Summary of APC Working Group

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Objective

- Provide recommendations to the project for APC coefficients and other antenna calibration parameters (e.g. galactic, solar, lunar contributions)
- Evaluate and assess errors in measured and modeled patterns provided pre- and post-launch

Background

- Pre-launch, two patterns were generated
  - Model pattern using GRASP EM modeling software
    - Model only included feed horns and reflectors
    - Spacecraft structures not included
  - Measured pattern using ~1/10 scale model of Aquarius and spacecraft
    - Represented all scattering structures
    - Measured on near field range
- Scale model pattern used to generate pre-launch APC coefficients and correction maps

Issues

- Post-launch, comparison to model showed APC coefficients had too much cross-pol coupling
  - Coefficients empirically adjusted and cross-pol set to zero
- A reassessment of pre-launch patterns identified several issues in the scale model patterns
  - Feed pointing was not equivalent to flight unit
  - Cross-pol coupling “tuned” on the range and prone to error
  - Only measured in one orientation – errors from support structure and missing cones

Current Status

- In collaboration with the SMAP antenna team, new model patterns were generated using a higher fidelity model developed for SMAP
  - Model includes entire spacecraft structure
- New APC terms and correction maps generated from the 2012 model patterns
  - APC parameters required less empirical adjustment to remove residuals from TA model
- WG recommended that the project use the new patterns
- Potential issue: New patterns have a higher spill-over fraction compared to previous patterns
  - Increases warm end TBs – no impact over ocean after re-calibration
  - Analysis on-going to assess radiometer warm end absolute calibration
  - Special cold sky backlobe calibration maneuver conducted