

December 12-18, 2003

<P>The Terra spacecraft is currently in Earth-pointing Safehold. The transition to Earth-pointing Safehold terminates science data collection and safes the instruments and transitions attitude control to ACE control. The transition to Safehold occurred at approximately 13:04:10 UTC on December 16, 2003 (8:04:10 a.m. local time). The event occurred out of contact and was detected by the Terra Flight Operations Team (FOT) at the beginning of the first contact subsequent to the Safehold event.</P>

<P>Out-of-Limit values were observed on all three axes (pitch, roll, and yaw) on both Inertial Reference Units (IRU) 2.5 seconds prior to Safehold. The Fault Detection, Isolation and Recovery (FDIR) software detected the out-of-limit values on the yaw rates, triggering the transition to Earth-pointing Safehold. The rates were fluctuating and saturating at both the high and low ends (1 degree/second). Performance of the IRUs was nominal until 2.5 seconds prior to Safehold.</P>

<P>The transition to Earth-pointing Safehold terminates science data collection, safes the instruments, performs a BDU (Bus Data Unit) swap, and transitions attitude control to ACE-A. The process of the BDU swap occurred as designed and the attitude control and performance on ACE-A are nominal. The Space Controls Computer (SCC-1) is running and the IRUs are behaving nominally. The spacecraft attitude has been nominal while in Safehold. Instrument and subsystem temperatures and other key parameters are being monitored closely. Earth-pointing Safehold is well understood and the spacecraft can remain in the current mode while investigation of the anomaly proceeds.</P>

<P>An Anomaly Investigation Team, coordinated by the Terra Mission Director, has been formed and includes the Terra Flight Operations Team, instrument teams, instrument suppliers, and the spacecraft manufacturer. This team is continuing to collect information relevant to the anomaly and is working to develop plausible causes and diagnostic procedures. The Earth-pointing Safehold recovery has been performed on Terra on several previous occasions and is well understood. However, no action will be taken until there is a better understanding of the problem. A temporary transition back to ACE-B (while remaining in Safehold) is being evaluated as a mechanism for collecting diagnostic information on the health of ACE-B and IRU data via ACE-B. This is tentatively planned for December 20. </P>

<P>On Sunday, November 30, anomalous behavior of the Science Formatting Equipment (SFE) on Terra resulted in the impairment of the MODIS Direct Broadcast (DB) capability. An Anomaly Team isolated the problem to a specific FIFO chip (#116) that appears to have experienced a single SAE event upset (SEU) as the spacecraft passed through the South Atlantic Anomaly (SAA). Risk analysis was conducted by the former Control and Data Handling (C&DH) Subsystem Engineer from the spacecraft manufacturer on the preliminary plan to perform a recycle of the SFE. This analysis indicates that the risk inherent in the recycle is very low, and this operation has been performed on the SFE on prior occasions after similar SEU-associated incidents. A preliminary Command Authorization Meeting (CAM) to review the entire recycle procedure was conducted on December 9, 2003. There were no issues with the draft plan, and the resulting science data outage as a result of the recycle was estimated at approximately 12 minutes. A decision to proceed with the recycle is expected after recovery from Earth-pointing Safehold.</P>

<P>The Solid State Recorder (SSR) Anomaly Investigation Team will meet again after resolution of the SFE issue to draft close-out reports on the root cause investigation. A preliminary Command Authorization meeting (CAM) covering the recycle of the Data Memory Unit (DMU) boards was conducted on November 17, 2003. There is no scheduled date for a DMU recycle at this time. The need for a recycle is not critical, but future PWA losses would increase operational challenges as well as the impetus for a decision on conducting the recycle activity.</P>

<P>The recent series of anomalies in the C&DH system is of concern and an effort will be initiated to look across these onboard anomalies for any common source.</P>

<P><B>Plans:</B><BR>

<UL>

<LI> Restore Terra spacecraft to nominal operations from Earth-pointing Safehold; and</LI>

<LI> Evaluate recycle of SFE to restore Direct Broadcast capability for MODIS</LI>

</UL>

</P>