

# High Resolution Stereo Satellite Elevation Mapping Service Confirmed Proof of Accuracy Case History, GeoEye-1 Stereo Photos, Asmara, Eritrea

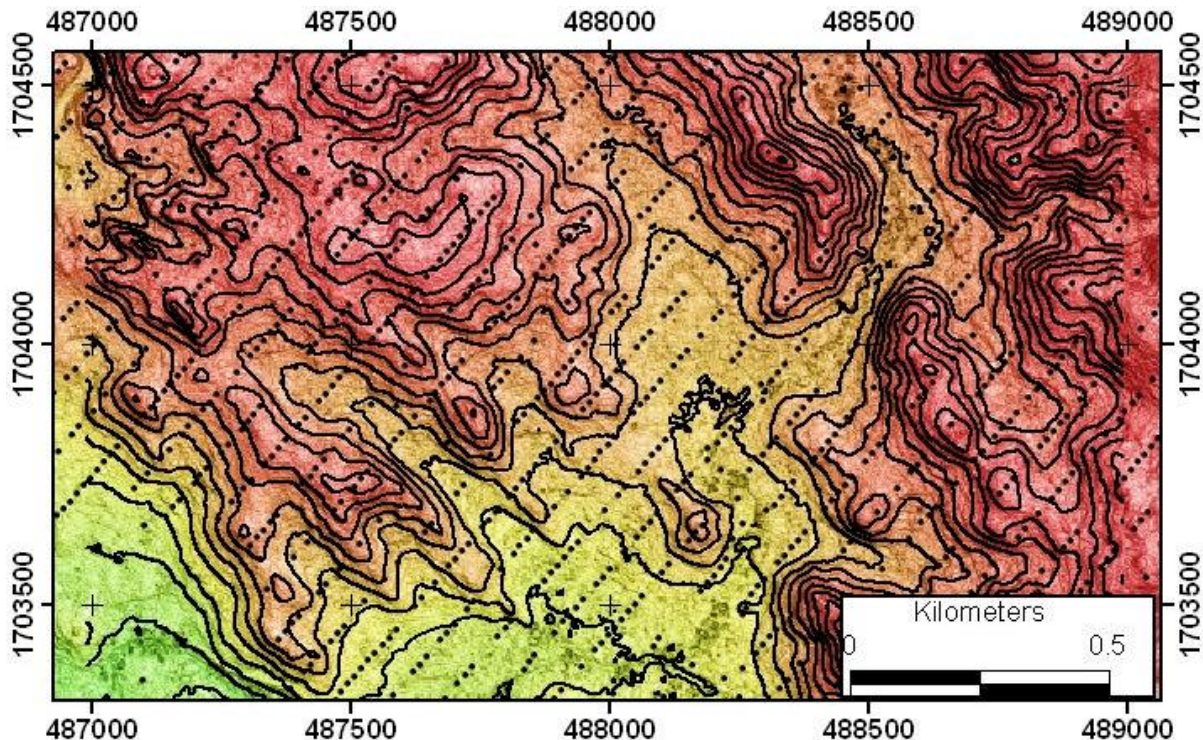
A one-metre square grid of elevations was produced by geophysical processing of September 10, 2009 GeoEye-1 stereo satellite photos covering an area of 225 km<sup>2</sup>.

The elevation accuracy is 31cm RMSE as determined by 8,983 conventionally established elevation checkpoints.

October 2009.

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Kevin MacNabb, Geophysicist, President MWH Geo-Surveys Inc.

A 1m square grid of elevation values, covering an area of 225 square kilometres, was produced over the Asmara Project of Sunridge Gold in Eritrea (TSX.V:SGC). The elevation grid was constructed using geophysical processing of 50cm ground resolution stereo satellite photos taken by the GeoEye-1 satellite on September 10, 2009. The stereo satellite elevations were referenced to the same benchmark as 8,983 previously established, accurately surveyed, gravity survey stations, on slopes of less than 20% grade.



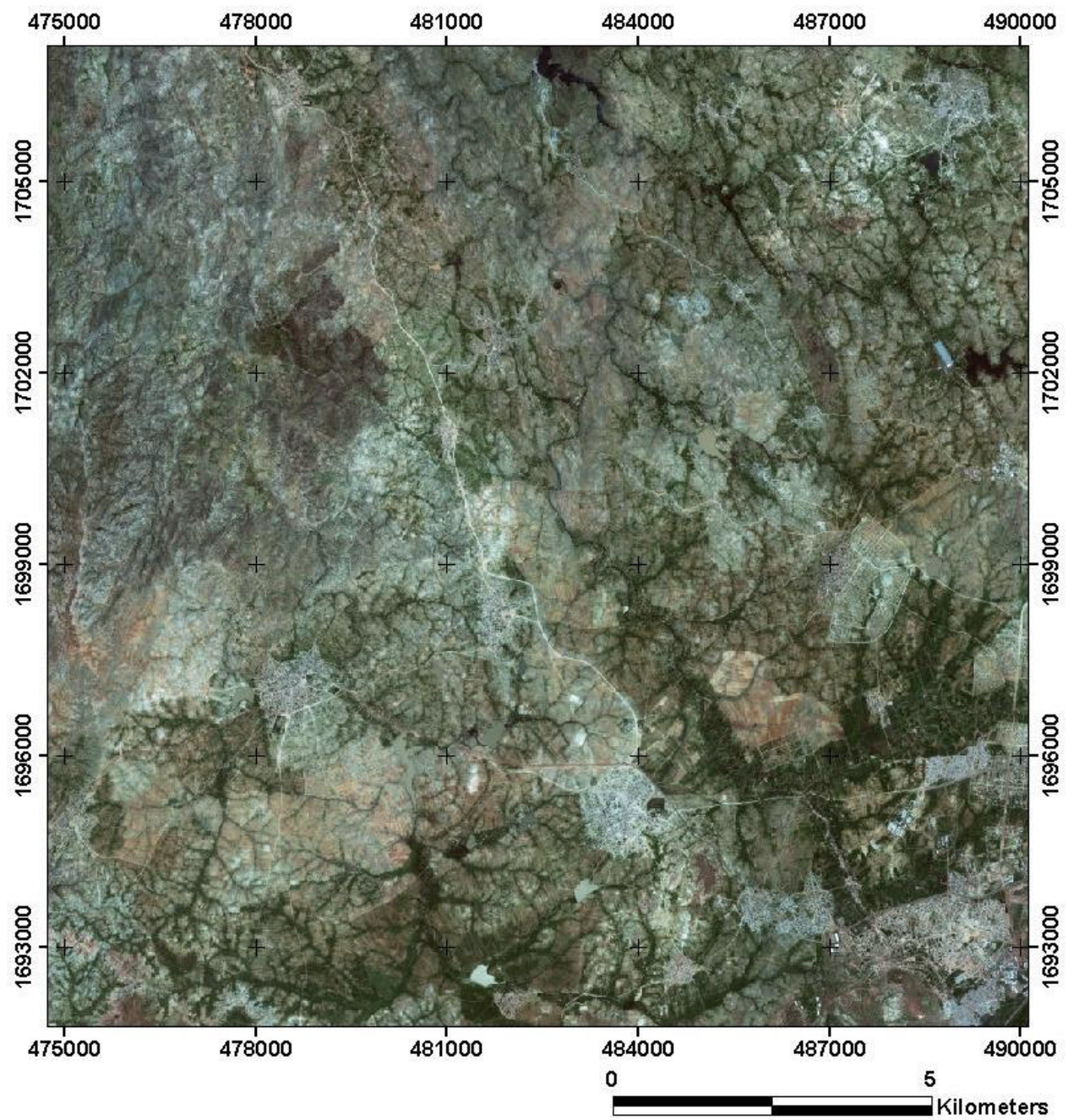
**Figure 1.** Stereo satellite elevation map with 5m contours showing a portion of the 8,983 checkpoints used to determine the elevation mapping accuracy of 31cm Root Mean Square Error (RMSE) for the September 10, 2009 GeoEye-1 stereo photos on the Sunridge Gold Asmara Project. For more information about the Sunridge Gold Asmara Project, please consult the Sunridge Gold website: [www.Sunridgegold.com/s/Asmara.asp](http://www.Sunridgegold.com/s/Asmara.asp).



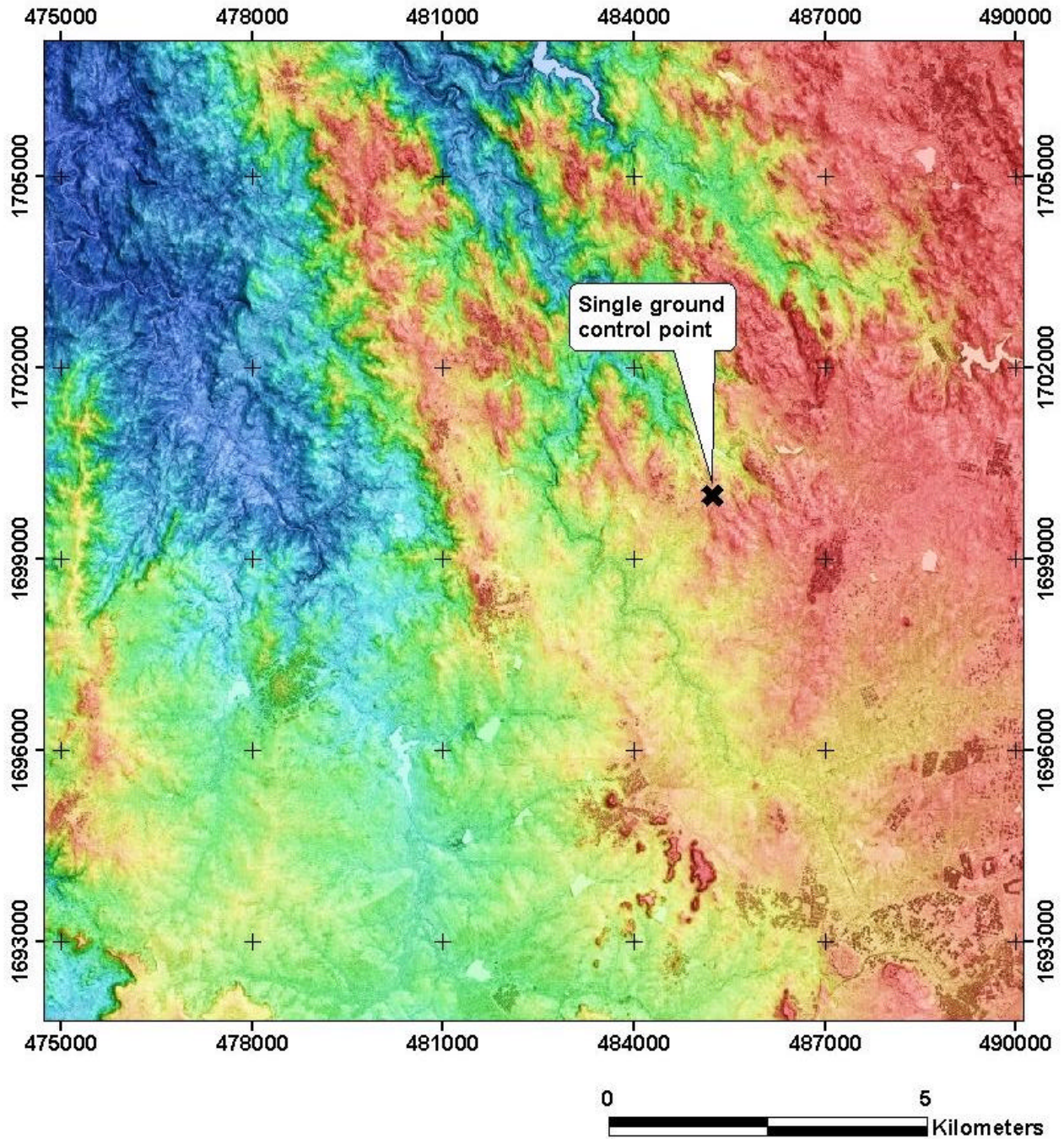
**Figure 2.** Asmara Project, Eritrea. MWH Geo-Surveys differential GPS survey crew and equipment. Over 45,000 gravity stations were surveyed from 2004 through 2008 using differential GPS instruments from Magellan. All of the GPS positions were surveyed in Real Time Kinematic (RTK) mode with accuracies of 2cm or better. 8,983 of these gravity survey stations were used as elevation checkpoints for the September 10, 2009 GeoEye-1 stereo satellite elevation mapping accuracy assessment. The Magellan RTK base with a ProMark<sup>TM</sup> 500 GPS rover are shown in this photo.



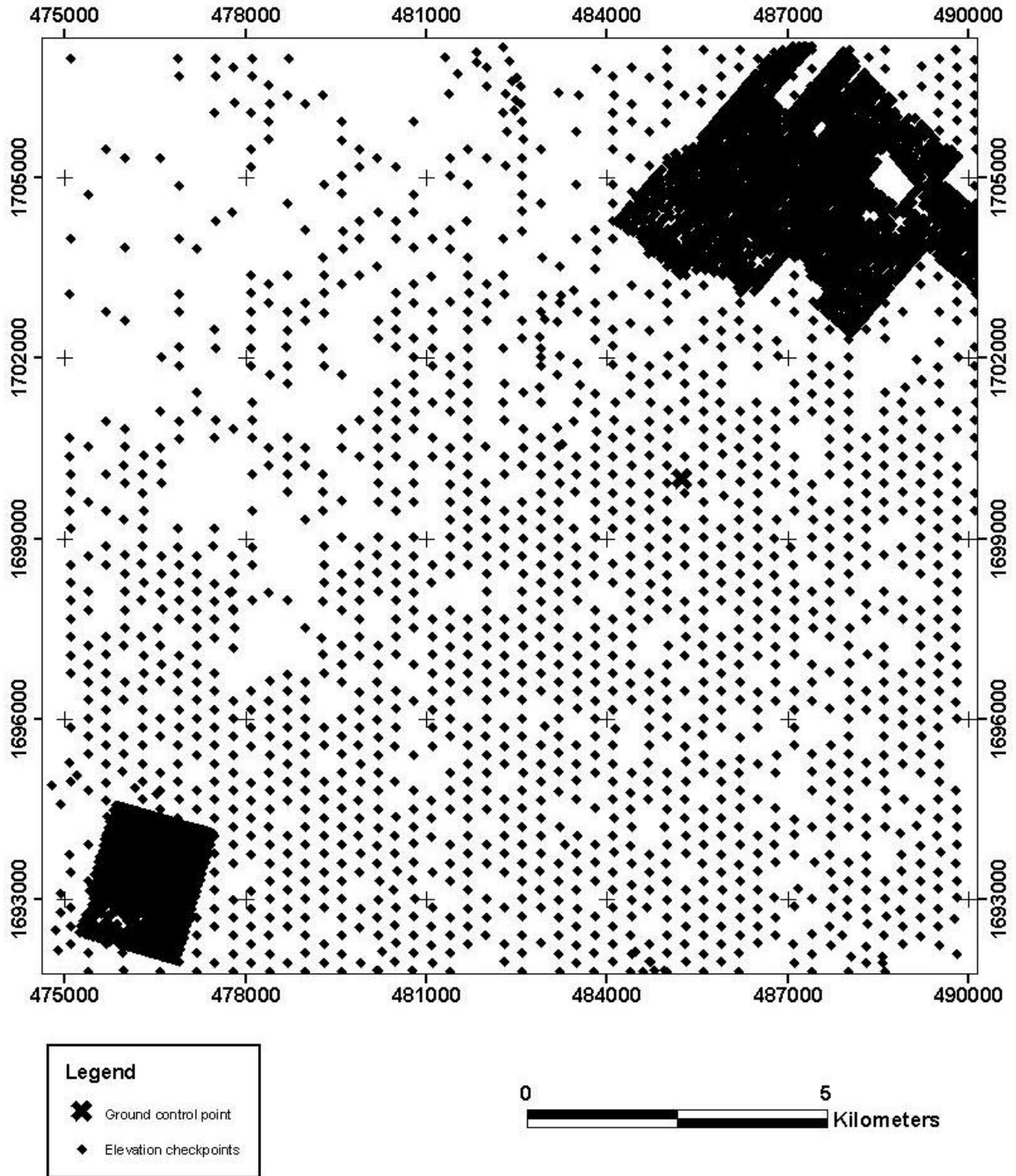
**Figure 3.** The entire 225 square kilometre Asmara, Eritrea, September 10, 2009, GeoEye-1 stereo satellite elevation mapping was referenced to the single ground control point shown in this photo. The 31cm RMSE accuracy of the stereo satellite elevation mapping was determined using 8,983 independent elevation checkpoints on slopes of less than 20% grade.



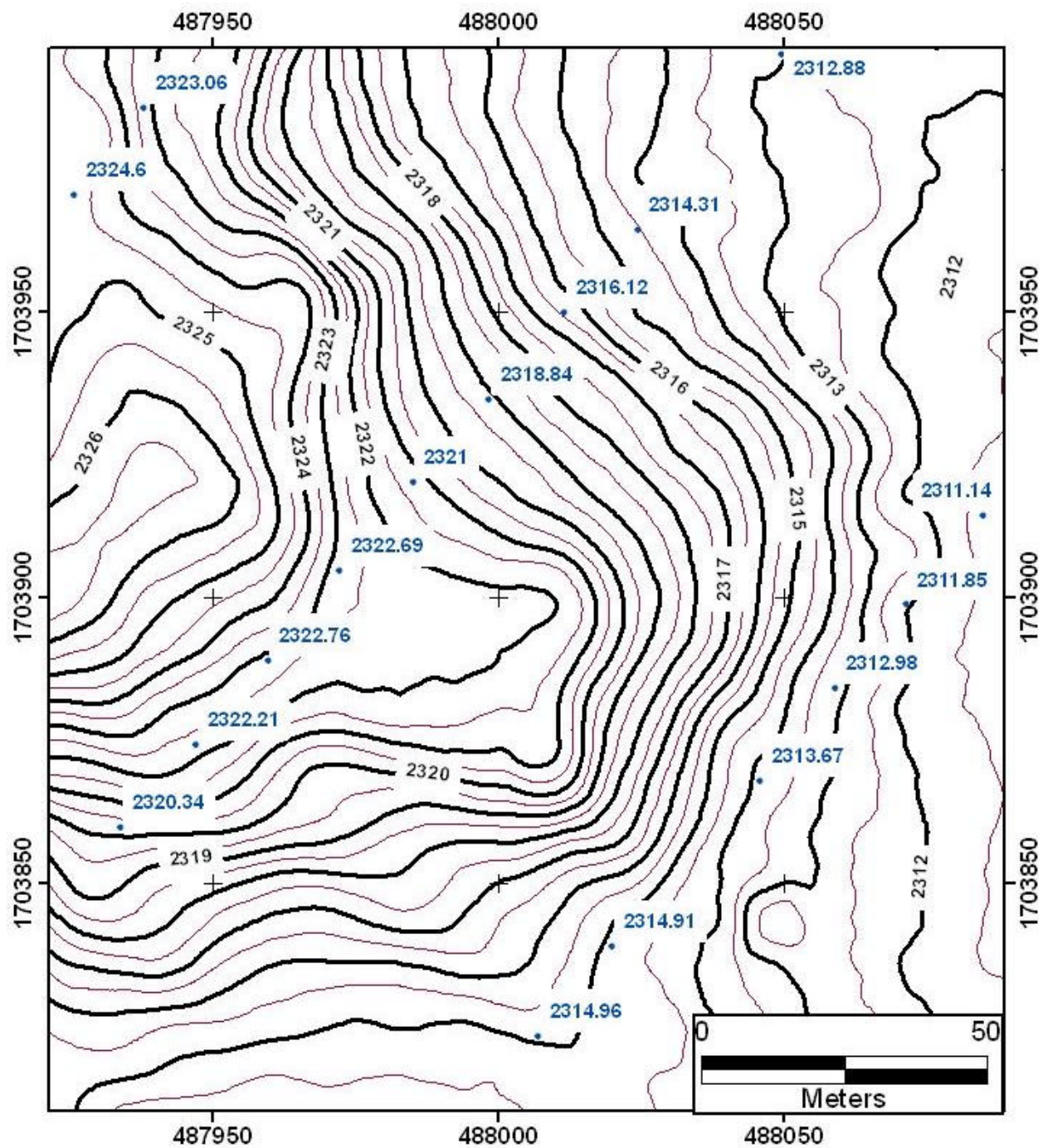
**Figure 4.** 50cm ground resolution, GeoEye-1 stereo satellite photo, Asmara, Eritrea, taken September 10, 2009.



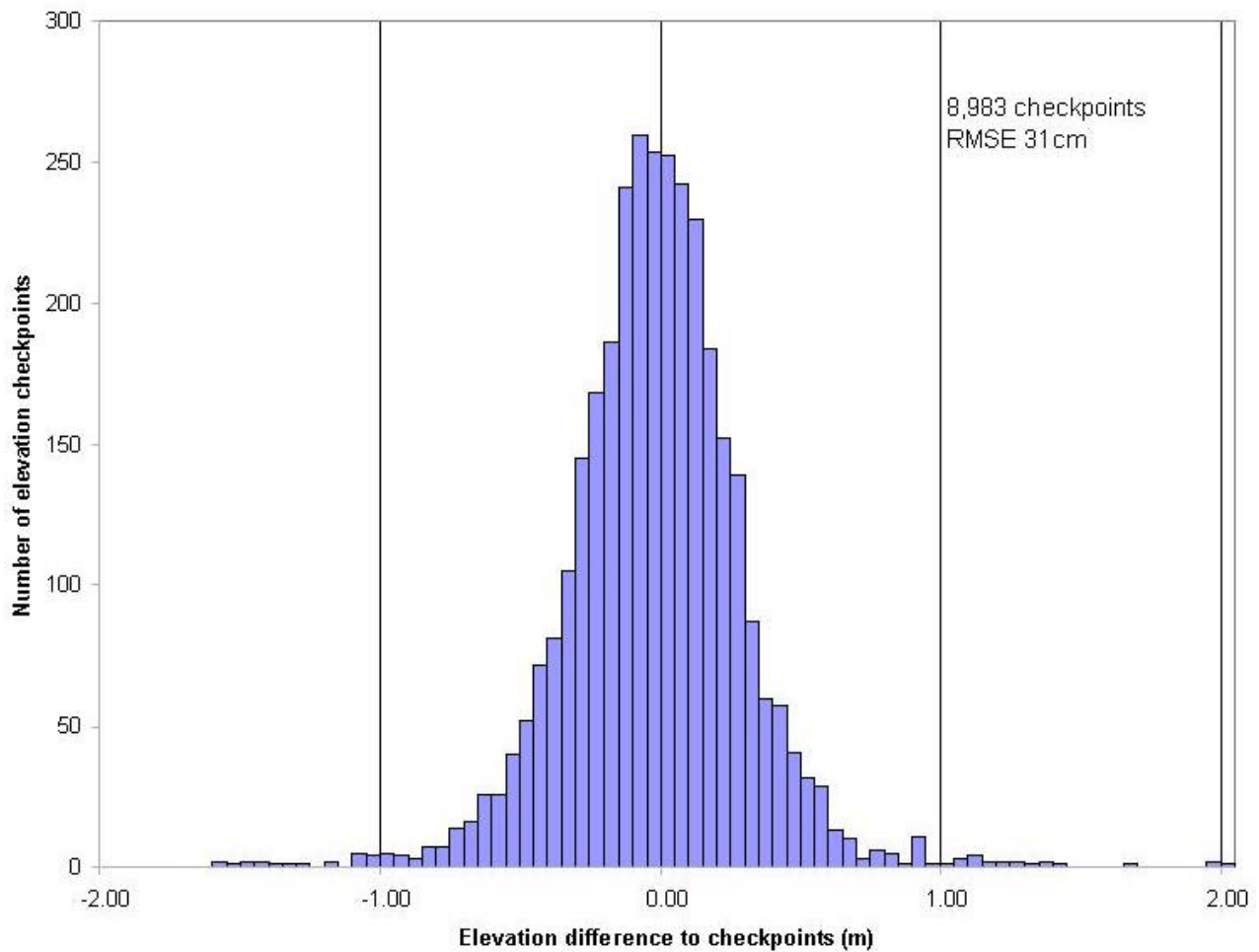
**Figure 5.** Stereo GeoEye-1 elevation image created from a 1m posted DEM, Asmara, Eritrea showing the location of the single ground control point used to reference the stereo GeoEye elevations. The 8,983 elevation check points used for the accuracy measure of 31cm RMSE for this DEM have an elevation range of 450m. The image colour range is 2,000m in blue to 2,450m in red.



**Figure 6.** Area of the 15km by 15km Eritrea Stereo GeoEye-1 1m posted DEM showing the single ground control point and the 8,983 gravity survey stations used as elevation checkpoints to determine the accuracy of the stereo satellite elevation mapping. As recommended in the *Guidelines for Digital Elevation Data* of the US National Digital Elevation Program (NDEP), the elevation checkpoints are in areas with slopes less than 20% grade.



**Figure 7.** 50cm contours from the stereo GeoEye-1 elevation mapping showing the elevations of some of the 8,983 elevation checkpoints used to determine the stereo satellite elevation mapping accuracy of 31cm RMSE.



**Figure 8.** Histogram of the elevation differences between the GeoEye-1 stereo satellite elevations for the 15km by 15km area and the 8,983 elevation checkpoints. The Root Mean Square Error (RMSE) is 31cm. The elevation checkpoints are in areas with DEM slopes of less than 20% grade.

**Cautionary Statement:**

This is an accuracy assessment for elevation mapping from a specific stereo pair of GeoEye-1 satellite photos. These results will not apply to all stereo pairs of GeoEye-1 photos.

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For stereo satellite elevation mapping, contact:



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