STEREO MOC Status Report
Time Period: 2016:361 – 2017:001

STEREO Ahead (STA) Status:

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

   - On day 363, during the DSS-63 support, the MOC lost real-
     time telemetry and monitor data at 1050z due to a disk
     anomaly on the primary command workstation. The MOC
     switched to the backup command workstation to continue
     command and control operations at 1104z. The primary
     command workstation was rebooted and placed back on-line at
     1303z. All SSR data was received.

2. The following spacecraft/instrument events occurred during
   this week. The Ahead observatory operated nominally during
   this week.

   - On day 366, the G&C wheel speed avoidance algorithm failed
     to converge at 1558z resulting in the intermittent loss of
     fine pointing for a total of 46 seconds through 2158z when
     the algorithm successfully converged. This coincides when
     two of the wheels reached the wheel speed dead zone for
     zero speed avoidance.

   - On day 366, a leap second was applied to UTC at 23:59:60z.

   - The average daily science data return for Ahead was 5.0
     Gbits during this week.

STEREO Behind (STB) Status:

1. Detailed status of the recovery activities this week to
   restore operations is listed below.

   - None.

2. The Behind loss of communication anomaly occurred on October
   1, 2014. Post superior solar conjunction, recovery operations
   resumed on November 30, 2015. By implementing the NASA
   Failure Review Board recommendations, the first recovery
   attempt began with carrier detection by the DSN on August 21st,

through September 23, 2016. At a spacecraft range of ~2 AU, the observatory was found to be rotating slowly about its principal axis of inertia for which the uncontrolled attitude allowed some solar array input and continuous uplink and downlink communications on the LGA at emergency data rates. Over the next 22 continuous days, significant obstacles to recovery were overcome with a collaborative effort of the JHU/APL engineering team, NASA GSFC, DSN, FDF, SSMO scheduling, and Mission Operations teams. This consisted of:

- Reliably commanding a rotating spacecraft with uncontrolled attitude at a distance of 2 AU
- How to power on the spacecraft that was never designed to be off without collapsing the battery voltage
- Acquiring telemetry at 35 bps from a spacecraft that is rotating with an uncontrolled attitude
- Warming a frozen propulsion subsystem with a degraded battery and limited solar array input with an uncontrolled attitude
- Configuring, loading, and verifying EA, C&DH, and G&C parameters and macros with very limited telemetry
- Conducting an autonomous momentum dump in the blind and transitioning to C&DH standby mode and successfully receiving telemetry on the HGA indicating star tracker lock and decreasing system momentum.

However, system momentum level remained above the threshold for re-establishing attitude control with the reaction wheels. Due to the uncontrolled attitude, communication degraded and the last detection of the carrier was on September 23rd.

Behind Observatory Status – From the last telemetry received on September 18th, main bus voltage is low, 2 out of 11 battery cells are currently not functioning, attitude remains uncontrolled, rotating at a ~45 second period about its principal axis of inertia. While propellant is suspected to be frozen, last telemetry indicated both propulsion tank latch valves are open and pressure transducer #2 is not functioning. EA mode is enabled. The battery charge rate is C/10. Necessary macro sequences have been tested to allow the peak power tracker in C&DH standby mode to protect the battery. These macro sequences will be loaded to EEPROM when the communications supports longer commands.

Monthly recovery efforts consist of attempting to power on the transmitter for 30 minutes. If no carrier signal is detected,

battery recovery operations will commence which consist of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off. The next recovery tracks are on January 20th, 21st, and 22nd.