Cold Sky Calibration (CSC)

Adam Freedman
• Cold sky calibration signature in incidence angle
• Need noise-only (L1B) signature of cold-sky cal
• Mysterious bump in scatterometer off-Earth view, beam 3 only
• Not seen in radiometer brightness temperature
• Seen in scat noise-only channel also
• Probably first range ambiguity off edge of Earth
  - need to verify ranges, times, angles
  - however, bump appears off Earth, while pointed to sky
• Other ideas?
COLD SKY CALIBRATION
MARCH 24, 2012
- First half of CSC maneuver (up to about 03:03) clear of RFI
- Second half of CSC dense with RFI in scat
- Beam 3 “bump” in middle of CSC at about 03:00±00:01
- This bump coincidentally corresponds to pitch “overshoot” of 180°?
• Bump at 03:00 seen in both noise only and echo, beam 3 only
• “Edge of Earth” range ambiguity in H-pol likely
• First half of 180° pitch (02:58 – 03:02) looks clean of RFI
• RFI pretty messy from 03:04 on
Orbit position at 02:58: mid-Pacific, no land in view.

Orbit position at 03:00: mid-Pacific, no land in view, but Hawaii just coming into view over horizon.
Orbit position at 03:02: Hawaii in view

Orbit position at 03:04: North America (Baja, CA) just coming into view over horizon
Orbit position at 03:06: West coast of U.S. in view over horizon
• Similar information as in averaged echo
• Small mini-bump at about 02:54, maybe in beam 1 only
• Closeups of scat echo channels
- Radiometer looks very flat for most of CSC
- No bumps
- RFI only appears at very end of maneuver
What are the scatterometer CSC “bumps”

• Not likely to be range ambiguity signature
• Is beam 3 only coincidence, or defining?
• Source of L band at or near 1260 MHz in space?
  – GPS or other satellite positioning system?
• Other ideas?
Information from Bryan Huneycutt

• Aquarius should see emissions in the 1258-1262 MHz band from the following RNSS systems: the 27 Glonass MEOs, 27 Compass MEOs & 5 Compass GEOs & 3 IGSOs, 30 Galileo MEOs, and 1 Arabsat GEO. When Aerospace modeled all of these RNSS systems, the peak RFI received into the SMAP backlobes and sidelobes was calculated to be -143 dBW for Glonass, -151 dBW for Compass, -142 dBW for Galileo, and -139 dBW for Arabsat. Aquarius would be in line-of-sight typically with more than half of each system constellation.

• In 2010 there were 23 Glonass MEOs, 0 Galileo MEOs, and 5 Compass MEOs/GEOs/IGSOs. I’m not sure how many there are now, but by 2013 there are expected to be 24 Glonass MEOs, 24 Galileo MEOs, and 12 Compass MEOs/GEOs/IGSOs.
### GNSS

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<tr>
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<td>US</td>
<td>MEO</td>
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<td>L1, L2, L5</td>
<td>CDMA</td>
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<td>MEO + GEO + IGSO</td>
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<td>Japan</td>
<td>IGSO</td>
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<td>India</td>
<td>GEO + IGSO</td>
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### Satellite Constellation

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<th>2013</th>
<th>2016</th>
<th>2019</th>
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<td>27 (+3)</td>
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<td>Total</td>
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**GNSS Systems and Satellite Constellations**

- L2
- E6/LEX