

**PALSAR cal/val – report from  
CVST meeting \b0(M. Shimada,  
JAXA)**

Masanobu Shimada  
June 23 2008

CVST7 discussions, June 19 2008

General: Calibration and validation of the PALSAR data has been discussed. 2 JAXA + 10 PI presentations covering the Polarimetry (POLCAL), SCANSAR, ocean, faraday rotation, image quality, range ambiguity, soil moisture, etc. Several method of POLCAL was proposed. JAXA PALSAR products were accepted by the CVST members for accuracy and quality in general. SCANSAR data is requested to be improved (one dB difference between near and far range).

Calibration Activities:

Will you maintain the CR in this year? ALOS tends to use resources for application more.

Zakharov, Kimura, Fukuchi, Ridha(?)

Calibration update:

Polarimetry

- 1) Trial of new distortion factors setting zero for cross talk.(Ridha, Moriyama,Shimada)(July 2006) , data (Amazon+Ocean data, Tokyo of Oct 21 2006)
- 2) hv and vh are different. Checking the discrepancy of hv+vh in Amazon and ocean by JAXA, Further analysis by ESA and Isoguchi,
- 3) Consider the distribution of the noise data to ridha
- 4) Utilization of the CR data (Rio Branco (2.5 m), Tomakomai(Japan 3m), Sweden(5m). AIST)

SCANSAR:

Antenna pattern and processor update: next version (July TBD)

Quality check using Amazon and Congo (20 scenes), two different sites 1.0 to JAXA.

FBD calibration: To be discussed between Kostas, Ridha, Shane, Shimada.

Requirements : conversion coefficients between Slant range <-> ground range,  
Inclusion of the raw data statistics (not the averaged values)

Submission to: ALOS special issue due by Nov. 30 2008.

Submission to ALOS PI meeting at Greece Rhode island due by June 20+7.

Future meeting : To be fixed. ~1/year)



**ALOS Kyoto & Carbon Initiative**  
**10<sup>th</sup> Science Team meeting**  
**RESTEC HQ, Tokyo**

**MONDAY, June 23, 2008**

9:30 – 12:30 **ALOS K&C Theme Coordinator Meeting**  
(Bruce Chapman, Laura Hess, John Lowry,  
Richard Lucas, Ake Rosenqvist)

**ALOS K&C 10<sup>th</sup> Science Team meeting**

- 13:15 Welcome**
- 13:20 K&C project issues** (A. Rosenqvist, JRC)  
• (Project news, Science plan revision, Reporting & timelines, Extension)
- 13:40 Observation strategy update** (Emi Aoki/Fumi Ohgushi, RESTEC)
- 14:00 PALSAR cal/val – report from CVST meeting** (M. Shimada, JAXA)
- 14:20 EORC strip data processing status and schedule** (D. Sango, RESTEC)
- 14:30 K&C data dissemination and user interface** (A. Mukaida, RESTEC)
- 14:45 Coffee**
- 15:00 K&C mosaic generation schedule**  
• B. Chapman (JPL)  
• T. Otaki (RESTEC)  
• F. De Grandi, JRC (by Ake Rosenqvist)
- 16:00 Work Session – Data issues** (all)  
• (Strip data geometry and radiometry, ScanSAR issues, Reprocessing, Other)
- ~ 17:30 Adjourn**

## Contents of talk

1. PALSAR STATUS
2. Raw data stability
3. Point target evaluations
  - 1) Radiometry
  - 2) Geometry
  - 3) Site dependent cal factors
4. Interference evaluation and filter update
5. FBD antenna pattern update
6. SCANSAR evaluation and improvement
7. DEM evaluation



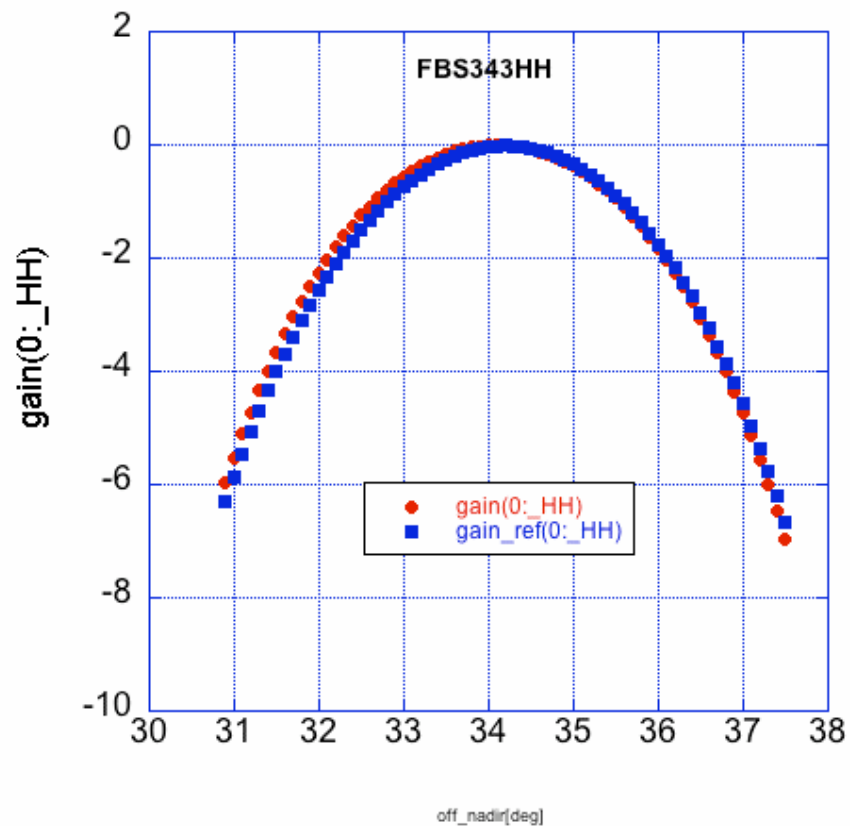
# Antenna Pattern Update

Mode: FBD343

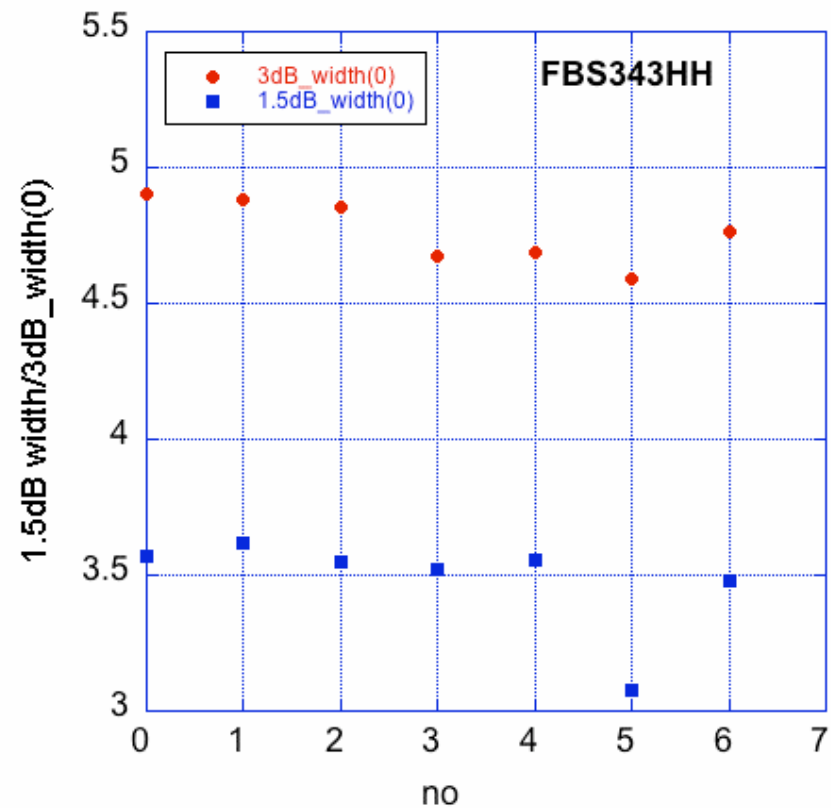
Pol: HH+HV: Status not evaluated yet

Data : Amazon forest

0	/Volumes/home7/PALSAR/FBD343/20070808_72_7070	Rio
1	/Volumes/home7/PALSAR/FBD343/20070808_72_7080	Rio
2	/Volumes/home7/PALSAR/FBD343/20070808_72_7090	Rio
3	/Volumes/home7/PALSAR/FBD343/20070825_73_7060	Rio
4	/Volumes/home7/PALSAR/FBD343/20070825_73_7070	Rio
5	/Volumes/home7/PALSAR/FBD343/20070825_73_7080	Rio
6	/Volumes/home7/PALSAR/FBD343/20070825_73_7090	Rio
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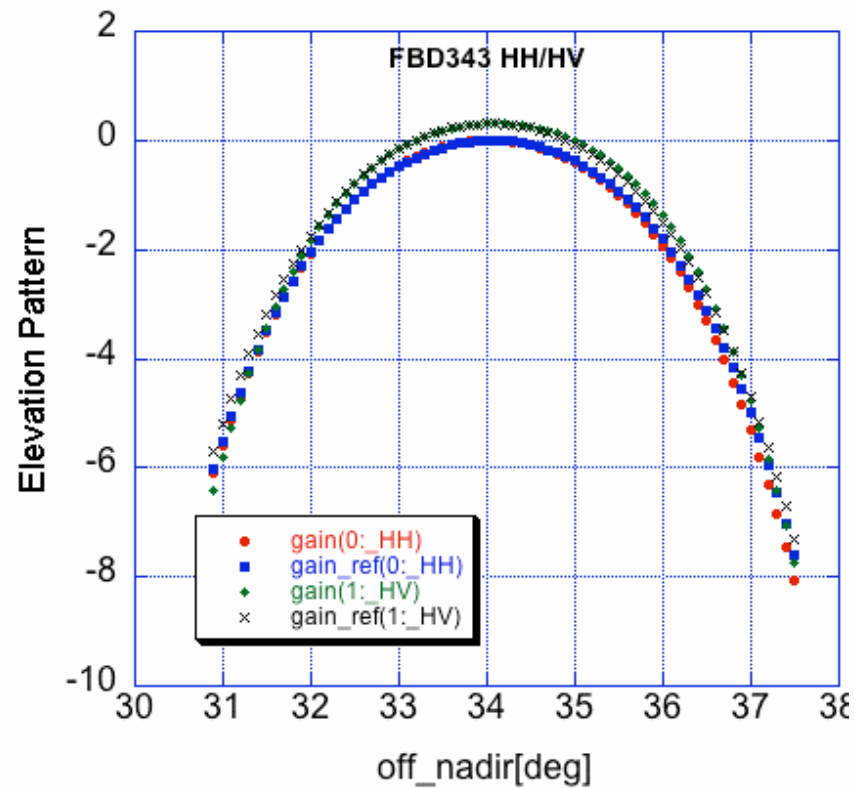


Antenna elevation pattern

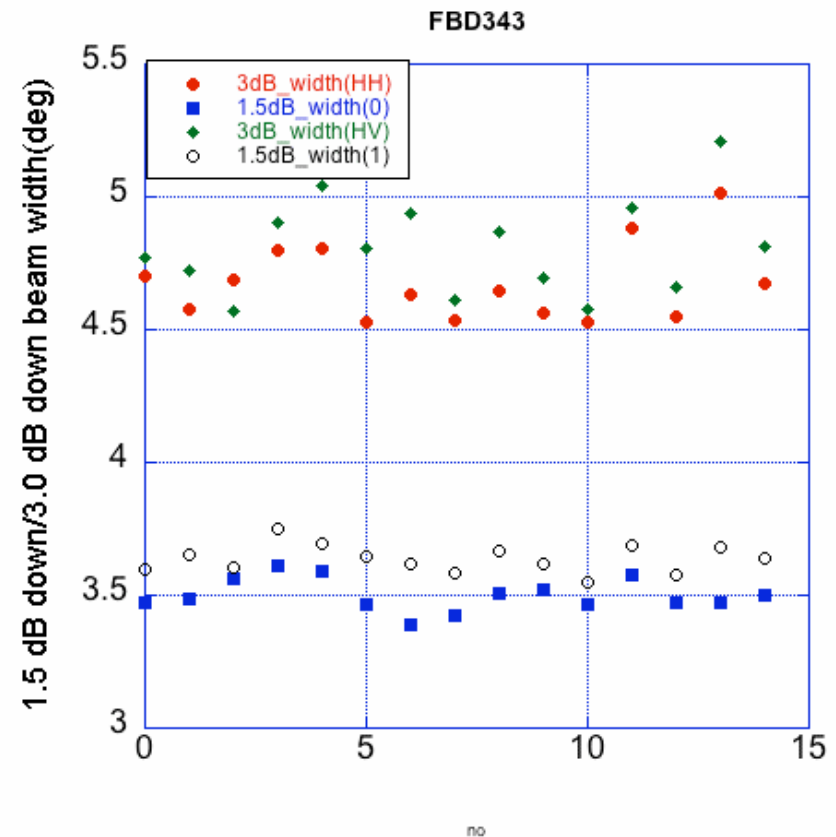


Antenna beam width

FBS343HH as of June 25 2006



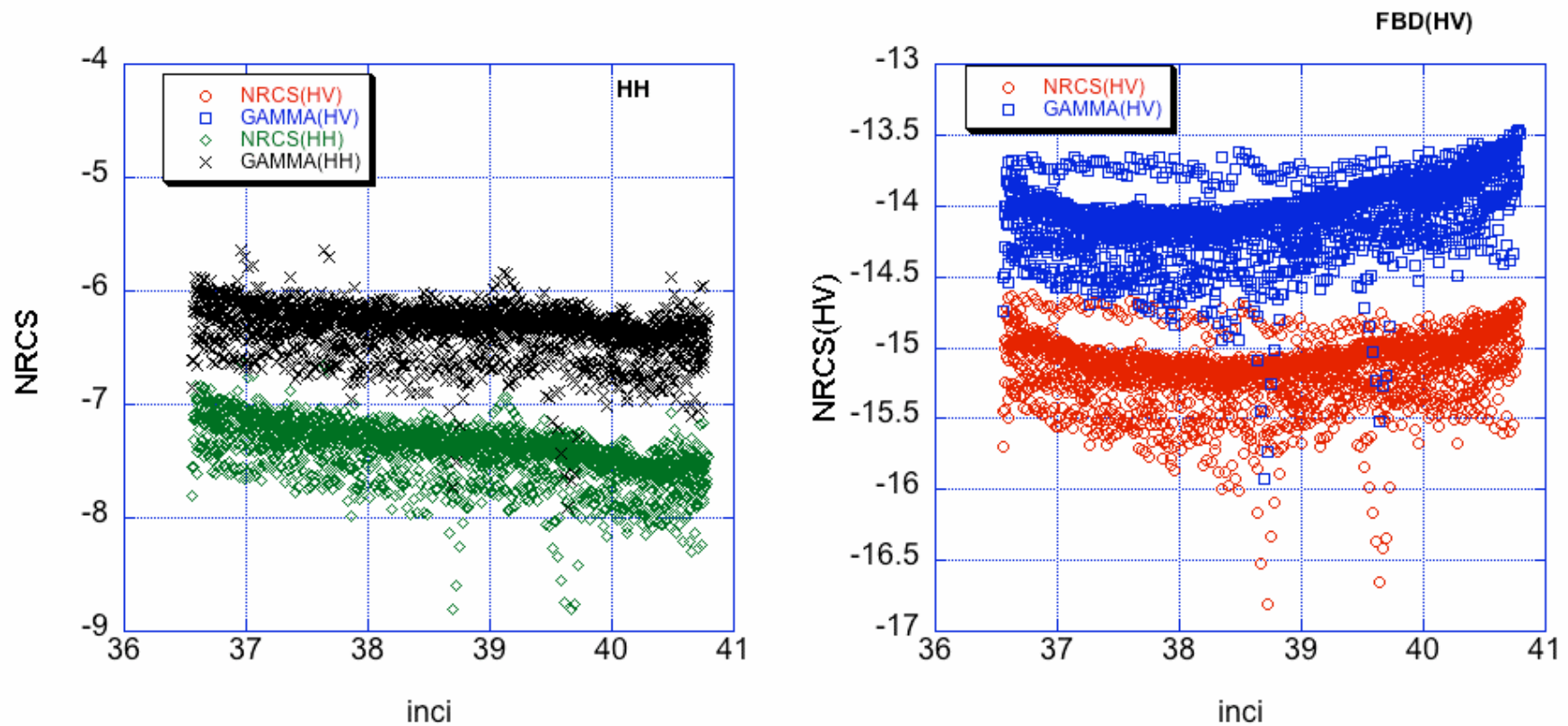
Antenna elevation pattern



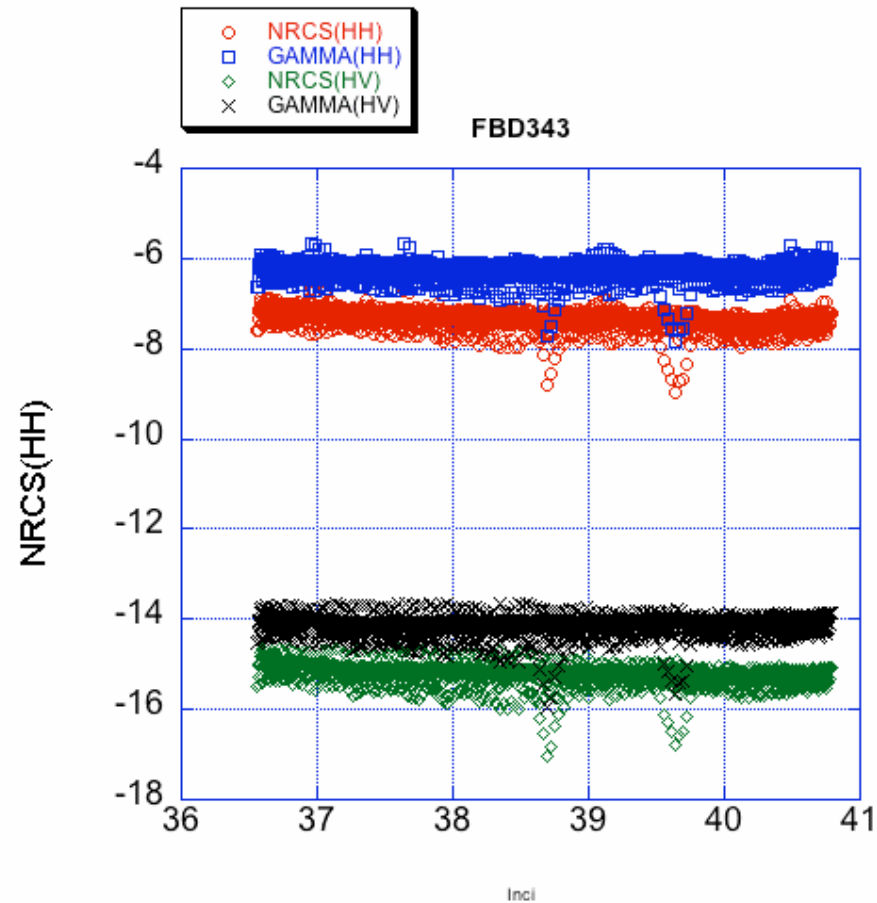
Antenna beam width

FBD 343 updated antenna pattern - slight update in HV

# GAMMA-naught vs. incidence for HH and HV (OLD)



# GAMMA-naught vs. incidence for HH and HV (NEW)



Flat in incidence angle

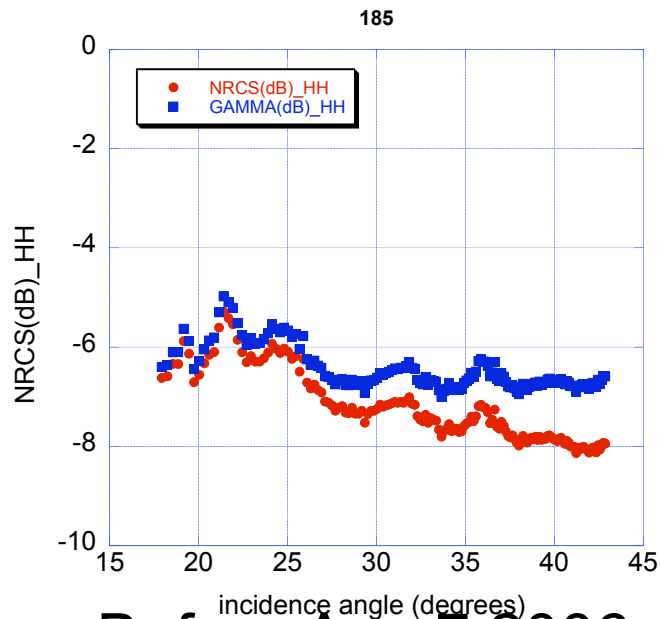
# SCANSAR antenna pattern update

Q: SCANSAR radiometric accuracy

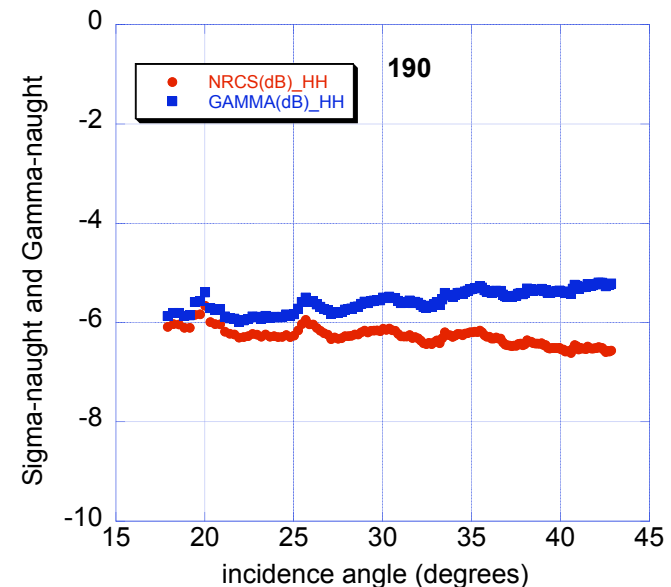
Q1. It is observed that the gamma naught vs.. incidence angle is not constant. It is correct or not?

Q2: The banding appears sometimes in Europe. Why?

Q3: Wind speed field near the land seems to be affected by the land intensity.



Before Aug 7 2006



After Aug 7 2006

# SCANSAR image quality improvement

1. Before Aug. 7 2006, Antenna pattern has been determined by using the Amazon rain forest data.
2. The data seems to be corrected.
3. On Aug. 7 2006, the attenuator have been set with new and larger values to make the saturation rate lower.
4. 1 : 25->25
5. 2 : 24->27
6. 3 : 23->26
7. 4 : 22->25
8. 5 : 21->24
9. Total improvement : Saturation -> small

Number of the acquisition data

~Aug. 6 2006, WB1: 401, WB2:46

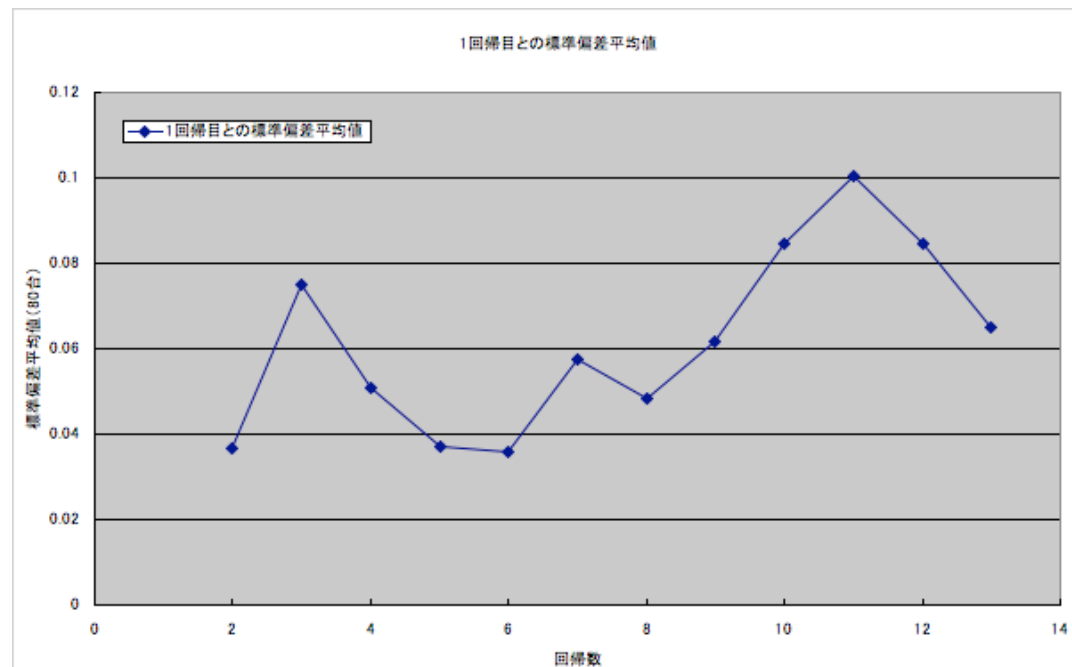
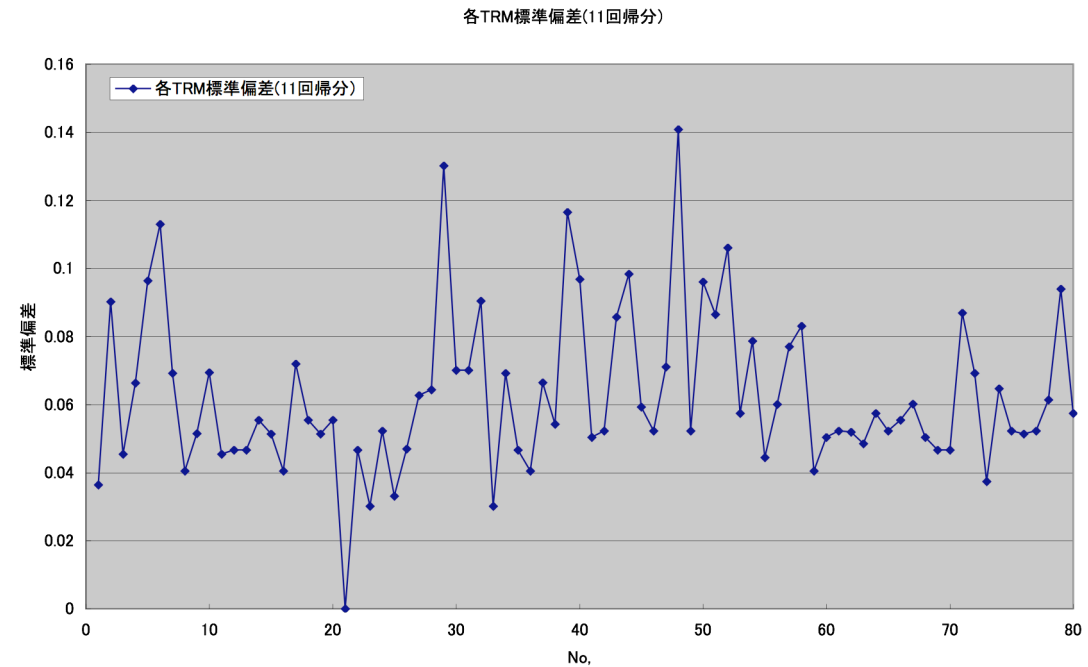
Aug. 7, 2007 ~ WB1:65566, WB2:797



# Stability of TR modules

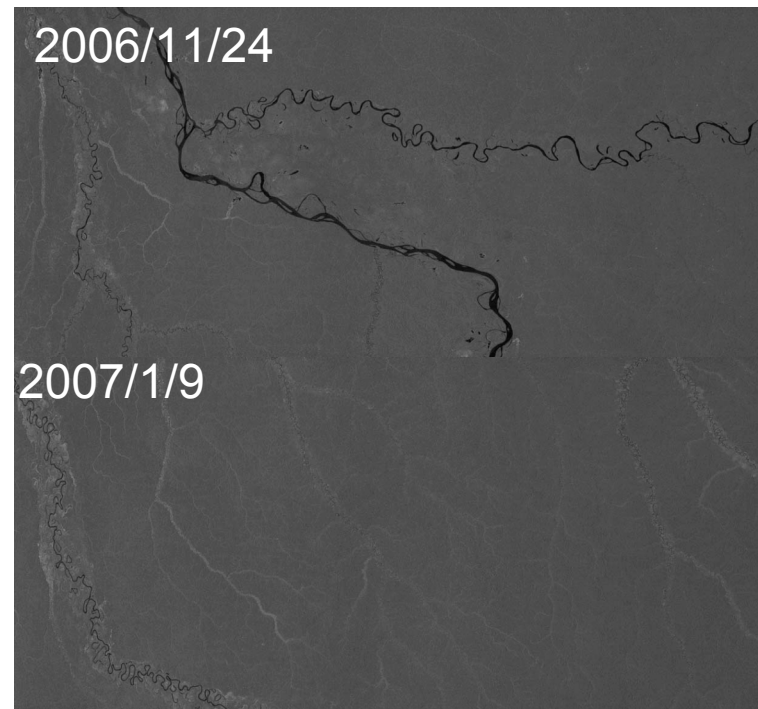
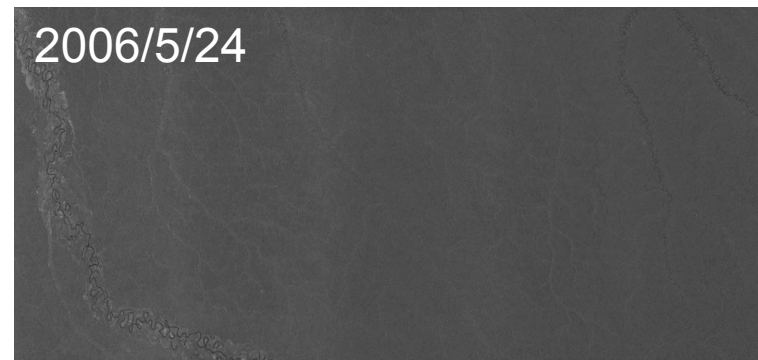
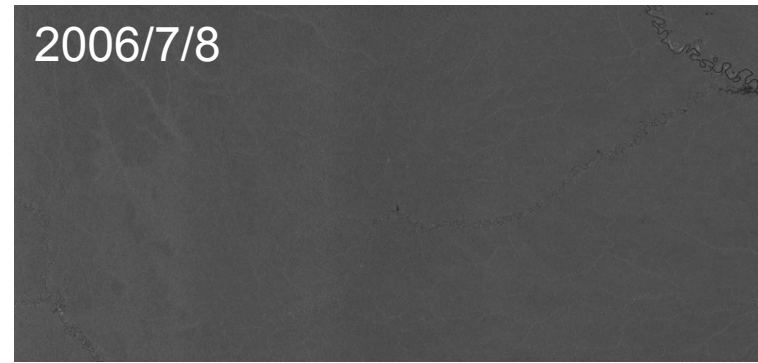
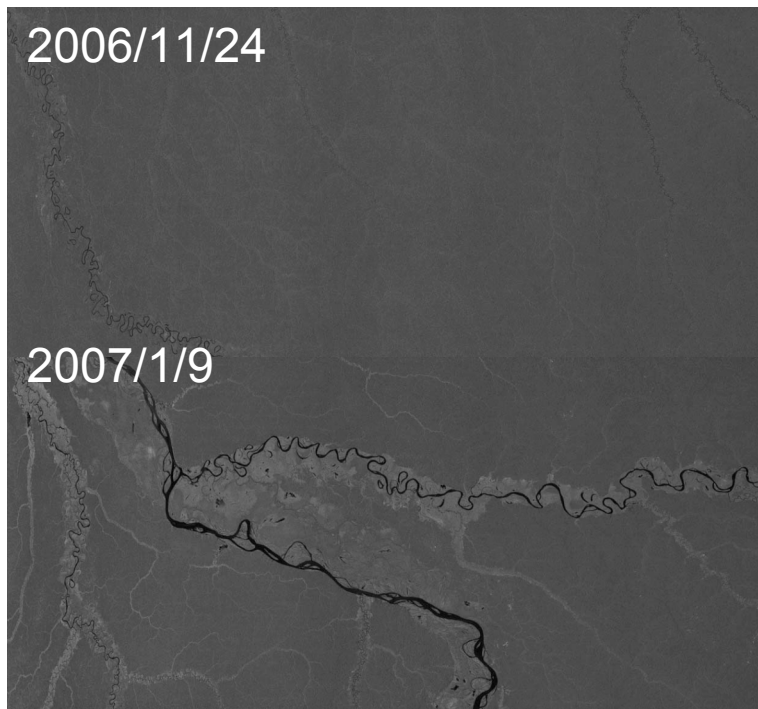
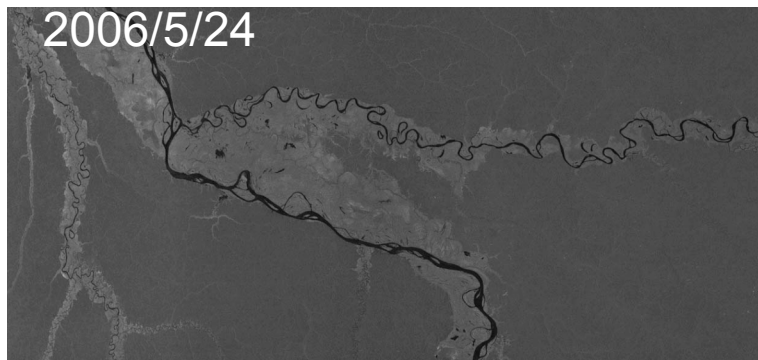
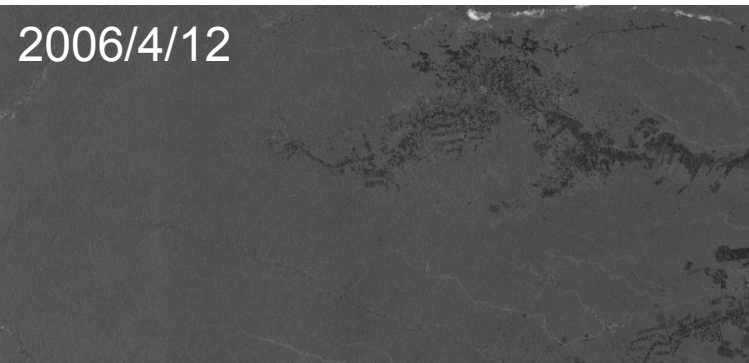
Temporal variation  
 $\leq 0.1$  dB

TR module is very stable.



TR module : did not change  $< 0.1$  dB

- Power spectrum : Each spectrum looks fine.
- But power depends on the SCAN and its order changed at Aug. 7 2007.
- Possible cause: Receiver attenuator changed in some meanings or power reduction due to the saturation is not fully corrected...:
- Saturation is too large?
- Answer:
- Apply normalization factor (divided by Naz)
- Update the antenna elevation pattern

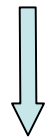


## Recalculation of the antenna elevation pattern

### Radar equation for the SPECAN SAR processor

$$P_C \propto \frac{G_{ele}^2}{R^4} \frac{1}{1 - S_a} \frac{\sin \theta}{\rho} \sigma^0 N_{az}^2$$

Assume  $\sigma^0 / \cos \theta = \text{const.}$



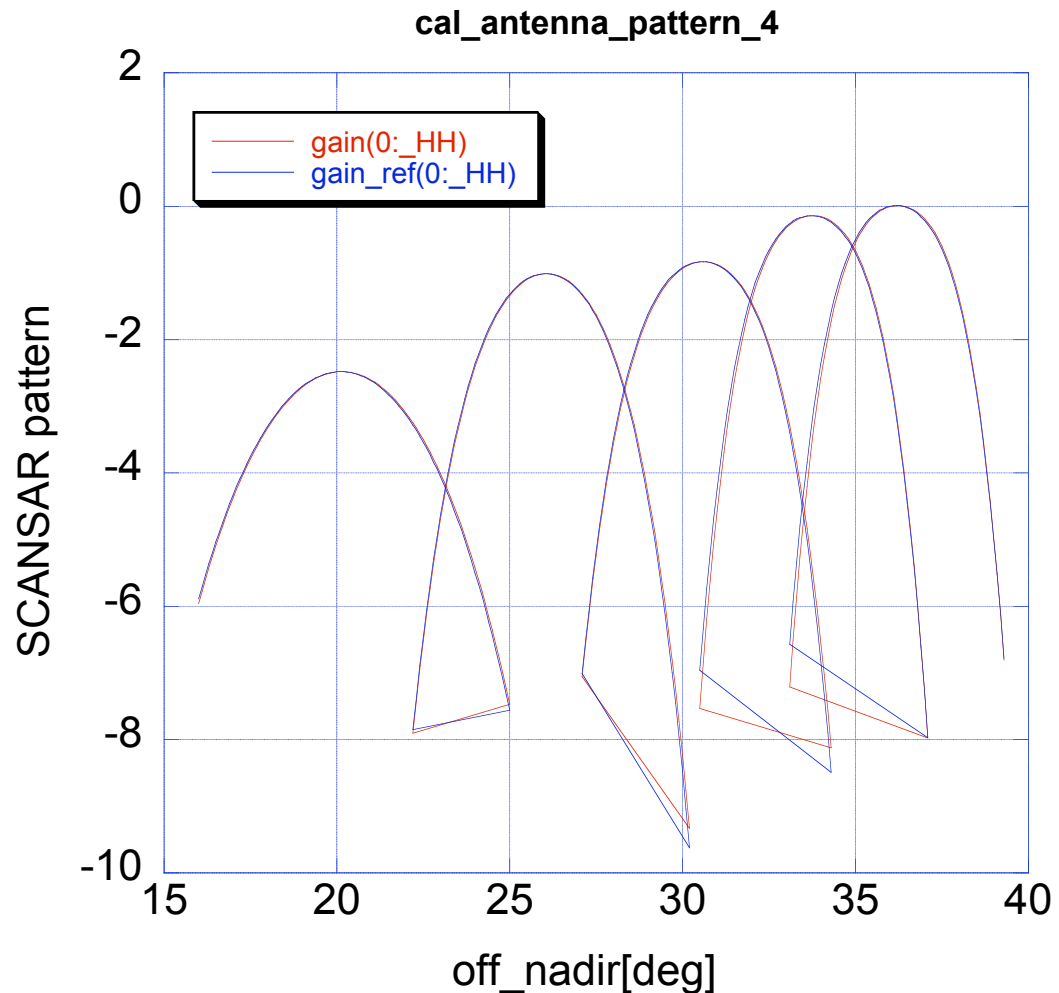
Least  
square  
method

$$G_{ele}^2$$

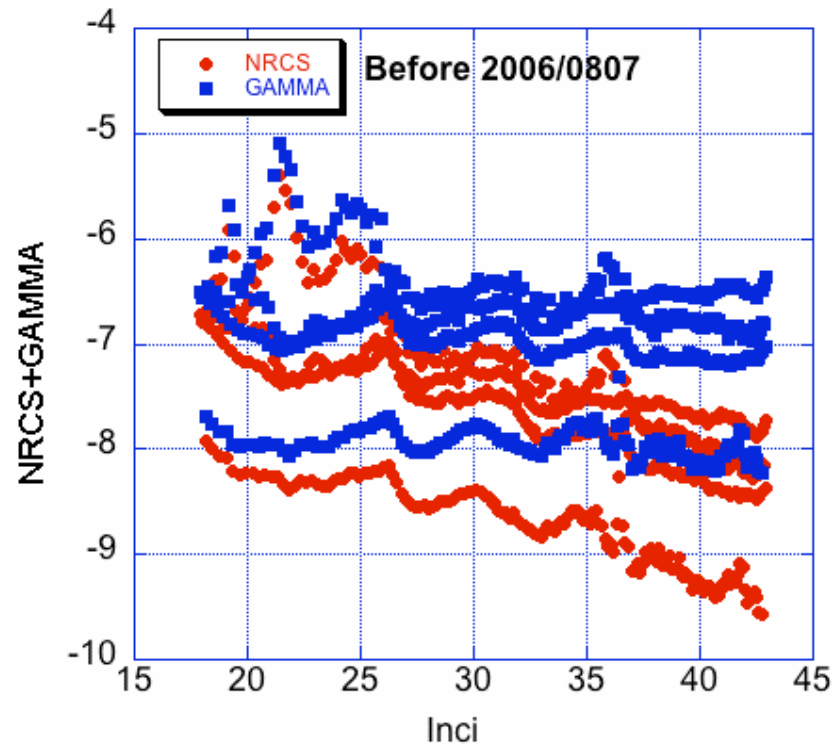
A little changes were detected from the previous antenna pattern (June 25 2006).

One way antenna pattern

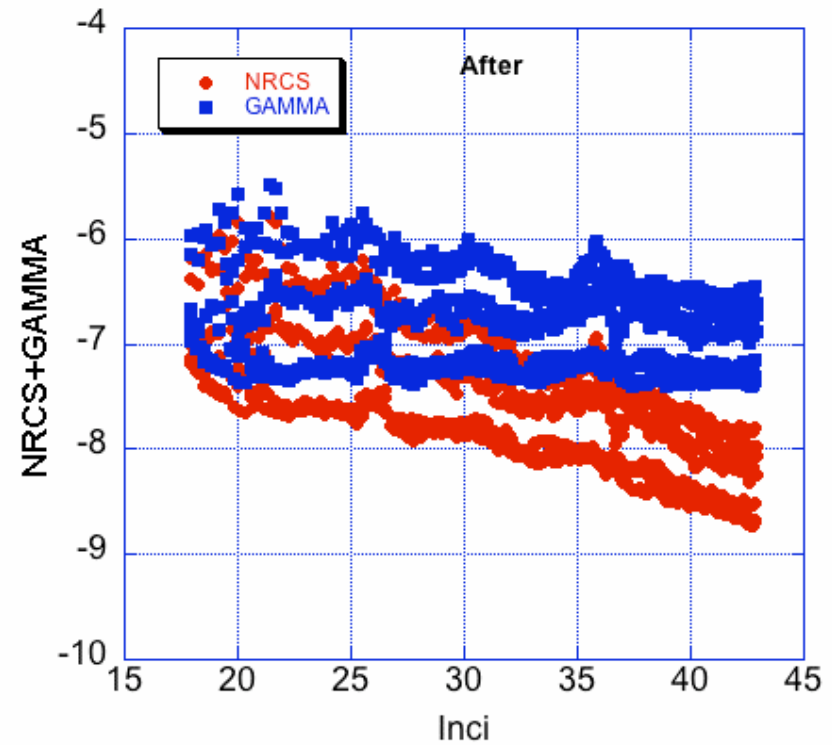
$$G_{ele} = a_0 + b_0(\theta - \theta_0)^2 + c_0(\theta - \theta_0)^4 (dB)$$



After change of the

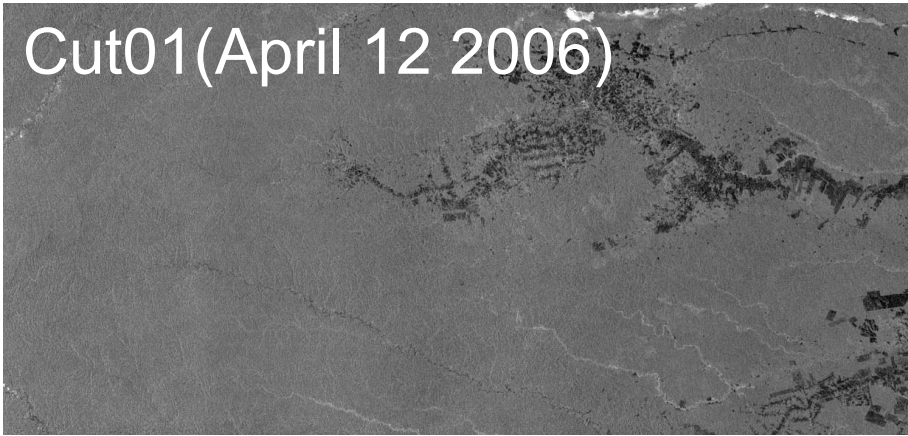


Before Aug. 7 2006

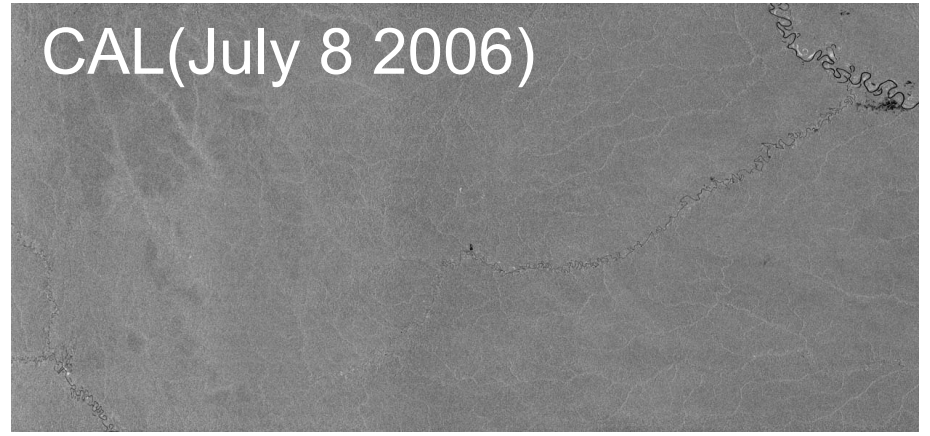


After Aug. 7 2006

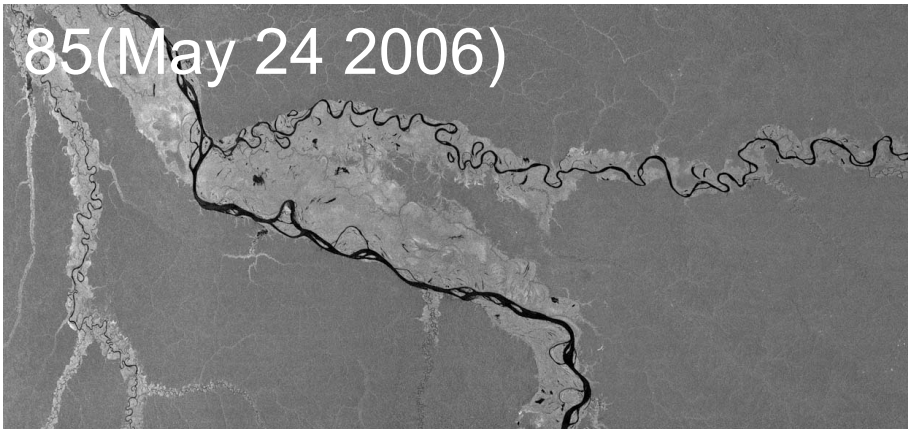
Cut01(April 12 2006)



CAL(July 8 2006)



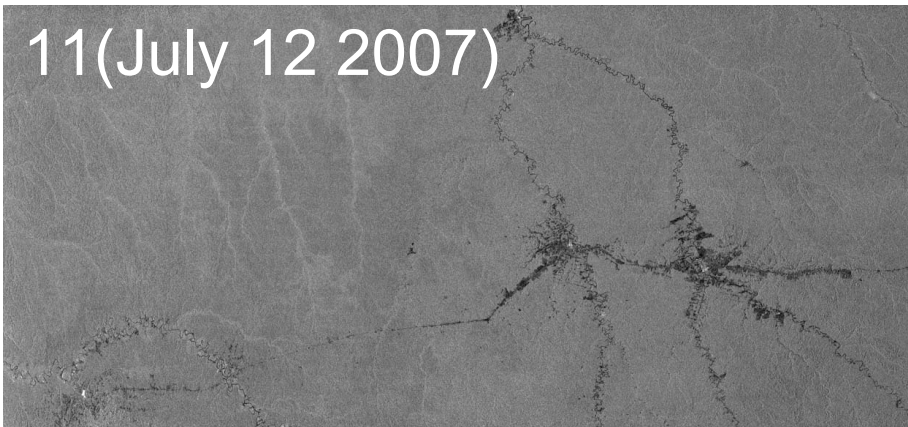
85(May 24 2006)



87(may 24 2006)



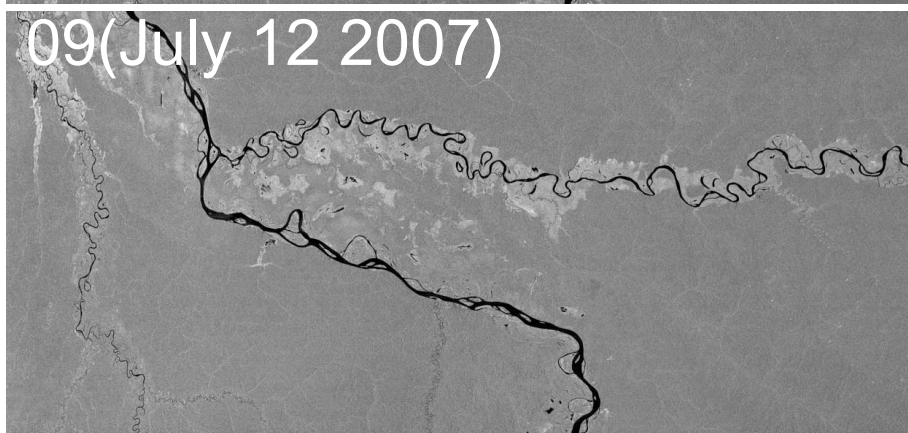
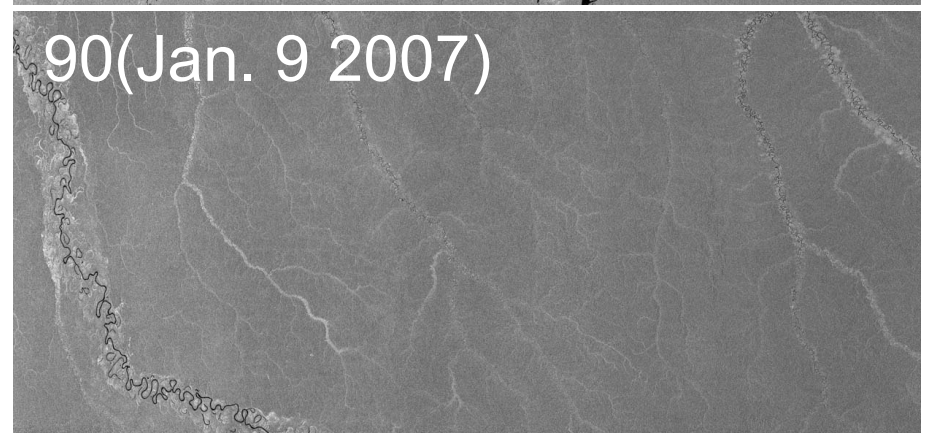
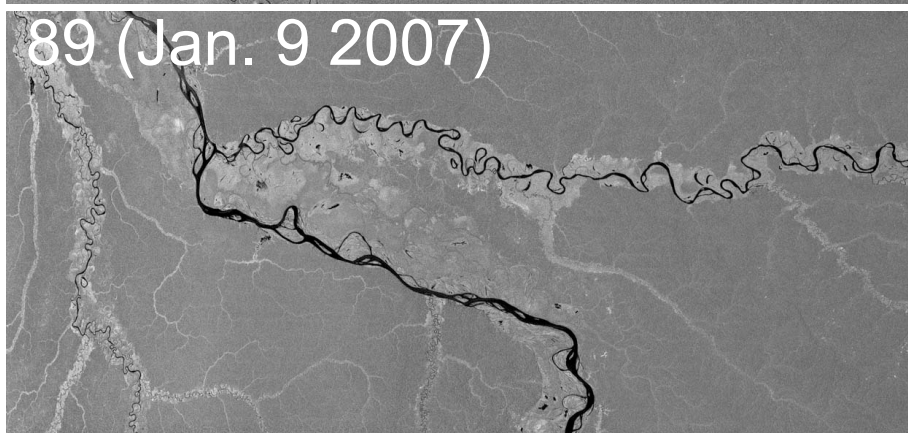
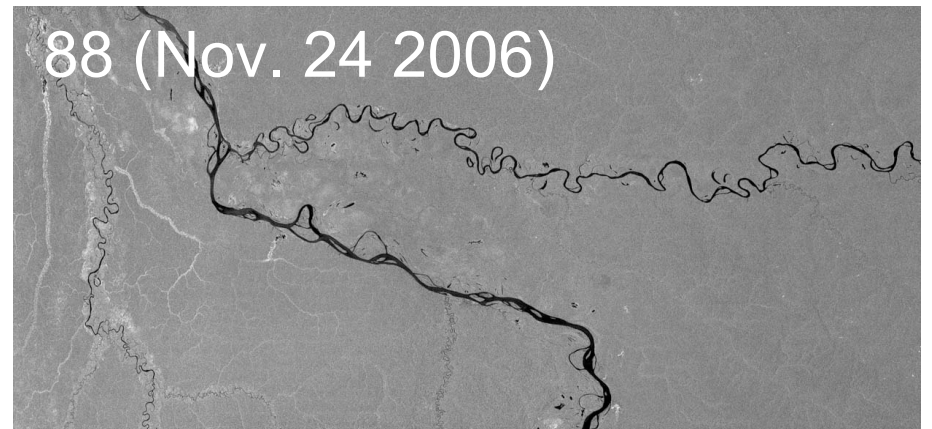
11(July 12 2007)

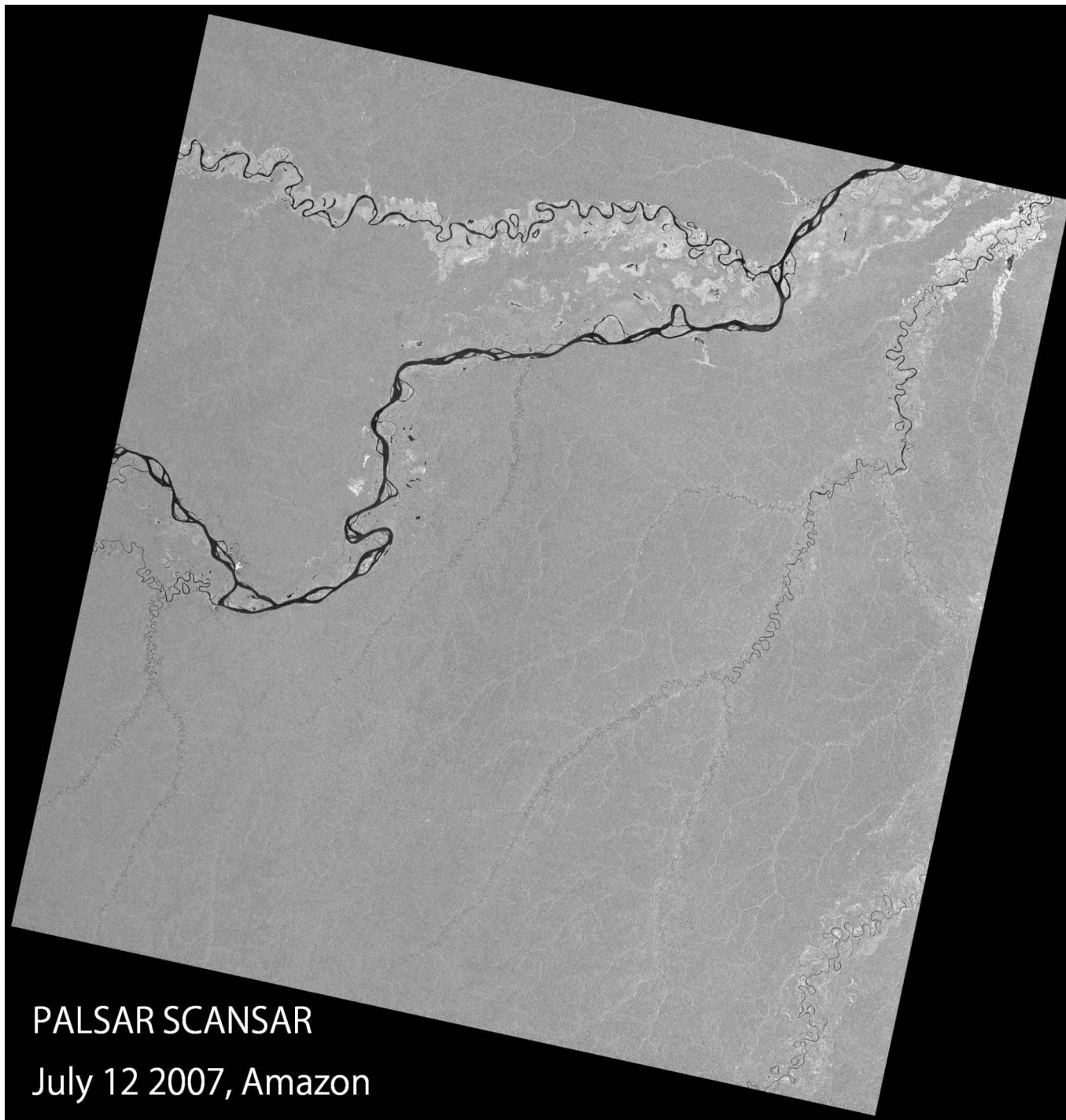


Seaice(Feb. 10 2007)









PALSAR SCANSAR

July 12 2007, Amazon



## Summary

Calibration in the year 2007 was reported.

- 1) Geometric accuracy : not changed.
- 2) Radiometry : almost the same to the previous factor
- 3) POL distortion matrix :not changed
- 4) Antenna pattern (WB1 and FBD HV) will be updated.
- 5) SCANSAR processing routine will be updated.
- 6) Noise Filter will be optimized
  
- 7) SIGMA-SAR will be updated in July.

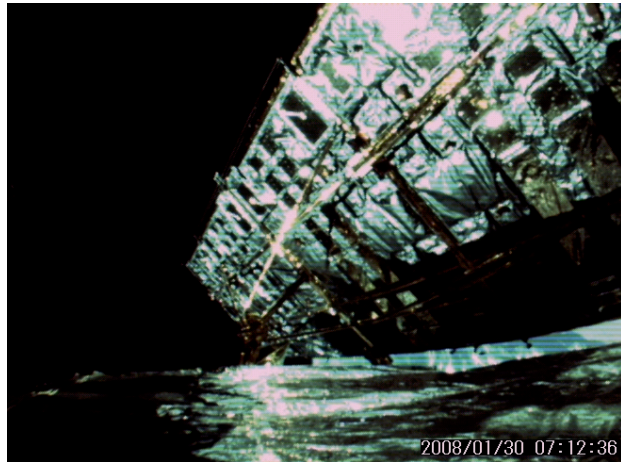
Topic in the polarimetry

$h_v \neq v_h$  : Trial for the distortion matrix update will be conducted.

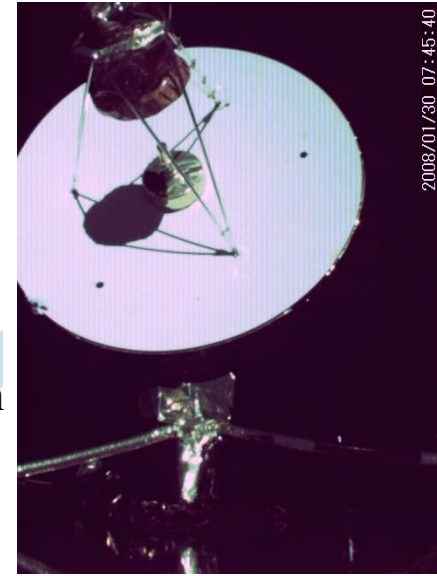
By calculating the matrix again.

# ALOS and its pictures

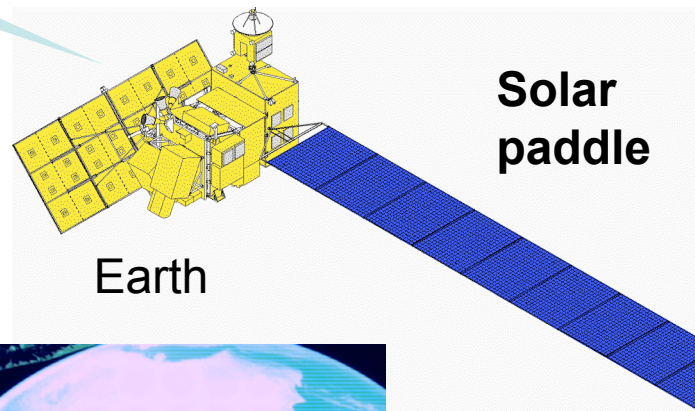
Jan. 30 2008



**PALSAR Antenna  
backside**

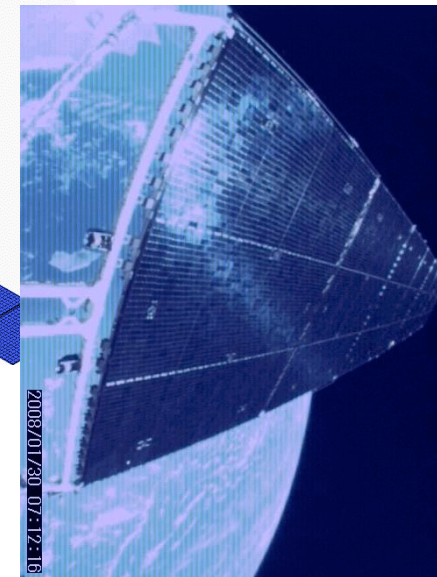
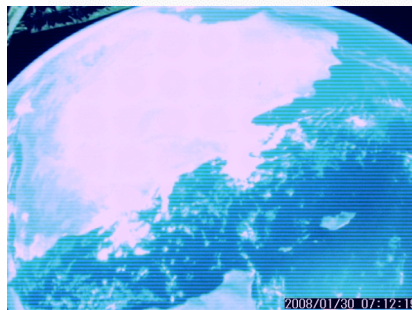


Antenna for  
Inter satellite  
communication



Earth

**Solar  
paddle**



# 1)ALOS-TDRScommunication test



1. Goal : communication test between ALOS and TDRS
2. Plan ALOS-TDRS(F-10) communication test (Ka)  
ALOS->TDRS F-10 ->WSC ->ASF
- 3.Schedule May 29 2008 3 passes(June 5 ,3 passes(backup))  
(Data: PN, PALSAR, and AVNIR-2)

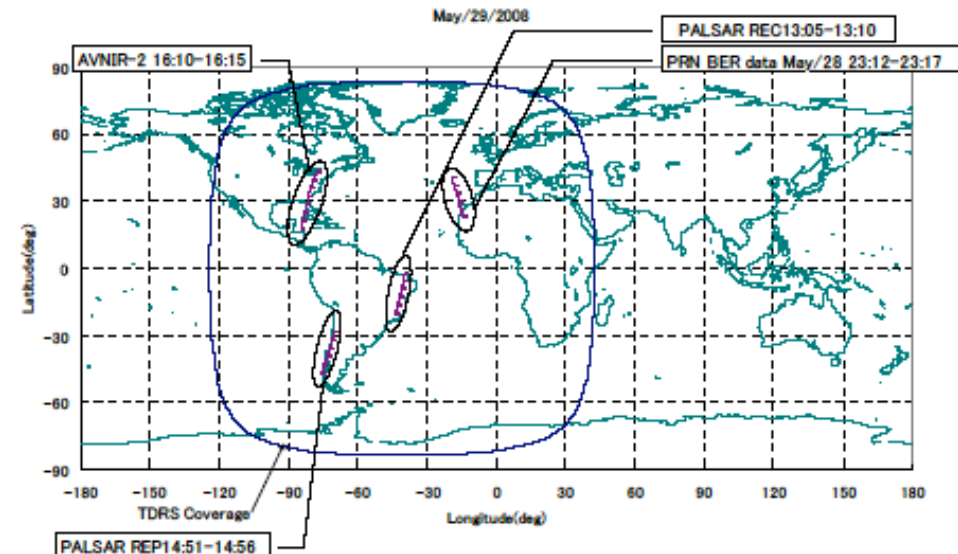
(White Sands Complex)

(Alaska Satellite Facility)

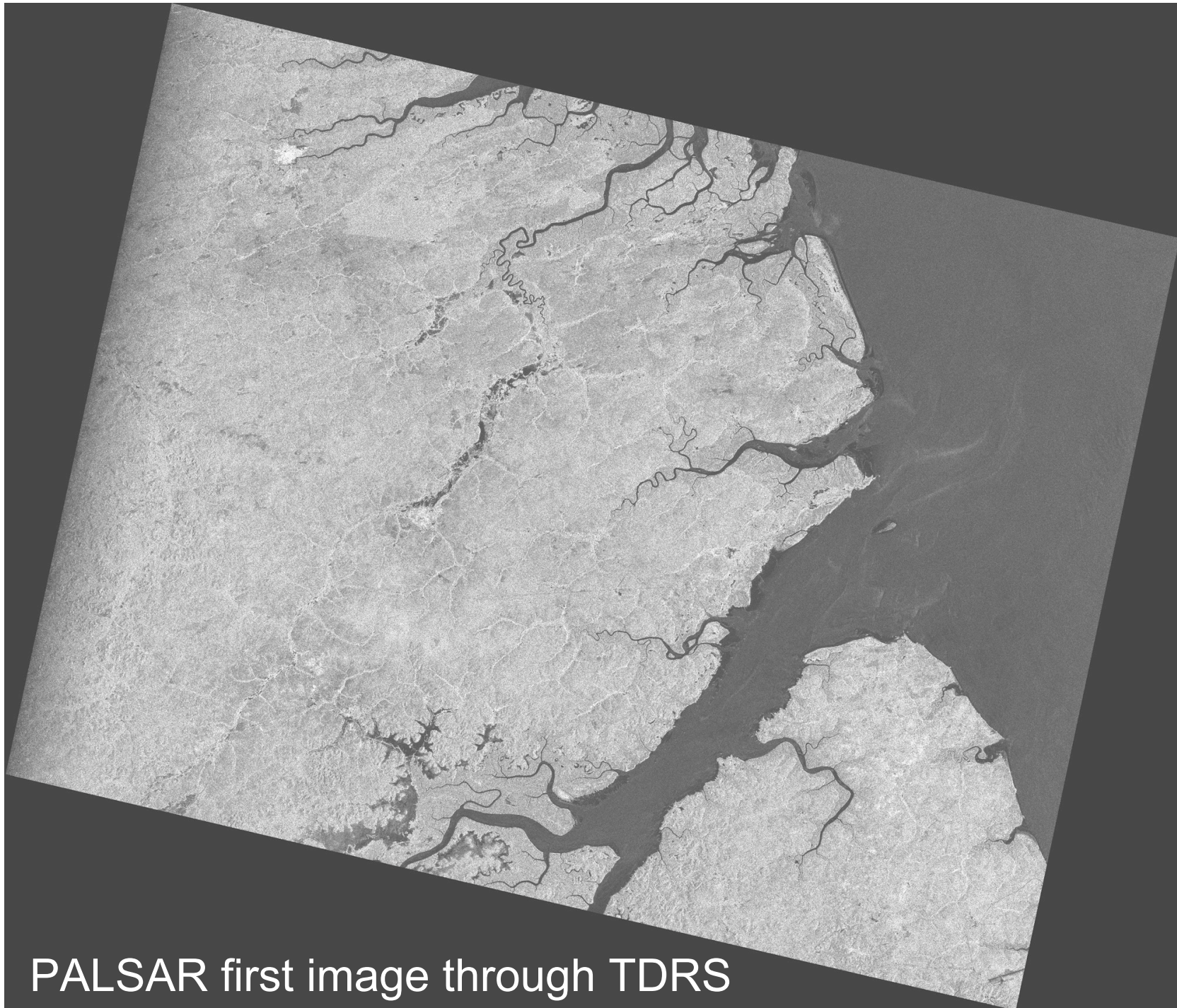
## 2)Orbit maneuver

June beginning: maintain the orbital plane (inclination)

> Tuning of the inclination.







PALSAR first image through TDRS