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Anomaly Phase

Responsible Editor: [Susan Linick](#) ⓘ
Assigned To: [Aseel Anabtawi](#) ⓘ [\[Reassign\]](#)

Origination	Move To Assignment / Assessment	Current Phase Action	Move To Signature	Closed
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Completed Phases Current Phase Other Phases

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Incident Surprise Anomaly (ISA)

ISA #: 54949

Title: S80 Rev 197 RSS Atmospheric Occ Missing a Limb-Track Manuever

Originator Name: [Aseel Anabtawi](#)

Organization: 332K

Phone: 8183931073

Mail Stop: 230-215

Origination Date: 8/26/2013

Date of Incident: 8/14/2013

Last Processed: 9/3/2013 5:21:37 PM

Status: Open

Projects Affected

Main Project Affected: CAS - Cassini

Spacecraft/Instrument ID: 082

Other Projects Affected:

Description

Description of Incident: The Rev 197 RSS occultation (in XD segment) was originally a rings only egress occultation, but additional time was given to RSS to allow the capture of a very good ingress southern latitude atmospheric occultation. The CIMS request times and description were updated accordingly. An RSS science team member suggested to the XD lead that the CIMS request be split into two separate requests (atmospheric ingress and rings egress), but this, and other steps that were necessary for the occ to be integrated correctly, were not implemented and fell through the cracks. The CIMS request remained as a single, absolute-timed rings request that included the atmospheric occ time. A separate, LMB EPOCH-relative atmospheric request was needed for proper integration.

During the SIP process, and based on its CIMS request, the occultation was implemented as a rings only observation: no RSS IVD files, no limb-track maneuver, no RSS PDT design, and no Live Update. The missing limb track maneuver went unnoticed until August 14 when RSS was working on the detailed timeline for the occultation.

Reported By: Aseel Anabtawi

Date Required By:

Assignment. Note -- * denotes Foreign Person.

Assigned Element: IO-RSS

Multiple Teams: Yes

Estimated Hours to Complete:

Codes and Ratings

Location:

Initial Criticality Rating: 3 Negligible impact or threat to mission success

Priority: Medium

Suspected Cause: Other Cause

Mission Activity: Tour

Project Phase: Phase F – Extended Mission

Criticality Rating: 4 No risk or threat to mission success

Mission Phase Affected If Not Corrected: Tour

Software Type:

Analysis/Impacts

Analysis and Impacts: See attached file (Rev197_MissingLMB_Timeline_V1.pdf).

The RSS team understands that it was their responsibility to change the CIMS request name and request an LMB. The team believes that the misleading CIMS request was the main reason the missing LMB went unnoticed and blinded everyone in the follow up processes to the fact that the observations included an atmospheric occultation that needed an LMB. Also, the planning of the RSS experiments that were taking place in January and February (during Rev 197 Integration) directed the team's attention to more pressing immediate needs.

Impacts:

In the case of the Rev197 atmospheric occultation, the absence of a limb-track maneuver, usually incorporated within an LMB to allow for IVD pointing update shortly before the occultation, would have resulted in missing probing the troposphere of Saturn, a major scientific target of an RSS Saturn atmospheric occultation. Bending of the radio signal in the dense troposphere would have caused the X-Band uplink signal to quickly "walk out" of the narrow Cassini HGA beam after probing the top of the troposphere, hence cause loss of spacecraft transponder lock and consequently loss of the S/X/Ka-bands coherent downlink signals.

The spacecraft would have still transmitted 1-way downlink signals referenced to the auxiliary oscillator, but the X/Ka-band signals would have been quickly extinguished because the spacecraft would have been Earth pointed rather than tracking the appropriate region on Saturn's limb where the signals emerge in the Earth direction, hence are strongest. Coherent ionospheric and stratospheric data would have been collected (negligible ray bending), but valuable tropospheric data would have been lost, significantly degrading the experiment. Restoration of the limb-track and the LMB allowed a pointing design based on a recent NAV OD which ensured accurate tracking of the limb to capture bending angles up to 0.82 degrees over an observation period of about 2 hrs and 22 min, hence capturing valuable tropospheric data that will largely restore the scientific value of the Rev197 atmospheric occultation.

Analysis and Impacts - Actual Hours:

Section Last Modified By: [Aseel Anabtawi](#) 9/3/2013 5:15:26 PM

Corrective Action Taken

Corrective Action: For the S80 Rev 197 occultation experiment, the attached file (Rev197_CorrectiveAction.pdf) describes the actions that were taken to correct the problem and implement a limb-track maneuver.

The RSS team discussed the ISA during the team telecon on Friday, August 30th. The team will be taking the following steps to ensure that this does not happen again:

- An Integration checklist with the steps that are required for each type of observation to be integrated

correctly.

- Move the science team's detailed review of the observations earlier in the SIP process (before Port 1 files are due). The review will include the generation of the detailed RSS timeline, which was previously done a couple of weeks prior to experiment execution.
- The RSS SIP reps will be reviewing all the details of the CIMS request and not just using the request name and times as a guide during implementation.

Cause Codes:

Corrective Action

Actual Hours:

Section Last

Modified By: [Aseel Anabtawi](#) 9/3/2013 5:21:37 PM

Test/Verification

Test Verification:

Test & Verification

Actual Hours:

Test Results

Verification:

Section Last

Modified By:

Environment

Workstation Name:

Operating System:

Operating System

Version:

Flight SW Version:

Ground SW Version:

Subsystem Name:

Program Name:

Reproducible:

Related Documents

Related Documents: No Related Documents for Anomaly #54949

Command File Module -- To be filled out by the MOAM

Command File Error: No

Category:

Uplink Process Locations:

Error Causes:

Corrective Actions:

Error Description:

Proximate Cause:

Contributing Cause:

Root Cause:

Corrective Action:

Additional Codes and Ratings

Residual Risk: 3 Known Cause/Uncertainty in corrective action. Some known residual risk

Command Process Related: No

Lessons Learned Candidate: Yes

Flight Project Concurrence: Yes

Personnel Safety: No

Hardware Safety: No

Signatures

Signer	Role	Label	Required/Optional	Condition	Sign Date	Agreed	Comments
Nazilla Rouse	CONDITIONAL APPROVER	Mission Operations Assurance	Required	Required All ISAs			
Susan Linick	RESPONSIBLE EDITOR	Team Lead	Required				
Earl Maize	CONDITIONAL APPROVER	Project Manager	Optional	ISA Criticality 1			

[Personnel Change](#)

Attached Files

File Name	Upload Date
Rev197_MissingLMB_Timeline_V1.pdf	9/3/2013 4:42:07 PM
Rev197_CorrectiveAction.pdf	9/3/2013 4:42:07 PM

Issues & Summary

Issues:

Executive Summary:

CogE Closure Plan:

CogE Last Date 8/27/2013 6:49:03 AM

Modified on:

Change Log