Aquarius Cross-Pol Calibration

March 27th 2012
HV ANT – HV expected; Ascending; 2011-323 to 2011-352
Model Faraday angle plotted on left
HV TOA – HV expected; Ascending; 2011-323 to 2011-352
ANT to TOA computed using model Faraday Angle

Beam 1; ASC; HV TOA – HV EXP
Beam 1; ASC; Faraday Angle

Beam 2; ASC; HV TOA – HV EXP
Beam 2; ASC; Faraday Angle

Beam 3; ASC; HV TOA – HV EXP
Beam 3; ASC; Faraday Angle
HV TOA – HV expected; Ascending; 2011-323 to 2011-352
ANT to TOA computed using radiometer Faraday Angle
HV ANT – HV expected; Descending; 2011-323 to 2011-352
Model Faraday angle plotted on left
HV TOA – HV expected; Descending; 2011-323 to 2011-352
ANT to TOA computed using model Faraday Angle
HV TOA – HV expected; Descending; 2011-323 to 2011-352
ANT to TOA computed using radiometer Faraday Angle
ANT to TOA conversion using model
Faraday Angle
ANT to TOA conversion using radiometer Faraday Angle
Amazon $\gamma_0$

\[ \gamma_0 = \frac{\sigma_0}{\cos(\theta_{inc})} \]

- PALSAR found $\gamma_0$ values in the Amazon stable across 20-45 degrees in incidence angle*
  - Wet-dry seasonal difference of $\sim 0.27$ dB**
  - Wet season is approx. Nov-April.
- Best estimates are:
  - HH $\sim -6.28$ dB (std 0.18)
  - HV $\sim -11.15$ dB (std 0.21)
  - Not clear which season this is from!

---


RAP correction is range antenna pattern correction
We included data contained in the blue polygon for the Aquarius Gamma 0 analysis.
Amazon Gamma 0 HH [dB]

Amazon Gamma 0 VV [dB]

Amazon Gamma 0 HV [dB]

Wet Season

Days since 2011–238
Aquarius Amazon $\gamma_0$ Histograms

B1; Mean HH gamma0: $-5.8$

B1; Mean VV gamma0: $-6.0$

B1; Mean HV gamma0: $-10.8$

B2; Mean HH gamma0: $-5.8$

B2; Mean VV gamma0: $-6.2$

B2; Mean HV gamma0: $-10.8$

B3; Mean HH gamma0: $-6.2$

B3; Mean VV gamma0: $-6.2$

B3; Mean HV gamma0: $-10.9$
Amazon Radar Vegetation Index

RVI should scale to 1 in high-biomass regions
Beam 1 is ~ 2% low
Beam 3 is ~ 2% high

\[ RVI = \frac{8HV}{HH + 2*HV + VV} \]
Summary

• The Faraday rotation correction seems to be improved when using the radiometer Faraday angle instead of model.
  – Beam 2 seems to perform the best.
  – Beams 1 and 3 still need some work
• The Aquarius Amazon has gamma 0 that agrees well with PALSAR and JERS-1.
  – HH calibration could be off by ~ 0.3 dB for beams 1,2
  – VV calibration could be off by ~ 0.2 dB for beam 1.
  – HV calibration could be off by ~ 0.3 dB for all beams.
• However, we have not seen the entire annual variation in Aquarius observations over the Amazon.
  – It is not clear if the PALSAR gamma 0 is reference to the wet, dry, or average season.
  – JERS-1 saw ~ 0.27 dB in seasonal variation, which is the same order of magnitude the indicated biases.
We included data contained in the blue polygon for the Aquarius Gamma 0 analysis.
- Collect model (scat s/w) and derived Faraday Rotation angles.
  - Land Fraction == 0
  - Abs(lat)<55
  - Abs(Polarization roll) < 0.5 deg
  - Abs(TaH-TfH)<1
UAVSAR Matchups
August 29th 2011 Flights over the Central Valley