STEREO MOC Status Report
Time Period: 2017:072 - 2017:078

STEREO Ahead (STA) Status:

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

   - On day 073, during the DSS-43 support, turbo decoder lock was lost intermittently between 0646z and 0702z due to heavy rain at the Canberra complex. This anomaly resulted in the loss of 26,385 frames of real-time and SSR data. As there was sufficient track time, SSR pointers were repositioned on the next support to recover the lost data. While all in-situ instrument data was recovered, unfortunately, due to the large volume of data recorded by SECCHI in between tracks, the SSR read pointer was re-positioned behind the write pointer resulting in approximately 10.2 hour loss of SECCHI science data from 073-1336z through 2350z. See DR# C112588 for more information.

   - On day 074, during the DSS-63 support, turbo decoder lock was lost at 1150z. This anomaly resulted in the loss of one frame of SSR data.

   - On day 077, during the DSS-43 support, turbo decoder lock was lost briefly while still one-way at 0513z, and then lost intermittently while two-way between 0641z and 0754z. This anomaly resulted in the loss of 58 frames of real-time telemetry and SSR data. See DR #C112592 for more information.

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

   - On day 075, the 38th SECCHI stepped calibration was executed at 1350z for midpoint in the Ahead orbit. This was the 7th SECCHI stepped calibration roll to be conducted without gyro use.

   - On day 075, IMPACT requested real-time commanding to dump RAM and clear a checksum error and to enable burst data which has been disabled since before solar conjunction.

- The average daily science data return for Ahead was 5.9 Gbits during this week.

STEREO Behind (STB) Status:

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

   - On day 076, during a 3.75 hour support with the 34m station DSS-26 using the 80 KW transmitter to minimize 70m contentions, initial commanding was delayed 9 minutes until 1634z due to the transmitter tripping off-line. After the uplink was restored, 380 commands were transmitted during the support. No carrier was detected by the DSN station after attempting to power on the TWTA for 30 minutes. Transitioned to battery recovery operations for the remainder of the support which consists of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off.

   - On day 077, during a 4.5 hour support with the 34m station DSS-26 using the 80 KW transmitter to minimize 70m contentions, 480 commands were transmitted during the support. No carrier was detected by the DSN station after attempting to power on the TWTA for 30 minutes. Transitioned to battery recovery operations for the remainder of the support which consists of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off.

   - On day 078, during a 6.5 hour support with DSS-14, 700 commands were transmitted during the support. No carrier was detected by either the DSN station or the radio science receiver team after attempting to power on the TWTA for 30 minutes. Transitioned to battery recovery operations for the remainder of the support which consists of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off.

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 and the telemetry assessment review held on February 24th, main bus voltage is low, 2 out of 11 battery cells are bypassed, attitude remains uncontrolled, rotating about its principal axis of maximum moment of inertia. While likely all ~42 kg of hydrazine remains and is frozen, both pressure transducers are not functioning. EA mode is enabled and autonomy is disabled. The battery charge rate is C/10. RF is configured for the +Z LGA at emergency data rates and the range of the expected best lock frequency is known. 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 April 14th, 15th, and 16th.