

# ***ADEN ALOS – PRISM CYCLIC REPORT***

## ***CYCLIC REPORT #31***

***28 OCTOBER 2009 TO 12 DECEMBER 2009***



This PRISM image has been taken on the 11<sup>th</sup> of June 2009 from frame 2825 on orbit 18006 over Setubal, Portugal.

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## PRISM CYCLIC REPORT # 31

### 1 INTRODUCTION

The PRISM Cyclic Report is distributed by the IDEAS PRISM team to keep the PRISM community informed of any modification regarding quality control, instrument performance, the data production chain and the results of calibration and validation campaigns at the end of each ALOS cycle, which represents 671 orbits, or 46 days.

The PRISM instrument is part of the Japanese JAXA ALOS mission and its products are received and processed via ESA's ADEN ground segment across Europe. This is done through an agreement between JAXA and ESA, where ALOS is classed as an ESA Third Party Mission, for which it is responsible for data reception and product dissemination across the European and African regions. A series of quality checks are undertaken in order to assess the ground segment, the instrument performance and the product quality

Checks are currently made on a weekly (header parameters, PDS status) or bi-monthly (visual report) basis to have a constant view on the mission status. The cyclic report presents the results of the analysis for the different part of the chain, from satellite to end-user product.

This document is available online at:  
<http://earth.esa.int/pcs/alos/prism/reports/cyclic/>

#### 1.1 *Acronyms and Abbreviations*

ADEN	ALOS Data European Node
ALOS	Advanced Land Observing Satellite
AVNIR-2	Advanced Visible and Near Infra-red Radiometer Type-2
CEOS	Committee on Earth Observation Satellites
DoM	Day of Mission
EO Help	Earth Observation Help Desk
GCP	Ground Control Points
IDEAS	Instrument Data quality Evaluation and Analysis Service
JAXA	Japan Aerospace Exploration Agency
OCM	Orbit Control Manoeuvre
PCS	Product Control Service
PDS	Payload Data Segment
PI	Principal Investigator
PRISM	Panchromatic Remote-sensing Instrument Stereo Mapping
QC	Quality Control
SPPA	Sensor Performance Products Algorithms
TOA	Top of Atmosphere
UT	Universal Time

## 1.2 Reference Documents

- RD.1 ALOS/AVNIR-2 Level 1 product format description Rev J - October, 2006 JAXA (NEB 00016)
- RD.2 Bouvet M., Goryl. P., Santer R., Chander G., Saunier S, Preliminary radiometric calibration assessment of ALOS AVNIR-2 IGARSS 2007 proceedings
- RD.3 Saunier S., Goryl. P and al., The contribution of ESA to the ALOS PRISM / AVNIR-2 commissioning phase, IGARSS 2007 proceedings.
- RD.4 Saunier S., Goryl P, Final calibration / Validation report: PRISM Instrument, Issue 1 Rev 0 – July 2007
- RD.5 JAXA, ALOS User Handbook, November, 03, 2007 (NDX 070015)
- RD.6 Gruen A., Kocaman S., Wolff K., 2007. Calibration and Validation of Early ALOS/PRISM Images. The Journal of the Japan Society of Photogrammetry and Remote Sensing, Vol 46, No. 1, pp. 24-38.
- RD.7 J Takaku, T Tadono And M Shimada, "High Resolution DSM Generation From ALOS PRISM Calibration Updates", Proc Of Igarss08, Boston, 2008.
- RD.8 Saunier S., Chander G., Goryl P. et al. Radiometric, Geometric and Image Quality Assessment of the ALOS AVNIR-2 and PRISM sensors. 2008
- RD.9 Saunier S., IDEAS Team, ALOS PRISM & AVNIR2 Data, ADEN Product Quality Status. 2008.  
[http://www.gael.fr/eoqc/alos\\_optical\\_mission/GAEL\\_PRES\\_003-ALOS-RHODES-QC.VF\\_exportable.pdf](http://www.gael.fr/eoqc/alos_optical_mission/GAEL_PRES_003-ALOS-RHODES-QC.VF_exportable.pdf)
- RD.10 Saunier S., IDEAS Team, PRISM in flight MTF assessment, 2008,  
[http://www.gael.fr/eoqc/alos\\_optical\\_mission/GAEL\\_PRES\\_004-ALOS-RHODES-MTF.pdf](http://www.gael.fr/eoqc/alos_optical_mission/GAEL_PRES_004-ALOS-RHODES-MTF.pdf)

## 1.3 Background information

The PRISM instrument is an optical instrument which forms part of the ALOS mission built by the Japan Aerospace eXploration Agency (JAXA).

The ALOS mission data is produced and disseminated through geographical nodes. The European node (ADEN) was set up and is operated by ESA through the Tromso, Matera, Mas Palomas and Frascati ground stations. As a third party mission (TPM), only the ground segment and data processing are dealt with by ESA, the platform being the responsibility of the owner: JAXA. Each node operates their ground segment independently and shares results with JAXA when required in the frame of the Calibration Validation Science Team (CVST).

The ADEN team is responsible for the operation and maintenance of the node that receives data acquired over Europe and North Africa. The ADEN team took part in the Calibration/Validation activities during the ALOS commissioning phase (January to October 2006). The methodologies used and results obtained are documented (RD.3 and RD.4) and made available to the user through the site:  
<http://earth.esa.int/object/index.cfm?fobjectid=3738>

As part of the ADEN operations, a series of quality checks are undertaken in order to assess the ground segment and instrument performance and the product quality for products requested by European users. Checks are currently made on a weekly basis (header parameters, PDS status) to have a constant view on the mission status.

## 2 SUMMARY

**Cyclic Report:** 31

**Cycle Start:** 28 October 2009

**Cycle End:** 12 December 2009

The main issues during the cycle have been as follows:

- **Processor Version**

Current PRISM processor version: 5.08

Version v5.08 has been validated and processors have been switched to the OPS 5.08 at three centers, December 9<sup>th</sup>: Esrin, Matera and Tromsø (Table 3-1). All the optical products generated after those times are generated with ALOS OPS 5.08.

- ALOS Core Processing Software v5.09 for AVNIR-2/PRISM (PRISM Pointing Alignment Parameter) was released on 2009, October 15<sup>th</sup> and validation activities have been initiated with this new version. This included an update to PRISM image abnormality and to the PRISM Pointing Alignment Parameter. See section 8 for details.

See **Section 3** for install dates of ADEN processors.



### 3 SOFTWARE & AUX FILE VERSION CONFIGURATION

Current Optical Processor Version	ESRIN	Matera	Tromso
5.08	09/12/2009	09/12/2009	09/12/2009

**Table 3-1 : PRISM Processing Versions**

A history of the ADEN optical processor release notes will be made available on the ALOS ADEN PCS website, location: <http://earth.esa.int/pcs/alos/prism/userinfo/>.

## 4 PDS STATUS

Please note; the major source of information for this document is the ALOS monthly report provided by JAXA. The monthly reporting timescale means that data concerning events conducted within this cycle may not be available at the time of writing. In this event, information will be included in the next cyclic report.

Instrument information provided by JAXA during the period 28 October 2009 to 12 December 2009 is reported in this document.

### 4.1 *Planned Instrument Unavailability*

For the periods described in Table 4-1, JAXA has announced planned instrument unavailability.

From (UT)		To (UT)		Reason
Date	Time	Date	Time	
Dec. 12, 2009	04:39:00.000000	Dec. 12, 2009	05:42:00.000000	OCM
Dec. 5, 2009	09:45:00.000000	Dec. 5, 2009	10:48:00.000000	OCM
Nov. 28, 2009	07:03:00.000000	Nov. 28, 2009	08:07:00.000000	OCM
Nov. 20, 2009	18:06:00.000000	Nov. 20, 2009	19:10:00.000000	OCM
Nov. 13, 2009	20:08:00.000000	Nov. 13, 2009	21:11:00.000000	OCM
Nov. 6, 2009	20:19:00.000000	Nov. 6, 2009	21:22:00.000000	OCM
Oct. 31, 2009	03:29:00.000000	Oct. 31, 2009	04:33:00.000000	OCM

Table 4-1 : Planned instrument unavailability

### 4.2 *Unplanned Instrument Unavailability*

For the periods described in Table 4-2, JAXA announced unplanned instrument unavailability.

From (UT)		To (UT)		Reason
Date	Time	Date	Time	
None				

Table 4-2 : Unplanned instrument unavailability

### 4.3 *Current Platform Status*

Information on the platform provided by JAXA:

Current platform status: **Normal**

#### 4.4 **Upcoming Instrument Unavailability**

For the periods described in Table 4-3, JAXA has announced planned instrument unavailability.

From (UT)		To (UT)		Reason
Date	Time	Date	Time	
None				

Table 4-3 : Upcoming instrument unavailability

#### 4.5 **ADEN PDS Unavailability**

None reported during this cycle.

#### 4.6 **Periods of missing precision orbit data**

For the periods described in Table 4-4 **Error! Reference source not found.**, JAXA has announced that precision orbit data is missing.

From (UT)		To (UT)		Reason
Date	Time	Date	Time	
Dec. 12, 2009	04:39:00.000000	Dec. 12, 2009	05:42:00.000000	Due to orbit manoeuvring
Dec. 5, 2009	09:45:00.000000	Dec. 5, 2009	10:48:00.000000	Due to orbit manoeuvring
Nov. 28, 2009	07:03:00.000000	Nov. 28, 2009	08:07:00.000000	Due to orbit manoeuvring
Nov. 20, 2009	18:06:00.000000	Nov. 20, 2009	19:10:00.000000	Due to orbit manoeuvring
Nov. 13, 2009	20:08:00.000000	Nov. 13, 2009	21:11:00.000000	Due to orbit manoeuvring
Nov. 6, 2009	20:19:00.000000	Nov. 6, 2009	21:22:00.000000	Due to orbit manoeuvring
Oct. 31, 2009	03:29:00.000000	Oct. 31, 2009	04:33:00.000000	Due to orbit manoeuvring

Table 4-4 : Missing Precision Orbit Data

## 4.7 *Periods of missing precision attitude data*

For the periods described in Table 4-5, JAXA has announced that precision attitude data is missing.

From (UT)		To (UT)		Reason
Date	Time	Date	Time	
None				

Table 4-5: Missing Precision Attitude Data

## 4.8 *Periods lacking Yaw steering*

For the periods described in Table 4-6, JAXA has announced that Yaw steering was not available.

From (UT)		To (UT)		Reason
Date	Time	Date	Time	
None				

Table 4-6 : No Yaw steering

## 4.9 *JAXA Observation Strategy*

The JAXA observation strategy can be found at:  
<http://www.eorc.jaxa.jp/ALOS/en/obs/overview.htm>

## 4.10 *Artefact repositories*

A number of image artefacts are not due to instrument or processing chain malfunctions. These are fully documented in the following JAXA web pages.

<http://www.eorc.jaxa.jp/en/about/distribution/info/alos/characteristics.html>

## 5 DATA QUALITY CONTROL

The following sections in this Cyclic Report do not contain inputs from the ALOS SPPA scientific experts.

### 5.1 *Instrument Related Anomalies*

No reported anomalies this cycle.

### 5.2 *Processor Related Anomalies*

No reported anomalies this cycle.

### 5.3 *Daily Report Issues*

During the past cycle, daily checks have been undertaken on all PRISM products generated by ADEN, although these are reported on a weekly basis due to current data volumes.

Browse products for all optical images are visually inspected and reported on in each daily report.

271 products have been examined during the course of this cycle, and only one issue has been highlighted by these checks.

### 5.4 *Visual Inspection Report Issues*

This section reports on anomalies detected in PRISM products as a result of detailed visual inspections by the IDEAS PRISM Team.

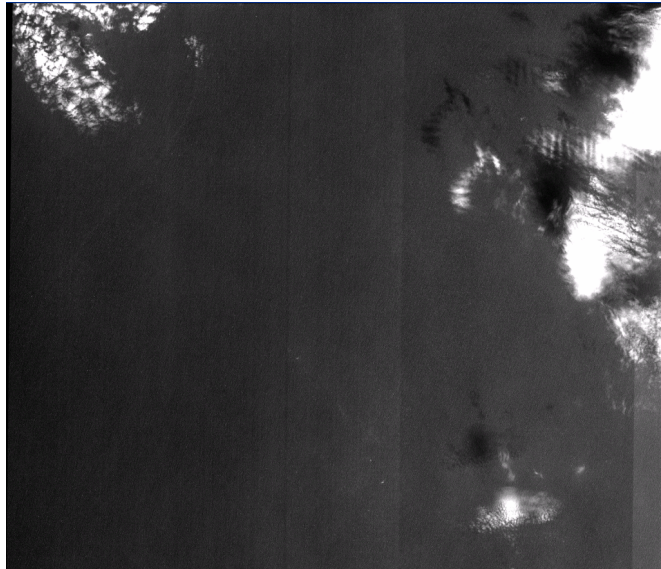
#### 5.4.1 JPEG COMPRESSION

- We continue to observe JPEG compression artefacts, which are expected as a result of PRISM processing.
  - Only a limited number of products (3%) have been distributed with compression mode 2 (1/9 compression ratio), consequently the observations of JPEG artefacts are primarily in compression mode 1 (1/4.5 compression ratio) data.
  - These effects are observed in all three views although not at the same location within the images of each view.

#### 5.4.2 CCD BOUNDARIES

- CCD Boundaries continue to be observed in 1B2 products, an example of which is given in Figure 5-1. This image is taken from the level 1B2R product from

frame 2725 of orbit 6015 in the Forward view. Here the boundaries between CCD4, CCD5 and CCD6 are clearly visible.



**Figure 5-1 - Intercamera boundaries can be observed**

- These effects are also observed in 1B2G products and in the Nadir and Backward views. It is understood that this is because the equalization between CCDs has not been performed as expected. This anomaly continues to be routinely observed.
- The geometry of the image is preserved and there is no shift between CCDs.



**Figure 5-2 – Browse image from ALPSMF060152670-01B2R\_UF**

- Figure 5-2 illustrates an example of a 1B2 product without visible CCD boundaries. This image is from the level 1B2R product from frame 2670 of orbit 6015 in the Forward view.

## **5.5 User Information**

A PRISM FAQ containing common user requests can be found on the ESA PCS website.

An updated version of this document will be issued shortly.

The most recent version of this document can be found at:  
<http://earth.esa.int/pcs/alos/prism/userinfo/>

## 6 CALIBRATION/VALIDATION ACTIVITIES & RESULTS

One paper has been written by Jaxa calibration team ([http://www.eorc.jaxa.jp/en/hatoyama/satellite/data\\_tekyo\\_setsumeialos\\_hyouka\\_e.html](http://www.eorc.jaxa.jp/en/hatoyama/satellite/data_tekyo_setsumeialos_hyouka_e.html)). The reference is;

- T. Tadono, M. Shimada, H. Murakami, and J. Takaku, "Calibration of PRISM and AVNIR-2 Onboard ALOS "Daichi"," IEEE Trans. Geoscience and Remote Sensing, Vol. 47, No. 12, Dec. 2009, in press.

The geometric and radiometric calibration accuracy have been assessed from observation date from Jun. 22, 2007 to Jun. 4, 2009

- Geometric calibration
  1. Absolute accuracy

	Pixel direction (cross track)	Line direction (along track)	Distance	No of GCPs	No of Scenes
Nadir view (RMS)	5.6 m	5.3 m	7.8 m	5,499	586
Forward view (RMS)	4.9 m	6.1 m	7.8 m	1,771	225
Backward view (RMS)	5.0 m	7.1 m	8.7 m	4,839	525

- Measurements: Statistical evaluation of the worldwide ground control points (GCPs) and calculation of the root mean square (RMS) of the distance between the position of GCPs, that were identified in the each PRISM image and obtained from the coordination conversion formula, and their true location on the GRS 80 that were calculated from the GCPs true measurement by GPS and the PRISM observation geometry.

- For reference: CE90  
Nadir view: 11.8 m, Forward view: 12.4 m, Backward view: 13.4 m

### 2. Relative accuracy (three radiometers)

	Pixel direction	Line direction	Distance
Std. dev. in a scene(1 $\sigma$ )	1.4 m	1.8 m	2.4 m



- Measurements: Averaged value of standard deviation of geometric errors in a scene in evaluating absolute accuracy.

- Radiometric calibration accuracy

1. Absolute accuracy (Nadir-looking radiometer)

Similar to that of AVNIR-2 (better than 3%, RMS)

- Measurements: Compared with calibrated AVNIR-2 as cross calibration over deserts, salt lakes, ocean etc.

2. Relative Accuracy (three radiometers)

Better than 0.4 % (better than 1DN) (RMS)

## 7 DISCLAIMERS

- One new disclaimer has been issued during this cycle, focusing on limitation in ALOS product provision.

**Limitation in Product Provision (ALOS precision orbit data unavailable)**

Product provision will be suspended when you order the product with "ALOS precision orbit data only" despite the data is not available.

The data is not available when the data cannot be obtained due to orbit maneuverings in order to maintain proper satellite's trajectory.

Please order products with "most available precise data" to avert this limitation. The scenes (the time of observation) without precision orbit data can be seen "Notice of Lacking ALOS Precision Orbit Data".

- A list of known product errors caused by image processing algorithm errors is listed on the JAXA site at:

[http://www.eorc.jaxa.jp/en/hatoyama/satellite/data\\_tekyo\\_setsumei/alos\\_renra\\_ku\\_e.html](http://www.eorc.jaxa.jp/en/hatoyama/satellite/data_tekyo_setsumei/alos_renra_ku_e.html)

## 8 EVENTS

The following section details events that may be of interest to ALOS data users.

- Result files and statistics of second stage of ALOS simulation #16 (Cycle 32 – 35) have been released on November 9th.
- Adoption/Rejection Information of Sim#16 Last Updated: November 17, 2009
- ALOS simulation #17(cycle 34 - 37) will be conducted in January 2010. Please develop and submit your request files before the due date below.
  - Otherwise, no change is made other than two exceptions as follows:  
<Cycle 35>  
A11 of AVNIR-2 deleted from Sim#16.  
C2 of PRISM changed from OB1 into OB2 from Sim#15.
- A publication from the JAXA team concerning the PRISM calibration is foreseen on IEEE in December 2009.

### 8.1 Past Events:

- ALOS Core Processing Software v5.08 for AVNIR-2/PRISM (PRISM Pointing Alignment Parameter) was released on December 09th. V5.08 includes an update to the PRISM Pointing Alignment Parameter in comparison to v5.04, the previous ALOS Core processing.
- ALOS Symposium:

Nov. 9 - 13, 2009: 3rd Joint PI symposium of ALOS Data Nodes for ALOS Science Program in Kona, Hawaii, US.

Details are available on site: [http://www.asf.alaska.edu/pi\\_symp/](http://www.asf.alaska.edu/pi_symp/)

Presentations in session dedicated to Calibration/Validation (November 9th 2009) context:

- Image Quality Evaluation on PRISM and AVNIR-2, Latest Evaluation Results, Akira Mukaida, Naritoshi Imoto, Sachi Kawamoto, Takeo Tadono
- PRISM Geometric Calibration Updates and DSM, Generation Status, Junichi Takaku, Takeo Tadono
- RPC Generations on PRISM/AVNIR-2 Level 1B2 Images, Junichi Takaku, Takeo Tadono
- The ALOS PRISM AVNIR-2 Quality Control at ADEN, a Status After 3 years of Operation, Sebastien Saunier, A. Mambimba, V. Motti
- Assessment of DEM Extraction Joanna Tan, M.Z Mat Jafri, H.S. Lim, K. Abdullah

- Time Trend Evaluations of Absolute Accuracies for PRISM and AVNIR-2, Takeo Tadono, Masanobu Shimada, Hiroshi Murakami, Junichi Takaku, Sachi Kawamoto
- ALOS simulation#15 (Cycle 31 – 40): Result files are available since Sep. 14th.
- ALOS Core Processing Software v5.09 for AVNIR-2/PRISM (PRISM Pointing Alignment Parameter) was released on October 15<sup>th</sup>.  
Modified Items:
  - (1) Update of Processing Software
    - PRISM image abnormality appeared in GeoCoded images of ascending passes are resolved. [*Ver\_PSM\_SW\_Resamp(6.41)*]
  - (2) Update of Correction Parameter
    - PRISM Pointing Alignment parameter file (Update version of September30, 2009) (for PRISM) [*Ver\_PSM\_PR\_AlignmentParameter(6.44)*]
  - (3) Update of DEM data directory
    - None
- Submission of the request files for the first stage simulation #15 (Cycle 31 – 40) was due to the end of August
- ALOS Core Processing Software v5.08 for AVNIR-2/PRISM (PRISM Pointing Alignment Parameter) was released on August 12<sup>th</sup>.
- Submission of request files for the first stage of simulation #15 (Cycle 30 – 33) was due towards the end of June.
- The simulation #15 is given because #14 is assigned to ALOS Long-term Full Simulation Cycle31–70
- Result files and statistics of second stage simulation #13 were released on May 22<sup>nd</sup>. Analysis report was released on May 28<sup>th</sup>
- The results of first stage simulation #13 were available from April 6<sup>th</sup>
- Submission of request files for the first stage simulation#13 (Cycle28 - 31) was due on March 12<sup>th</sup>
- ALOS Core Processing Software PRISM/AVNIR-2 Version 5.05 (PRISM Pointing Alignment Parameter) was released on Feb. 6th
- ADN-15 meeting was held on Feb. 24<sup>th</sup> and 25<sup>th</sup> in Tokyo
- The result files and statistics for the second stage simulation#12 were released

on Feb. 13th.

- Analysis Report and Adoption/Rejection Information for simulation#12 was released on Feb. 20th.
- The submission of request files for the second stage simulation#12 is due on Jan. 19<sup>th</sup>.
- 11th Science Team meeting for ALOS Kyoto and Carbon Initiative, January 13 - 16, 2009 (Tue. - Fri.), JAXA.  
[http://www.eorc.jaxa.jp/ALOS/kyoto/jan2009\\_kc11/kyoto\\_meeting\\_2009jan.htm](http://www.eorc.jaxa.jp/ALOS/kyoto/jan2009_kc11/kyoto_meeting_2009jan.htm)
- The result files of first stage simulation#12 will be available on Jan. 3<sup>rd</sup>
- ALOS Core Processing Software (Version 5.03 for PALSAR and Version 5.04 for PRISM/AVNIR-2) was provided Dec. 19<sup>th</sup>.
- Result files and statistics for simulation#11 were released on Nov. 21<sup>st</sup>
- Analysis Report and Adoption/Rejection Information for simulation#11 were released on Nov. 29<sup>th</sup>.
- The submission of request files for the first stage of simulation#12 was due Dec. 16<sup>th</sup>.
- The second ALOS PI Symposium took place from the 3<sup>rd</sup> to the 7<sup>th</sup> of November in Rhodes, Greece.
- Results of first stage simulation#11 made available on Oct. 15<sup>th</sup>.
- The submission of request files for the second stage simulation#11 was due on Oct. 28<sup>th</sup>.
- Analysis report and Adoption/Rejection information of simulation#10 were released by JAXA on 21/08/2008.
- The due date of Observation/Acquisition request files for ALOS simulation 11 was 25/09/2008. This simulation covers the period 10/12/2008 to 11/06/2008.
- ADN-14 meeting was held at ASF from Sep. 9<sup>th</sup> to 11<sup>th</sup>
- Analysis report and Adoption/Rejection information of simulation#10 were released by JAXA on 21/08/2008.
- The submission of request files for ALOS simulation number 10 was due by 20<sup>th</sup> of June.

- The submission of request files for ALOS simulation number 9 was due by March 21, 2008
- The ALOS PCS Site is now available at: <http://earth.esa.int/pcs/alos/>
- ALOS simulation #8 for Cycle 18-21
  - The results of the second stage simulation were made available by JAXA on Feb.4<sup>th</sup>.
  - The Analysis Report on ALOS simulation #8 was delivered by JAXA on Feb.12<sup>th</sup>.
- 29 January 2008: Users are now able to submit orders for ALOS future acquisitions via EOLI-SA (email [eohelp@esa.int](mailto:eohelp@esa.int) for more information)

## APPENDIX A                      INSTRUMENT ANOMALIES

Below is a list of ALOS anomalies that may have an impact on image quality, radiometric calibration or localisation accuracy (from 24th October 2006).

- Orbit manoeuvres conducted on 5 and 12 December 2009
  
- Orbit manoeuvres conducted on 6, 13, 20, 28 November 2009
  
- Orbit manoeuvres conducted on 31 October 2009
  
- Orbit manoeuvres conducted on 2<sup>nd</sup>, 9 and 17 October 2009
  
- Orbit manoeuvres conducted on 25<sup>th</sup> September 2009
  
- Orbit manoeuvres conducted on 14<sup>th</sup> and 28<sup>th</sup> August 2009
  
- Orbit manoeuvres conducted on 20<sup>th</sup> June, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 13<sup>th</sup> July 2009
  
- Orbit manoeuvre conducted on 16<sup>th</sup> May 2009
  
- Orbit manoeuvres conducted on 13<sup>th</sup> and 28<sup>th</sup> March 2009
  
- Orbit manoeuvres conducted on 14<sup>th</sup> February 2009
  
- Orbit manoeuvres conducted on 3<sup>rd</sup>, 10<sup>th</sup>, 16<sup>th</sup> and 30<sup>th</sup> of January 2009
  
- Orbit manoeuvres conducted on 15<sup>th</sup>, 29<sup>th</sup> November 2008
  
- Orbit manoeuvres conducted on 11<sup>th</sup>, 18<sup>th</sup>, 24<sup>th</sup> October 2008
  
- Orbit manoeuvres conducted on 12<sup>th</sup>, 26<sup>th</sup> September 2008
  
- Orbit manoeuvres conducted on 5<sup>th</sup>, 8<sup>th</sup> August 2008
  
- Orbit manoeuvres conducted from 2<sup>nd</sup> August 2008 14:27 – 3<sup>rd</sup> August 2008 06:05
  
- Inclination and related in plane orbit manoeuvres conducted from 29<sup>th</sup> July 22:26 – 31<sup>st</sup> July 05:42
  
- Orbit manoeuvres conducted on 19<sup>th</sup> July 2008,
  
- LSSR acquisition failure 11<sup>th</sup> June 2008,
  
- Orbit manoeuvres conducted on 19<sup>th</sup> July 2008,

- Orbit manoeuvres conducted on 11<sup>th</sup>, 14<sup>th</sup>, 17<sup>th</sup>, 20<sup>th</sup>, 23<sup>rd</sup> June 2008,
- Calibration operations for Star Tracker conducted on 11<sup>th</sup> and 13<sup>th</sup> of May 2008,
- Orbit manoeuvres conducted on 16<sup>th</sup> May 2008,
- Orbit manoeuvres conducted on 26<sup>th</sup> April 2008,
- Orbit manoeuvres conducted on 4<sup>th</sup> April 2008.
  
- Orbit manoeuvres conducted on 26<sup>th</sup> January and 2<sup>nd</sup>, 15<sup>th</sup>, 29<sup>th</sup> February 2008.
  
- YAW steering was suspended on 28<sup>th</sup> January 2008
  
- Orbit manoeuvres conducted on 15<sup>th</sup> December 2007, 4<sup>th</sup>, 11<sup>th</sup> & 18<sup>th</sup> January 2008.
  
- Observation, yaw steering, and precision attitude system suspended on 31st October 2006 between 03:50 and 15:50 UT due to change AOCS on-board orbit model to that of 15th order.
  
- Yaw steering suspended during 23rd February 00:12 UT to 24th February 2007 23:01 UT (yaw steering suspended due to calibrating operations for Star Tracker (STT) and Precision Attitude Determination).
  
- Yaw steering suspended during 22nd March 00:24 UT to 23rd March 2007 23:17 UT (yaw steering suspended due to calibrating operations for Star Tracker (STT) and Precision Attitude Determination).
  
- Yaw steering on/off switching on 10th April 2007:  
Yaw steering on to off: 12:57 – 13:22 UT (data unavailable)  
No yaw steering operation: 13:22 – 14:42 UT (data available)  
Yaw steering off to on: 14:42 – 15:45 UT (data unavailable)
  
- Orbit manoeuvres on 25th, 27th and 29th April 2007.
  
- Orbit manoeuvres on 8th and 22nd June 2007.
  
- Orbit manoeuvres conducted on 7th and 20th July 2007.
  
- Yaw steering on/off switching on 31st July 2007:  
Switching in progress: 00:00 – 00:30, 21:57 – 22:46 UT (Observation suspended)  
No yaw steering observation: 00:30 – 21:57UT (Data available)
  
- Orbit manoeuvres conducted on 3rd and 25th August 2007.



- Orbit manoeuvres conducted on 6th, 12th and 26th October 2007.
- Orbit manoeuvres conducted on 10th and 23rd November 2007.
- Orbit manoeuvres conducted on 7th and 15th December 2007.
- Orbit manoeuvres conducted on 4th, 11th, 18th and 26th January 2008.
- Orbit manoeuvres conducted on 2nd, 15th and 29th February 2008.
- Orbit manoeuvres conducted on 8th March 2008.

## APPENDIX B            PROCESSOR UPDATE SUMMARY

**Upgrade Version:** 5.08

**Previous Version:** 5.04

**Modifications:**

- Update of Processing Software
  - PRISM image abnormality appeared in GeoCoded images of ascending passes are resolved
    - [Ver\_PSM\_SW\_Resamp(6.41)]
- Update of Correction Parameter
  - PRISM Pointing Alignment parameter file (Update version of September30, 2009) (for PRISM)
    - Ver PSM PR AligmentParameter(6.44)]
- Update of DEM data directory
  - None

**Comments:**

None