

Summary of Team Response to Radiation Events

EXAMPLE #2: STRONG SOLAR ACTIVITY DECEMBER 2006

STRONG SOLAR ACTIVITY - NOTIFICATION EMAILS

From: <secproducts@noaa.gov>
To: <acidude@head.cfa.harvard.edu>
Subject: SUMMARY: X-Ray Event exceeded X1
Date: Tue, 5 Dec 2006 11:26:42 -0000

Space Weather Message Code: SUMX01
Serial Number: 61
Issue Time: 2006 Dec 05 1122 UTC

SUMMARY: X-ray Event exceeded X1
Begin Time: 2006 Dec 05 1025 UTC
Maximum Time: 2006 Dec 05 1035 UTC
End Time: 2006 Dec 05 1045 UTC
X-ray Class: X9.0
Optical Class: 2n
Location: S07E79
NOAA Scale: R3 - Strong

From: "SpaceWeather.com" <swlist@spaceweather.com>
To: "SpaceWeather.com" <swlist@spaceweather.com>
Subject: Major Solar Flare
Date: Tue, 05 Dec 2006 06:21:49 -0600

Space Weather News for Dec. 5, 2006
<http://spaceweather.com>

MAJOR SOLAR FLARE: Earth-orbiting satellites detected a powerful X-class solar flare this morning, Dec. 5th, at 10:35 Universal Time. The source: big, new sunspot 929, which is emerging over the Sun's eastern limb. Because of the sunspot's position near the limb, this flare was not Earth-directed. Future eruptions could be, however, because the Sun's spin is turning the spot toward Earth. Sunspot 929 will be visible for the next two weeks as it glides across the solar disk.

Please visit <http://spaceweather.com> for more information and updates.

From: <secproducts@noaa.gov>
To: <acidude@head.cfa.harvard.edu>
Subject: SUMMARY: X-Ray Event exceeded M5
Date: Wed, 6 Dec 2006 09:37:29 -0000

From: <secproducts@noaa.gov>
To: <acidude@head.cfa.harvard.edu>
Subject: SUMMARY: X-Ray Event exceeded X1
Date: Wed, 6 Dec 2006 19:10:32 -0000
Space Weather Message Code: SUMX01
Serial Number: 62
Issue Time: 2006 Dec 06 1907 UTC

SUMMARY: X-ray Event exceeded X1
Begin Time: 2006 Dec 06 1829 UTC
Maximum Time: 2006 Dec 06 1847 UTC
End Time: 2006 Dec 06 1900 UTC
X-ray Class: X6.3
Optical Class: 3b
Location: S05E61
NOAA Scale: R3 - Strong

From plucinsk@head.cfa.harvard.edu Wed Dec 6 10:42:09 2006
To: depasq@head.cfa.harvard.edu
cc: acidude@head.cfa.harvard.edu
Subject: radiation environment
Date: Wed, 06 Dec 2006 10:42:02 -0500
From: "Paul P. Plucinsky" <plucinsk@head.cfa.harvard.edu>

hi Joe,

So we have about 30 hr left in this orbit of all ACIS observations but we have two HETG observations in the mix. If I ignore the fact that the HETG reduce the flux of particles reaching the focal plane, the ACE P3 rate would have to average 18,500 for the remaining 30 hr to reach a fluence of 2e9 (please double check my calculations).

The rates are rising gradually now, but we should expect more impulsive, sharp rises as a result of the additional M class flares.

Paul

SCS 107 NOTIFICATION

Subject: SCS 107 run

Date: Wed, 6 Dec 2006 17:25:56 -0500

From: "Paul Viens" <pviens@occ-cfa.cfa.harvard.edu>

To: "sot_red_alert" <sot_red_alert@occ-cfa.cfa.harvard.edu>

Realtime telemetry indicates SCS107 has run due to elevated E1300 levels. **Telecon on x1159 now.**

From: DOSS - Monitoring and Trends Analysis <mta@head.cfa.harvard.edu>

Date: Wed, 6 Dec 2006 17:28:05 -0500 (EST)

Message-Id: <200612062228.kB6MS5xw015133@rhodes.cfa.harvard.edu>

To: operators@head.cfa.harvard.edu, sot_red_alert@head.cfa.harvard.edu

Subject: SCS107

Chandra realtime telemetry shows SCS107 DISA at 2006:340:22:27:21 UT

Current pass: 2006:340:2215 to 2315

Next passes: 2006:341:0225 to 0325

2006:341:1215 to 1315

2006:341:1725 to 1825

Snapshot:

<http://cxc.harvard.edu/cgi-gen/mta/Snap/snap.cgi>

This message sent to sot_red_alert

From: ACIS Monitor <acisdude@head.cfa.harvard.edu>

Date: Wed, 6 Dec 2006 17:30:04 -0500 (EST)

To: acisdude@head.cfa.harvard.edu

Subject: ACIS LIMIT TRIP!

ACIS ALERT During Current COMM Pass!

YELLOW_LO limit tripped 2 times!

MSID: **IDPICACU**

Last Violation Value: **0.42**

Current OBSID: 7410

Current Altitude / Direction: 128835 / A

Date and Time: Wed Dec 6 22:30:03 GMT 2006

Check <http://asc.harvard.edu/mta/RT/acis/www/acis-mean.html> for latest info.

Load Replans and Radiation Telecon Notification

From: majordomo Wed Dec 6 17:49:56 2006

Subject: maneuver only load tonight

Date: Wed, 6 Dec 2006 17:47:55 -0500

From: "Sabina Bucher" <sbucher@ipa.harvard.edu>

To: <replan_alerts@head.cfa.harvard.edu>

Due to the SCS 107 run, our current attitude is only good through 3 pm local tomorrow. The communications passes are such that we must have a maneuver only load approved by 7 am local tomorrow. We will put together that load tonight. We will hopefully have products ready within a few hours and will look for a fast turn around load review.

Sabina

From: majrdomo Wed Dec 6 17:50:57 2006
To: sot_red_alert@head.cfa.harvard.edu
Date: Wed, 06 Dec 2006 17:49:05 -0500
From: "Michael Juda" <juda@head.cfa.harvard.edu>

SCS-107 ran nominally at ~2006:340:16:16Z - probably due to E1300 combination of actual radiation and current-limit effect.

There will be an Earth attitude violation at 2006:341:20:06Z so a maneuver-only load is required. First uplink opportunity is 2006:341:12:15Z (7:15AM EST) so load will be work this evening.

Radiation indicators are still rising and we do not expect to try for a resumption of science until after the next perigee pass. Discussion of science resumption plan at tomorrow's 9AM tag-up 405-244-5060 1159#.

More Alerts!

From: DOSS - Monitoring and Trends Analysis <mta@head.cfa.harvard.edu>
Date: Thu, 7 Dec 2006 02:50:01 -0500 (EST)
To: 6172573986@mobile.mycingular.com, sot_yellow_alert@head.cfa.harvard.edu
Subject: **GOES Alert**

A Radiation violation of GOES 11 P5 (40-80 MeV) has occurred indicating a probable EPHIN P41GM trip.

Value: 0.72 p/cm2-s-sr-MeV

Limit: 0.71

From: DOSS - Monitoring and Trends Analysis <mta@head.cfa.harvard.edu>
Date: Thu, 7 Dec 2006 07:20:01 -0500 (EST)
To: sot_yellow_alert@head.cfa.harvard.edu
Subject: **ACE_p3_scaled**

A Radiation violation of P3 (130keV) scaled from P6 (761keV) has been observed by ACE
Observed = 1.2037e+08

(limit = fluence of 1.2e8 particles/cm2-ster-MeV within 2 hours)

see <http://cxc.harvard.edu/mta/ace.html>

This message sent to sot_yellow_alert

From: DOSS - Monitoring and Trends Analysis <mta@head.cfa.harvard.edu>
Date: Thu, 7 Dec 2006 14:25:02 -0500 (EST)
To: sot_yellow_alert@head.cfa.harvard.edu
Subject: **ACE_p3**

A Radiation violation of P3 (130Kev) has been observed by ACE

Observed = 3.6321e+08

(limit = fluence of 3.6e8 particles/cm2-ster-MeV within 2 hours)

see <http://cxc.harvard.edu/mta/ace.html>

This message sent to sot_yellow_alert

And the re-planning continues:

Subject: **next load review**
Date: Fri, 8 Dec 2006 17:56:44 -0500
From: "Sabina Bucher" <sbucher@ipa.harvard.edu>
To: <replan_alerts@head.cfa.harvard.edu>

DEC0906 products are a NO GO. We will continue to replan for a 344:01:00 resumption. Plan is to hold a load review at 10 am. Products will be out as soon as possible, but not likely within the next few hours.

Sabina

To: sot@head.cfa.harvard.edu, fot@head.cfa.harvard.edu
Subject: **Result of Science Resumption Go/No-go Telecon**
Date: Fri, 08 Dec 2006 18:08:35 -0500
From: "Michael Juda" <juda@head.cfa.harvard.edu>

At the current pass, 2006:342:22:45-23:45 UT, the radiation levels were too high to resume the science mission with the DEC0906A load. The E1300 level was ~70 (vs a threshold of 20) and the P4GM level was ~700 (threshold 300); P41GM was below threshold but not to the normally required 1/3 of threshold.

The overall radiation level as seen by ACE and GOES has been dropping slowly so there is a good change that we will be able to resume with the next re-plan which is planned to resume science at 2006:344:01:00.

To: sot_yellow_alert@head.cfa.harvard.edu
Subject: Science Go/No-Go Telecon
Date: Sat, 09 Dec 2006 14:09:18 -0500
From: "Michael Juda" <juda@head.cfa.harvard.edu>

There will be a science resumption Go/No-Go telecon this evening at:
7:30PM EST (6:30PM CST)
on:
405-244-5060 1159#.

At the start of the 1:55-2:55PM EST pass the E1300 flux was still slightly above its RADMON threshold; P4GM was only slightly below its threshold.

There will be a review of CAP 675 for enabling SCS-107 to be held in conjunction with the Go/No-Go telecon.

Thought we were "out of the woods":

Subject: scs107 RUN
Date: Sun, 10 Dec 2006 05:45:44 -0500
From: "fotcc" <fotcc@occ-cfa.cfa.harvard.edu>
To: "sot_red_alert" <sot_red_alert@occ-cfa.cfa.harvard.edu>

SCS 107 run. E1300 at 56.5. Telecon on 1165 immediately.

To: sot_yellow_alert@head.cfa.harvard.edu
Subject: SCS-107 telecon result
Date: Sun, 10 Dec 2006 06:44:33 -0500
From: "Michael Juda" <juda@head.cfa.harvard.edu>

SCS-107 ran at 2006:344:08:59, nearly four hours before the planned RADMON disable for rad-zone entry. At the 10:40 comm pass the E1300 level was ~60 (3 times threshold), presumably due to extremely enhanced rad-belts from the recent storm.
The next constraint violation is from the EPHIN thermal model at 2006:345:05:53:30; other constraint violations are days out. A maneuver only load to take EPHIN to a more favorable attitude is planned, with uplink by the 2006:345:03:45:00 pass.
The science schedule will be re-woked to pick-up sometime after rad-zone exit and with a 20ks pad on the first rad-zone entry. The remaining radzone entries will be unchanged.

More Alerts!!

From: <secproducts@noaa.gov>
To: <acisdude@head.cfa.harvard.edu>
Subject: SUMMARY: X-Ray Event exceeded X1
Date: Wed, 13 Dec 2006 03:36:48 -0000

Space Weather Message Code: SUMX01
Serial Number: 63
Issue Time: 2006 Dec 13 0333 UTC

SUMMARY: X-ray Event exceeded X1
Begin Time: 2006 Dec 13 0214 UTC
Maximum Time: 2006 Dec 13 0240 UTC
End Time: 2006 Dec 13 0257 UTC
X-ray Class: X3.4
Optical Class: 4b
Location: S05W23
NOAA Scale: R3 - Strong

From: DOSS - Monitoring and Trends Analysis <mta@head.cfa.harvard.edu>
Date: Tue, 12 Dec 2006 23:30:03 -0500 (EST)
To: 6172573986@mobile.mycingular.com, sot_yellow_alert@head.cfa.harvard.edu
Subject: GOES Alert

A Radiation violation of GOES 11 P5 (40-80 MeV) has occurred indicating a probable EPHIN P41GM trip.
Value: 0.81 p/cm2-s-sr-MeV
Limit: 0.71

From: "slodell@mycingular.com" <slodell@mycingular.com>
To: sot_yellow_alert@head.cfa.harvard.edu
Subject: X3 @2006:347:02:40
Date: Tue, 12 Dec 2006 22:32:13 -0600

In belts; RADMON enable @22:33.
Hard-p event, AR10930 geoeff.
P41 trip if enabled.
SWEPAM swamped.

From: DOSS - Monitoring and Trends Analysis <mta@head.cfa.harvard.edu>
Date: Wed, 13 Dec 2006 08:30:02 -0500 (EST)
To: sot_red_alert@head.cfa.harvard.edu
Subject: ACE_p3_scaled

A Radiation violation of P3 (130keV) scaled from P6 (761keV) has been observed by ACE
Observed = 1.2417e+08
(limit = fluence of 1.2e8 particles/cm2-ster-MeV within 2 hours)
see <http://cxc.harvard.edu/mta/ace.html>
This message sent to sot_red_alert

To: sot_red_alert@head.cfa.harvard.edu, sot_red_alert@ipa.harvard.edu
Subject: radiation telecon
Date: Wed, 13 Dec 2006 17:50:30 -0500
From: "Michael Juda" <juda@head.cfa.harvard.edu>

telecon now 405-244-5060 1165#

To: sot_red_alert@head.cfa.harvard.edu, sot_red_alert@ipa.harvard.edu
Subject: radiation telecon summary
Date: Wed, 13 Dec 2006 18:41:35 -0500
From: "Michael Juda" <juda@head.cfa.harvard.edu>

As anticipated SCS-107 ran at ~2006:347:22:44 UT due to E1300. The E1300 level was ~30 (vs a RADMON threshold of 20). P4GM was ~2/3 threshold and P41GM was ~1/3 threshold. SCS-107 ran nominally but ACIS BEP experience a re-boot due to missing a watchdog timer. The reboot caused the ACIS Flight software to revert to an earlier version (11). ACIS will diagnose the problem and present a plan for moving forward with ACIS operations. ACIS Flight S/W patches must be up uplinked to restore full, expected capability; however, it may be that the current planned observations do not use the missing capability. ACIS OPS will investigate the near-term need for the patches.

There is a replan load for an attempt to resume science at 2006:348:23:00:00.000UT, subject to the radiation environment and ACIS readiness. Review tomorrow at 11am EST

Comm at 2006:348:21:25 - 23:15 UT for possible uploading of ACIS patches and science loads. Acitivity contingent on ACIS diagnostics and radiation environment.

Next discussion of radiation (and ACIS state?) at tomorrow's 9am OPS tag-up.

From: DOSS - Monitoring and Trends Analysis <mta@head.cfa.harvard.edu>
Date: Thu, 14 Dec 2006 09:35:01 -0500 (EST)
To: sot_yellow_alert@head.cfa.harvard.edu
Subject: ACE_p3

A Radiation violation of P3 (130Kev) has been observed by ACE
Observed = 3.9296e+08
(limit = fluence of 3.6e8 particles/cm2-ster-MeV within 2 hours)
see <http://cxc.harvard.edu/mta/ace.html>
This message sent to sot_yellow_alert

Date: Thu, 14 Dec 2006 15:05:32 -0500
From: Tom Aldcroft <aldcroft@head.cfa.harvard.edu>
To: sot_yellow_alert@head.cfa.harvard.edu
Subject: Radiation go/no-go 4:25pm EST on 1165

The DEC1406A loads were approved so the radiation go/no-go telecon will be held at 4:25pm EST on 1165.

Date: Thu, 14 Dec 2006 17:13:10 -0500
From: Tom Aldcroft <aldcroft@head.cfa.harvard.edu>
To: sot_yellow_alert@head.cfa.harvard.edu, www@occweb.cfa.harvard.edu
Subject: **Radiation telecon summary**

Approval was given to uplink loads for the DEC1406A schedule.

The current EPHIN radiation levels are below about 1/3 of the RADMON trip limit, with E1300 and P41GM being well below and P4GM being right at the threshold but declining. The ACE P3 rate is at around 25000 and declining rapidly. The expected fluence in the remainder of this orbit will be acceptable.

One concern was the possibility of an SCS107 trip going into perigee due to puffed up radiation belts. Given the current schedule this leaves the spacecraft open to an Earth violation about 5 hours after RADMON disable at 349:19:19. A contingency to deal with this possibility (which includes adding a 1/2 hour comm pass at 349:23:00) will be developed.

Subject: RE: radiation telecon summary
Date: Thu, 14 Dec 2006 17:25:56 -0500
From: "Sabina Bucher" <sbucher@ipa.harvard.edu>
To: <sot_red_alert@head.cfa.harvard.edu>,
"sot_red_alert" <sot_red_alert@occ-cfa.cfa.harvard.edu>

X2 class flare just detected. Considering not sending DEC1406 loads. Radiation telecon now. 405-244-5060 x 1159.

Subject: Load review back on
Date: Thu, 14 Dec 2006 17:46:44 -0500
From: "Sabina Bucher" <sbucher@ipa.harvard.edu>
To: <replan_alerts@head.cfa.harvard.edu>

Due to the recently detected solar flare the DEC14 loads **were not uplinked.** We now need to review DEC15. Review at 6:30.

Finally GO for Science Resumption:

Subject: GO
Date: Fri, 15 Dec 2006 17:36:56 -0600
From: "O'Dell, Steve" <Steve.O'Dell@nasa.gov>
To: <sot_lead@head.cfa.harvard.edu>

As you know, there have been no new solar events and current radiation levels are all non-increasing and sufficiently low to restart science. Consequently, I don't plan to participate in tonight's telecon unless the space weather turns bad.

Subject: **Go for science resumption**
From: Tom Aldcroft <aldcroft@head.cfa.harvard.edu>
To: sot_yellow_alert@head.cfa.harvard.edu
Date: Fri, 15 Dec 2006 22:11:06 -0500

At the 10pm go/no-go telecon it was agreed that the radiation environment is well within limits to uplink the science portion of the DEC1506A loads. The first load segment will be uplinked at the 350:04:00 pass tonight.