Outline

• Satellite status
  • Overall status of Suzaku since the launch
• Operational status
  • Status of the tracking station
  • Conflict with other satellites
• Detector status
  • Summary of XIS/HXD status
• Observational status
  • Cycle 1 (AO1) and Cycle 2 (AO2) observations
Satellite status

Troubles in Attitude control system & Data recorder

- Safe hold (SH)
- Temporary countermeasure
- On-board software update

2005
- Launch
- SH
- DR trouble
- Attitude offset

2006
- Wrong Star ID in SAA
- SH
- Cycle-2 guest observations

2007
- On-board software update
- Processor for XIS0 segments CD stopped at 4:48 on Dec. 8, recovered at on Dec. 11
Satellite status

Troubles in Attitude control system & Data recorder

- On-board software update
- Temporal countermeasure
- Safe hold (SH)
- Operations of AOCS and DR were stable

Processor for XIS0 segments CD stopped at 4:48 on Dec. 8, recovered at on Dec. 11
Satellite status: Daily operations

Losses of satellite contacts

2005
Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec

2006
Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec

2007
Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec

Akari
Launch
Typhoon
Hinode
Kaguya

Losses of satellite contacts:
- Akari
- Typhoon
- Hinode
- Kaguya
- Wind troubles
- Thunder

Hardware troubles of the tracking station are much reduced in 2007.
Both the energy scale and resolution of HXD/PIN are monitored using the fluorescent lines from Gd.

Energy spectrum of a single PIN diode obtained with the coincident events of PIN and GSO.
Due to the radiation damage in the space environment, significant increase of the noise events is observed in the Si PIN diodes.

epoch1 : 2005.08.19 -- 2005.12.30  
epoch2 : 2006.01.04 -- 2006.05.31  
epoch3 : 2006.06.04 -- 2006.10.31  
epoch4 : 2006.11.02 -- 2007.03.31

The increase of the noise events is suppressed by reducing the bias voltage from 500V to 400V.
Some of the PMTs show significant decrease in gain due to the in-orbit radiation damage. Short-term variations due to the temperature fluctuations are also observed. The activation background of GSO scintillators has increased gradually (as expected before launch), but is close to saturation.
Long-term change of the CCD performance

Monitoring data of $^{55}$Fe

Performance is gradually degrading due to the radiation damage.

Gain

Normalized peak ch.

Energy resolution

-2%/yr

Normalized peak ch.

FWHM (eV)

Date

August 2005

October 2007

Time

-2%/yr
Spaced-row Charge Injection (SCI)

Injected charge will fill the traps to improve the charge transfer efficiency.

Sample image of XIS with SCI

Injected charge will not be read out in normal operation.
Effectiveness of the charge injection

Monitoring data of $^{55}$Fe

-0.4 or -0.8%/yr

-2%/yr

Spaced-row charge injection (SCI)
Anomaly of XIS2 on November 9, 2006

Large amount of charge suddenly started to leak in the imaging region. Cause is unknown; impact of micro-meteoroid is one of the possibilities.
Contamination on OBF

Suzaku/XIS contamination history, $N_c/N_0 = 6$ assumed, rev2.0

- XIS3
- XIS2
- XIS1
- XIS0

The original trends fit (CALDB 2006)
The trends fit (CALDB 2007-10-01 update).
OBF annealing test at Kyoto University

don August 28, 2007, by Mori, Tsuru, & Matsumoto

To TMP + RP
Penning gauge
Sample jig + Heater
+80°C
Rubber in IRU shock absorber

vent valve
candidate contamination material

Osaka Mini-chamber
Gate valve
Kyoto Mini-chamber

Viewport (φ 100)

-80°C
-40°C
Cold finger
Cold-trap box
TQCM
OBF
IWATANI CyroMini

OBF/TQCM mounting jig
Result (1)

- Deposition of DEHP: 162 µg/cm²

- 5 cycles between -40 and -15ºC

- OBF survived after the thermal cycles.

- However, evaporation rate of DEHP is very low at -15ºC.
Result (2)
Wrinkles in the OBF

Before the test

After the test

• Patterns of wrinkles have changed, in particular, near the OBF frame.
• Difference in the spatial frequencies of the wrinkles.
  ➔ A possibility: the glue on the frame dissolved in DEHP, and the OBF slipped between the two frame plates (??)
Recommendation from the XIS team

• The XIS baking should not be done, because of the following reasons.

(1) Origin and nature of the contamination are not well understood.
(2) Cause and their stress of the wrinkles developed during the thermal cycle are not understood.
(3) OBF temperature can be raised only up to -15°C. It is not clear whether the contamination can be removed quickly enough.
(4) It is not clear whether we can raise the OBF temperature safely.
(5) Contamination thickness of XIS3 is already saturated, and that of XIS1 is close to saturation. The transmission is about 30 % at Oxygen K line energy.
(6) We have already (effectively) lost XIS2. We need to avoid an operation with even a slight risk not to loose the sensor any more.
Data processing

• Version 1.x processing
  • Official data release for guest observers
  • May 30, 2006
  • HEAsoft 6.0.6 released on May 16, 2006

• Version 2.x processing
  • SCI mode of XIS
  • August 14, 2007
  • HEAsoft 6.3.1 on July 30, 2007
## AO-1 observations

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(1) after anomaly in XIS2, we increased the integration times of Priority-A targets by 25%
(2) Including 3 reserved ToO.
(3) Generic ToO

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<td>4700</td>
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<td>2852</td>
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</tbody>
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As of December 5, 2007

(1) Including 2 reserved ToO.
(2) Including 1 reserved ToO.
(3) Generic ToO
   Nova Vul  2007/11/4  Data is public
   GROJ1008-57 2007/11/30  Data processing in progress
   3C454.3  2007/12/5  Just observed
AO-3 proposals

- Japan (JAXA)
  - 146 proposals (2 LP), 22 Msec
    (AO-2: 135 proposals, 18Ms)
- US (NASA)
  - 120 proposals (9LP), 21 Msec
    (AO-2: 156 proposals, 26Msec)
- ESA
  - 30 proposals, 3Msec
    (AO-2: 39 proposals)
• Continue stable operations
• Continue to produce good scientific results