

PlanetScope Imagery Geolocation Accuracy Assessment for NASA Planet and DigitalGlobe Evaluation

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Purpose: Assess the geolocation accuracy of the PlanetScope imagery suitable for scientific analysis

Study Objective: Measure the positional accuracy of PlanetScope imagery against higher resolution imagery (Quick Bird) with known accuracy

Imagery: PlanetScope Dove, Landsat-8, Sentinel-2

Findings: The geolocation accuracy and apparent spatial resolution of imagery was found to be insufficient to support scientific analysis at the reported 3-4 m pixel resolution. Typically, geolocation accuracy for scientific research is set at less than 0.5 of the pixel resolution, with a goal of less than 0.2 of the pixel resolution. In order to ensure that all images satisfy one single requirement, it is customary to use the worst scenario as the requirement. In our case, images over Australia had the largest standard deviation of about 20 meters. Therefore, the pixel size should be 40 meters, which is 13 times of the Planet's nominal pixel size. Images over Asia had the lowest standard deviation of about 2 meters, necessitating a pixel size of 4 m, close to the Planet pixel size. For all other regions, pixel size should be at least 10 meters, which is three times Planet's nominal pixel size.

Site	Scenes per Sat		Valid Points	Mean (m)		Stdev (m)		RMSE (m)	
	WV	QB		X	Y	X	Y	X	Y
Africa	4	0	71	-12.4	-4.8	9.3	4.7	14.9	6.4
Australia	6	0	129	-7.7	-4.5	19.4	16.2	20.8	16.8
Europe	5	0	81	8.2	-7.4	17.5	10.1	19.3	12.5
Asia	4	1	56	7.8	-4.6	1.3	2.0	7.9	4.9
North America	2	3	129	0.1	1.8	5.5	5.1	5.5	5.4
South America	4	0	90	0.0	2.1	6.8	4.0	6.7	4.5
Global (all)	25	4	556	0.2	-0.8	13.8	10.7	13.8	10.7

The mean geolocation error for the 29 scenes examined for absolute geolocation is < 0.8 m. However, this mean error varies by scene and by continent. The best continent is North America, where the mean error for all points is < 1.8 m and the Root Mean Square Error (RMSE) is < 5.5 m. The worse continent is Africa where the mean error for all points is < 12.4 m and the Root Mean Square Error (RMSE) is < 14.9 m.