

PALSAR-2 Calval and operation status – improving the mosaic quality

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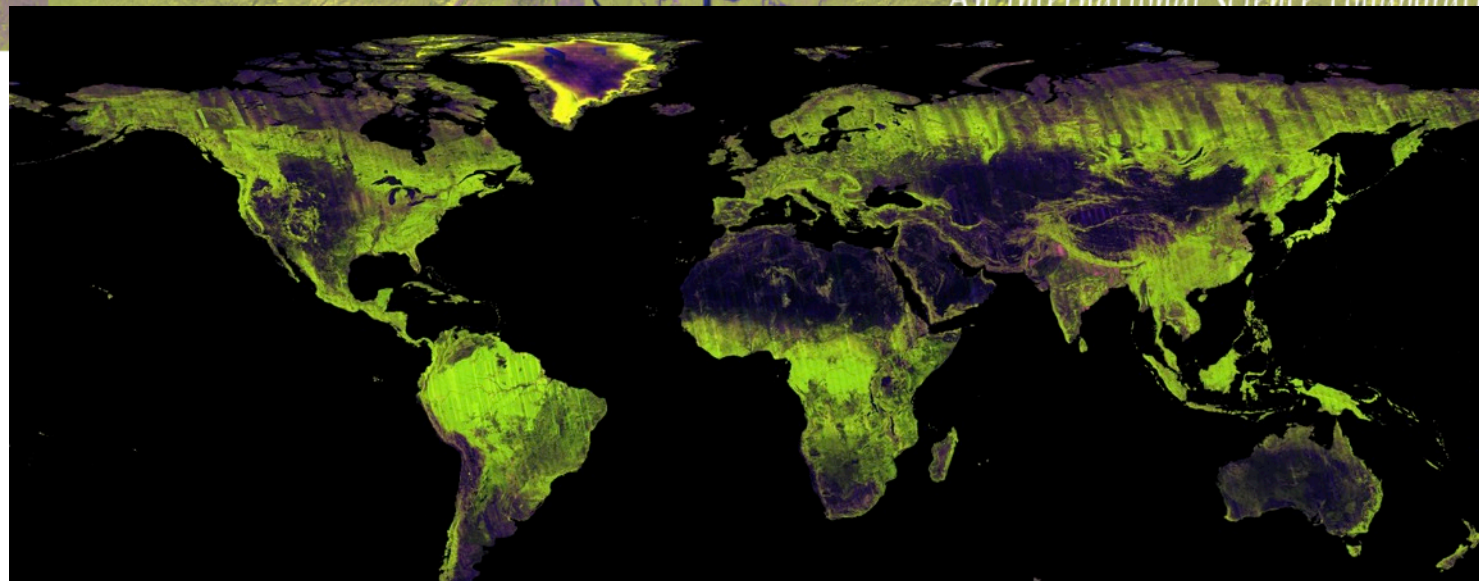
Jan. 18-20, 2017

KC23, TDU Hatoyama

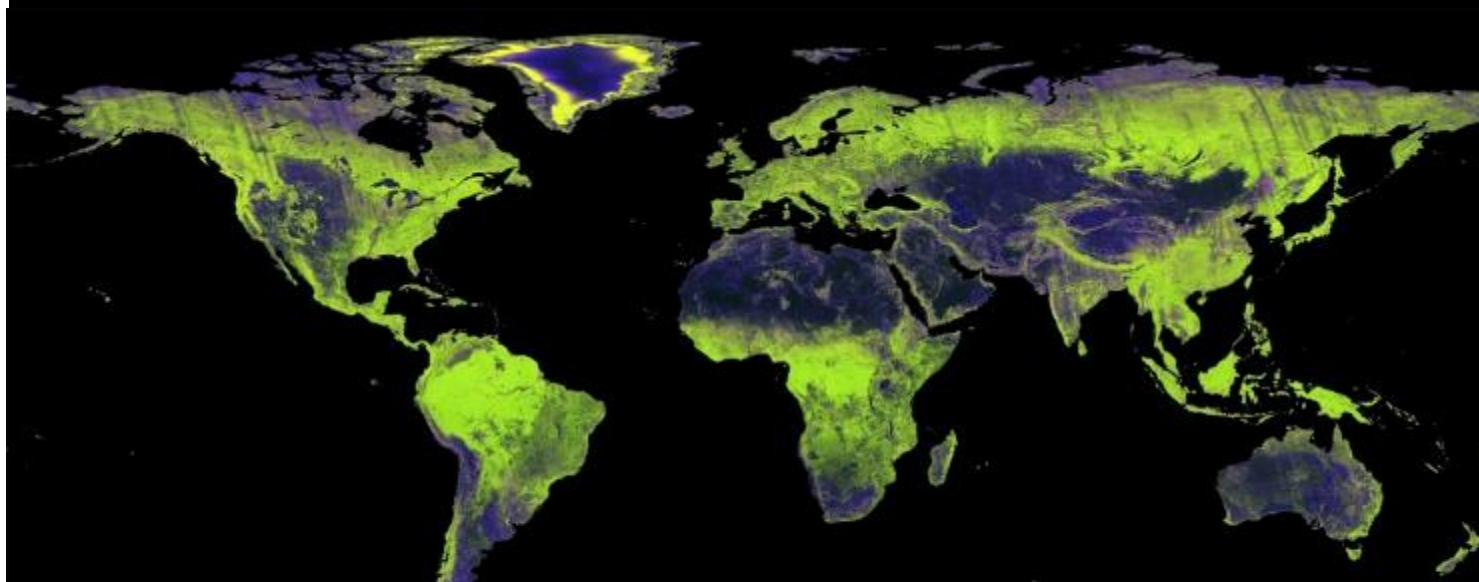
- Contents
- Rechecking the PALSAR-2 mosaic
- Antenna Pattern Evaluation
- Radiometric balancing on the neighboring Strips
- Conclusions

ALOS Comparison of 25m PALSAR/PALSAR-2

An international science collaboration led by JAXA



2015 PALSAR-2 25m Global Mosaic

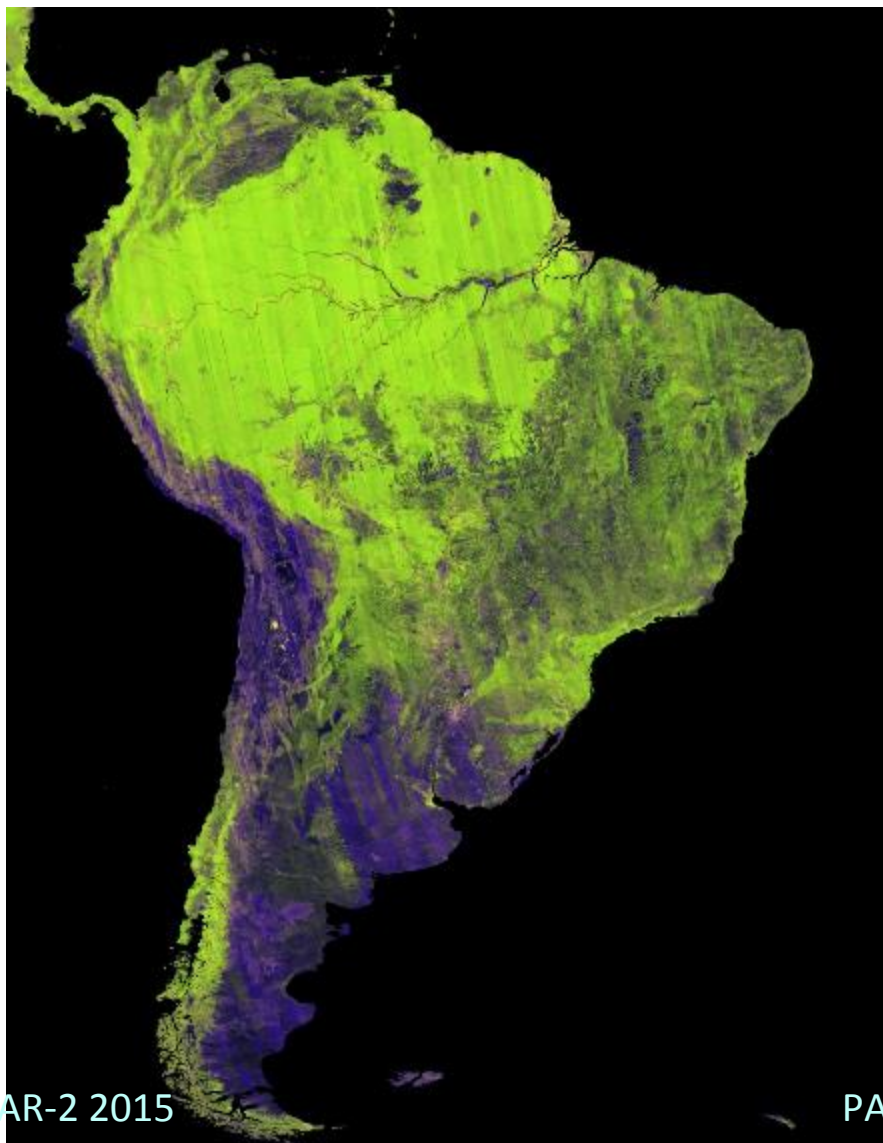


2010 PALSAR 25m Global Mosaic

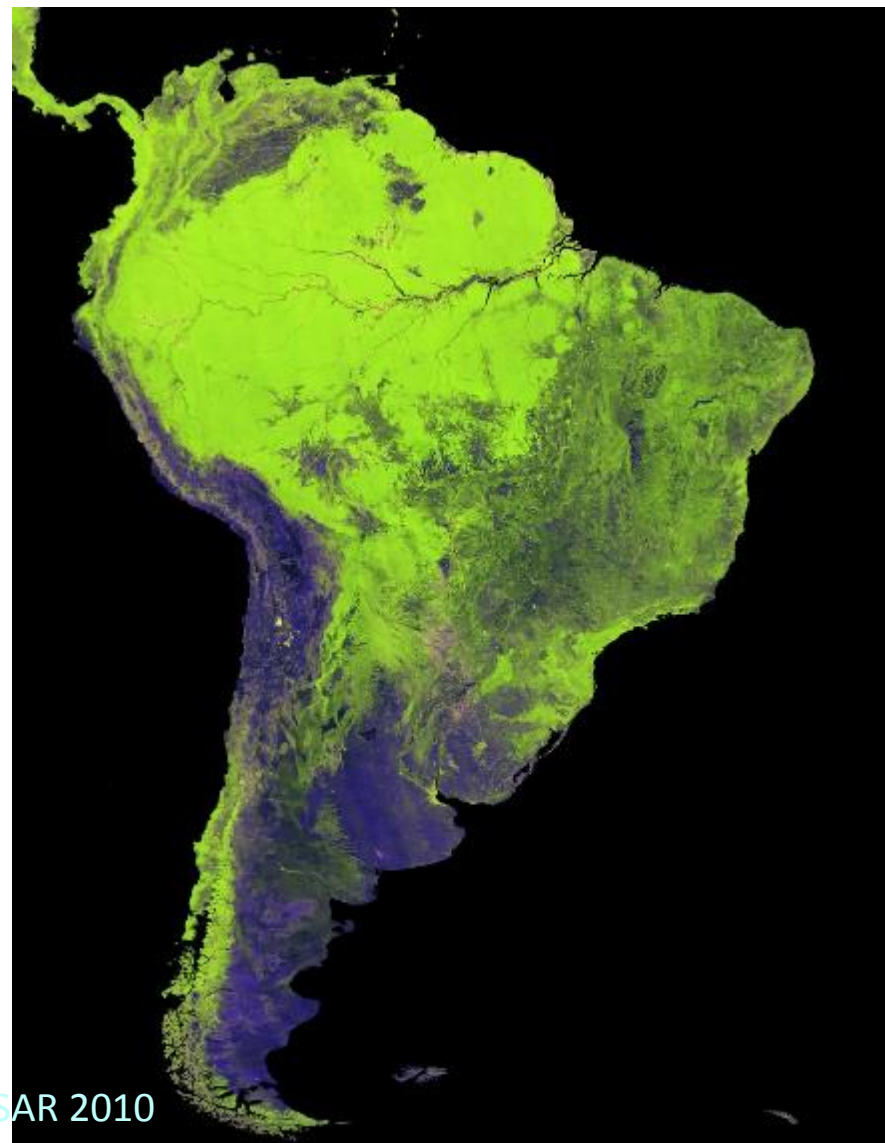
ALOS

25m PALSAR/PALSAR-2 Mosaic Initiative

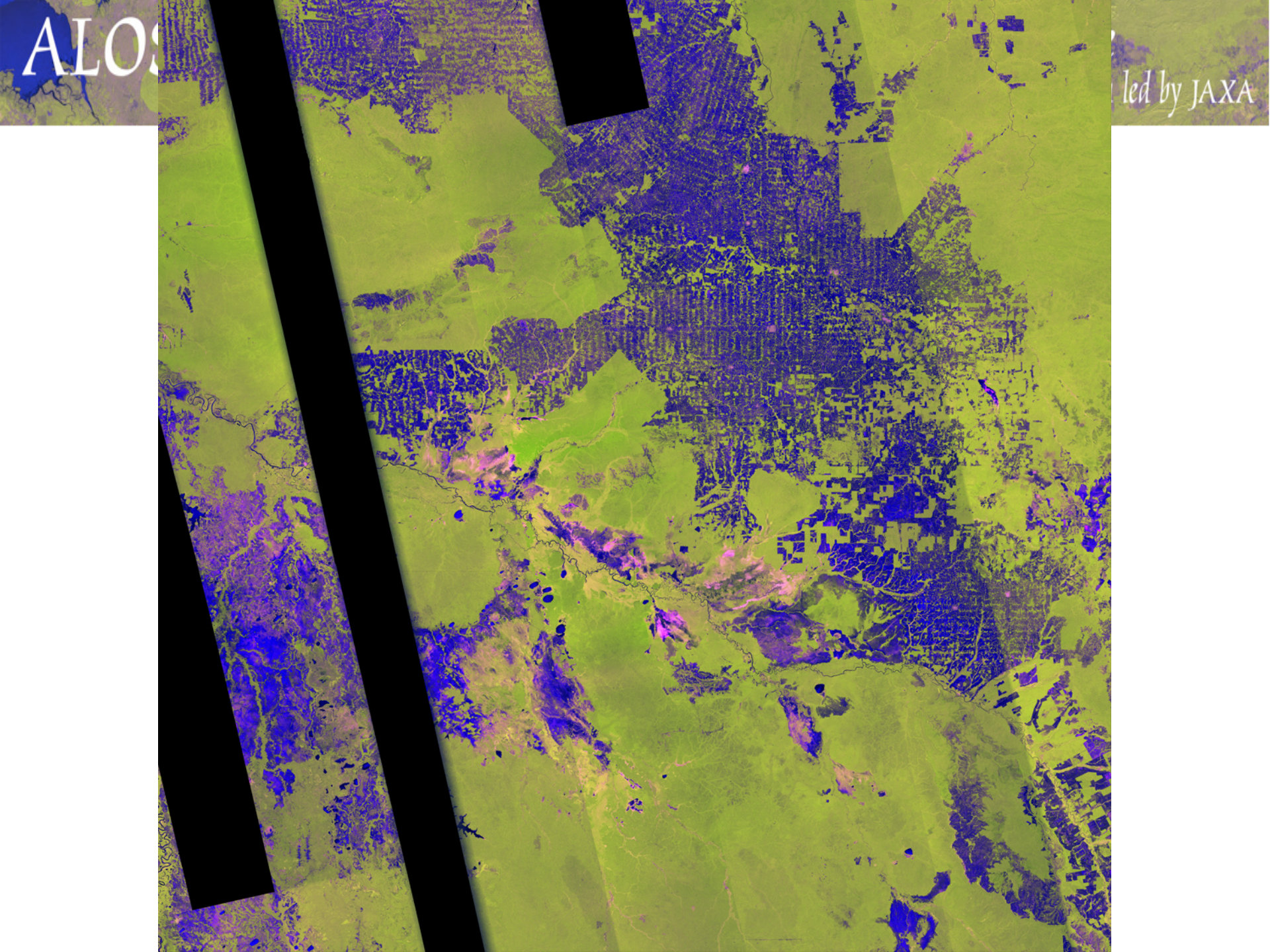
An international science collaboration led by JAXA
South America



PALSAR-2 2015



PALSAR 2010

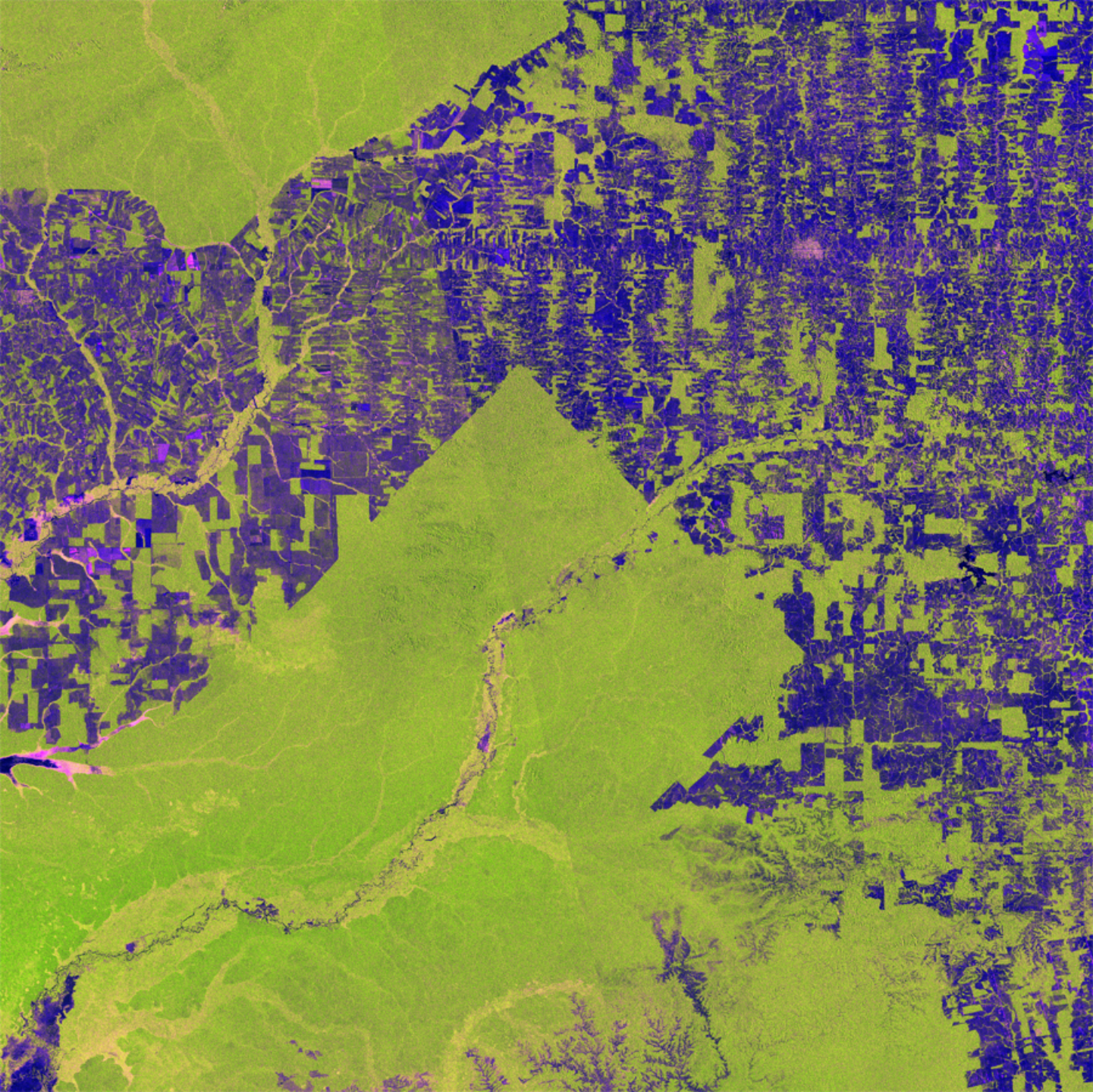


ALOS

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ALOS

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ALOS-2 Specifications

		Spotlight	Ultra Fine	High sensitive	Fine	ScanSAR nominal		ScanSAR wide
Bandwidth		84MHz	84MHz	42MHz	28MHz	14MHz	28MHz	14MHz
Resolution		Rg×Az: 3×1m	3m	6m	10m	100m		60m
Swath		Rg×Az: 25×25km	50km	50km	70km	350km (5-scan)		490km (7-scan)
Polarization		SP	SP/DP	SP/DP	FP/CP	SP/DP		
NESZ		-24dB	-24dB	-28dB	-26dB	-26dB	-23dB	-23dB
S/A	Rg	25dB	25dB	23dB	25dB	25dB		20dB
	Az	20dB	25dB	20dB	23dB	20dB		20dB

SP : HH or VV or HV , DP : HH+HV or VV+VH , FP : HH+HV+VH+VV , CP : Compact pol (Experimental mode)

Main applications:

Fine beam (DP): Forest and land cover monitoring

ScanSAR (DP): Rapid deforestation / wetlands / InSAR (ScanSAR-ScanSAR)

Spotlight (SP): Emergency observations

Ultra Fine (SP) : Global map, InSAR base mapping

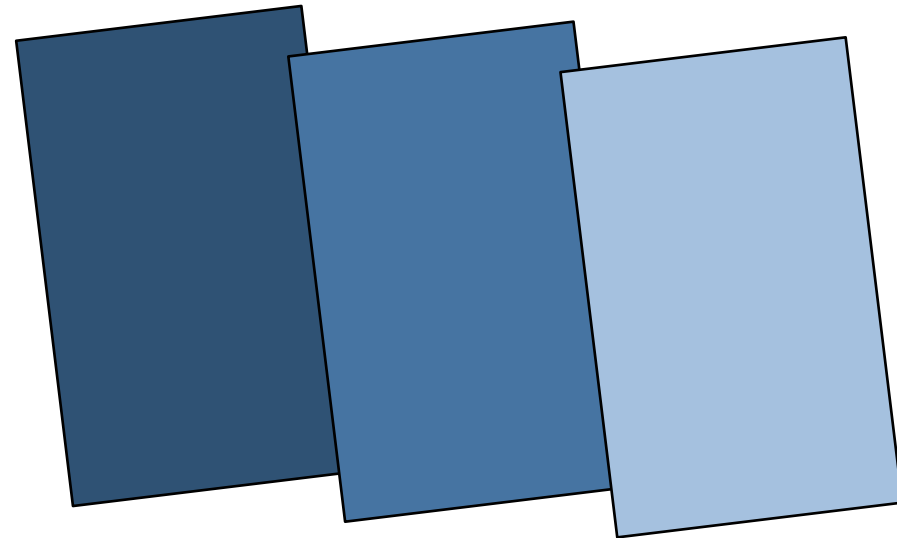
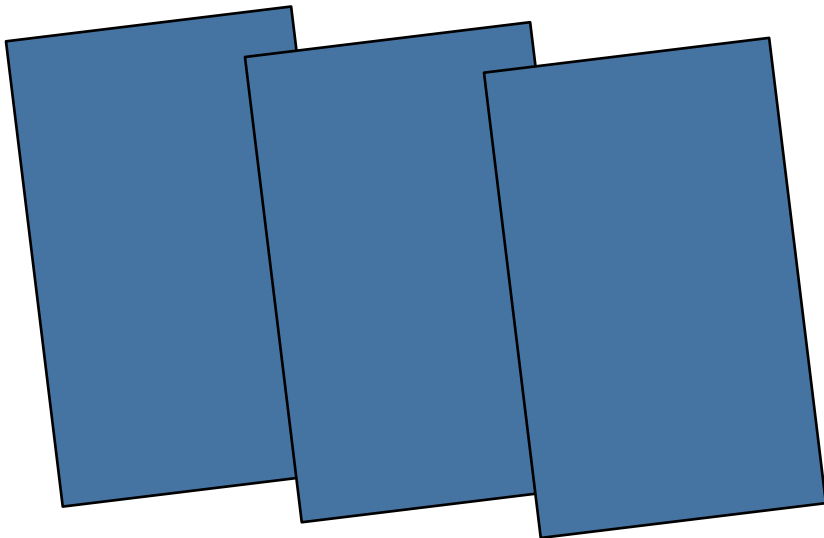
High sensitive (QP): Global map

ScanSAR wide (SP) : Polar ice

- Introduction
- ALOS-2 launched on May 24 2014 was calibrated during the initial cal-phase of 2014
- The first mosaic dataset was released end of 2015.
- It showed that the deforestation has occurred as before.
- The visual checking clarified the calibration of the data since the striping occurred often especially over the equatorial regions and northern areas.
- Clarification of the reasons
- Fixing the errors
- Regeneration of the processing and the mosaickings
- Conclusions

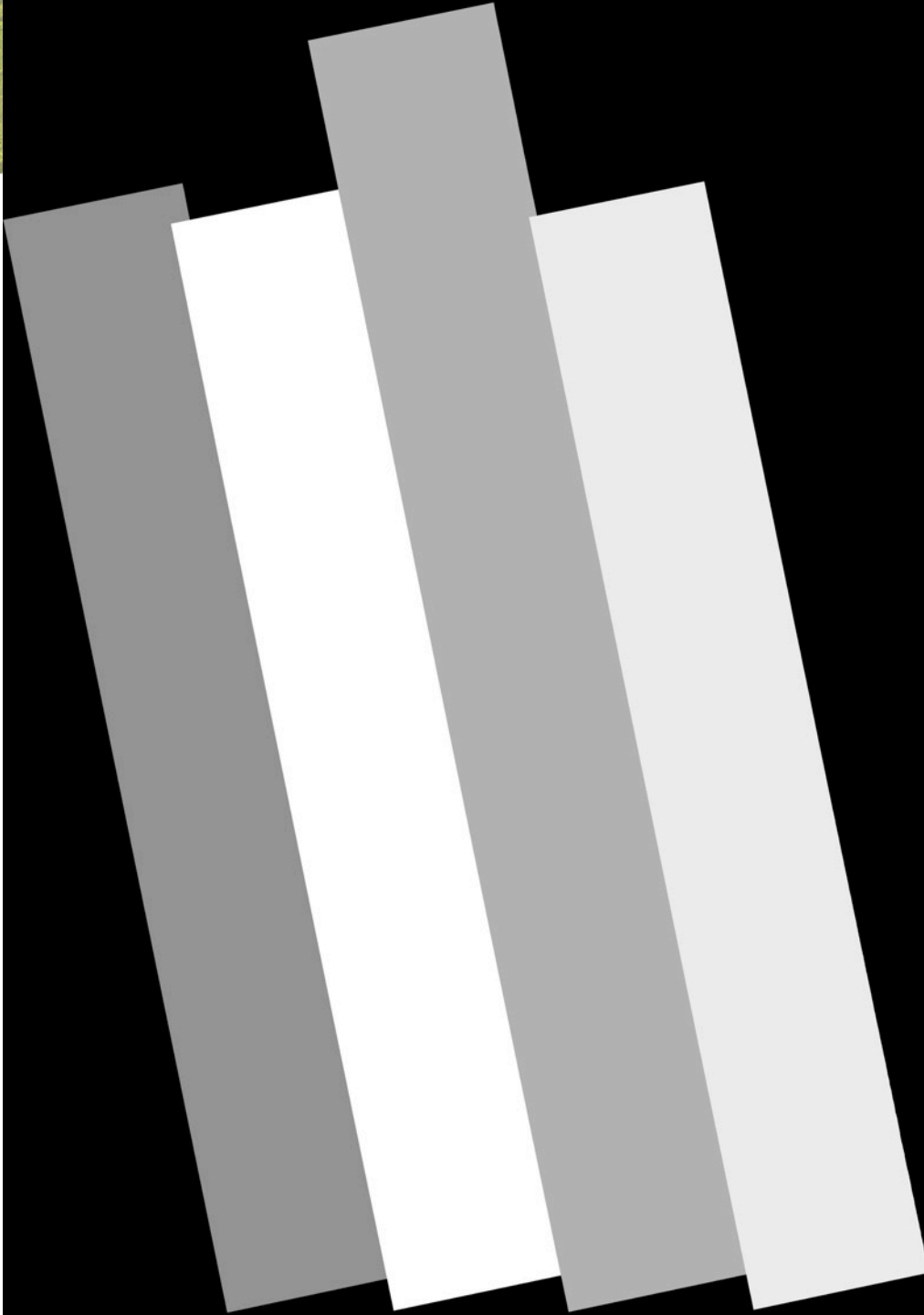
Differences between PALSAR/PALSAR-2

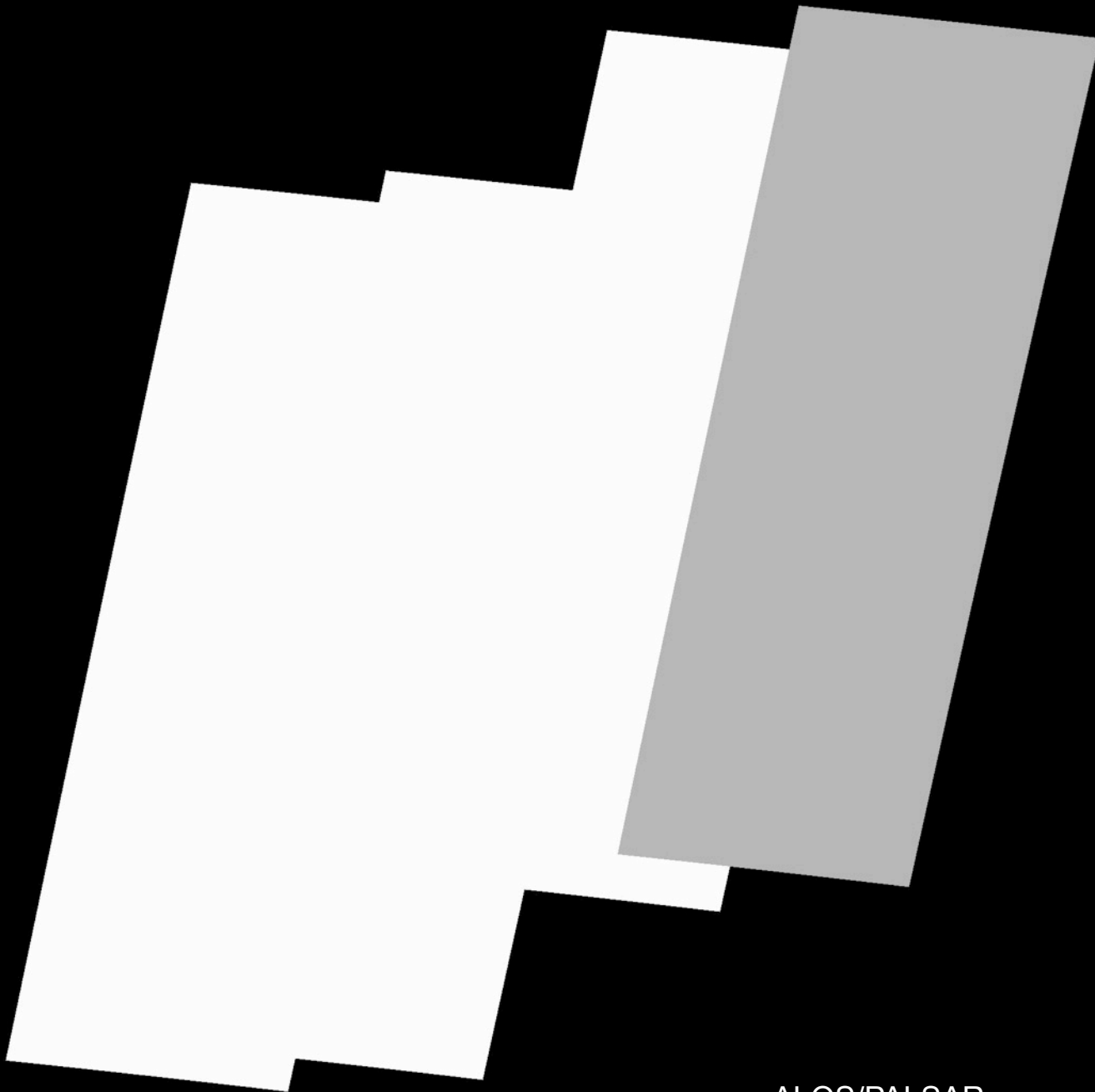
	PALSAR	PALSAR-2
Orbits and width/orbit over equator	671 59.6 km	207 64.4 km
Image width	70km	70km
Gain	MGC	AGC
Incidence angle range	~5 degrees (33~38 degrees)	~14degrees (28.5~33.9,33.7~ 38.5,38.3~42.5 degrees)
Overlap	large	small



Possible reasons

- Smaller ROI overlapping over two strips
- Mixture of high-water/low-water images
- Inclusion of the Ionosphere scintillation
- Antenna Elevation Pattern





Gamma0 – incidence angle – improving the antenna pattern

- 2016/09/23版SIGMA-SAR
- 2016/10/17版SIGMA-SAR



ALOS

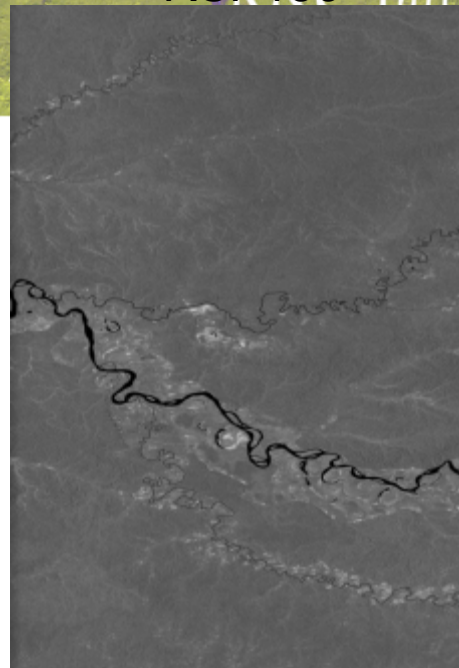
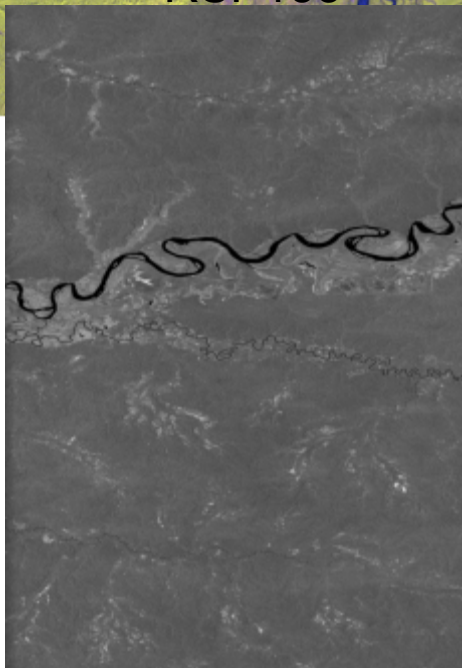
FBD

K&C Initiative

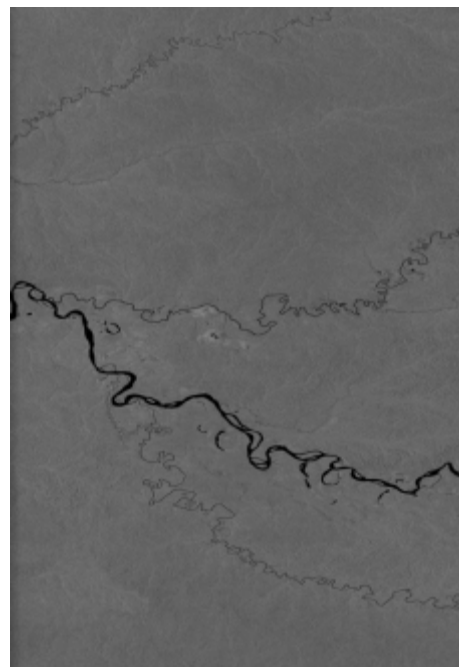
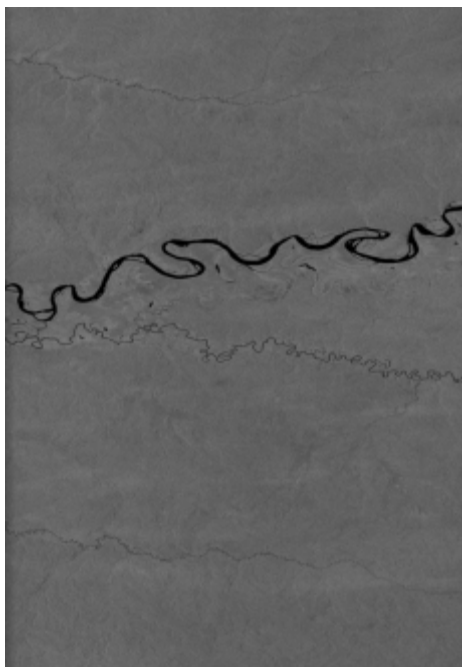
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Mode	Beam	RSP	Obs.Date	Reply ID
FBD282	F2-5(D/R)	135	20150323	SARD000000067008-00048
FBD282	F2-5(D/R)	135	20150713	SARD000000082196-00040
FBD282	F2-5(D/R)	135	20160307	SARD0000000110609-00044
FBD282	F2-5(D/R)	135	20160502	SARD0000000116793-00039
FBD325	F2-6(D/R)	135	20141006	SARD0000000042162-00048
FBD325	F2-6(D/R)	135	20141020	SARD0000000043997-00030
FBD325	F2-6(D/R)	135	20150420	SARD0000000071656-00052
FBD325	F2-6(D/R)	135	20150504	SARD0000000074245-00052
FBD325	F2-6(D/R)	135	20160321	SARD0000000112380-00043
FBD362	F2-7(D/R)	135	20150601	SARD0000000078042-00035
FBD362	F2-7(D/R)	135	20160418	SARD0000000115180-00034
FBD362	F2-7(D/R)	135	20160613	SARD0000000120642-00034
FBD282	F2-5(D/R)	136	20140927	SARD0000000040592-00058
FBD282	F2-5(D/R)	136	20141011	SARD0000000042725-00049
FBD282	F2-5(D/R)	136	20150314	SARD0000000064637-00052
FBD282	F2-5(D/R)	136	20150328	SARD0000000067700-00052
FBD282	F2-5(D/R)	136	20160312	SARD0000000111052-00050
FBD282	F2-5(D/R)	136	20160507	SARD0000000117121-00038
FBD325	F2-6(D/R)	136	20150425	SARD0000000072709-00054
FBD325	F2-6(D/R)	136	20150509	SARD0000000075271-00051
FBD325	F2-6(D/R)	136	20160326	SARD0000000112898-00040
FBD325	F2-6(D/R)	136	20160604	SARD0000000119933-00034
FBD362	F2-7(D/R)	136	20150606	SARD0000000078595-00034
FBD362	F2-7(D/R)	136	20150620	SARD0000000080205-00045
FBD362	F2-7(D/R)	136	20160423	SARD0000000115893-00039

HH

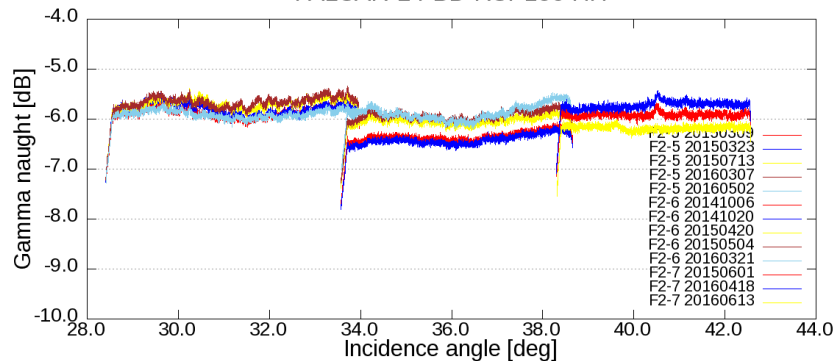


HV

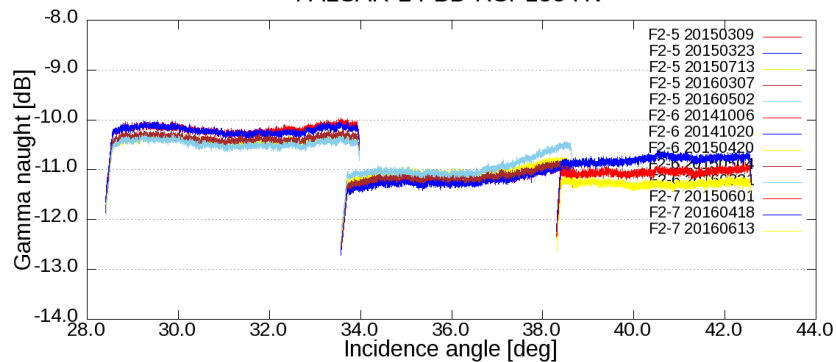


2016/09/23版

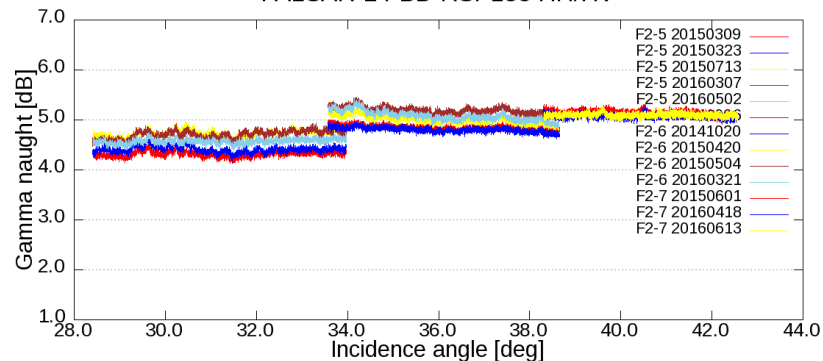
PALSAR-2 FBD RSP135 HH



PALSAR-2 FBD RSP135 HV

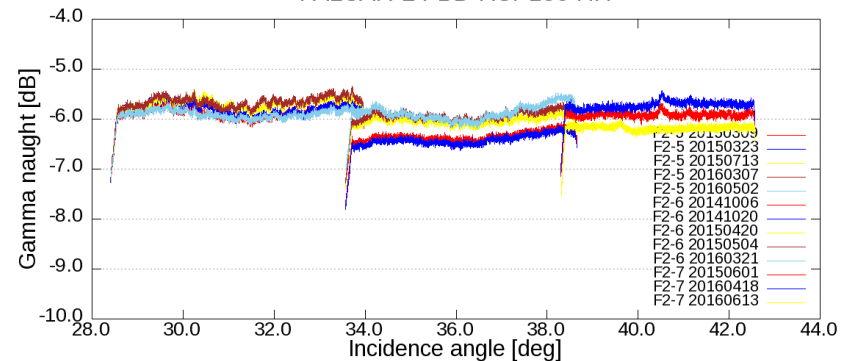


PALSAR-2 FBD RSP135 HH/HV

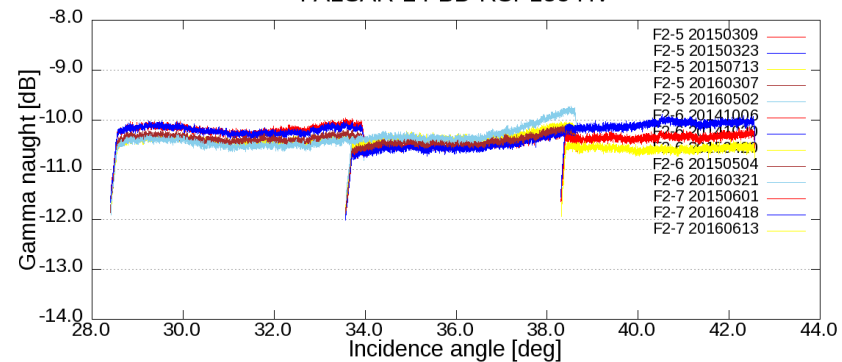


2016/10/17版

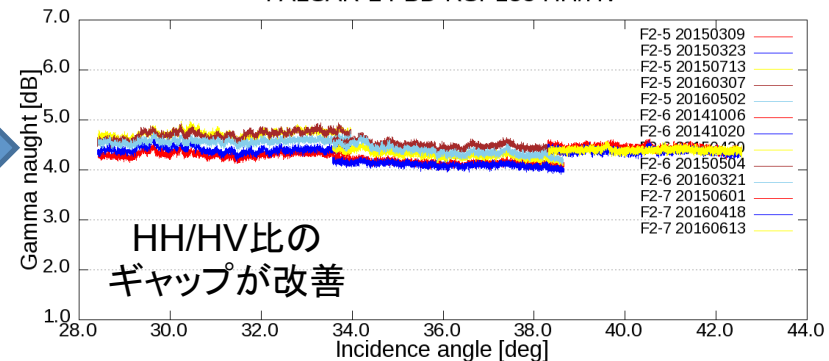
PALSAR-2 FBD RSP135 HH



PALSAR-2 FBD RSP135 HV



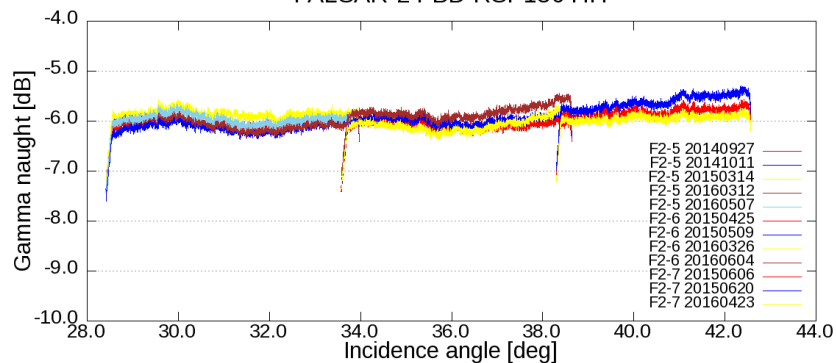
PALSAR-2 FBD RSP135 HH/HV



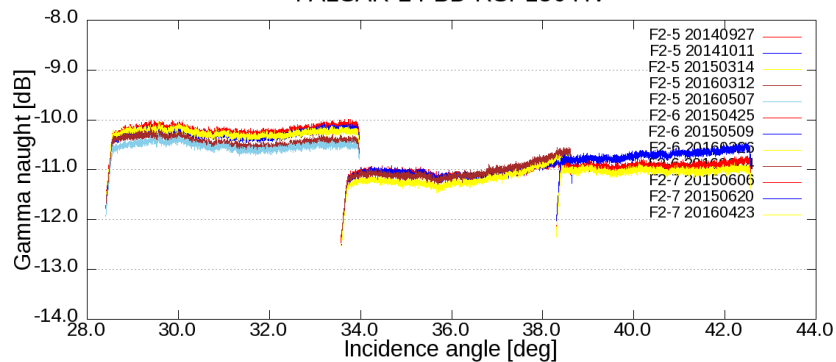
HH/HV比の
ギャップが改善

2016/09/23版

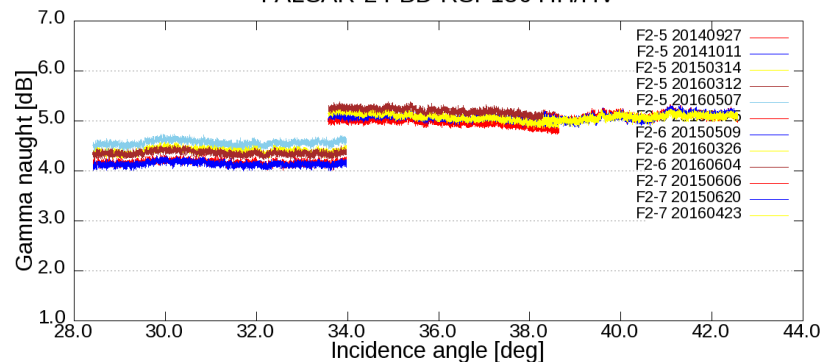
PALSAR-2 FBD RSP136 HH



PALSAR-2 FBD RSP136 HV

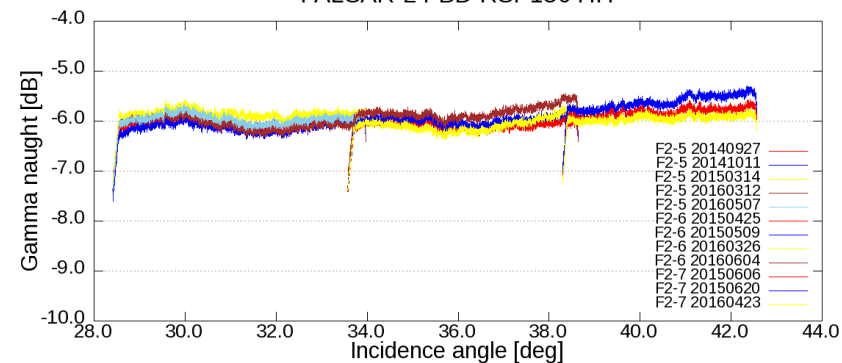


PALSAR-2 FBD RSP136 HH/HV

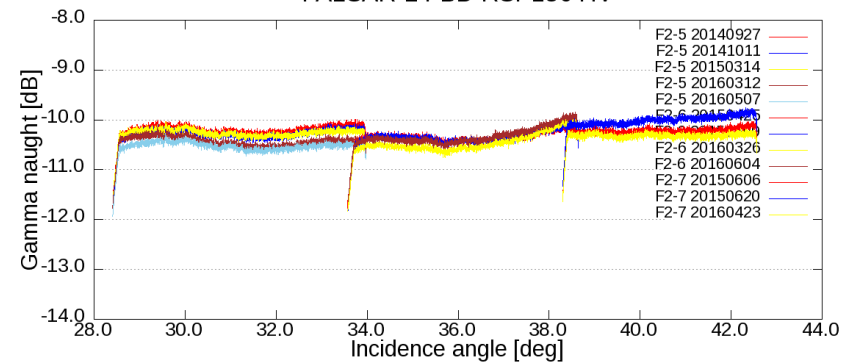


2016/10/17版

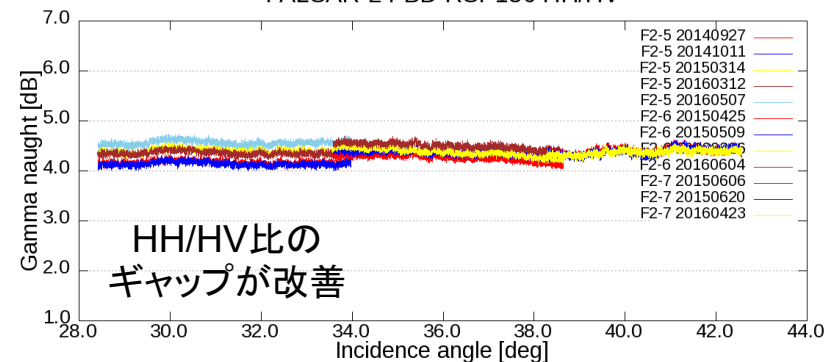
PALSAR-2 FBD RSP136 HH



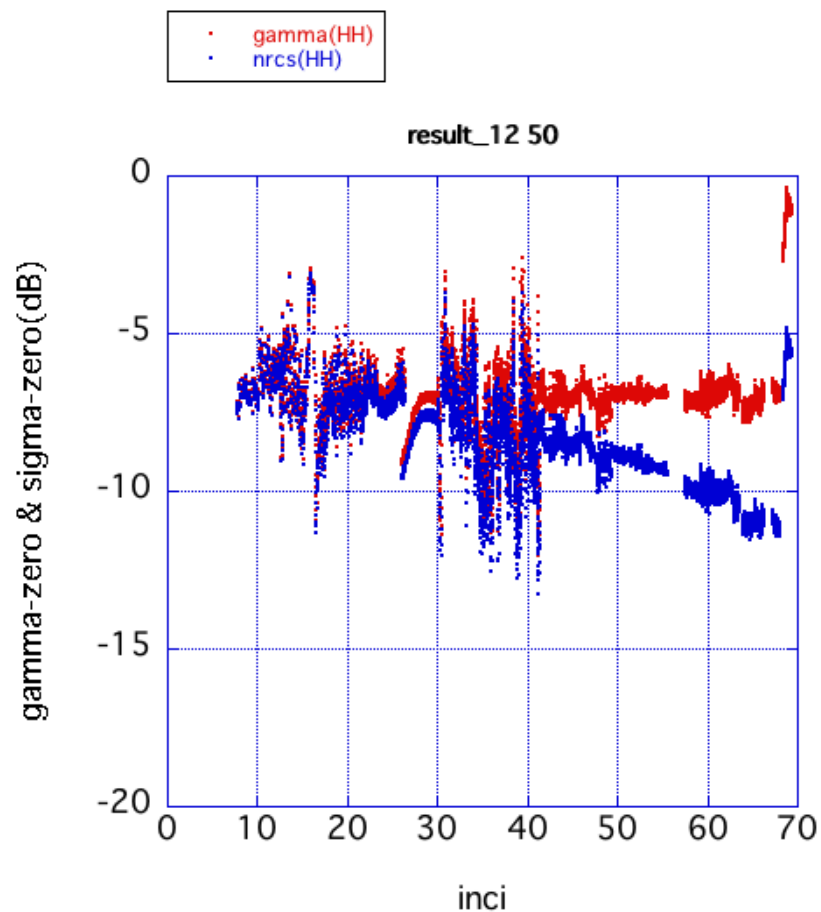
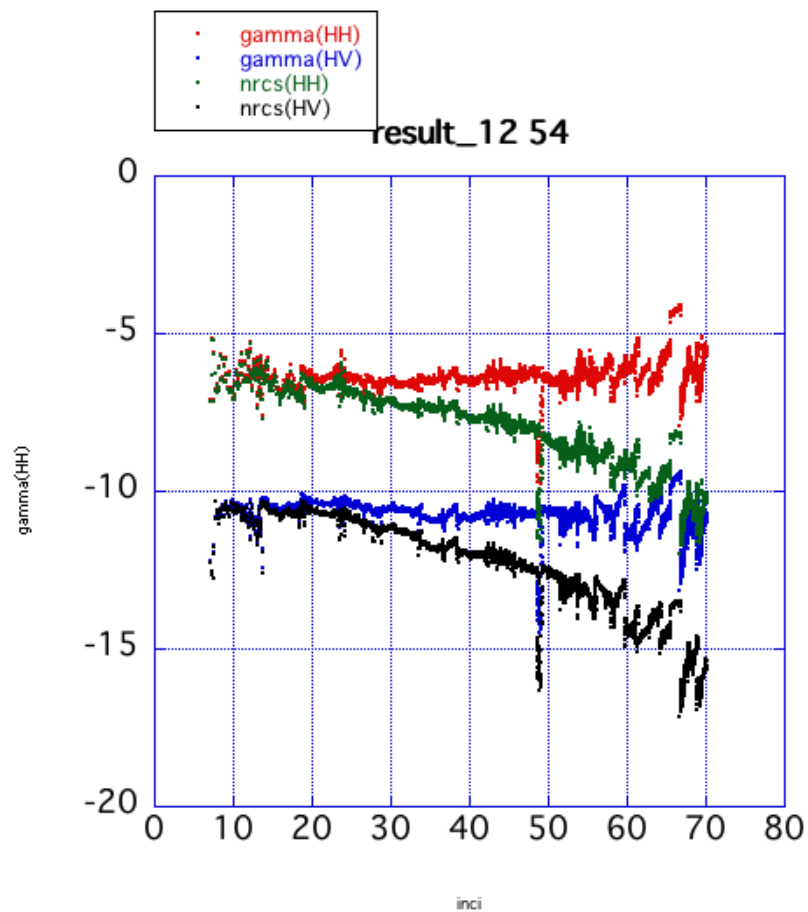
PALSAR-2 FBD RSP136 HV



PALSAR-2 FBD RSP136 HH/HV

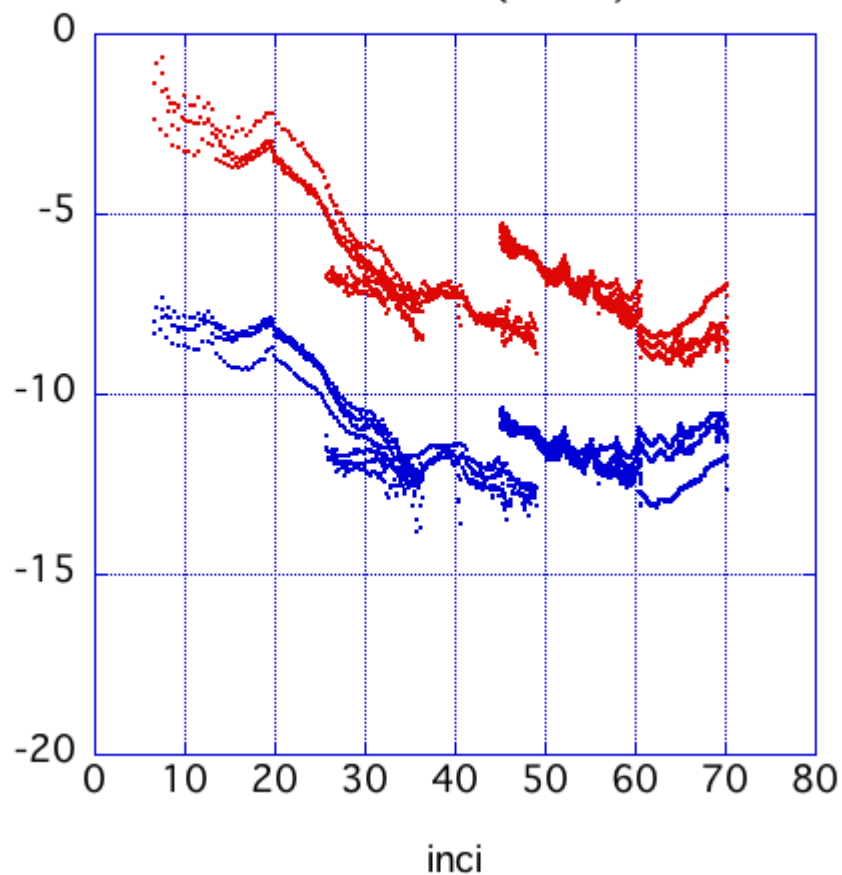


HH/HV比の
ギャップが改善

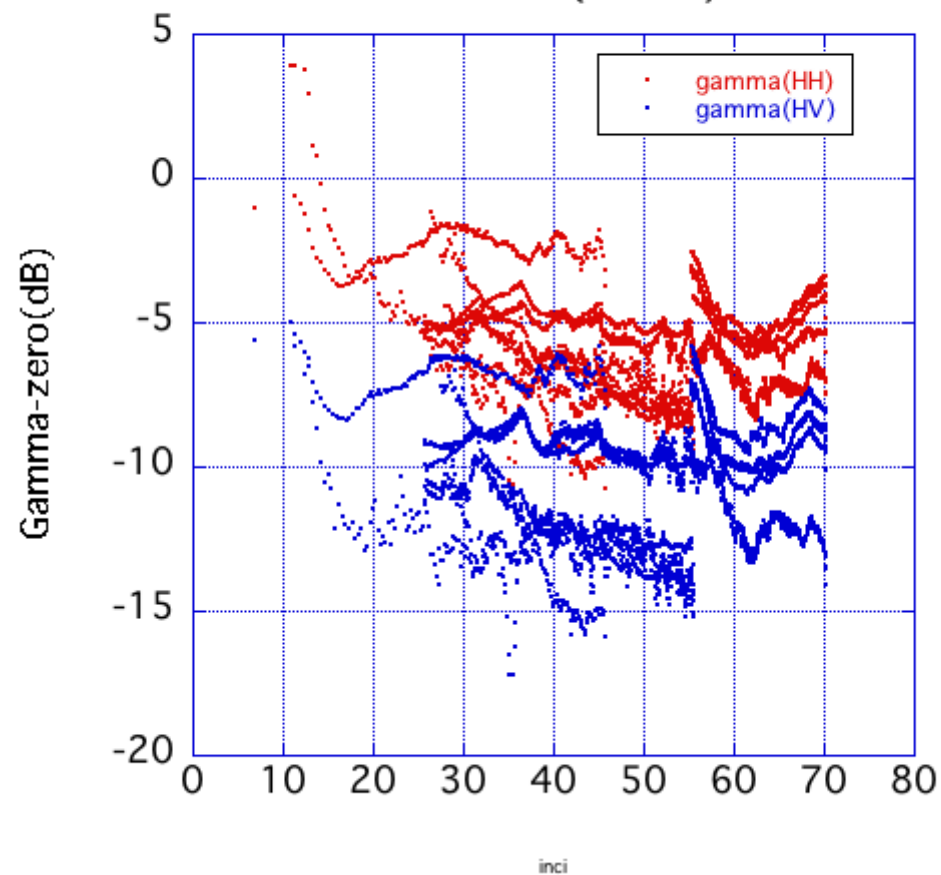




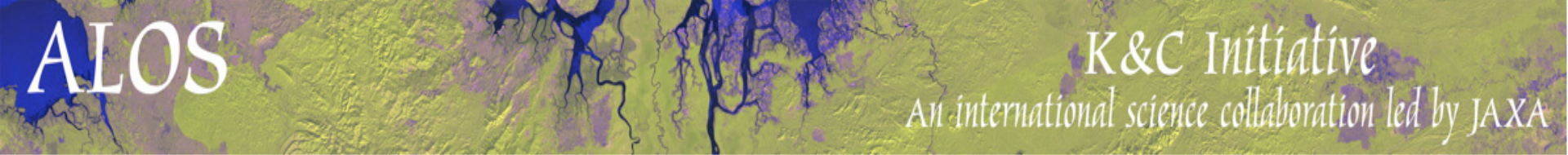
ScanSAR-5Scan(14 sites)



ScanSAR714 (16 cases)



ビーム	オフナディア角 [deg]	HH 平均値[dB] 標準偏差	HV 平均値[dB] 標準偏差
F2-5	28.2	-5.911	-10.346
		0.211	0.179
F2-6	32.5	-6.076	-10.396
		0.248	0.205
F2-7	36.2	-5.874	-10.271
		0.221	0.221



ALOS

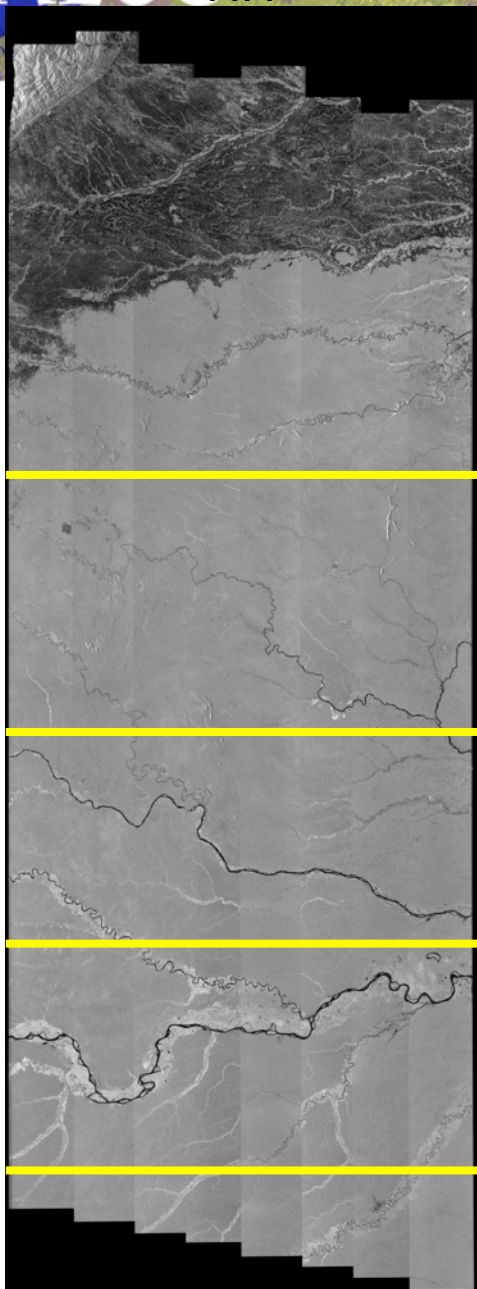
K&C Initiative

An international science collaboration led by JAXA

Cross section of the data

ALOS_{HH}

HH



K&C Initiative

an international science collaboration led by JAXA

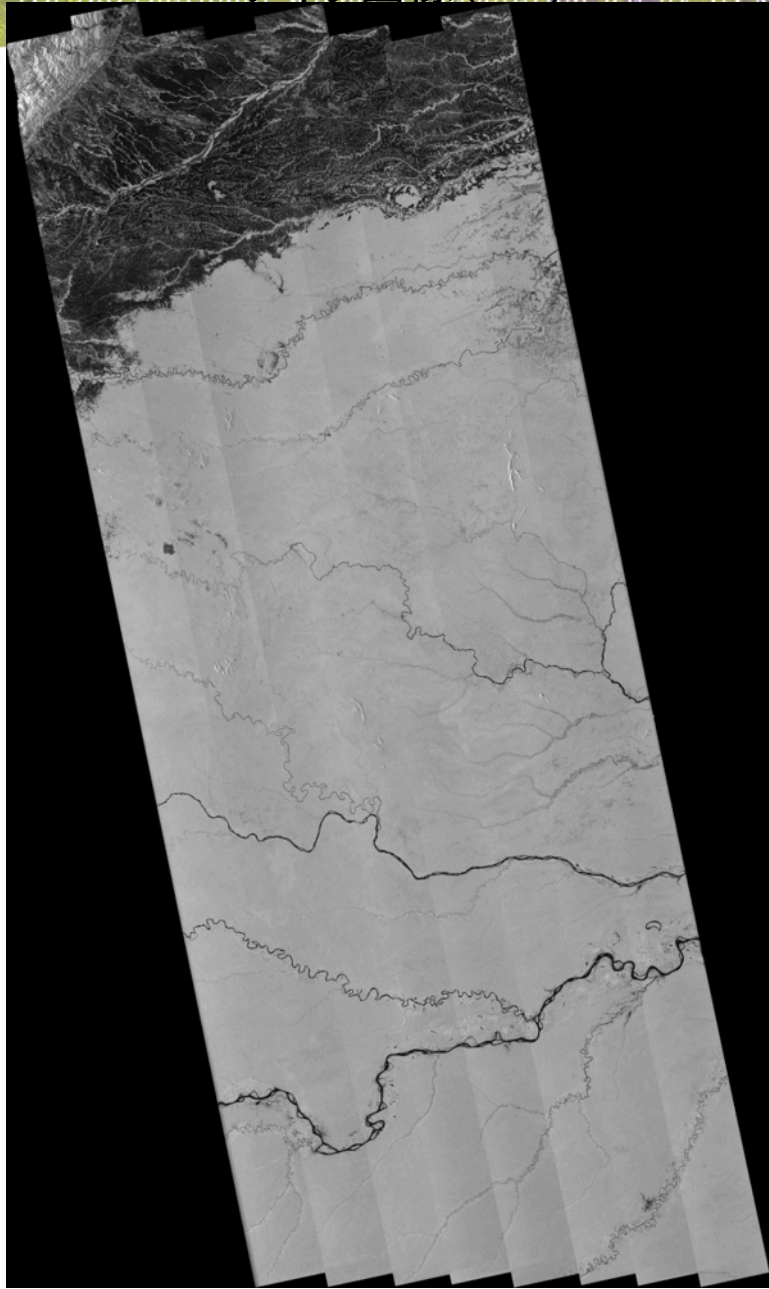
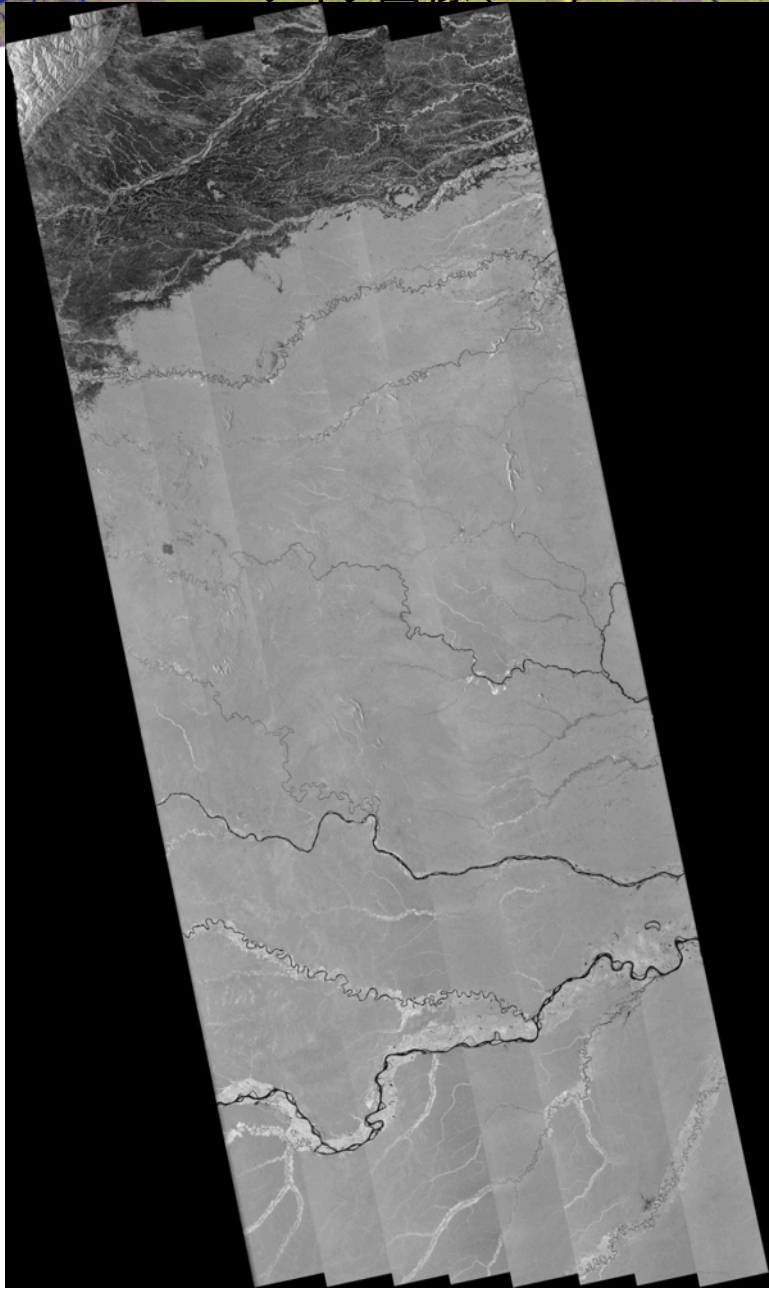
- ・調査には地図投影前モザイク (mosaic_usi_o.dat_xx)を使用
- ・指定したラインから1000ラインの平均値を算出
- ・平均値±標準偏差でのスクリーニングを3回実施

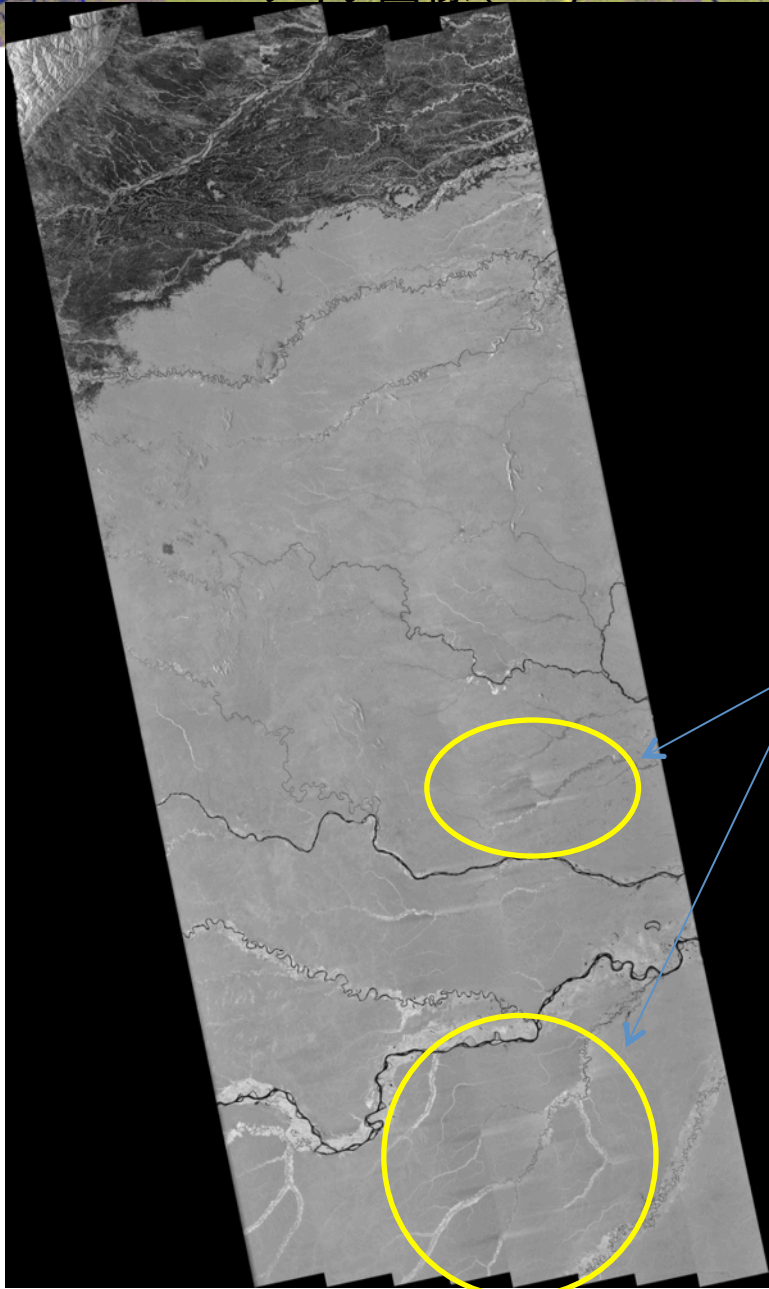
①StartLine : 22500ライン

②StartLine : 33000ライン

③StartLine : 42000ライン

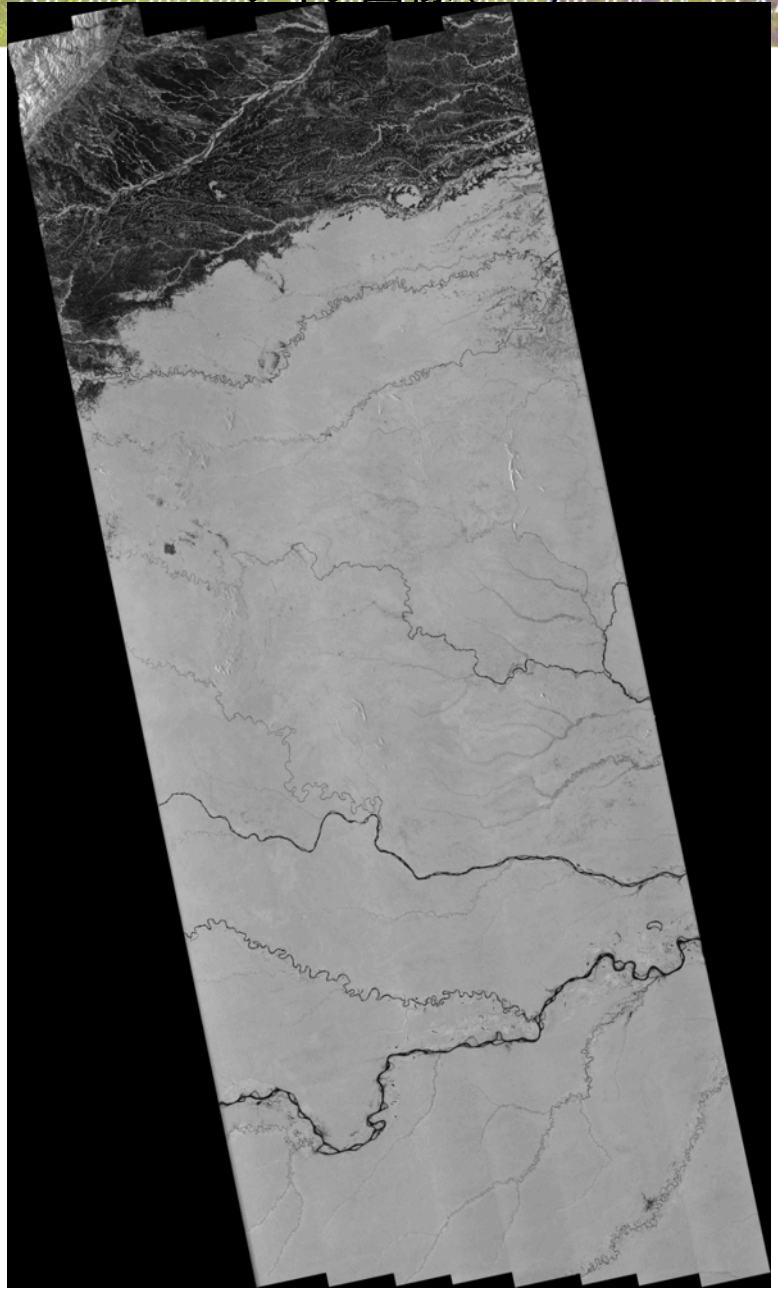
④StartLine : 52000ライン

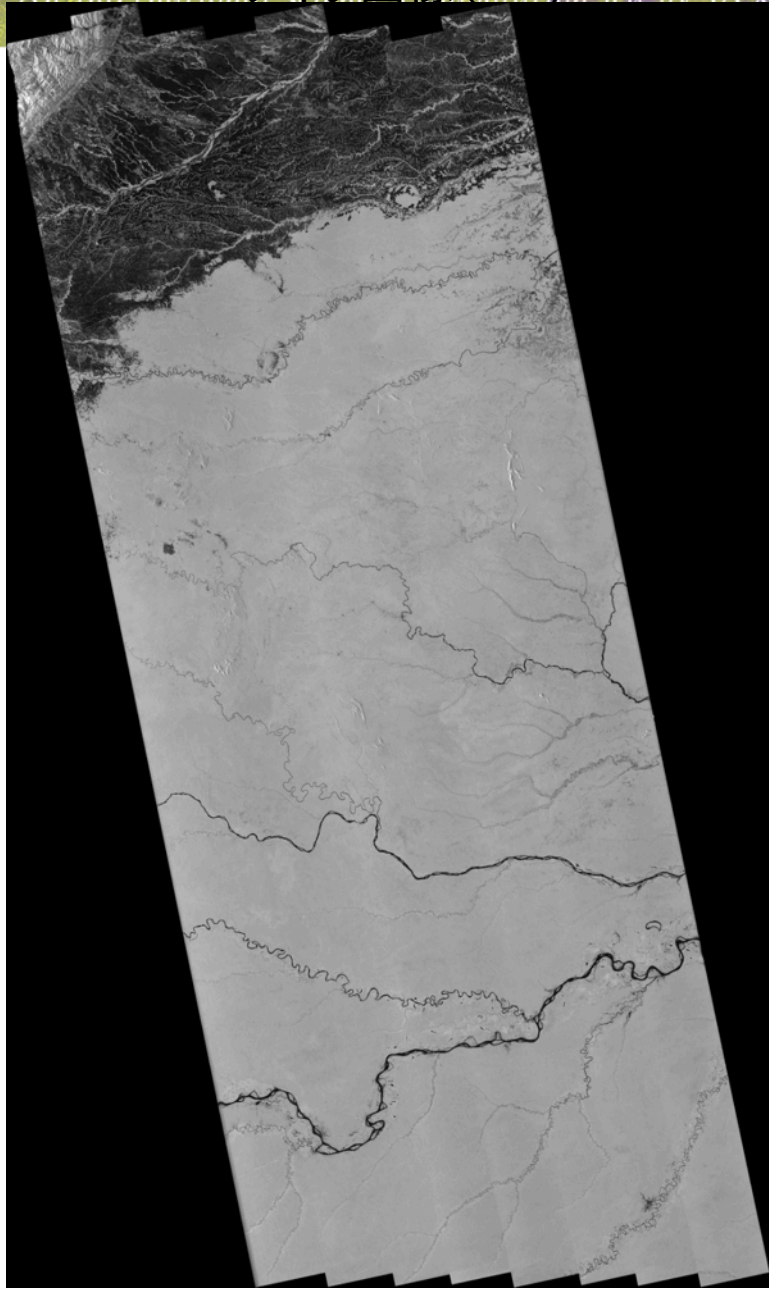
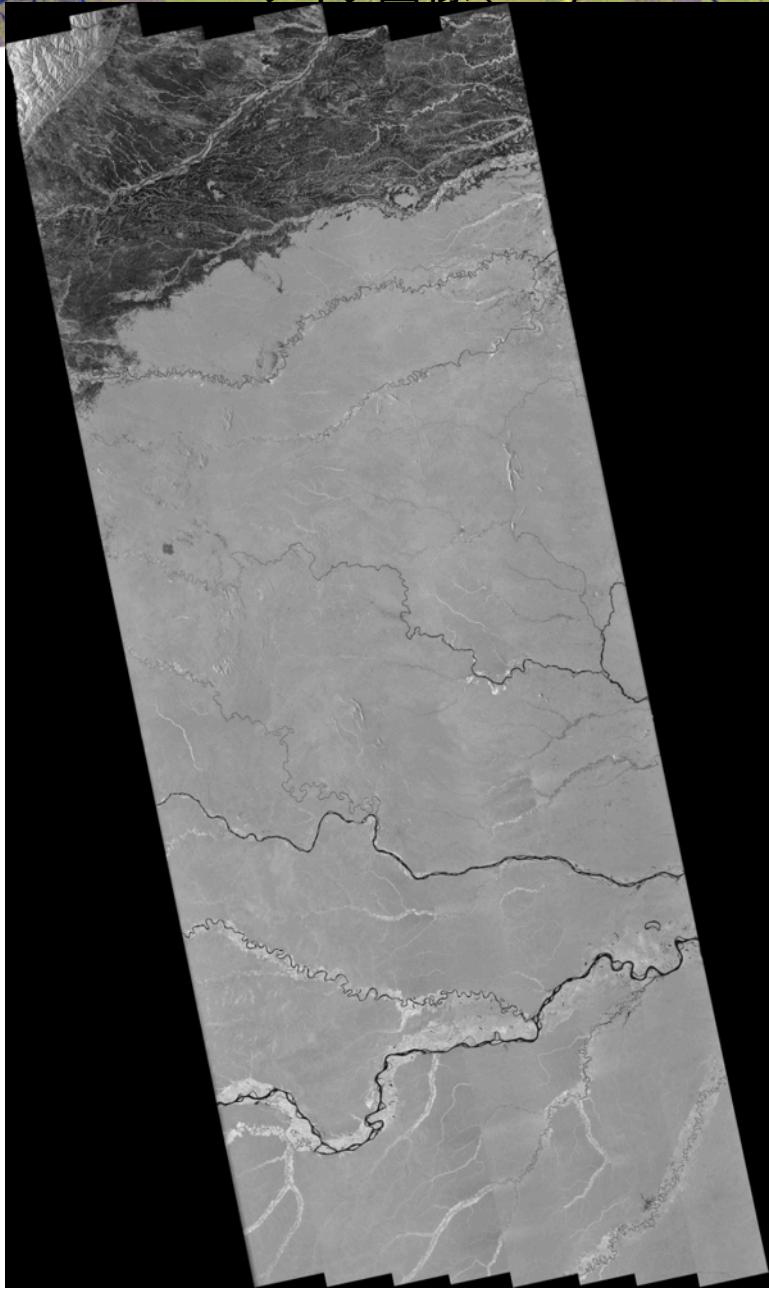


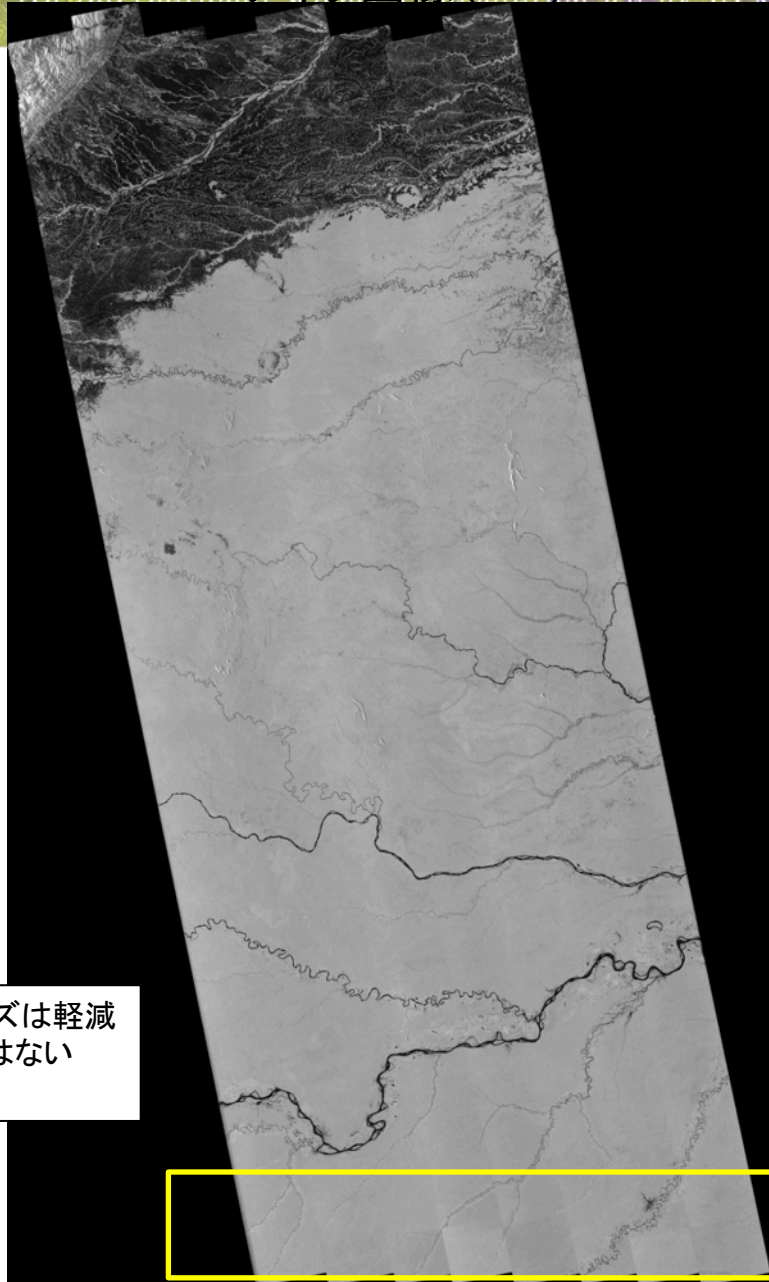
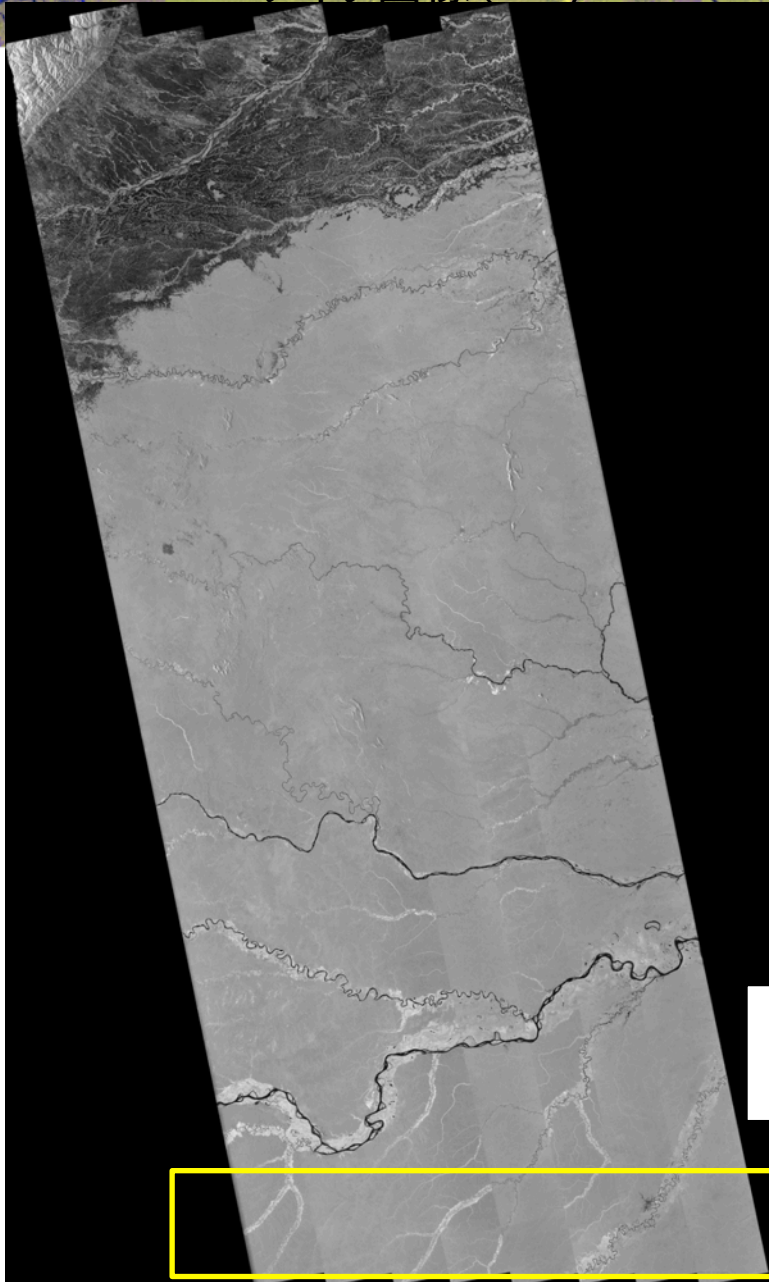


目視の限りでは
HH,HVともに
輝度差が軽減
されている

前版でなかった
ノイズのような
ものがある

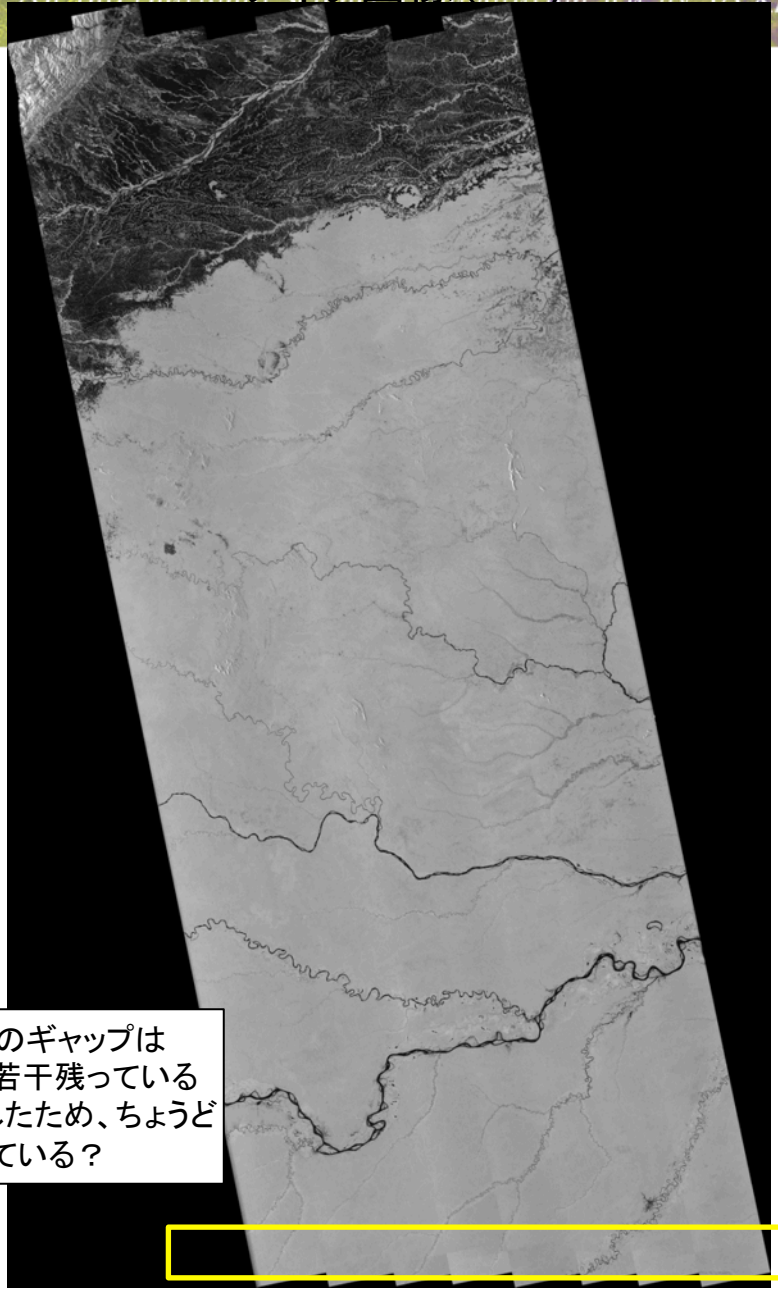
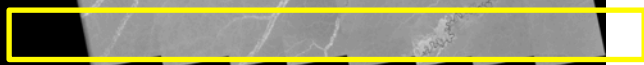
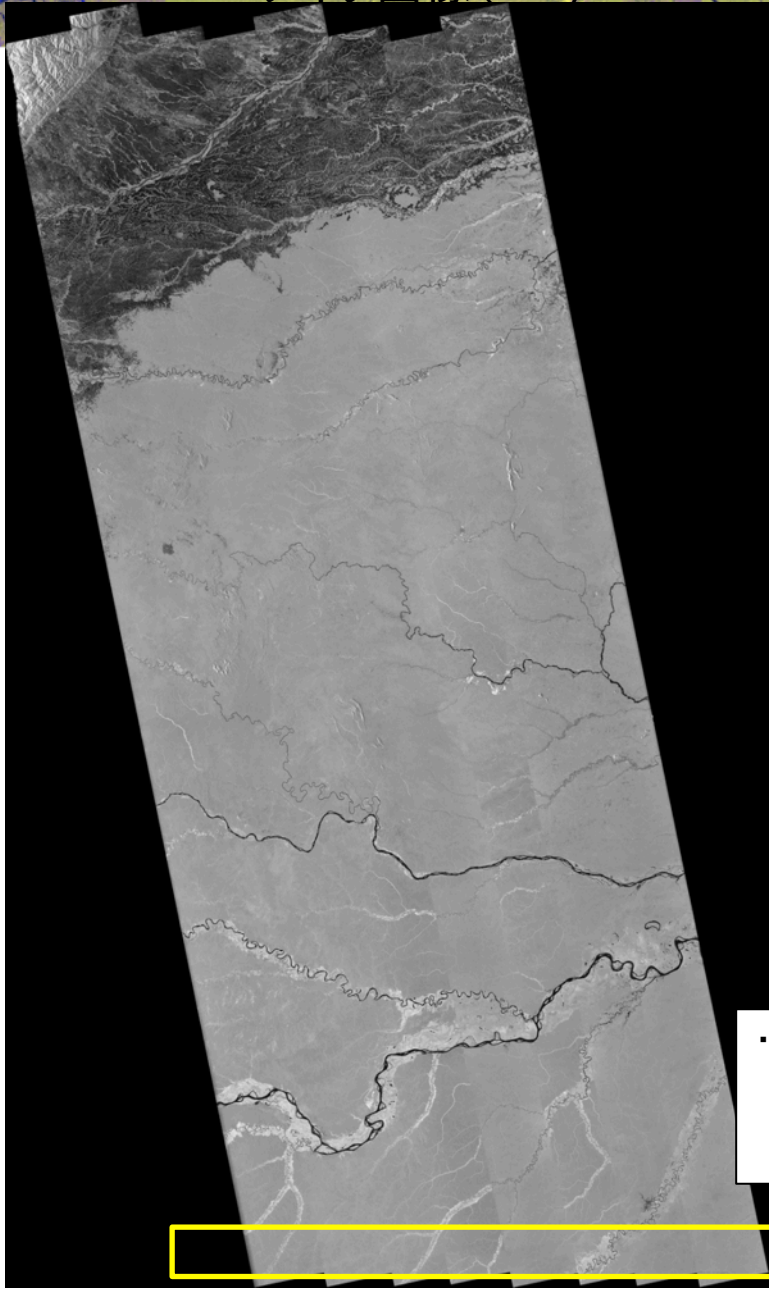




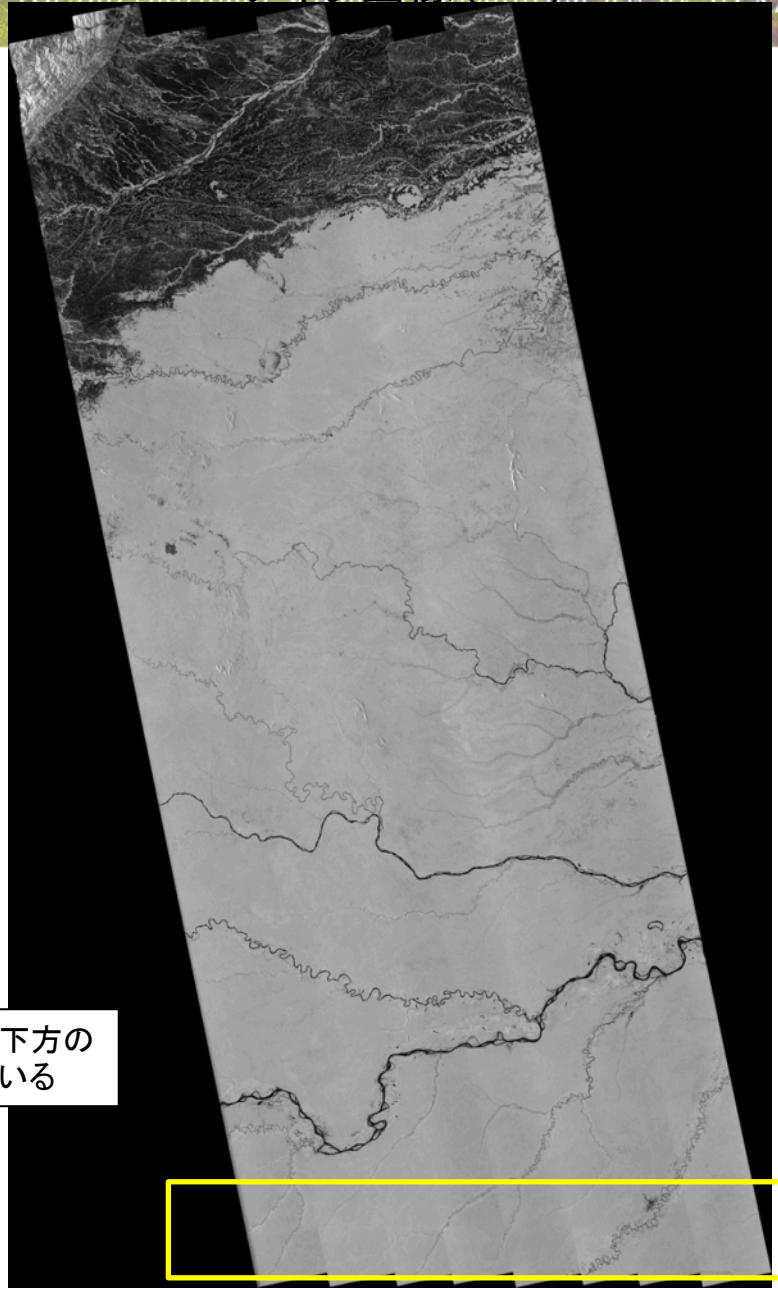
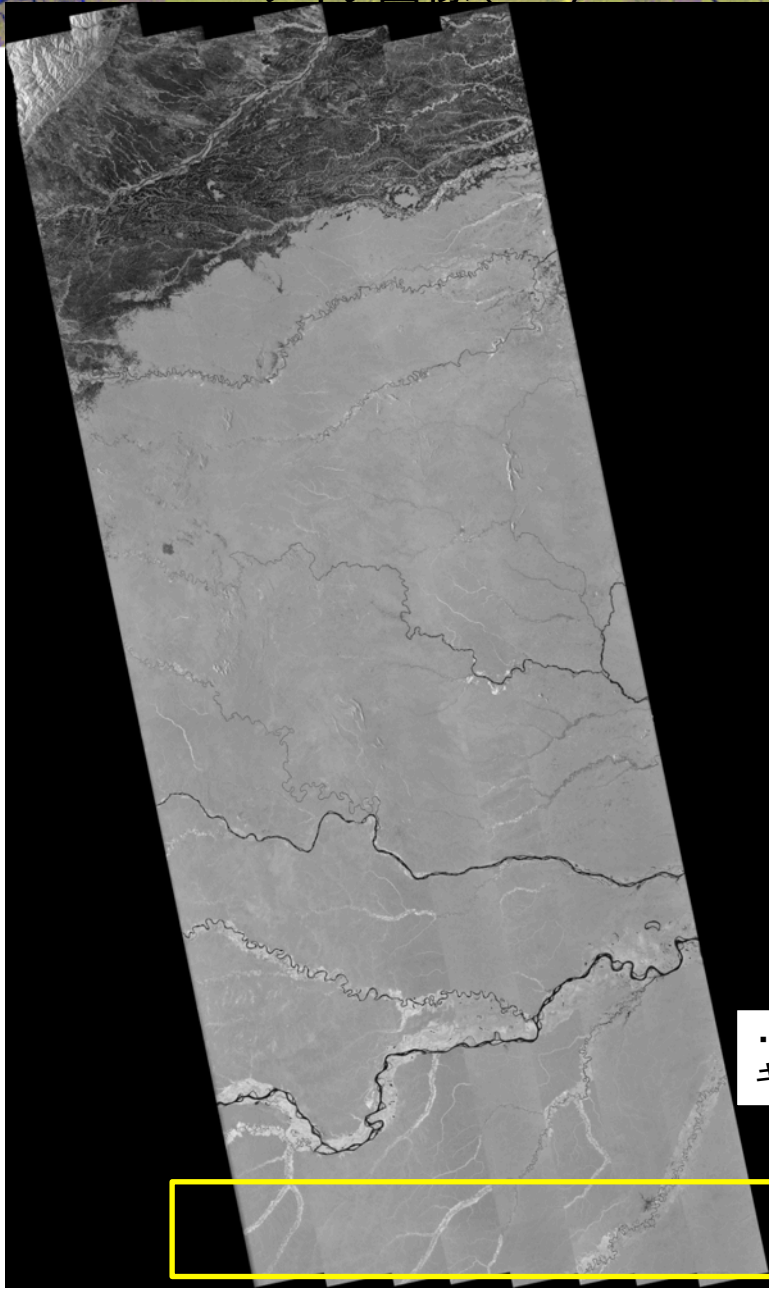


- ・前版と比較してノイズは軽減
- ・パス下方で前版にはないギャップが出ている

モザイク画像 (HH)

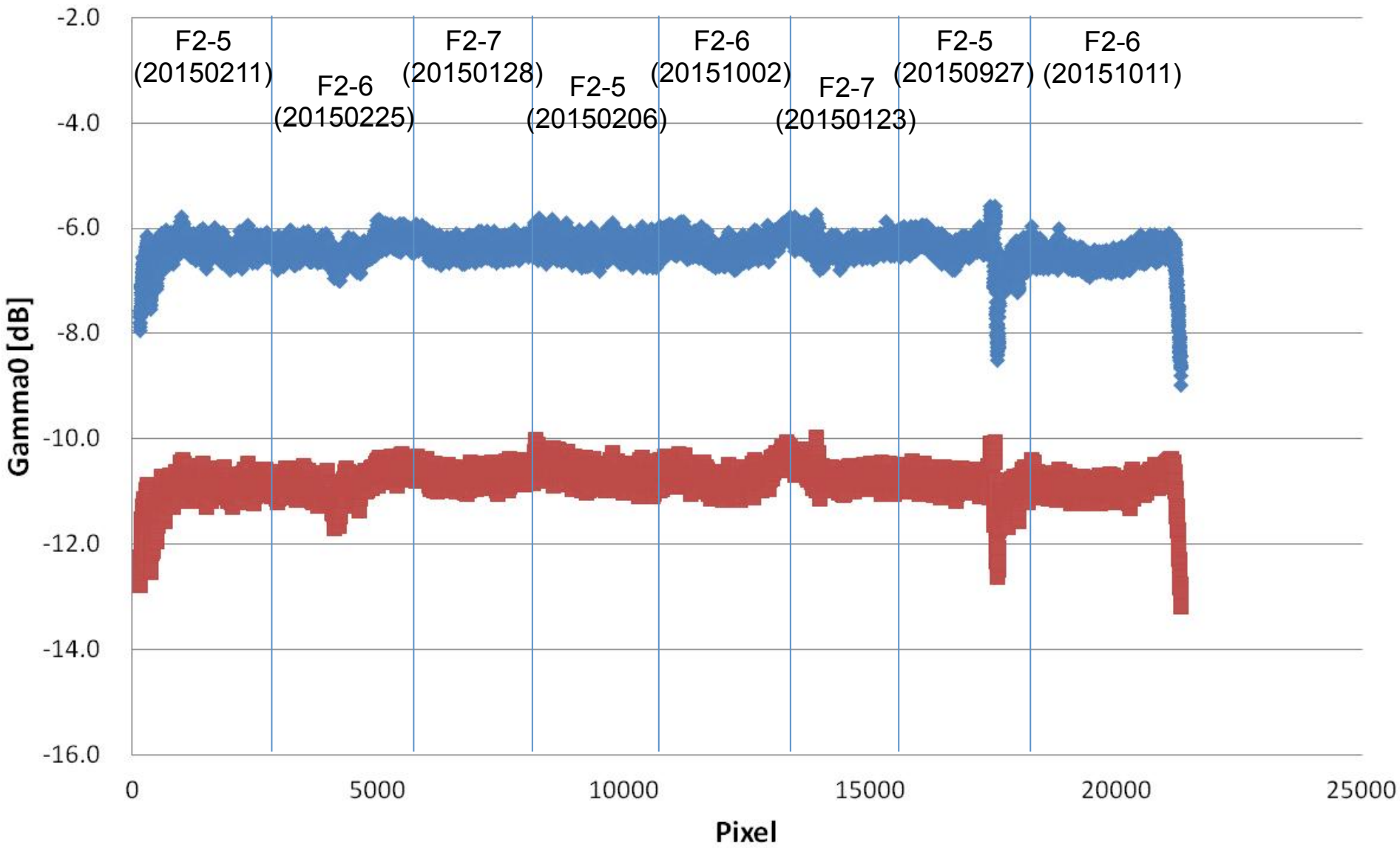


・前版と比較して下方のギャップは
軽減されているが、若干残っている
Fft size=64を32にしたため、ちょうど
半分くらい軽減されている？

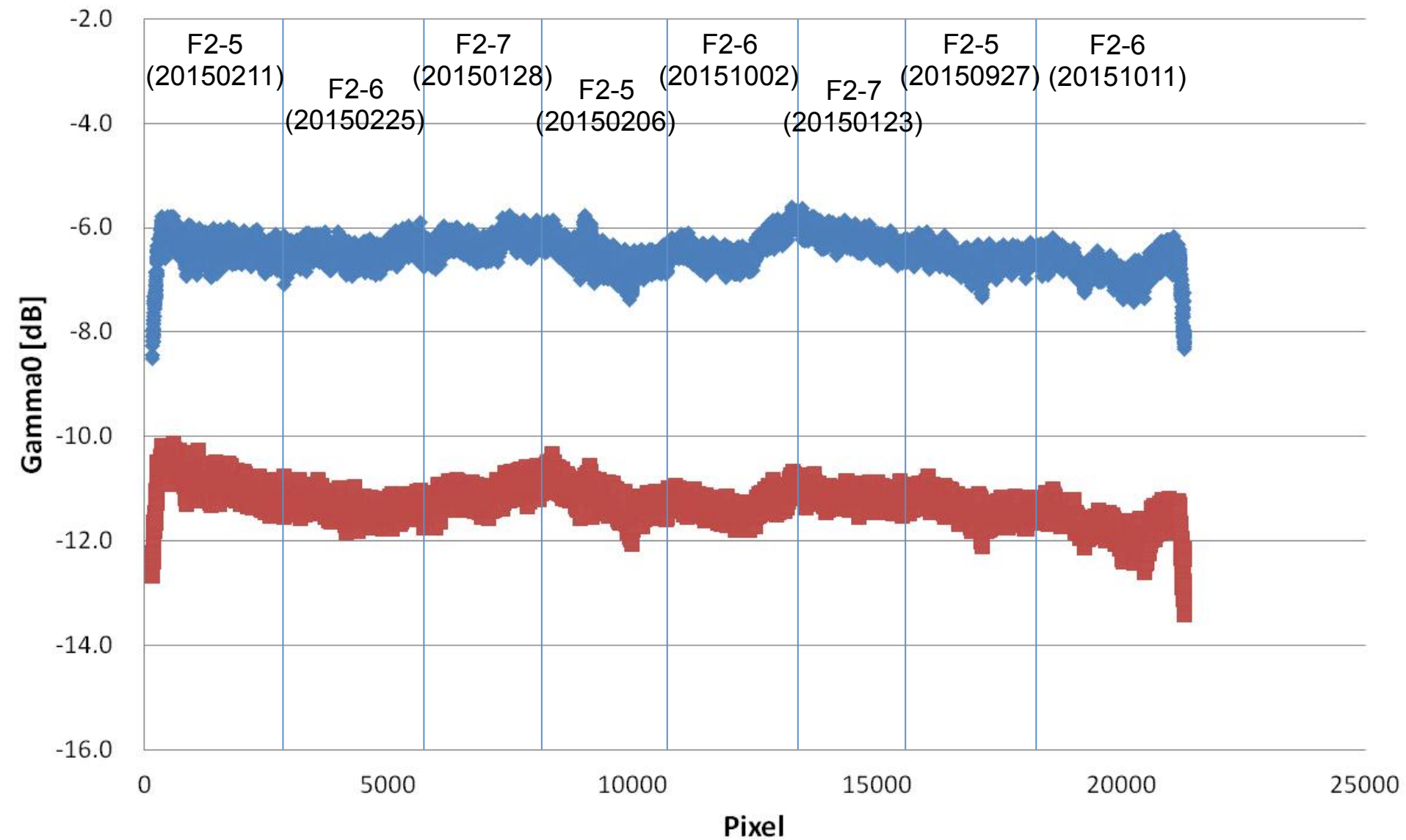


・前版で出ていたパス下方の
ギャップは改善されている

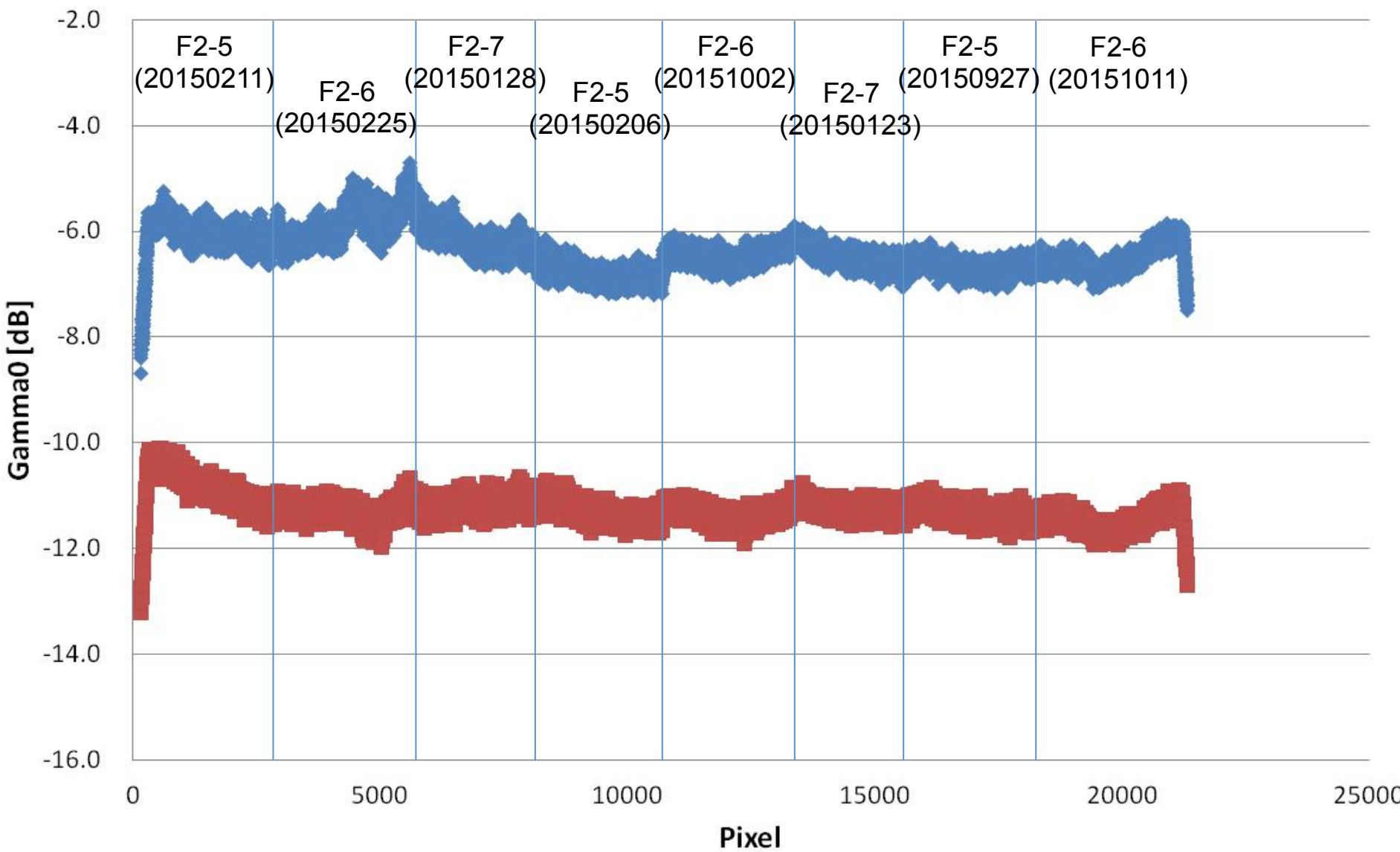
Gamma0 - Pixel (StartLine : 22500)



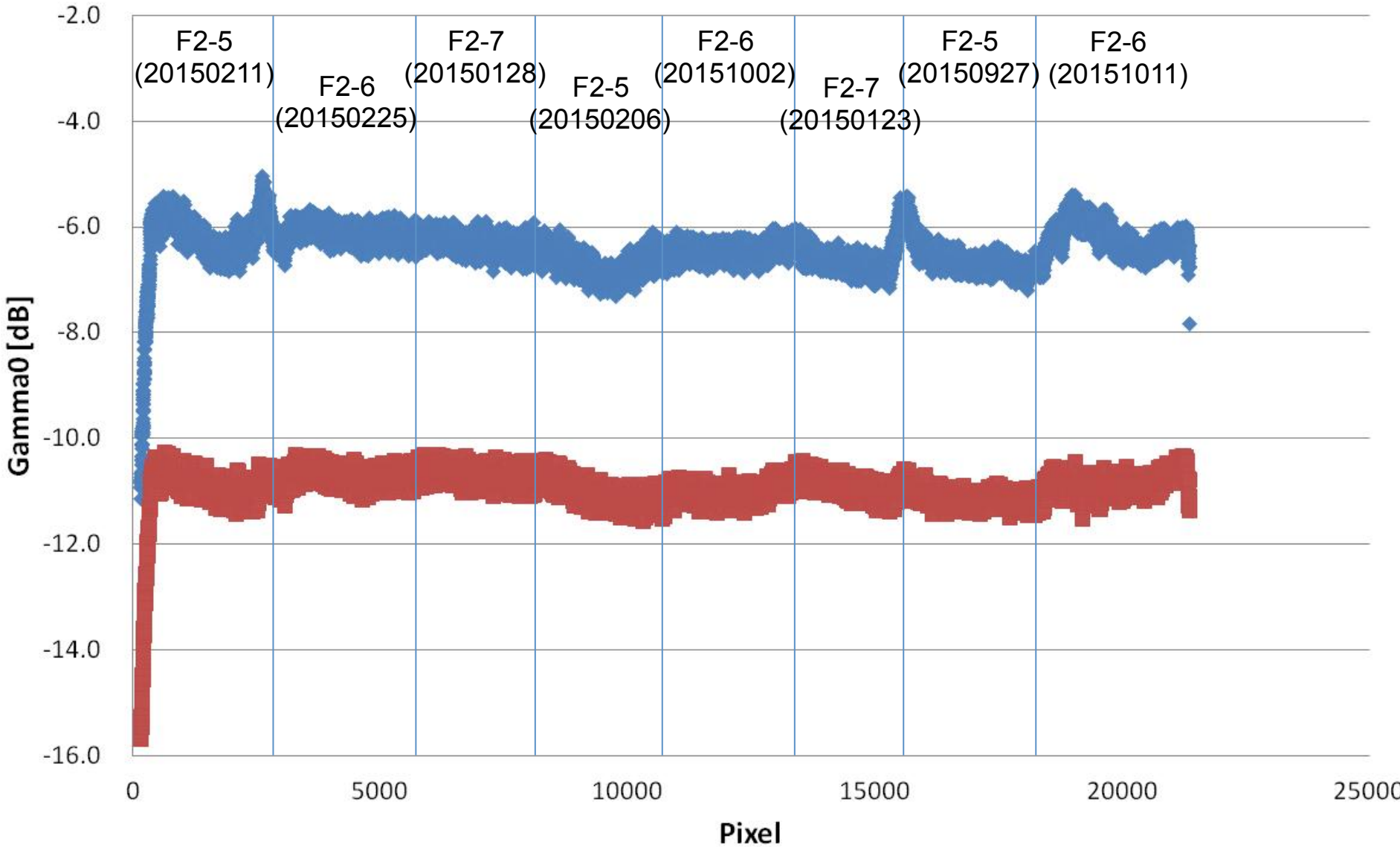
Gamma0 - Pixel (StartLine : 33000)



Gamma0 - Pixel (StartLine : 42000)

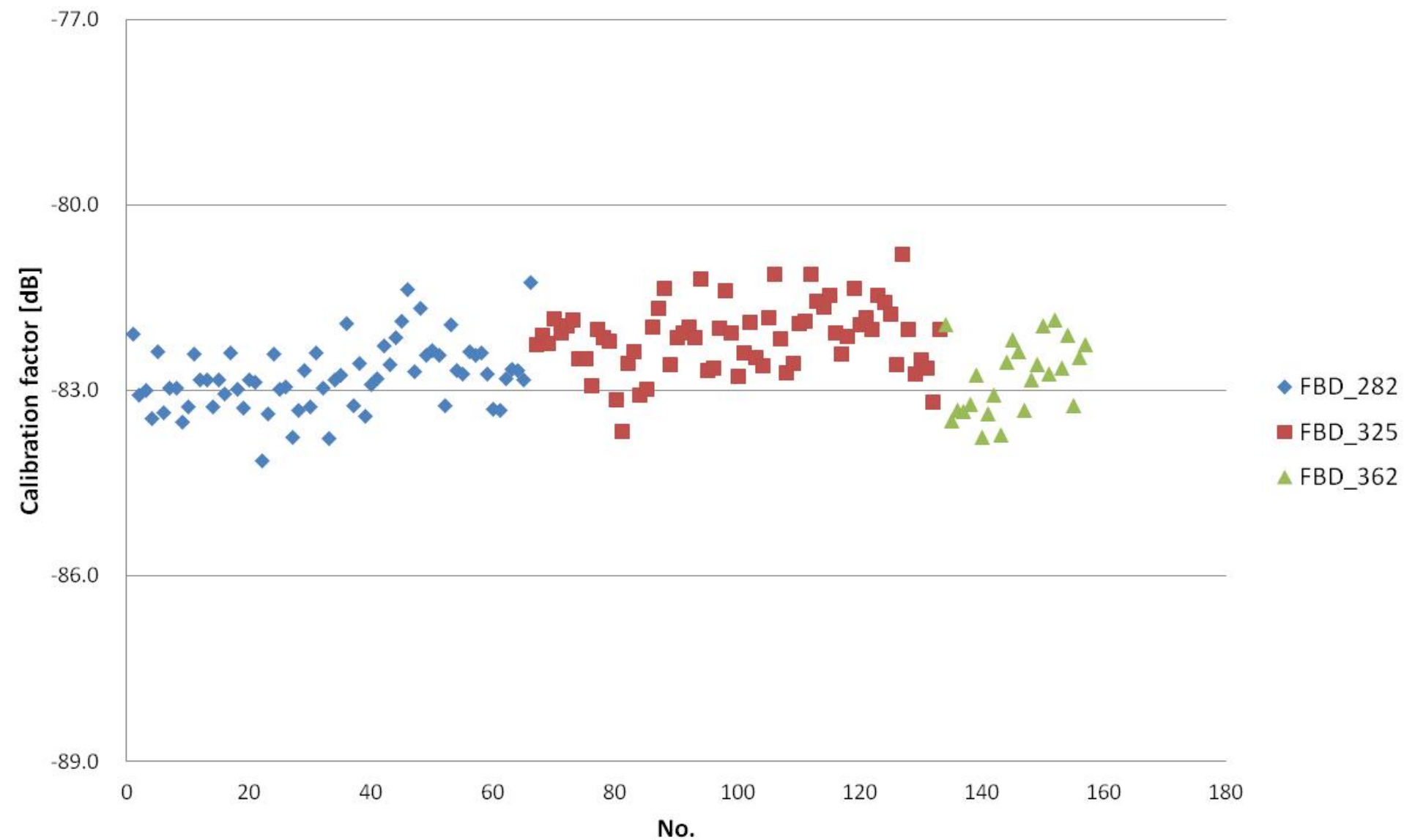


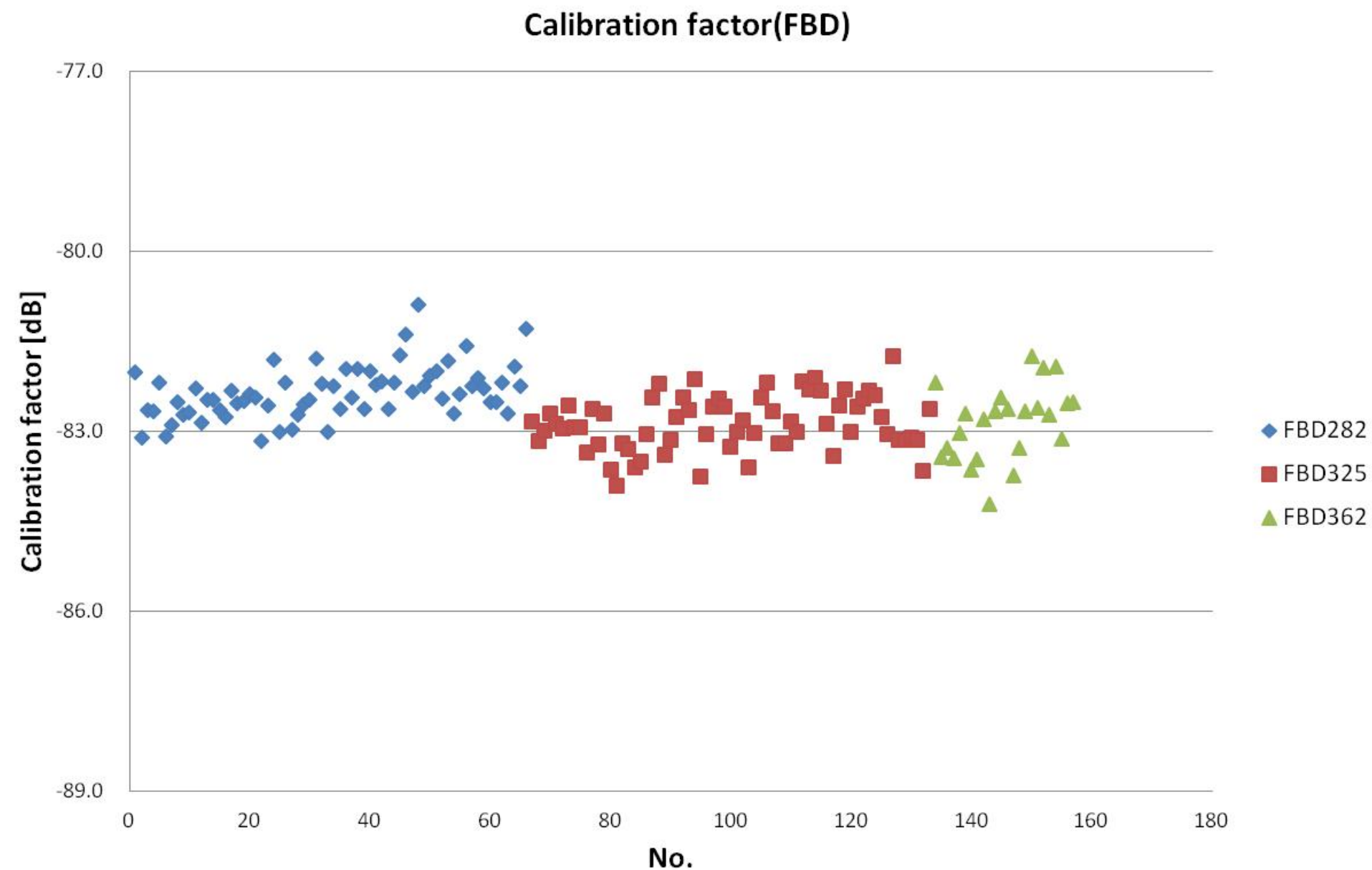
Gamma0 - Pixel (StartLine : 52000)



ポイントターゲット評価結果 (2016.08.23.03版SIGMA-SAR)

Calibration factor (FBD, 2016.02.01版)





After antenna pattern updated

3-3. 校正係数 統計値(FBD)

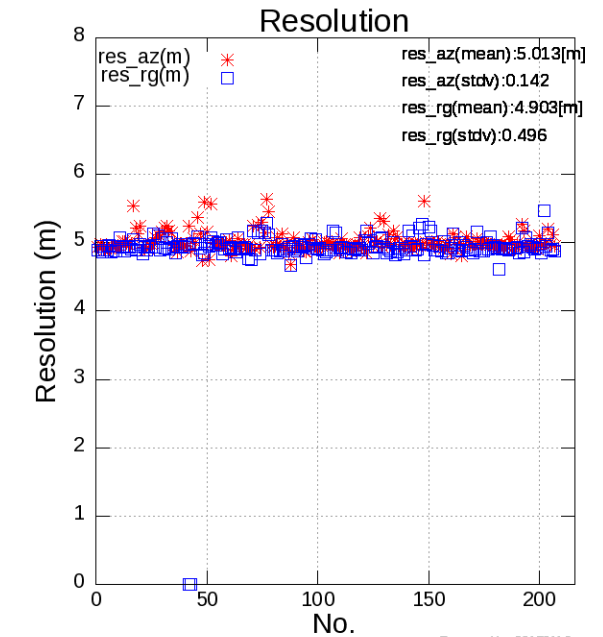
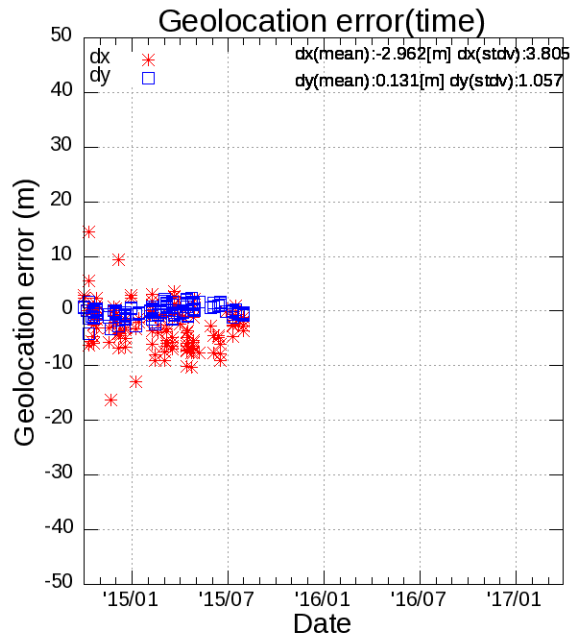
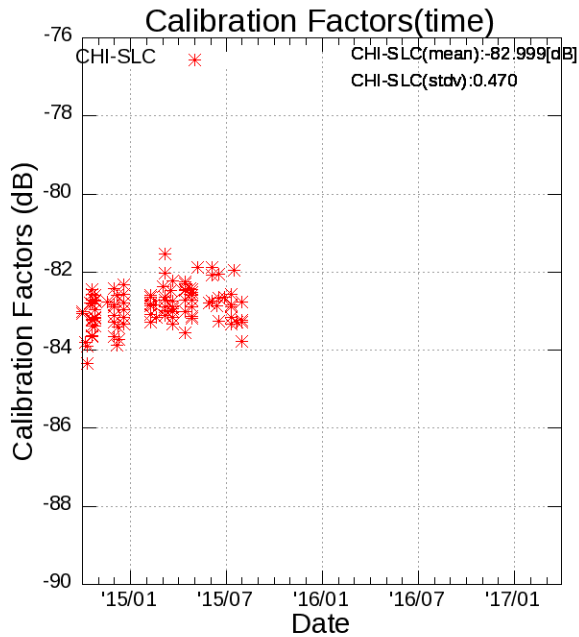
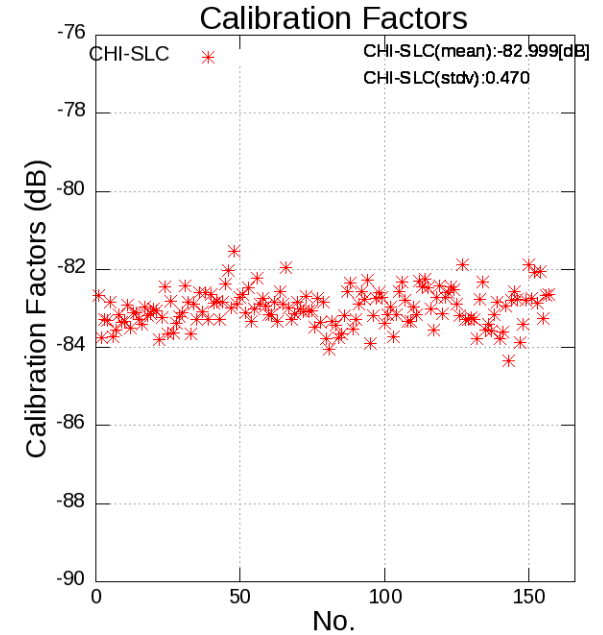
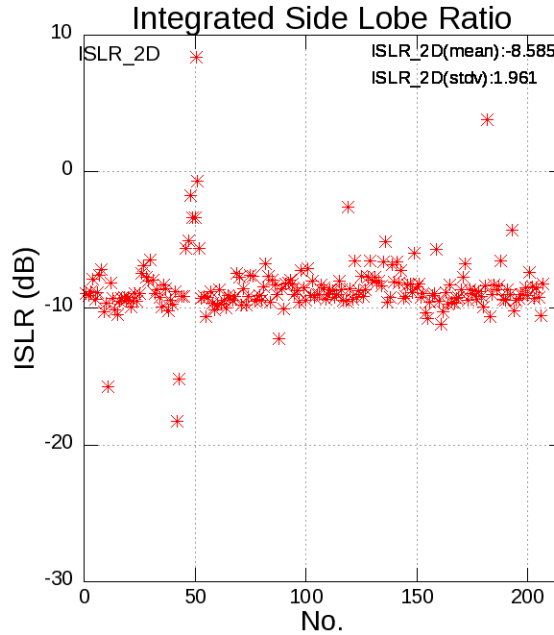
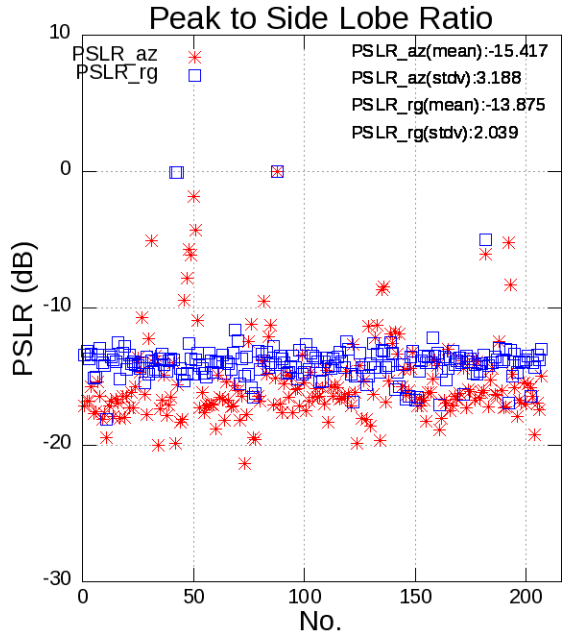
【2016.02.01版】

モード	ポイント数	平均値 [dB]	標準 偏差
FBD_282	66	-82.76	0.54
FBD_325	67	-82.13	0.55
FBD_362	24	-82.79	0.58
FBD	157	-82.50	0.63

【2016.08.23.03版】

モード	ポイント数	平均値 [dB]	標準 偏差	83.0との 差分
FBD_282	66	-82.36	0.44	0.64
FBD_325	67	-82.87	0.45	0.13
FBD_362	24	-82.87	0.62	0.13
FBD	157	-82.65	0.54	0.35

Point target analysis (FBD)



5. 各評価項目の統計値(1/2)

評価項目	モード	ポイント数	SIGMASAR (2016.02.01版)		SIGMA-SAR (2016.08.23.03版)		要求精度の 仕様値
			平均値	標準偏差	平均値	標準偏差	
PSLR(range)[dB]	-	397(411)	-14.305	2.999	-14.272	3.904	-13.26dB+2dB
PSLR(azimuth)[dB]	-	397(411)	-15.478	4.183	-15.464	4.373	-13.26dB+2dB
ISLR [dB]	-	397(411)	-8.477	2.486	-8.434	2.624	-10.16dB+2dB
CF [dB]	SBS	-	-	-	-	-	
	UBS	94(107)	-82.62	0.75	-82.01	1.02	
	HBQ	41(42)	-83.33	0.59	-84.35	0.74	
	FBD	157(157)	-82.50	0.63	-82.65	0.54	
dx_grd [m]	-	397(411)	-2.760	4.513	-2.692	4.495	20m
dy [m]	-	397(411)	-0.100	1.133	-0.123	1.120	20m
Resolution [m] (range)	SBS	-	-	-	-	-	1.78
	UBS	107(121)	1.954	0.060	1.953	0.059	1.78
	HBQ	79(83)	3.397	0.133	3.395	0.153	3.57
	FBD	211(207)	4.904	0.492	4.903	0.497	5.36
Resolution [m] (azimuth)	SBS	-	-	-	-	-	1.00x1.1(1.10)
	UBS	107(121)	3.928	0.137	3.936	0.176	2.75x1.1(3.025)
	HBQ	79(83)	3.847	0.353	3.834	0.374	3.75x1.1(4.125)
	FBD	211(207)	5.014	0.141	5.013	0.142	5.00x1.1(5.500)

評価項目	ポイント数	SIGMA-SAR (2016.02.01版)		SIGMA-SAR (2016.08.23.03版)		要求精度の 仕様値
		平均値	標準偏差	平均値	標準偏差	
Gain balance VV/HH	21(21)	0.990	0.028	0.991	0.028	1.047
Phase balance VV/HH	21(21)	0.463	1.277	0.463	1.277	5 [deg]
Cross talk HV/HH	21(21)	-42.462	4.226	-42.443	4.221	-30 [dB]
Cross talk VH/VV	21(21)	-40.983	5.456	-40.996	5.465	-30 [dB]
Cross talk	21(21)	-42.851	7.008	-42.839	6.999	-30 [dB]

※ ()内の数字は2016.08.23.03版評価におけるポイント数

- Antenna Patterns for FB, UB, HB, and ScanSAR were calibrated. First beam of ScanSAR needs more calibration.
- Another type of smoothing function needs to be developed.
- Use the backscatter lower than 0dB in HH for balancing the two adjacent small ROI. > allows the different seasonal mosaics.
- Build the scene selection strategy. Allows the summer strips including the light order scintillation.
- From this year, new mosaic will be generated using the updated processing routines.