

ALOS-2/PALSAR-2 Calibration and Validation Results

Ver. 2021.9

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Summary of evaluation results of ALOS-2 PALSAR-2 standard products [1/3]

✓ Observation dates of the evaluated scenes: July, 2014 ~ September, 2021

Items		Observation modes	Results	Number of data	Requirements
Geometric accuracy [m]		Stripmap and Spotlight	5.46 m (L1.1) 6.73 m (L2.1)	510 129	≤ 20 m
		ScanSAR	60.77 m (L1.1) 29.33 m (L2.1)	7 8	≤ 100 m
Radiometric accuracy [dB]	Evaluation using corner reflectors	Stripmap and Spotlight	0.529 dB (1σ) (mean CF: -83.019 dB)	334	≤ 1.0 dB
	Evaluation using images over Amazonian forests	Stripmap and Spotlight	0.41 dB (1σ) (mean γ^0 : -7.50 dB)	30 scenes	
Polarimetry	VV/HH amplitude ratio	Stripmap 6m (polarimetry)	1.003 ($\sigma=0.012$)	49	$\leq 1 \pm 0.047$
	VV/HH phase difference [deg.]		-0.323 deg ($\sigma=1.436$)		≤ 5 deg
	Cross talk [dB]		-42.858 dB ($\sigma=6.638$) [HV/HH] -42.667 dB ($\sigma=5.518$) [VH/VV]		≤ -30 dB

Summary of evaluation results of ALOS-2 PALSAR-2 standard products [2/3]

Items		Observation modes	Results	Number of data	Requirements
Resolution [m]		Spotlight	Az. 0.95 ($\sigma=0.32$) Rg. 1.69 ($\sigma=0.01$)	8	Az. 1.00 x 1.1 Rg. 1.78
		Stripmap 3m	Az. 2.81 ($\sigma=0.02$) Rg. 1.71 ($\sigma=0.02$)	176	Az. 2.75 x 1.1 Rg. 1.78
		Stripmap 6m	Az. 4.01 ($\sigma=0.03$) Rg. 3.51 ($\sigma=0.02$)	95	Az. 3.75 x 1.1 Rg. 3.57
		Stripmap 10m	Az. 4.96 ($\sigma=0.05$) Rg. 5.32 ($\sigma=0.05$)	74	Az. 5.00 x 1.1 Rg. 5.36
Sidelobe (dB)	PSLR	All	Az. -16.244 ($\sigma=2.308$) Rg. -12.782 ($\sigma=0.507$)	353	$\leq -13.26+2.00$ dB
	ISLR	All	-9.187 ($\sigma=1.603$)		$\leq -10.16+2.00$ dB

Summary of evaluation results of ALOS-2 PALSAR-2 standard products [3/3]

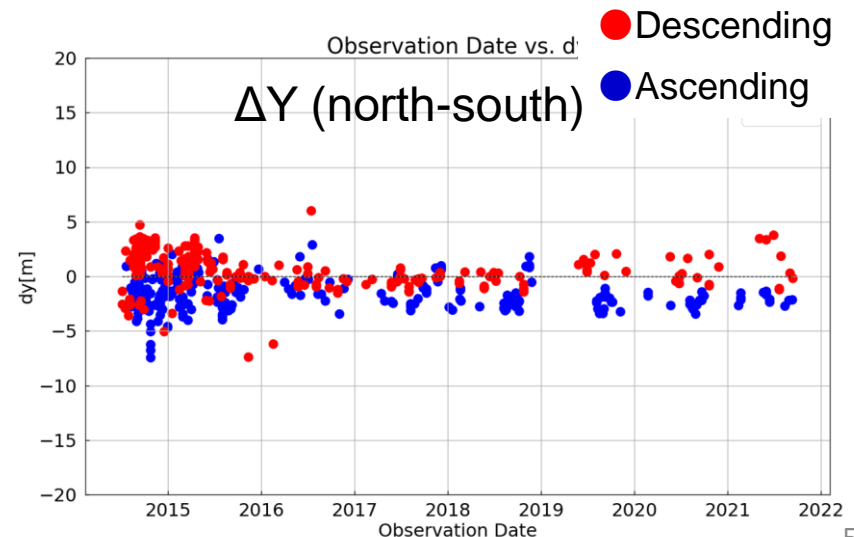
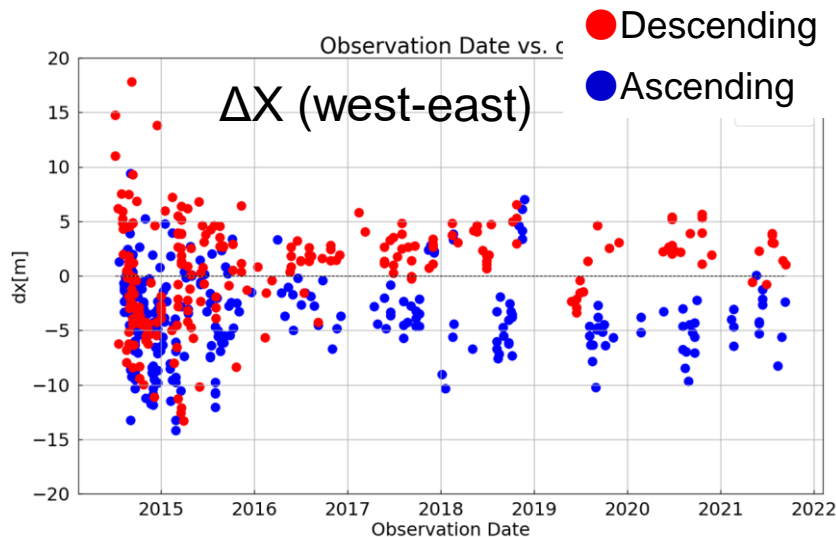
Items		Observation modes	Results	Number of data	Requirements
NESZ [dB]		Stripmap 3m (U2)	-36.6 (HH)	3	≤ -24.0 dB (scene center)
		Stripmap 6m (FP6-3~7)	-36.0 (HH) -46.0 (HV)	5	≤ -28.0 dB (scene center)
		Stripmap 10m (F2)	-41.1 (HH) -49.2 (HV)	3	≤ -26.0 dB (scene center)
Ambiguity [dB]	Azimuth	All	14-23 dB (ave. 20dB)	7 scenes	$\geq 20-25$ dB
	Range	All	Not visible	7 scenes	$\geq 20-25$ dB

Evaluation results of geometric accuracy

Differences between point target responses in SAR images and in situ GPS measurements

Mode	ΔX (west-east) [m]			ΔY (north-south) [m]			n
	mean (bias)	SD	RMS	mean (bias)	SD	RMS	
Spotlight	-5.126	4.365	6.946	-0.569	1.870	1.964	10
Stripmap 3 m (U2-6~9, U3-10~14)	0.188	4.277	4.281	0.038	1.837	1.837	239
Stripmap 6 m (FP6-3~7)	-3.296	3.777	5.020	-1.522	1.406	2.076	142
Stripmap 10 m (F2-5~7)	-3.533	5.226	6.317	-0.736	2.282	2.399	119

Timeseries plot of Stripmap 3 m, 6m, 10m and Spotlight 1m

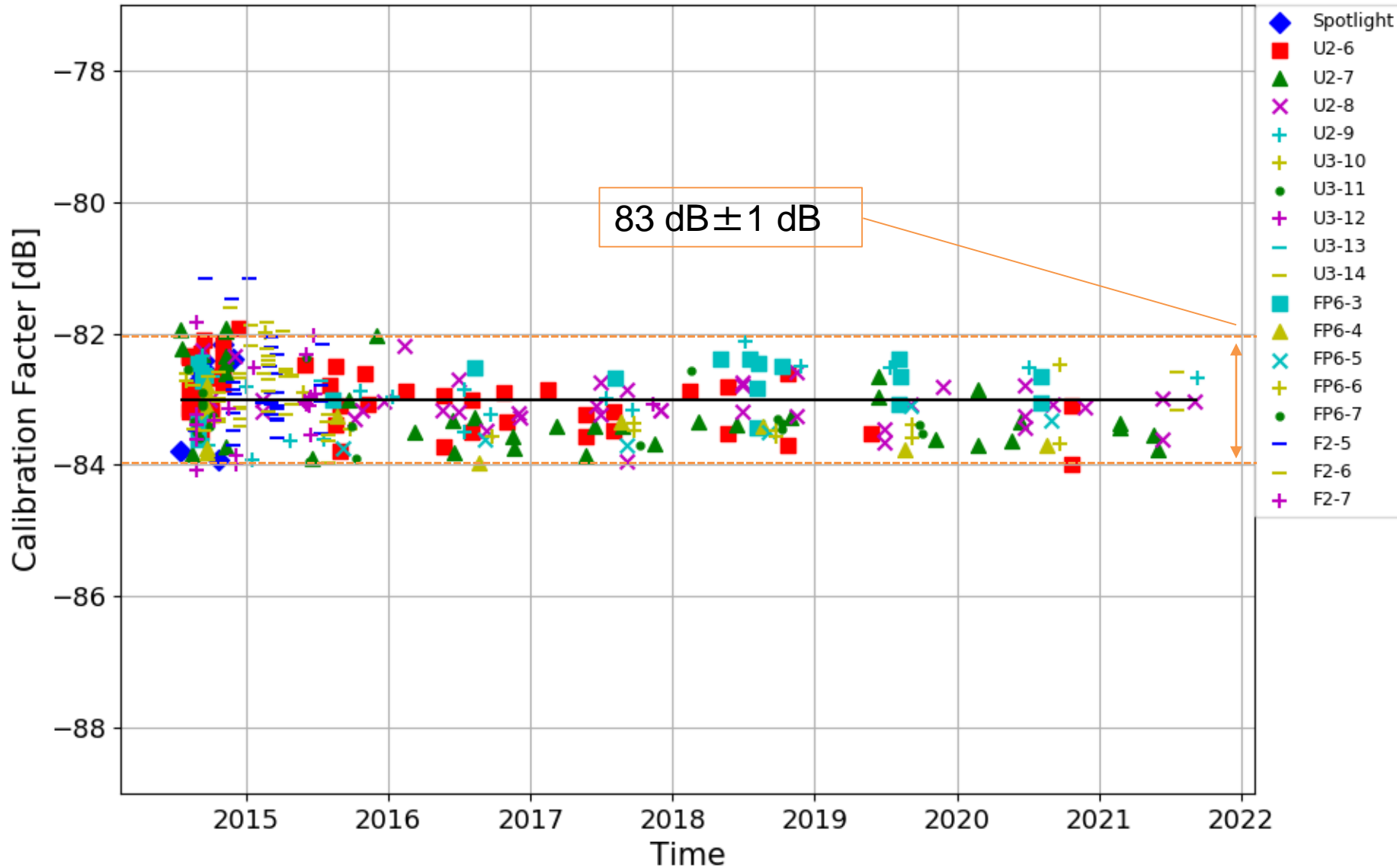


Evaluation results of radiometric accuracy – calibration factor (CR) [1/2]

Mode	Mean [dB]	SD [dB]	RMS to -83 dB [dB]	n
Spotlight	-82.831	0.657	0.682	8
U2-6	-82.971	0.436	0.437	50
U2-7	-83.268	0.519	0.586	35
U2-8	-83.076	0.363	0.372	40
U2-9	-82.967	0.471	0.473	25
FP6-3	-82.776	0.376	0.441	19
FP6-4	-83.419	0.381	0.580	12
FP6-5	-83.471	0.233	0.559	7
FP6-6	-83.280	0.424	0.515	12
FP6-7	-83.272	0.377	0.469	19
F2-5	-82.806	0.659	0.687	31
F2-6	-82.838	0.526	0.551	44
F2-7	-83.172	0.583	0.609	17
ALL	-83.035	0.513	0.515	319

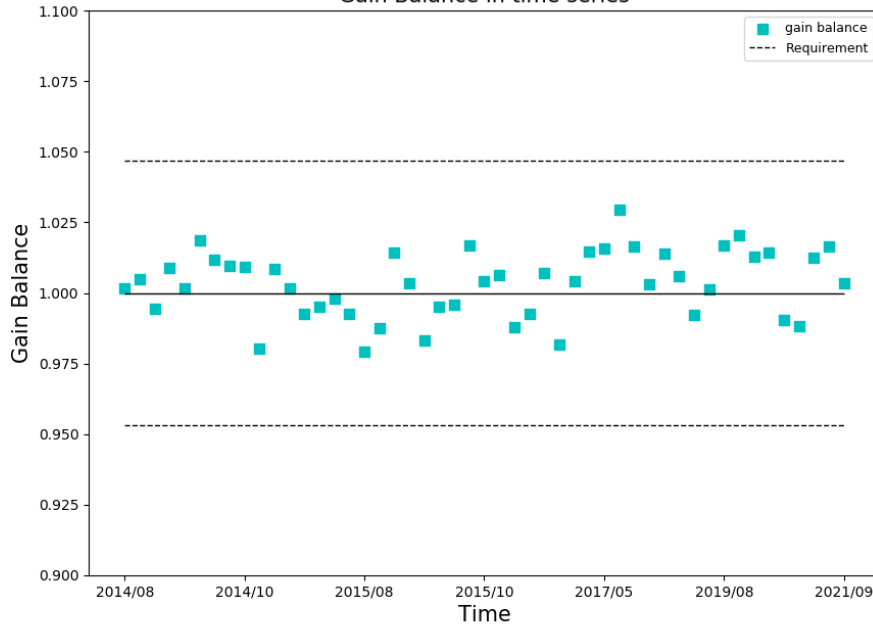
Evaluation results of radiometric accuracy – calibration factor (CR) [2/2]

Calibraion Factor by beams in time series

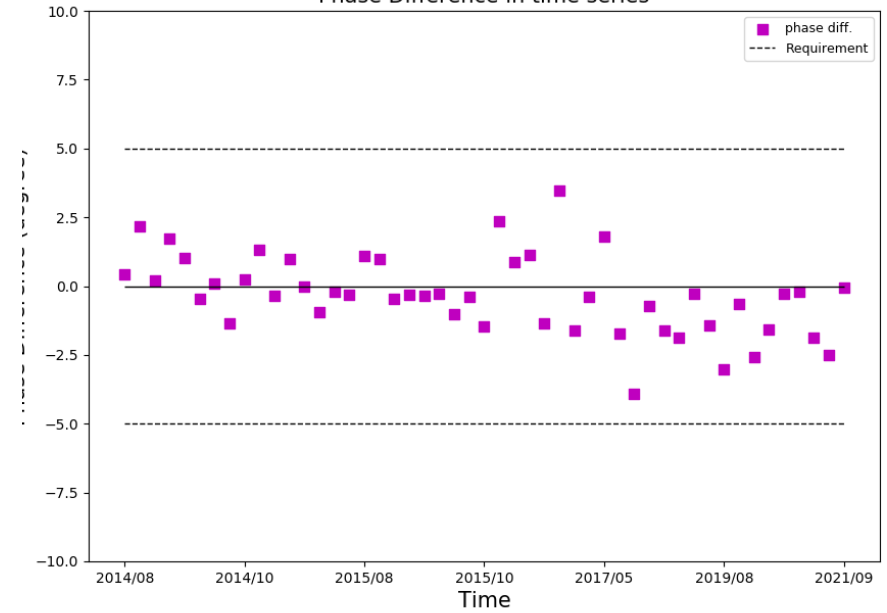


Evaluation results of polarimetric accuracy

Gain Balance in time series



Phase Difference in time series



Cross Talk in time series

