

## **The Geometric Accuracy Evaluation Results of RPC (Ver.1.4)**

### **1. Purpose**

This document describes the geometric accuracy evaluation results of RPC (Ver.1.4) produced by the ALOS-PRISM RPC generating software of JAXA-EORC/RESTEC. The updated points from the previous version (Ver.1.3 [1]) are as follows;

- The PRISM sensor alignment trend model of Pitch angle after Jan.2, 2008 was updated 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 Jan. 4 through Jul. 8, 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 5 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					
			$\Delta P$			$\Delta L$		
Date	Site	No. of GCP	Bias[m]	SD[m]	RMS[m]	Bias[m]	SD[m]	RMS[m]
2008/01/04	Showa (Antarctica)	13	-4.758	1.294	4.931	1.365	1.217	1.828
2008/01/23	Chiangmai (Thai)	13	-2.810	1.689	3.279	2.208	1.301	2.563
2008/02/25	Nagoya	12	-3.929	1.329	4.148	0.942	1.419	1.703
2008/03/29	Paris (France)	6	9.353	0.564	9.370	-4.630	1.599	4.899
2008/04/16	Terengganu (Malaysia)	3	-1.459	0.155	1.467	-1.826	0.958	2.062
2008/05/11	Thun (Swiss)	25	0.099	1.192	1.197	1.357	1.085	1.737
2008/05/20	Fairbanks (Alaska)	6	6.422	1.415	6.576	-2.820	2.189	3.570
2008/06/27	Saroma	64	1.332	1.521	2.022	-2.821	1.494	3.192
2008/06/30	Osaka	6	2.465	0.933	2.635	-0.179	1.545	1.555
2008/07/08	Brisbane (Australia)	24	0.330	1.152	1.198	1.743	1.171	2.100
RMS			4.299	1.207	4.465	2.307	1.436	2.717

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

Scene			NDR					
			$\Delta P$			$\Delta L$		
Date	Site	No. of GCP	Bias[m]	SD[m]	RMS[m]	Bias[m]	SD[m]	RMS[m]
2008/01/04	Showa (Antarctica)	13	-1.016	1.124	1.515	10.428	1.252	10.503
2008/01/23	Chiangmai (Thai)	13	-4.507	1.552	4.767	3.821	1.305	4.038
2008/02/25	Nagoya	12	-1.997	1.132	2.296	-0.773	1.615	1.790
2008/03/29	Paris (France)	6	8.858	1.162	8.934	-1.323	1.160	1.760
2008/04/16	Terengganu (Malaysia)	3	-0.912	0.222	0.938	-3.766	0.366	3.784
2008/05/11	Thun (Swiss)	25	5.153	1.329	5.321	-0.431	1.056	1.141
2008/05/20	Fairbanks (Alaska)	6	9.749	1.611	9.881	3.899	1.484	4.172
2008/06/27	Saroma	64	3.718	1.319	3.946	2.659	1.297	2.958
2008/06/30	Osaka	6	4.274	1.009	4.392	1.375	0.879	1.632
2008/07/08	Brisbane (Australia)	24	6.125	1.670	6.349	2.120	1.191	2.432
RMS			5.439	1.275	5.587	4.108	1.206	4.281

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

Scene			BWD					
			$\Delta P$			$\Delta L$		
Date	Site	No. of GCP	Bias[m]	SD[m]	RMS[m]	Bias[m]	SD[m]	RMS[m]
2008/01/04	Showa (Antarctica)	13	-2.897	0.906	3.035	-9.778	1.177	9.849
2008/01/23	Chiangmai (Thai)	13	-1.842	1.208	2.203	4.051	1.577	4.347
2008/02/25	Nagoya	12	-3.151	1.737	3.598	4.516	1.571	4.782
2008/03/29	Paris (France)	6	6.146	1.169	6.257	3.819	1.022	3.954
2008/04/16	Terengganu (Malaysia)	3	0.514	0.809	0.959	3.858	0.351	3.874
2008/05/11	Thun (Swiss)	25	-1.689	1.046	1.986	3.564	1.225	3.769
2008/05/20	Fairbanks (Alaska)	6	-1.517	0.587	1.627	-10.754	2.226	10.981
2008/06/27	Saroma	64	-1.952	1.578	2.510	-3.536	1.487	3.836
2008/06/30	Osaka	6	-2.018	0.475	2.073	-0.090	1.495	1.497
2008/07/08	Brisbane (Australia)	24	-1.372	1.331	1.911	5.590	1.273	5.733
RMS			2.733	1.151	2.965	5.779	1.415	5.950

## **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.1.3): RESTEC, January 11, 2008.
- [2] The Geometric Accuracy Evaluation Results of RPC (Ver.1.0): RESTEC, April 5, 2007.