

The Geometric Accuracy Evaluation Results of RPC (Ver.1.5)

1. Purpose

This document describes the geometric accuracy evaluation results of RPC (Ver.1.5) produced by the ALOS-PRISM RPC generating software of JAXA-EORC/RESTEC. The updated points from the previous version (Ver.1.4 [1]) are as follows;

- The PRISM sensor alignment trend model of Pitch angle after Mar.22, 2007 was updated as exterior orientations parameters.

2. Method

Same as Ver.1.0 [2].

3. Data

1) PRISM Standard Product L1B1

Ten triplet data sets which were observed from Jan. 4 through Dec. 19, 2008 are used for the evaluation. First five data sets are identical to those which were used at the evaluation of Ver.1.4. Those data sets are sampled from the calibration data sets of JAXA-EORC/RESTEC geometric Cal/Val activities.

2) Geometric models

The CCD alignment data (interior orientation parameters) is version 3 (Jun.20, 2007 release) which has already applied to the JAXA-EOC Standard Product processing. The PRISM sensor alignment (exterior orientation parameters) is version 6 which was calibrated at JAXA-EORC/RESTEC (briefly explained at section 1). No orientation processing with GCPs is performed.

3) GCP

Reference GCPs and its mensuration results are provided by JAXA-EORC/RESTEC Cal/Val activities.

4. Results

The number of GCPs and errors stats (Bias, SD = Standard Deviation, RMS) for “RPC for each image” and “RPC for full image” of forward, nadir, and backward images are described at Table 1~3 as RPC geometric accuracies evaluation results. The units of errors are converted to meters from pixels by using the default pixel spacing of 2.5m. The relative accuracies of “RPC for full image” against “RPC for each image” are almost same as the case of previous models.

Table 1 The evaluation results of “RPC for each image” - forward

Scene			FWD					
			ΔP			ΔL		
Date	Site	No. of GCP	Bias[m]	SD[m]	RMS[m]	Bias[m]	SD[m]	RMS[m]
2008/01/04	Showa (Antarctica)	13	-3.610	1.294	3.834	-0.675	1.217	1.391
2008/02/25	Nagoya	12	-4.989	1.328	5.163	0.273	1.423	1.449
2008/04/16	Terengganu (Malaysia)	3	-1.168	0.156	1.178	-2.944	0.958	3.096
2008/05/20	Fairbanks (Alaska)	6	5.178	1.415	5.368	-4.266	2.189	4.795
2008/06/30	Osaka	6	1.541	0.927	1.798	-1.781	1.541	2.355
2008/08/13	Kyushu	4	0.304	1.352	1.386	3.692	0.720	3.761
2008/09/05	WashingtonDC (USA)	8	3.885	1.047	4.024	2.877	2.200	3.622
2008/10/03	Ranong (Thai)	3	-2.649	0.395	2.679	3.000	0.410	3.028
2008/11/23	Brisbane (Australia)	5	5.384	2.446	5.914	10.959	2.162	11.170
2008/12/19	Himeji	4	-3.263	1.628	3.647	5.058	0.643	5.099
RMS			3.610	1.343	3.852	4.551	1.490	4.789

Table 2 The evaluation results of “RPC for each image” - nadir

Scene			NDR					
			ΔP			ΔL		
Date	Site	No. of GCP	Bias[m]	SD[m]	RMS[m]	Bias[m]	SD[m]	RMS[m]
2008/01/04	Showa (Antarctica)	13	-2.171	1.124	2.445	8.887	1.252	8.975
2008/02/25	Nagoya	12	-3.205	1.132	3.399	-1.263	1.616	2.051
2008/04/16	Terengganu (Malaysia)	3	-3.967	0.222	3.973	-3.949	0.366	3.966
2008/05/20	Fairbanks (Alaska)	6	7.829	1.611	7.993	6.475	1.484	6.643
2008/06/30	Osaka	6	1.182	1.010	1.555	3.502	0.879	3.611
2008/08/13	Kyushu	4	0.507	2.090	2.150	1.400	1.195	1.841
2008/09/05	WashingtonDC (USA)	8	3.734	0.910	3.844	5.204	2.026	5.584
2008/10/03	Ranong (Thai)	3	-1.954	0.351	1.985	-0.403	0.228	0.463
2008/11/23	Brisbane (Australia)	5	7.251	2.271	7.598	-9.048	1.127	9.118
2008/12/19	Himeji	4	-2.716	1.393	3.053	-0.615	1.101	1.261
RMS			4.140	1.365	4.359	5.117	1.239	5.265

Table 3 The evaluation results of “RPC for each image” - backward

Scene			BWD					
			ΔP			ΔL		
Date	Site	No. of GCP	Bias[m]	SD[m]	RMS[m]	Bias[m]	SD[m]	RMS[m]
2008/01/04	Showa (Antarctica)	13	-1.490	0.906	1.744	-11.526	1.177	11.586
2008/02/25	Nagoya	12	-2.009	1.749	2.664	0.466	1.569	1.637
2008/04/16	Terengganu (Malaysia)	3	2.407	0.810	2.540	3.314	0.351	3.332
2008/05/20	Fairbanks (Alaska)	6	0.110	0.587	0.597	-16.769	2.225	16.916
2008/06/30	Osaka	6	0.518	0.482	0.708	-3.550	1.505	3.856
2008/08/13	Kyushu	4	-1.241	0.858	1.509	3.389	1.184	3.590
2008/09/05	WashingtonDC (USA)	8	0.791	0.865	1.172	-0.377	1.656	1.698
2008/10/03	Ranong (Thai)	3	-1.592	0.889	1.823	4.685	0.193	4.689
2008/11/23	Brisbane (Australia)	5	4.858	2.256	5.356	14.068	2.065	14.218
2008/12/19	Himeji	4	-3.076	1.308	3.342	4.742	0.480	4.766
RMS			2.238	1.191	2.535	8.318	1.409	8.436

5. Summary

It is confirmed that the bias errors of RPC follow the fitting accuracy of PRISM alignment trend model calibrated by JAXA-EORC/RESTEC.

References:

- [1] The Geometric Accuracy Evaluation Results of RPC (Ver.1.4): RESTEC, July 31, 2008.
- [2] The Geometric Accuracy Evaluation Results of RPC (Ver.1.0): RESTEC, April 5, 2007.