STEREO MOC Status Report
Time Period: 2014:321 – 2014:327

STEREO Ahead (STA) Status:

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

   • On day 321, the planned DSS-14 support did not occurred due
     to the antenna being declared red due to a mechanical
     problem. No other 70 meter stations were available. This
     anomaly resulted in the loss of 2.25 hours of real-time
     science data. See DR #G115671 for more information.

2. The following spacecraft/instrument events occurred during
   this week. Note that the Ahead observatory is operating on
   the first side lobe of the HGA to prevent overheating of the
   HGA feed assembly which is currently at 115 degrees C with the
   HGA angle at 7.8 degrees, with respect to the spacecraft-Sun
   line.

   • On day 322, MOps macro release 1.1.25 was loaded to C&DH
     EEPROM. This release updated the SSR playback ratio from 2
     to 3 for spacecraft playbacks during side lobe operations.

   • The average daily science data return for Ahead, while
     operating on the first side lobe on the HGA, was 69 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 274, are
   listed below. To ensure communications on the LGA during long
   term recovery efforts, the Behind track coverage have been
   reduced to 3 hour 70 meter supports for 3 days in a row each
   week.

- On days 321 through 323, during the DSN 70 meter supports, recovery commanding was conducted on ensuring that the transmitter is in its operational configuration. No signal was received by the DSN radio science receivers.

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 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 access of inertia due to an autonomous momentum dump initiated by bad gyro data flagged good, 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.

The cause and effect analysis of the loss of communications from the LGAs is continuing. G&C simulations using the bad gyro data flagged good are continuing to better understand the potential impact to the observatory state. Recovery from a negative power state is also being investigated. While the recovery and analysis efforts continue on Behind, as the Ahead observatory will enter superior solar conjunction in March, the primary focus of the engineering team is on developing operational

configuration changes to add robustness to the G&C rate sensor usage to ensure the Ahead observatory's continued safety.

Once communications are restored and the anomaly resolved, the operational plan for exiting the solar conjunction testing will continue to return the Behind observatory back to nominal science data collection as soon as safely possible.