# Geometric Modeling Accuracy Assessment of KOMPSAT-5

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PCI Geomatics, founded in 1982, is the world leader in geo-imaging products and solutions. PCI Geomatics has set the standard in remote sensing and image processing tools offering customized solutions to the geomatics community in over 135 countries.

PCI Geomatics is the developer of Geomatica® - a complete and integrated desktop software that features tools for remote sensing, digital photogrammetry, geospatial analysis, map production, mosaicking and more. Geomatica® software enables users to apply imagery in support of a wide range of applications such as the environment, agriculture, security and intelligence, defense, as well as in the oil and gas industries.

PCI Geomatics is also the developer of the GeoImaging Accelerator (GXL), an automated, high performance, Graphics Processor (GPU) system for processing terabytes of imagery data. PCI Geomatics is a privately held Canadian corporation headquartered in Toronto, Ontario.

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In this study two blocks of **KOMPSAT-5 L1A standard mode images** were used to study the geometric modeling accuracy of the images both with and without GCPs. The first set is a block of four images of the city of Ottawa, Ontario, Canada. The second set is a block of 9 images of Kelowna, British Columbia, Canada. **PCI OrthoEngine** software was used to perform the evaluation process. Since KOMPSAT-5 L1A data is distributed with RPCs, **RPC geometric modeling method** was used for the study.

## Ottawa, Canada

The study area has an elevation range from 40m to 330m. The images were acquired between February and May of 2019, and have a resolution of 3m GSD. The following figure shows the four images.

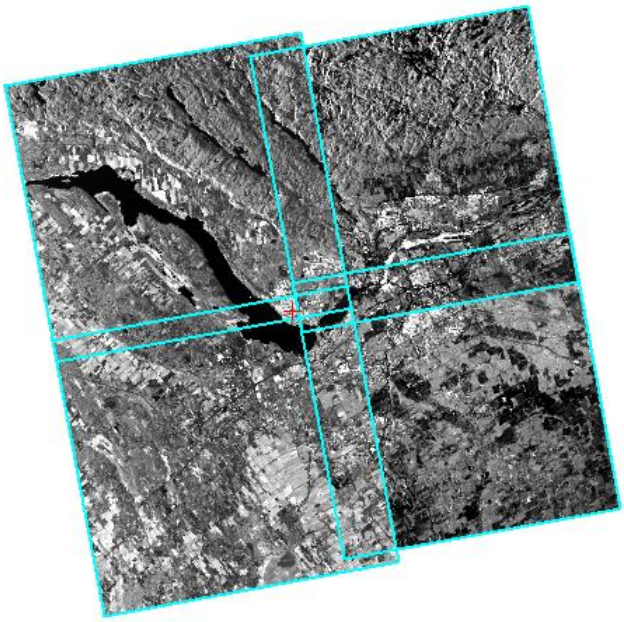

Figure 1. Four KOMPSAT-5 images overlaid

21 GCPs were collected using 20cm airphotos, and 24 tie points were collected automatically. The following table shows the GCP residuals/errors. It can be seen from the table the RMS errors when using no GCPs, and RMS residuals when using 21 GCPs are quite similar (i.e. both are within 2 pixels). This means that GCP collection for KOMPSAT-5 data does not make a big difference in resulting geometric accuracy. Since it is very difficult to collect GCPs for radar data, especially in mountainous areas, this is good news when using KOMPSAT-5 data. The user can just use a DEM, such as SRTM DEM, with the RPCs provided to generate orthos with RMS errors within 2 pixels anywhere in the world.

PRODUCTS USED
- KOMPSAT-5
  - Standard imaging mode
  - 3m resolution
  - X-band SAR satellite
  - Level 1A

| GCP | Check Points | Residuals / Errors | | |
|---|---|---|---|---|
| | | | X(m) | Y(m) |
| 0 | 21 | RMS | 5.1 | 4.3 |
| | | Max | 9.5 | 9.0 |
| 10 | 11 | RMS | 6.7 | 3.7 |
| | | Max | 9.7 | 5.1 |
| 21 | 0 | RMS | 5.1 | 3.2 |
| | | Max | 10.6 | 6.0 |

Table 1. GCP residuals/errors

## Kelowna, Canada

This is a mountainous area with elevation range from 350m to 2100m. No GCPs were available in this case. 211 tie points were collected automatically. Orthos were generated using 1 arc second SRTM DEM. The following figure shows the mosaic of the 9 images.

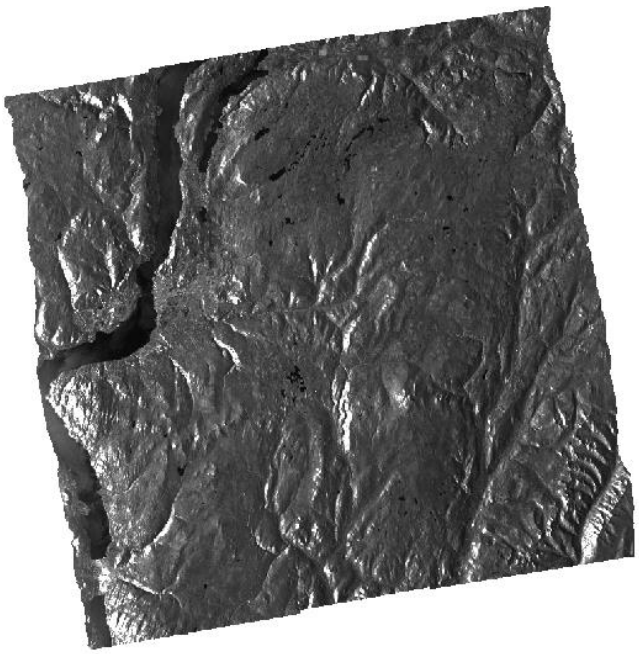

Figure 2. Mosaic of nine KOMPSAT-5 images

To check the accuracy of the mosaic, road and water body vector layers were used. The following figures show the images overlaid with road vectors represented in red, and the water body vector layer in blue. It can be seen the vectors overlaid nicely with the mosaic.

PRODUCTS USED

- KOMPSAT-5
  - Standard imaging mode
  - 3m resolution
  - X-band SAR satellite
  - Level 1A

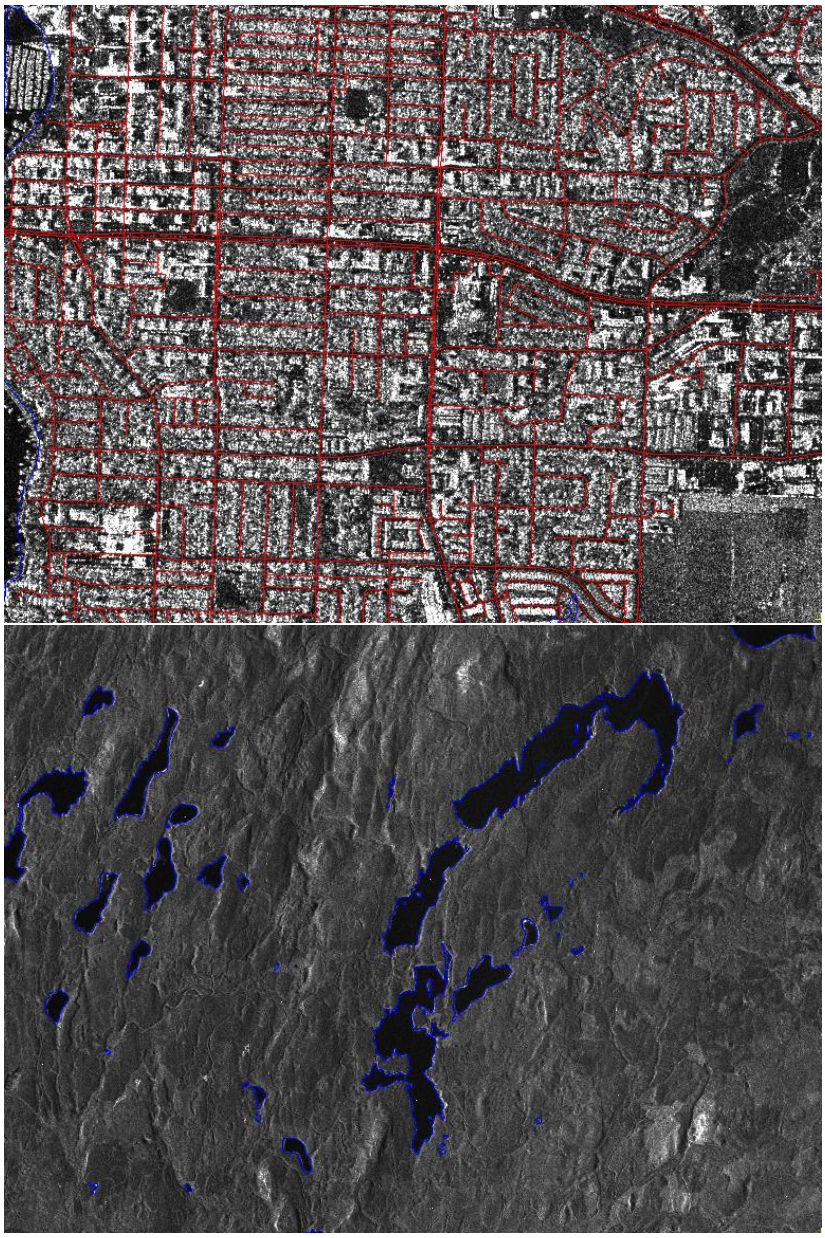

Figure 3. KOMPSAT-5 ortho image overlaid with water body vectors

## Conclusion

Two sets of KOMPSAT-5 L1A standard mode data were used to evaluate the geometric modeling accuracy. This study shows that it is possible to correct the data without GCPs, resulting in corrected imagery with RMS accuracy within 2 pixels.

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