STEREO MOC Status Report
Time Period: 2015:243 – 2015:249

STEREO Ahead (STA) Status:

1. The following Ground System anomalies/events occurred during
   this reporting period:

   - On day 244, before the beginning of the 1st support with
     DSS-34 that day, the transmitter was declared red and the
     support remained downlink only for the duration. This
     anomaly resulted in the loss of 5.3 hours of commanding and
     two-way Doppler support. See DR# C111354 for more
     information.

   - On day 244, before the beginning of the 2nd support with
     DSS-34 that day, the transmitter was declared red and the
     support remained downlink only for the duration. This
     anomaly resulted in the loss of 3.2 hours of commanding and
     two-way Doppler support. See DR# C111356 for more
     information.

   - On day 248, during the DSS-65 support, turbo decoder lock
     was lost intermittently between 1441z and 1545z. This
     anomaly resulted in the loss of 30 frames of real-time
     data.

   - On day 249, during the DSS-14 support, turbo decoder lock
     was lost briefly at 1954z. This anomaly resulted in the
     loss of 3 frames of real-time data.

2. The following spacecraft/instrument events occurred during
   this week. The Ahead observatory operated nominally during
   this week on the 1st side lobe of the HGA to prevent
   overheating of the HGA feed assembly which was at 117 degrees
   C and decreasing with the HGA angle at 7.5 degrees and
   increasing, with respect to the spacecraft-Sun line.

   - On day 243, G&C parameters release 1.3.3 was loaded to G&C
     EEPROM. This release increased the propulsion subsystem
     enable delay for G&C thruster use to 60 seconds in
     preparation for No Gyro Operations (NGO) to be deployed
     later this year.

- This week, data for the following days was played back from the C&DH routine SSR partition playback:

  2015-240-11:47:25z through 2015-249-22:29:08z

  Specifically, this partition contains spacecraft bus data for science analysis and instrument status, i.e., attitude history, instrument thermal interface temperatures, heater performance, etc., which are used to create the attitude history and converted spacecraft housekeeping data products.

  The following days have not played back yet:

  071 through 133 = 63 days (inclusive)
  146 through 231 = 86 days (inclusive)
  Total = 149 days

  This partition's write pointer is being monitored to ensure that these days are not overwritten, which is currently predicted to do so after returning to the HGA main lobe on or about Nov 13th.

  Once on the HGA main lobe, the in-situ instrument space weather science SSR data along with the spacecraft housekeeping data will be downlinked twice and verified before the SSR is reconfigured to resume nominal daily science operations.

- The average daily science data return for Ahead, while operating on the 1st side lobe of the HGA, was 93 Mbits during this week.

STEREO Behind (STB) Status:

1. The following Ground System anomalies/events occurred during this reporting period:

   - None.

2. Detailed status of the activities that occurred on the Behind loss of communication anomaly, which occurred on day 2014-274, are listed below.

   - The Behind observatory entered superior solar conjunction at the 2.0 degree SPE angle on day 022. Recovery efforts

resumed post solar conjunction on day 124, May 4th through day 178, June 27th, as the spacecraft had cleared solar interference for LGA communications. The Failure Review Board recommendations were implemented consisting of battery state of charge recovery and powering on the downlink carrier. The Green Bank Radio Telescope and the Arecibo Observatory also observed the carrier recovery tracks. To date, no downlink signal has been detected from the Behind observatory. Due to Behind's retrograde motion causing it to re-enter the region of solar interference, recovery operations will be suspended from July through November. The Failure Review Board's recommended faster frequency segmented acquisition sequence will be tested with the Ahead observatory on day 272, September 29th. The DSN uplink arraying capability will be tested again with the Ahead observatory in October and November, and when it is ready, it will be used to increase the spacecraft received signal power to assist with Behind recovery commanding. With time the spacecraft range improves RF communications and the ability for other assets to acquire data on Behind. LGA uplink margin returns to 6 dB for the 7.8 bps rate in March 2016 and 125 bps in December 2019 and the LGA downlink margin returns to 3 dB for the 12 bps rate in December 2016 and 35 bps in March 2018.

Significant findings to date:

1. Analysis of the three DSN extracted telemetry frames from the carrier signal just before the planned observatory reset/anomaly occurred on day 2014-274, October 1st, showed nominal performance of the spacecraft, i.e., no anomalies, IMU off, and the star tracker providing an attitude solution.

2. Post reset, from the very limited telemetry, three packets, extracted from the carrier signal by the DSN, the X-axis gyro on IMU-A had failed. Unfortunately, this telemetry contained only G&C anomaly data and no spacecraft summary data, i.e., the state of the RF, G&C, fault protection and other subsystems is not known at the time of the anomaly. With a failed IMU and the star tracker being off-line for an undetermined duration, the sun sensors will keep the observatory pointed at the Sun, though the G&C will not have any roll knowledge, and cannot roll the observatory as part of the safing configuration to re-establish communications on the LGAs. From analysis of this telemetry and initial G&C simulations, it is highly

suspected that the observatory is rotating about the principal axis of inertia due to an autonomous momentum dump initiated by biased gyro data flagged good by the IMU, but this has not yet been confirmed.

3. At least two anomalies occurred post reset, the star tracker not promoting to AAD mode and the X-axis gyro failure. Unfortunately, due to the number of possible combinations, the STEREO fault protection system is not designed for simultaneous failures.

Once communications are restored and the anomaly resolved, the Behind observatory will be returned to nominal science data collection as soon as it is safely possible.