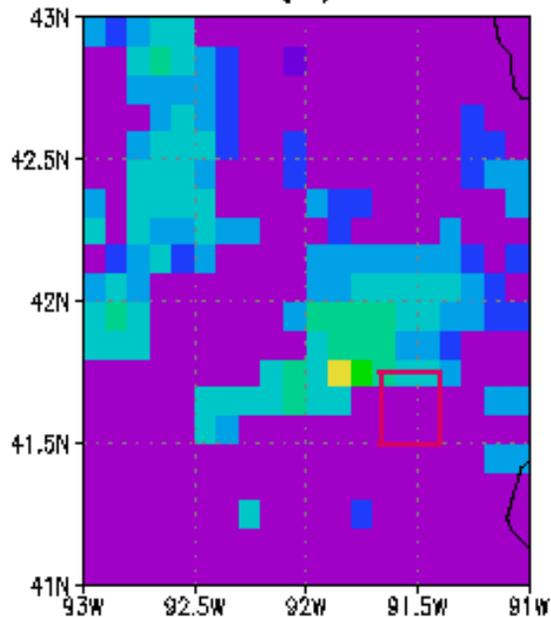


Site 05 - click to zoom.
(lat,lon)=(41.72893, -91.42688)
Last updated: 2003-06-16
Last Significant Event: 2003-06-16

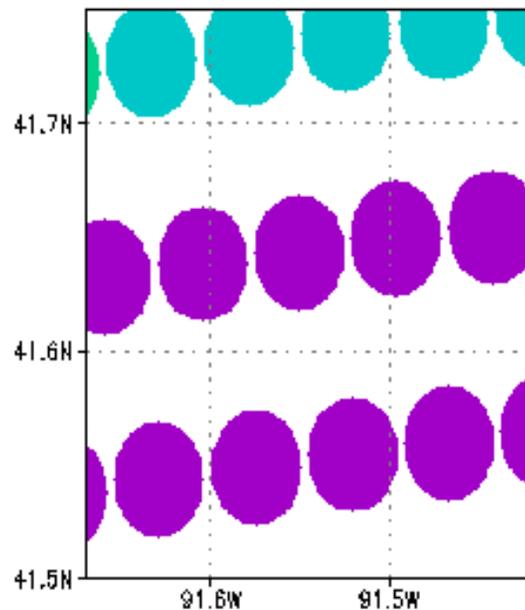




(c)



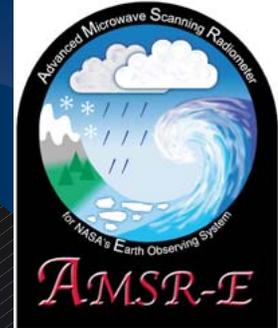
(d)



**1 October 2002
1911 UTC**

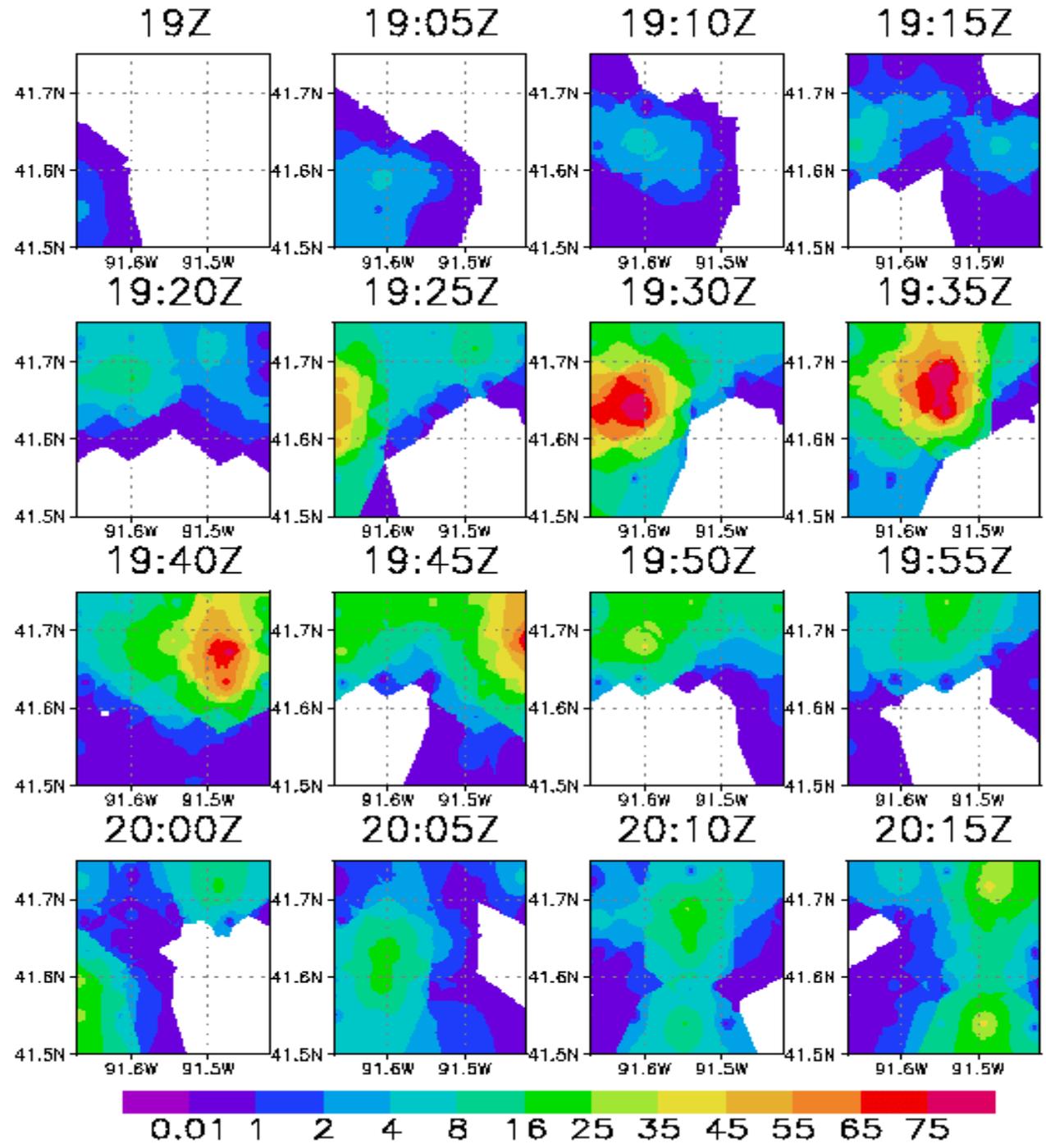
**Rain over gauge
network**

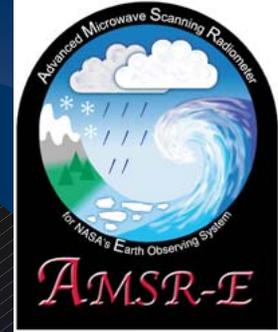




Gauge Time Sequence

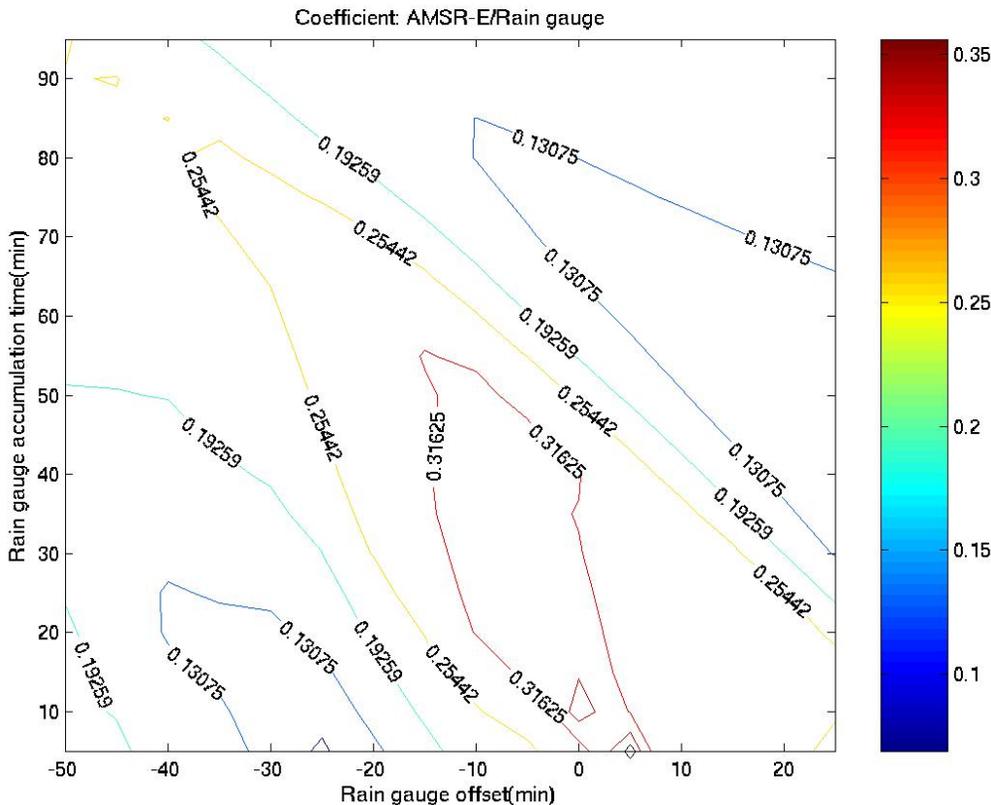
- 5 km and 5 minute sampling allows for detailed evolution of rain system
- Best match with AMSR-E in this case appears to be ~10 minutes after overpass
- Interpolated gauge field used for comparison statistics





Quantitative Gauge vs. Satellite Results

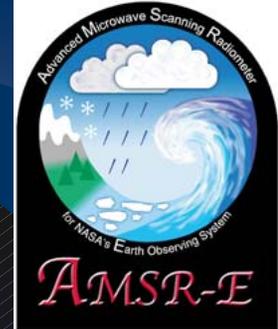
Correlation coefficients between satellite footprint estimate and interpolated gauge values centered on footprints



This plot is for 'point' interpolated values for footprint centers.

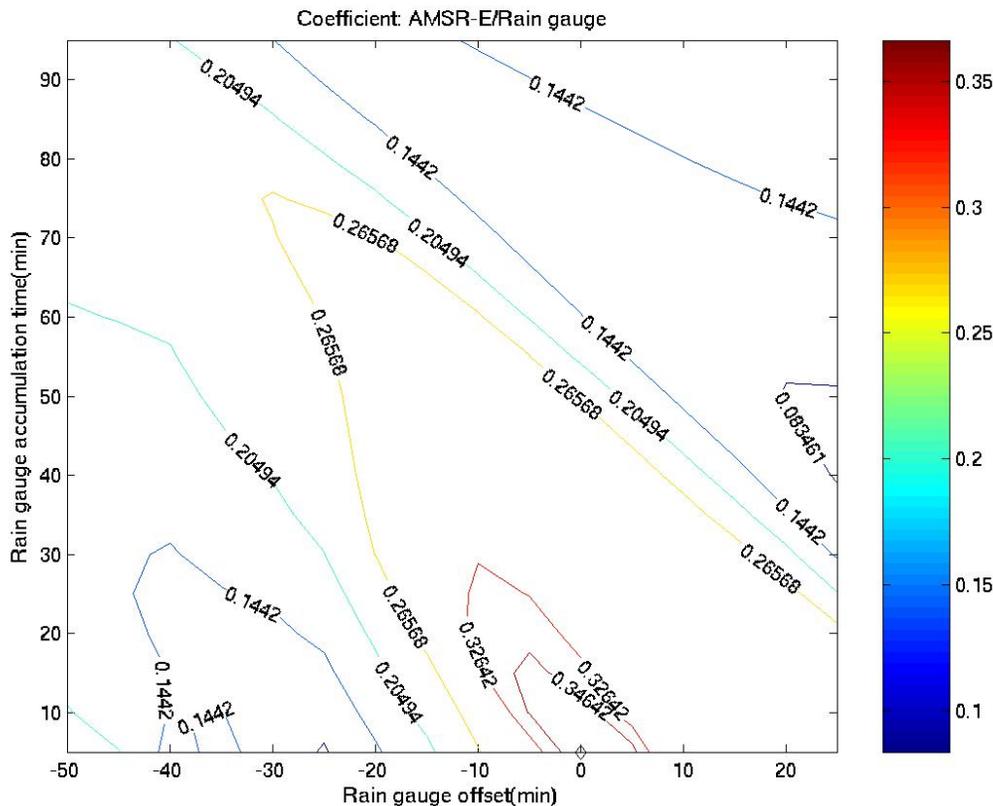
Highest correlation for 5-minute gauge accums are observations 5 minutes after satellite overpass





Quantitative Gauge vs. Satellite Results

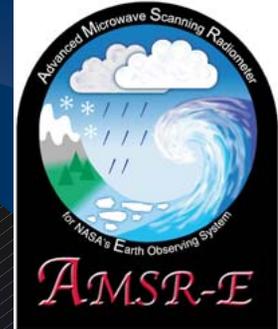
Correlation coefficients between satellite footprint estimate and interpolated gauge values centered on footprints



This plot is for 12-km radius interpolated values for footprint centers (only for footprints in center of 25-km box).

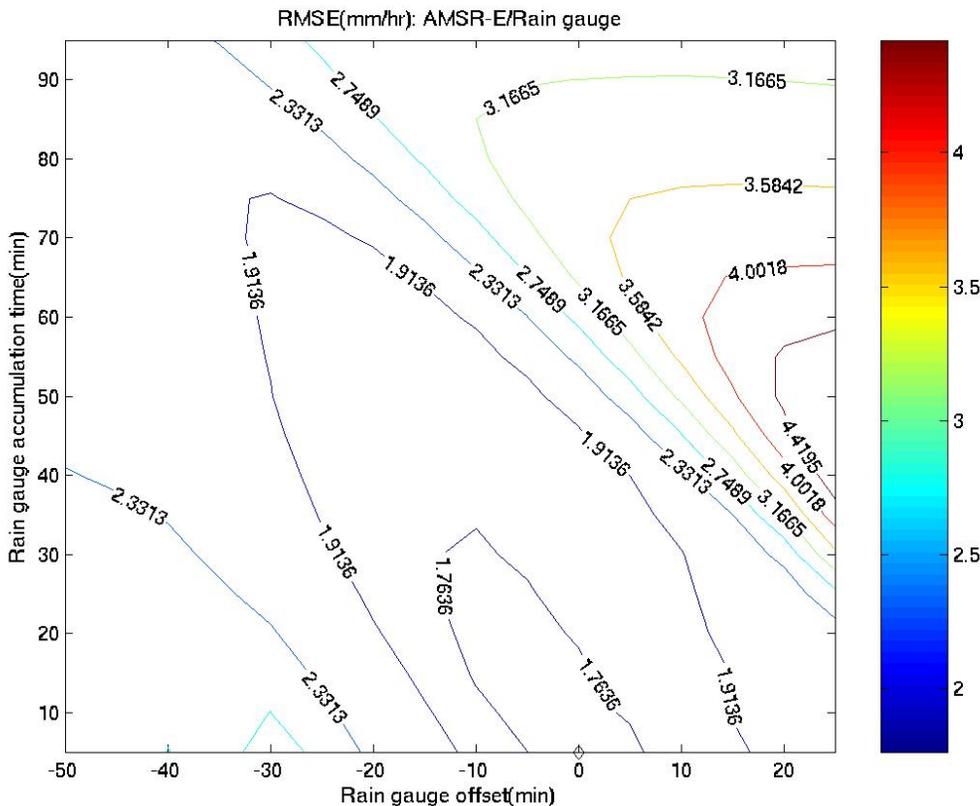
Highest magnitudes of correlation coefficients (increasing spatial averaging increases correlation coeff.)





Quantitative Gauge vs. Satellite Results

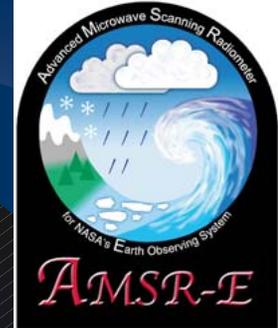
Root-mean-square error (RMSE) between satellite footprint estimate and interpolated gauge values centered on footprints



Left: 12-km radius interpolated values for footprint centers

Lowest magnitudes RMSE (increasing spatial averaging reduces RMSE), similar to correlation coefficient results (with slightly less time offset)





Quantitative Gauge vs. Satellite Results

- Overall AMSR-E 19% higher than gauges for 2003
- Just starting data analysis and continue to collect more data for better results
- Also beginning comparison with Guosheng Liu's AMSR estimates

