AMSRS-E Geolocation and Resampling 6.9 and 10.7 GHz Channels: Implications for Applications

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- Geolocation Review
- Sensor-to-Spacecraft Roll of .09° -> use Earth_Incidence over water
- 10.7 (not-resampled) geolocation errors: ~2 km -> use resampled TBs
- 6.9 (not-resampled) geolocation errors: ~4 km -> use resampled TBs
- 10.7 GHz RFI -> Geostationary_Satellite_Glint_Angle

Joint AMSR Science Team Meeting
La Jolla, CA, September 6-8, 2006
Review of Geolocation Approach

Ground Truth: Coastlines
- Stable, well known locations (with a few exceptions, e.g. Aral Sea)
- High contrast, large diff's in brightness temps from land to water

Methodology:
- Iteratively tweak geometric parameters to achieve coastal alignment
  Repeat: “better or worse” until: proper alignment

Three Independent Comparisons:
- Global, (left side of swath - right side of swath) differences
- Global, (ascending - descending) swath differences
- Local, direct comparison to Matlab high resolution coastal maps

Confidence:
- All 3 comparisons yield nearly the same geometric parameters
- Accuracy between 1 and 2 km
89A, left minus right, after
37H, ascending minus descending, before
37H, ascending minus descending, after
89 GHz Ascending/Descending, 2 Months
Sensor-to-Spacecraft Roll

- .09 degrees (~"tenth of a degree")
- Earth incidence angle affected by roll; varies more than thought

Per Channel Alignment:

- Separate geolocation analysis for each of 14 channels
- For each frequency, V and H are well aligned
- 89A and 89B align as expected; have their own lats, lons
- 19, 24, and 37 GHz channels are well aligned with each other
- 7 and 11 GHz horn pointing errors:
  - 11 GHz offset by ~2.3 km
  - 7 GHz offset by ~3.9 km
Sensor-to-Spacecraft Roll: Implications

First Corrected L2A Version B02 (November, 2004)
- Along scan (cross swath) bias detected and removed
- Earth incidence not as well known then; correction improved calibration

Improved Correction L2A version B05 (August, 2005)
- Along scan bias due to sensor-to-spacecraft roll no longer removed
- L2A brightness temps represent what the instrument sees on Earth:
  - Earth incidence angles vary along scan
  - Ocean brightness temps vary along scan
- Earth incidence angle is computed and included in L2A:
  - Low_Res_Swath : Data Fields : Earth_Incidence

Implication:
- Use Earth_Incidence
Sensor-to-Spacecraft Roll: Implications
Channels 7, 11 Misalignment: Implications

Corrected via Resampling

- Beginning with L2A version B07 (March, 2006)
- Newly derived resampling weights to recenter 7, 11 footprints
- Channels 7, 11 are resampled to match the center point of 19-24-37

Previously Reasonable:

- Compare native 7 to channels resampled to match 7 footprint (Res.1)
- Compare native 11 to channels resampled to match 11 footprint (Res.2)

Now Recommended:

- Use resampled 7, especially when using other resampled channels
- Use resampled 11, especially when using other resampled channels
Channels 7, 11 Misalignment

Expected

Discovered

Resampled
Channels 7, 11 Misalignment

Both

Not Resampled
Channels 7, 11 Misalignment

Both

Resampled
Channels 7, 11 Misalignment

Both

Resampled
Channels 7, 11 Misalignment:

Caution:
7, 11 (not-resampled) do not align with:
* resampled Res.1 (7)
* resampled Res.2 (11)
* resampled Res.3 (19)
* resampled Res.4 (37)
Other Calibration Improvements

Lunar Radiation in Cold Mirror
- Twice per month, the moon (120°-370° K) is seen in AMSR-E cold mirror
- Lunar contributions to cold counts are now removed (corrected)

Aqua Pitch Error August-September 2003
- Correction improved calibration and Earth_Incidence
- Corrected with version B05 (August, 2005)

More Improvements
- See release notes

Implications:
- Use latest L2A when available
Geostationary RFI @ 10.7 GHz

AMSR-E Sea Surface Temperature: 2002/06/22 - nighttime passes - European Satellite TV

SST: -1 4 9 14 19 24 29 34 (degrees Celsius)

Land

Ice

No data
Geostationary RFI @ 10.7 GHz

Astra: 19.2° East Longitude
(RFI from 19° not obvious in eastern Mediterranean; highly consistent with power images shown here.)

Hotbird: 13.0° East Longitude
Geostationary RFI: Implications

Implemented L2A Version B05 (August, 2005)

- Glint Angles computed to 13.0° and 19.2° E (at geostationary altitude)
- Smallest glint angle included in L2A:
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