Geomatica OrthoEngine v10.2 Tutorial
Orthorectifying WorldView-1 Data
Rigorous and RPC Modeling

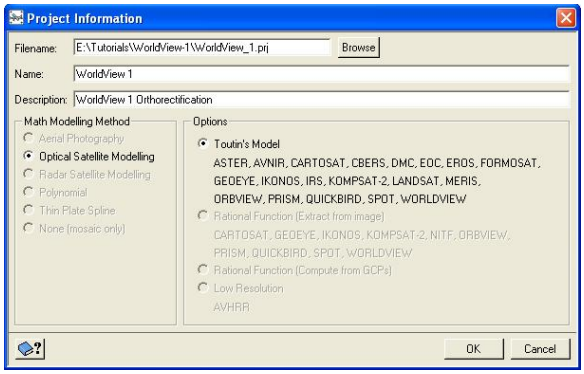
WorldView–1, launched on September 18, 2007, offers a panchromatic imagery at a very high resolution of 50 cm at nadir. The key benefits of this highly detailed imagery are in the sectors of precise map creation, change detection and in-depth image analysis. Data is distributed by DigitalGlobe (www.digitalglobe.com).

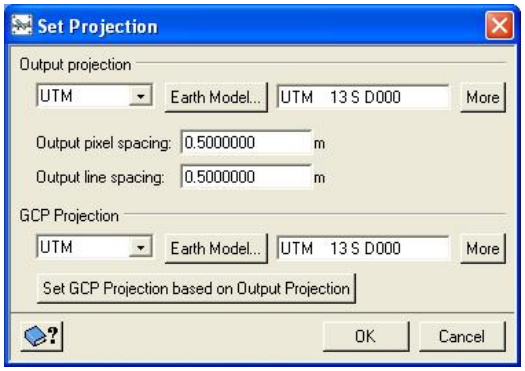
The following is a brief tutorial over the use of Geomatica OrthoEngine v10.2 for Orthorectifying WorldView - 1 raw (Basic) imagery with the Rigorous Model and Rational Polynomial Coefficients (RPC).

1.0 Rigorous Modeling

1.1 Initial Project Setup

Start OrthoEngine and click '*New*' on the File menu to start a new project. Give your project a '*Filename*', '*Name*' and '*Description*'. Select '*Optical Satellite Modeling*' as the Math Modeling Method. Under Options, select '*Toutin's Model*'. After accepting this panel you will be prompted to set up the projection information for the output files, the output pixel spacing, and the projection information of GCPs. Enter the appropriate projection information for your project.





1.2 Data Input

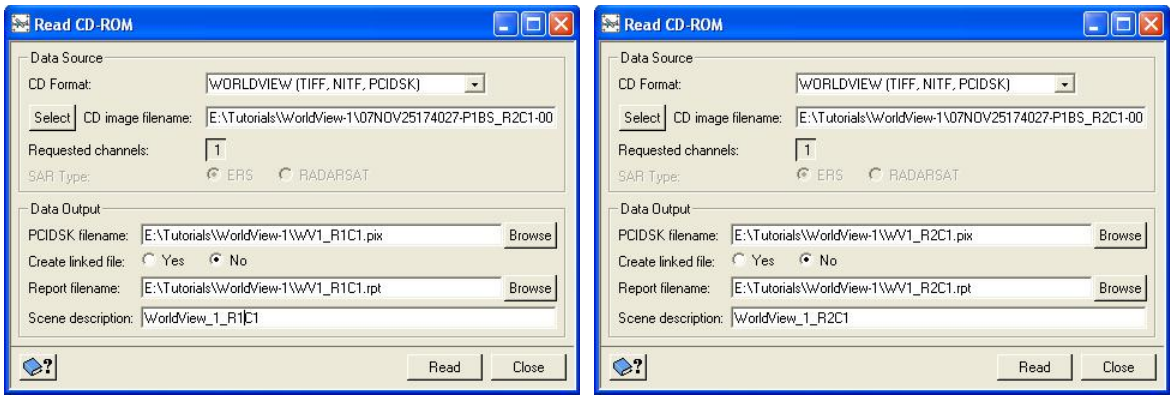
For Rigorous Modeling with Geomatica OrthoEngine, the user should have WorldView-1 "Basic Imagery" product. "Standard Imagery" products are pre-processed to a further extent than Basic Imagery product. Since they have a correction already applied, therefore Standard Imagery products cannot be Orthorectified. For more information on these products, please refer to Digital Globe's official website www.digitalglobe.com

WorldView-1 data is delivered in *Geotiff 1.0, NITF 2.0, and NITF 2.1* formats, which are fully supported by Geomatica OrthoEngine v10.2. The data is also delivered with a number of support files (*ATT, EPH, GEO, IMD, RPB, STE, TIL and XML*). Please note that these support files should be located in the same directory as the image data while reading the data.

Depending upon your media delivery method, you may have to copy or extract your data to your hard disk. After successful extraction of data to your hard disk, proceed to the '*Data Input*' processing step.

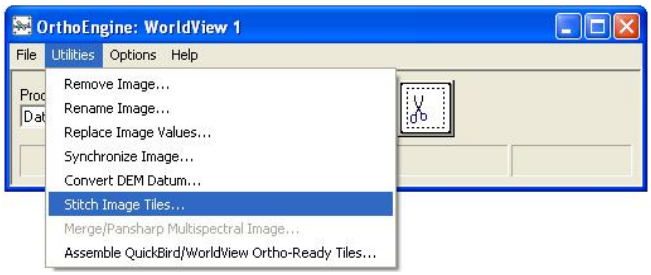
Select '*Data Input*' option from '*Processing Step*' drop down and click on '*Read CD-ROM data*' button (Please note that we are treating this data as if it is on CD-ROM, even though it is actually located on the hard disk)

Choose '*WORLDVIEW*' as the '*CD Format*' and select your TIFF or NITF image file. Press the appropriate channel buttons (*1 for a PAN image*). Specify an appropriate output '*PCIDISK filename*', a '*Scene description*', and a '*Report filename*'. This step will convert the file to '*.pix*' format, and add the information needed for modeling.



1.3 Stitch Images

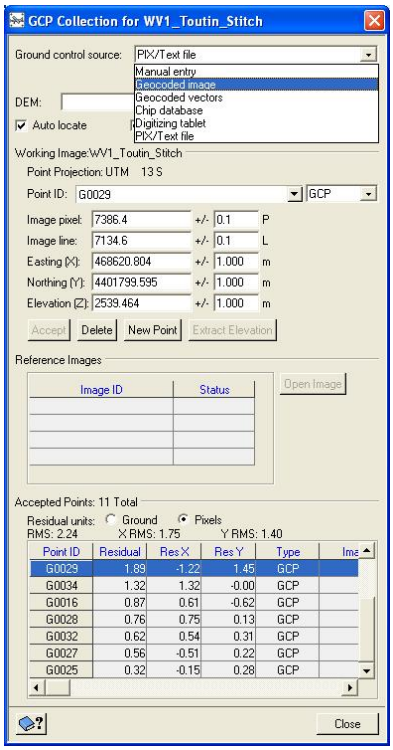
If the filenames contain R1C1, R2C1, etc, the files must be stitched using the '*Utilities* | *Stitch Image Tiles*' option. Stitch merges different tiles, obtained from the same orbit on the same day, into one complete scene. It rebuilds the orbital data for the whole strip to maintain the ephemeris information

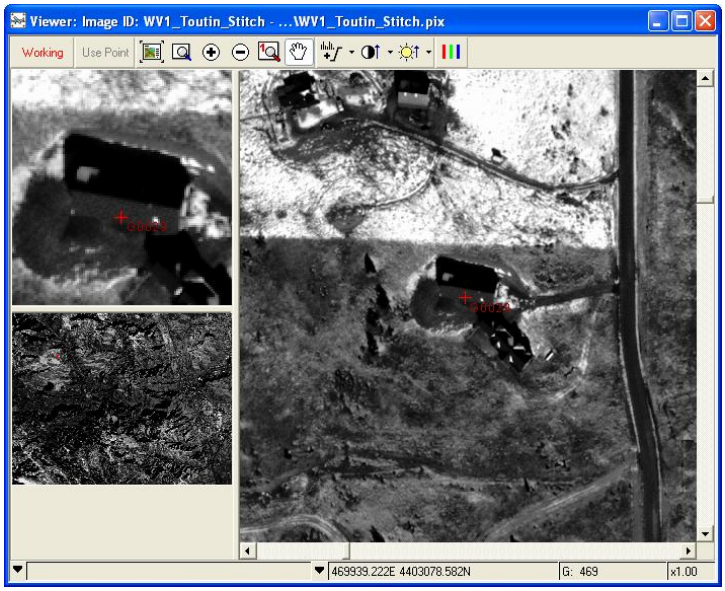


1.4 Collect GCPs and Tie Points

Select the '*GCP/TP Collection*' processing step. GCP collection can be done using various options viz. '*Manual Entry*', '*Geocoded Images/Vectors*', '*Chip Database*' or a '*Text File*'.

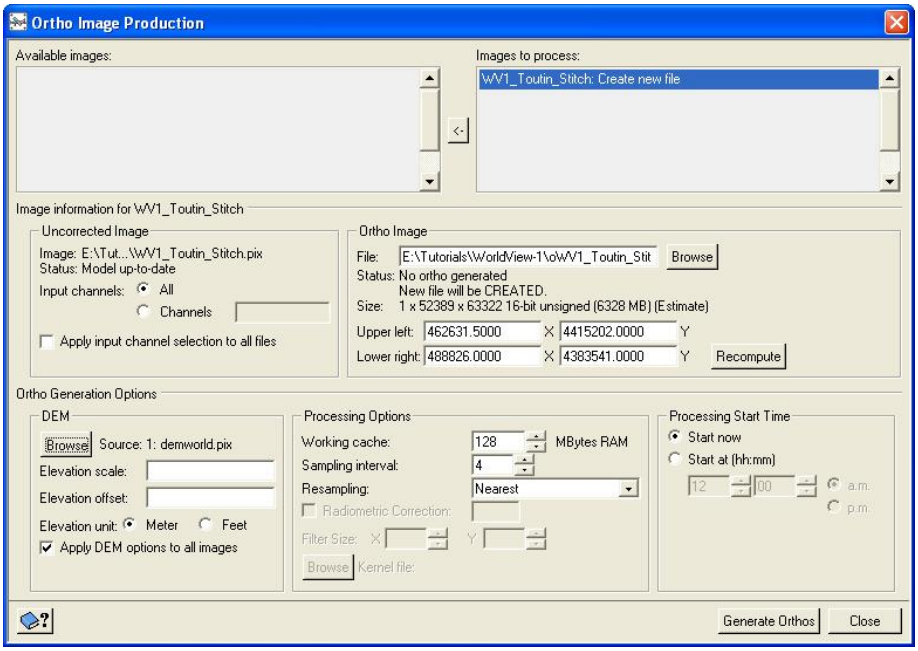
For the WorldView-1 Rigorous model, a minimum of six accurate GCPs per image (or more, depending on the accuracy of the GCPs and accuracy requirements of the project) are required. After collecting the GCPs, select the '*Model Calculation*' Processing Step and click on '*Compute Model*'. Check '*Residual Report*' panel (under the Reports processing step) to review the initial results.





1.5 Generating Orthos

The final step is to set up your Ortho Image Production. Proceed to the '*Ortho Generation*' processing step and select the file(s) to be orthorectified. Choose the DEM file to be used in the processing and other processing parameters. Click on '*Generate Orthos*' to create the final Orthorectified image

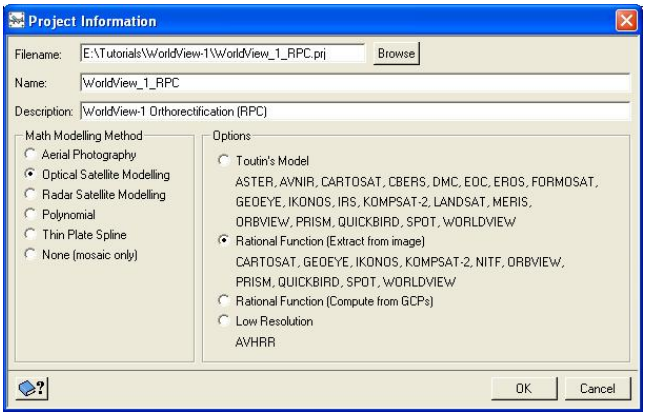


2.0 Rational Polynomial Coefficients (RPC)

WorldView data is delivered with RPCs, which can be used in the absence of adequate GCPs. Further addition of 1-4 GCPs into your project, in addition to the delivered RPCs can significantly improve the accuracy of your final Orthophoto.

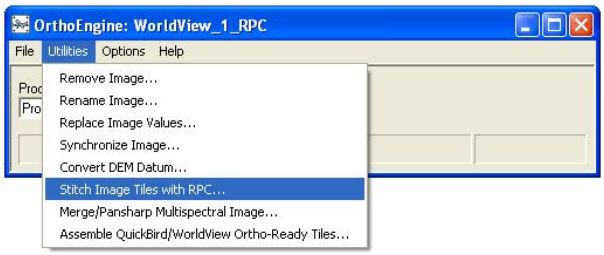
2.1 Initial Project Setup

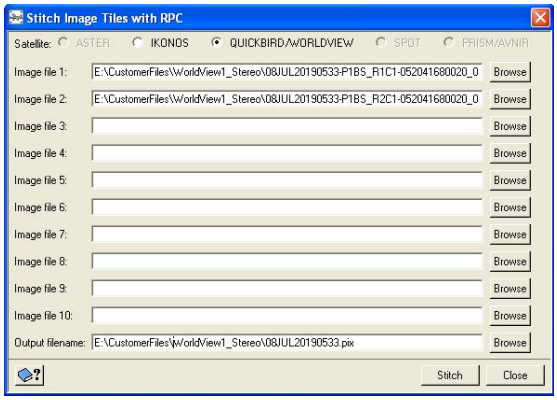
Start a new project and select the math modeling method as '*Optical Satellite Modeling*'. Under '*Options*' select '*Rational Functions' (Extract from Image*' option.



2.2 Stitch Images

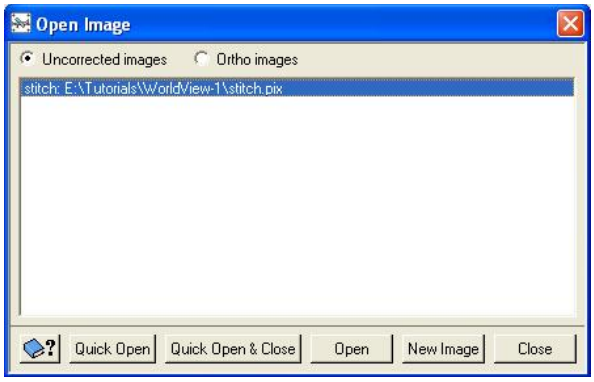
Stitch the image tiles that contain R1C1 and R2C1 by '*Stitch Image Tiles with RPC*' under '*Utilities*' menu. Stitch combines different RPC files in to a singe RPC for the entire stitched image



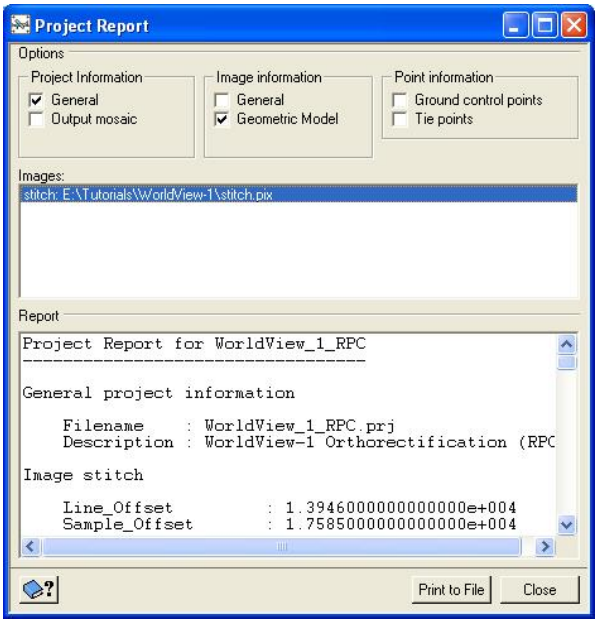


2.3 Data Input

Proceed to the '*Data Input*' window and use the '*Open a new or existing image*' button to bring the stitched data into the project using 'New Image' option. Select the appropriate image file, OrthoEngine will find the '.*RPB*' file and add the coefficients to the project.



Coefficients can be reviewed by using '*Project Report*' option under the '*Reports*' processing step. Select '*Geometric Model*' under Image Information panel.



2.4 GCP Collection

At this stage an Orthophoto can be directly generated in the absence of any GCPs. The model will be computed based on the supplied RPCs.

If GCPs are available, they can be added into the project using the same process as defined in section 1.4 of this document. The model will be automatically computed, and GCPs can be reviewed through Residual report.

2.5 Ortho Generation

The final step is to '*Schedule Ortho Generation*'. Proceed to the '*Ortho Generation*' processing step and select the files to be processed. Select an appropriate DEM file and set other processing options before generating the final Orthophoto.