

The Geometric Accuracy Evaluation Results of RPC (Ver.1.3)

1. Purpose

This document describes the geometric accuracy evaluation results of RPC (Ver.1.3) produced by the ALOS-PRISM RPC generating software of JAXA-EORC/RESTEC. The updated points from Ver.1.2 [1] are as follows;

- The linear model is re-applied for PRISM sensor alignment long term trend of Roll and Pitch angle after Mar.22, 2007 as exterior orientations parameters.

2. Method

Same as Ver.1.0 [2].

3. Data

1) PRISM Standard Product L1B1

10 triplet data sets which were observed from Mar.23 through Jan.1, 2008 are used for the evaluation. 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 4 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]
2007/03/23	Hamana	24	-6.512	1.622	6.711	2.999	2.043	3.629
2007/05/03	Saitama	213	0.848	1.451	1.680	-0.124	1.711	1.716
2007/06/28	Kyoto	8	2.239	1.127	2.506	-1.132	0.995	1.507
2007/07/03	Fairbanks (Alaska)	10	4.349	1.489	4.597	-5.091	1.734	5.378
2007/07/23	Brisbane (Australia)	19	2.757	1.969	3.388	-0.479	1.268	1.356
2007/09/09	Kyushu	8	-0.127	1.905	1.909	2.230	0.906	2.407
2007/11/16	Bangkok (Thai)	4	-1.660	0.634	1.777	2.579	1.305	2.891
2007/12/03	Ranong (Indonesia)	3	-0.859	1.067	1.370	2.058	0.780	2.201
2007/12/08	Chiangmai (Thai)	21	-4.334	1.523	4.594	5.769	1.317	5.918
2008/01/01	Bangkok (Thai)	3	-2.260	0.255	2.275	0.833	1.345	1.583
RMS			3.195	1.402	3.489	2.937	1.392	3.251

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]
2007/03/23	Hamana	24	-3.214	1.570	3.577	-4.402	1.268	4.581
2007/05/03	Saitama	213	2.301	1.681	2.850	1.406	1.696	2.203
2007/06/28	Kyoto	8	1.550	1.683	2.288	3.509	0.792	3.598
2007/07/03	Fairbanks (Alaska)	10	2.725	1.292	3.015	0.159	1.912	1.919
2007/07/23	Brisbane (Australia)	19	0.763	1.930	2.076	1.746	1.067	2.046
2007/09/09	Kyushu	8	-3.441	2.271	4.123	2.247	1.331	2.612
2007/11/16	Bangkok (Thai)	4	0.221	1.357	1.375	1.245	1.296	1.797
2007/12/03	Ranong (Indonesia)	3	0.146	1.380	1.388	-0.024	1.170	1.170
2007/12/08	Chiangmai (Thai)	21	-1.930	1.464	2.423	3.942	1.306	4.153
2008/01/01	Bangkok (Thai)	3	-1.271	0.193	1.286	1.648	0.512	1.725
RMS			2.081	1.568	2.606	2.482	1.292	2.798

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]
2007/03/23	Hamana	24	-0.371	1.445	1.492	5.460	2.114	5.855
2007/05/03	Saitama	213	1.185	1.804	2.158	-1.160	1.800	2.142
2007/06/28	Kyoto	8	-0.424	1.163	1.238	0.643	1.016	1.203
2007/07/03	Fairbanks (Alaska)	10	-0.218	1.653	1.667	-2.757	1.819	3.303
2007/07/23	Brisbane (Australia)	19	1.279	1.641	2.080	0.920	1.450	1.717
2007/09/09	Kyushu	8	-0.541	1.634	1.721	5.468	1.388	5.642
2007/11/16	Bangkok (Thai)	4	0.669	0.491	0.830	2.594	1.912	3.222
2007/12/03	Ranong (Indonesia)	3	-2.083	2.114	2.968	7.025	1.096	7.111
2007/12/08	Chiangmai (Thai)	21	-1.172	1.217	1.689	6.146	1.408	6.305
2008/01/01	Bangkok (Thai)	3	-0.770	1.372	1.573	3.570	0.502	3.605
RMS			1.022	1.512	1.825	4.201	1.522	4.469

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.1.2): RESTEC, October 5, 2007.
- [2] The Geometric Accuracy Evaluation Results of RPC (Ver.1.0): RESTEC, April 5, 2007.