

ALOS-2/PALSAR-2 Calibration and Validation Results

Ver. 2024.11

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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, 2024

Items		Observation modes	Results	Number of data	Requirements
Geometric accuracy [m]		Stripmap and Spotlight	5.36 m (L1.1) 6.73 m (L2.1)	617 129	≤ 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	0.541 dB (1σ) (mean CF: -83.015 dB)	384	≤ 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)	1.005 ($\sigma=0.013$)	58	$\leq 1 \pm 0.047$
	VV/HH phase difference [deg.]		-0.437 deg ($\sigma=1.369$)		≤ 5 deg
	Cross talk [dB]		-43.151 dB ($\sigma=6.497$) [HV/HH] -43.354 dB ($\sigma=5.725$) [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 ($\sigma=0.03$) Rg. 1.71 ($\sigma=0.02$)	226	Az. 2.75 x 1.1 Rg. 1.78
		Stripmap 6m	Az. 4.01 ($\sigma=0.03$) Rg. 3.51 ($\sigma=0.02$)	110	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. -16.343 ($\sigma=2.152$) Rg. -12.738 ($\sigma=0.531$)	418	$\leq -13.26+2.00$ dB
	ISLR	All	-9.179 ($\sigma=1.479$)		$\leq -10.16+2.00$ dB

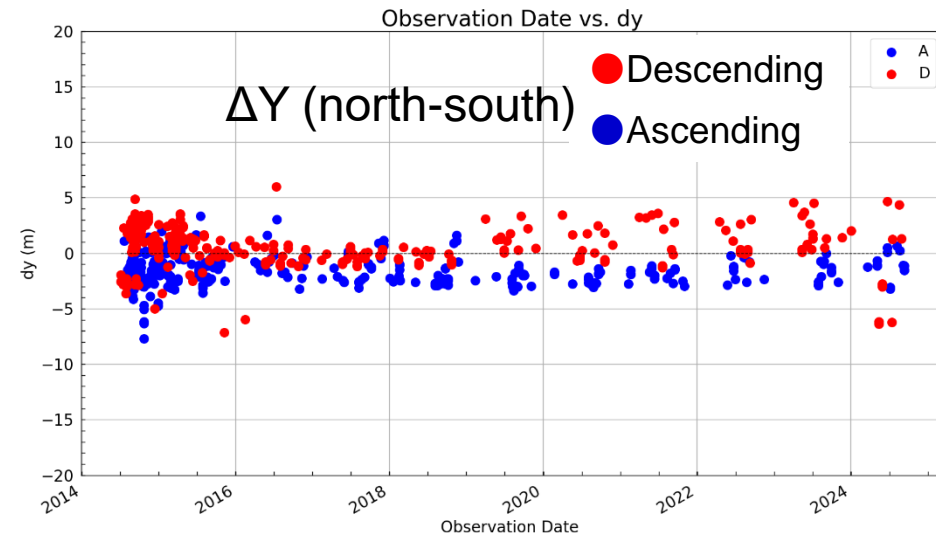
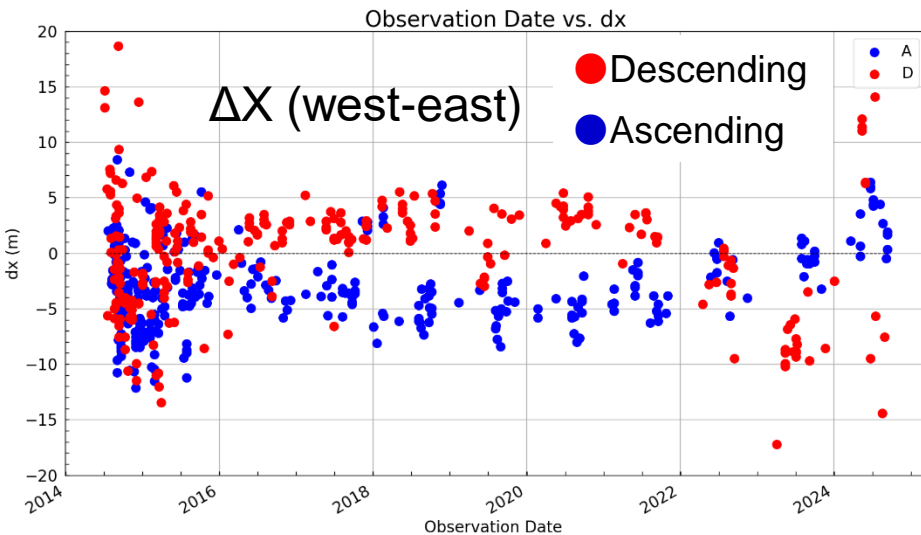
Summary of evaluation results of ALOS-2 PALSAR-2 standard products [3/3]

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	-5.190	4.499	7.083	-0.581	1.845	1.944	10
Stripmap 3 m (U2-6~9, U3-10~14)	-0.478	4.786	4.810	0.050	2.020	2.021	317
Stripmap 6 m (FP6-3~7)	-2.574	3.755	4.557	-1.451	1.344	1.981	171
Stripmap 10 m (F2-5~7)	-3.185	4.651	5.644	-0.729	2.204	2.323	119



The result of the geometric accuracy evaluation of Stripmap 3 m, 6m, 10m, and Spotlight 1m from 2014.

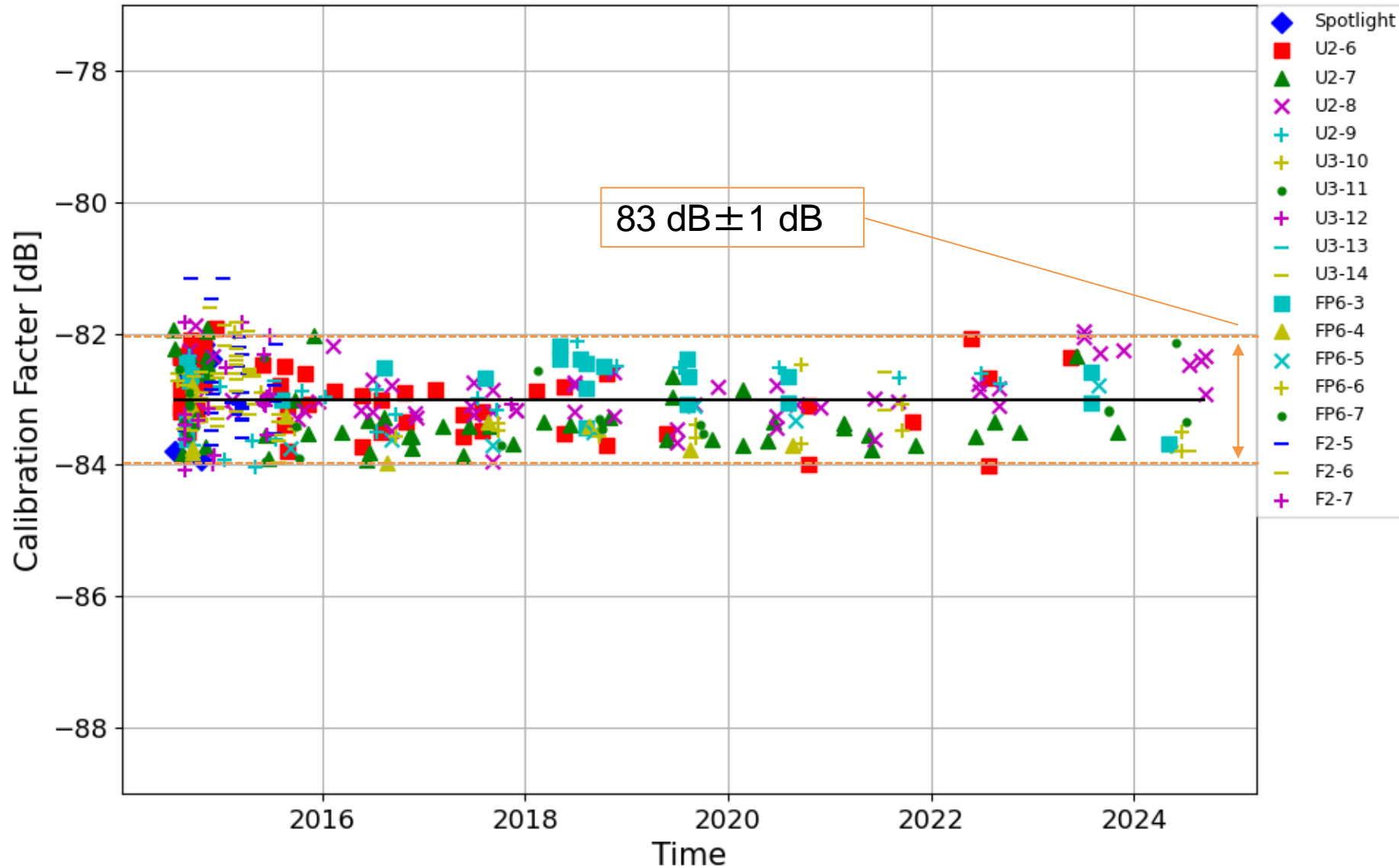
Note: Especially since 2021, geometric accuracy is affected by the ionosphere. For more information, please refer to https://www.eorc.jaxa.jp/ALOS/en/alos-2/pdf/ALOS2_calval_ionospheric_error_202207_En.pdf

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	-82.983	0.484	0.484	56
U2-7	-83.287	0.529	0.604	47
U2-8	-82.950	0.424	0.427	54
U2-9	-82.986	0.496	0.496	28
FP6-3	-82.795	0.416	0.466	23
FP6-4	-83.419	0.381	0.580	12
FP6-5	-83.384	0.326	0.524	8
FP6-6	-83.323	0.393	0.516	16
FP6-7	-83.267	0.351	0.445	22
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	-83.034	0.525	0.526	366

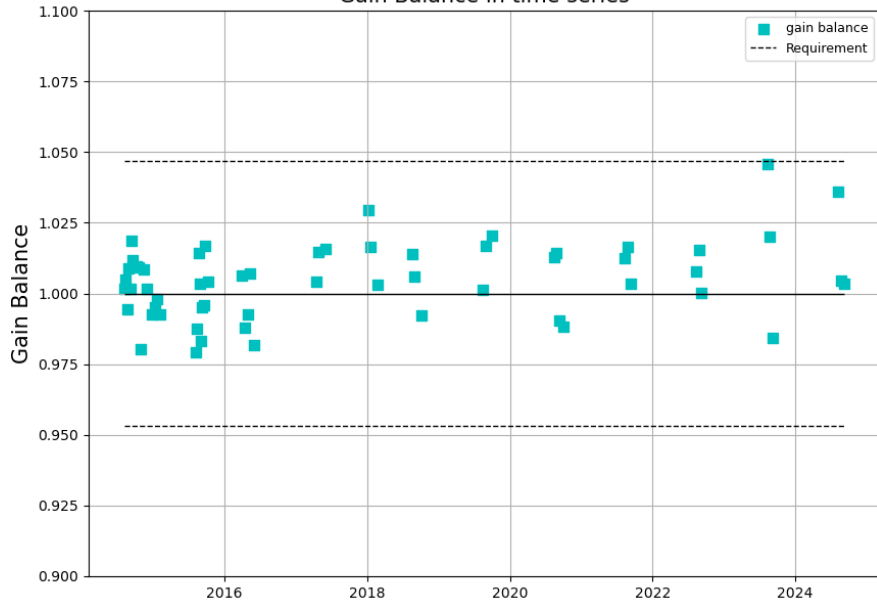
Evaluation results of radiometric accuracy – calibration factor (CR) [2/2]

Calibraion Factor by beams in time series

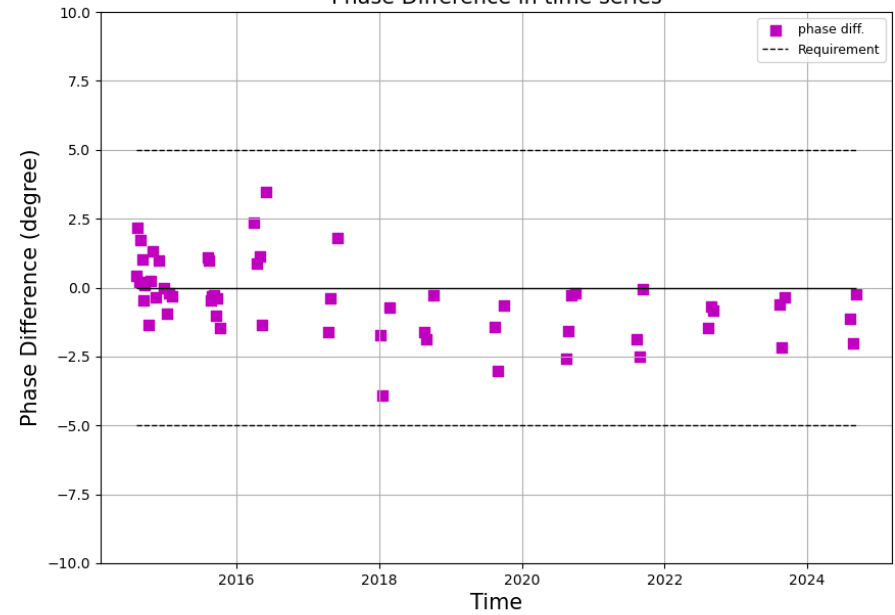


Evaluation results of polarimetric accuracy

Gain Balance in time series



Phase Difference in time series



Cross Talk in time series

