

# Geomatica OrthoEngine v10.2 Tutorial

## Orthorectifying ALOS PRISM Data

### Rigorous and RPC Modeling

**ALOS** stands for Advanced Land Observing Satellite and was developed by the Japan Aerospace Exploration Agency (JAXA). The sun Synchronous, Sub recurrent ALOS was launched by JAXA in January of 2006 from Tanegashima Space Center in Japan. The purpose of ALOS was to provide valuable information for mapping, precise regional land coverage observation, disaster monitoring, and resource surveying. ALOS contains three sensors, commonly referred to as the “three eyes” of ALOS. These sensors are: the Panchromatic Remote-Sensing Instrument for Stereo Mapping (PRISM), the Advanced Visible and Near Infrared Radiometer type 2 (AVNIR-2), and the Phased Array type L-band Synthetic Aperture Radar (PALSAR).

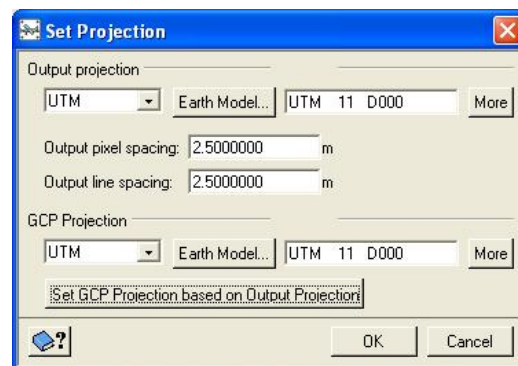
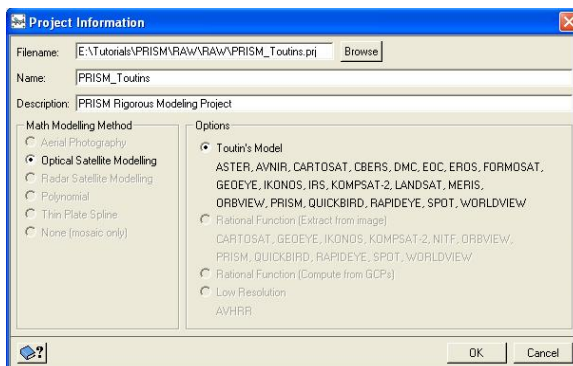
The **PRISM** sensor onboard ALOS contains three independent optical systems that allow for viewing in the Nadir direction, as well as forward and backward directions. This allows for the production of a stereoscopic image along the satellite’s track. PRISM contains 1 band (panchromatic) with a wavelength of 0.52 to 0.77 micrometers. The spatial resolution of PRISM is 2.5m (when viewing in the Nadir direction). Swath width of PRISM is 70km when viewing in the Nadir direction, and 35km when in triplet mode. Prism’s spatial resolution makes this sensor particularly desirable for mapping, urban planning, and monitoring desired areas. PRISM cannot image regions that are beyond 82 degrees North latitude and 82 degrees South latitude.

The PRISM sensor contains 6 CCDs for viewing at the Nadir, and 4 CCDs for viewing in the forward and backward directions. An image file is provided for each CCD when dealing with 1A and 1B1 level imagery (uncorrected imagery). Geomatica software offers support for PRISM imagery levels 1A, 1B1 and 1B2R. It is recommended to use Level 1B1 data because it is radiometrically corrected and is without geometric correction.

## 1.0 Rigorous Modeling

### 1.1 Initial Project Setup

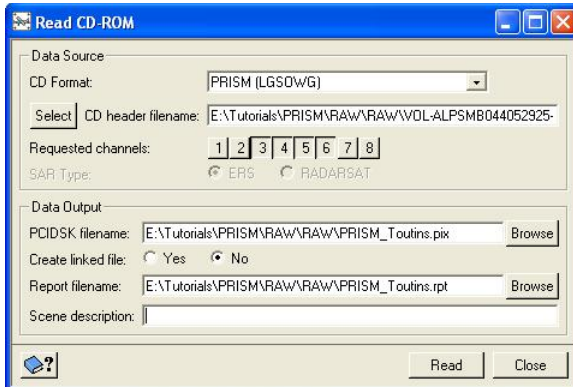
Start OrthoEngine and click ‘New’ on the File menu to start a new project. Give your project a ‘Filename’, ‘Name’ and ‘Description’. Select ‘Optical Satellite Modeling’ as the Math Modeling Method. Under Options, select ‘Toutin’s Model’. After accepting this panel you will be prompted to set up the projection 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

Under 'Processing Step' goto 'Data Input' and click on 'Read CD-ROM'. Select 'PRISM (LGSOWG)' as the CD Format and VOL file as the header file. As per the raw imagery, choose the appropriate channel number(s). Provide a PIX file name and click 'Read'. This will import the raw PRISM data into PIX format and will add it to the OE project.

The raw PRISM 1A and 1B1 level data are distributed in 4/6 tiles. These tiles get stitched and converted into one single PIX file while reading-in inside OrthoEngine project. User do not need to explicitly stitch the image tiles while doing Rigorous Modeling.

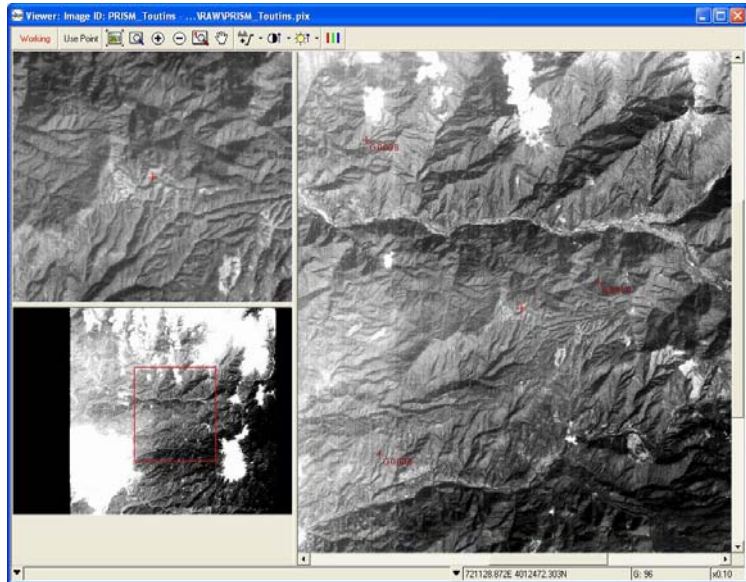
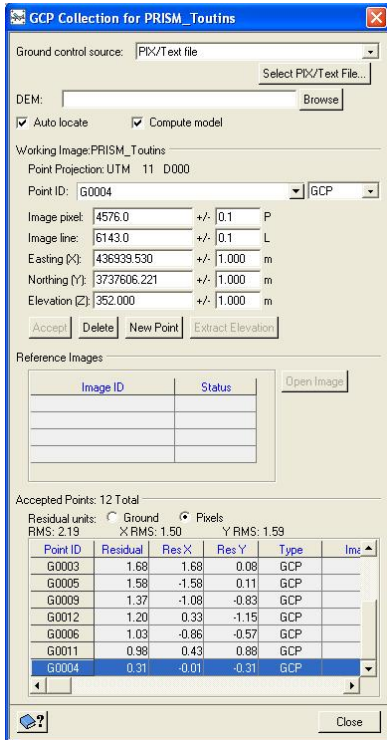


The image tiles channels available in this project are 3, 4, 5 and 6. Mostly the imagery provided is prefixed with the channel number like IMG-03, IMG-04 etc.

## 1.3 Collect GCPs and Tie Points

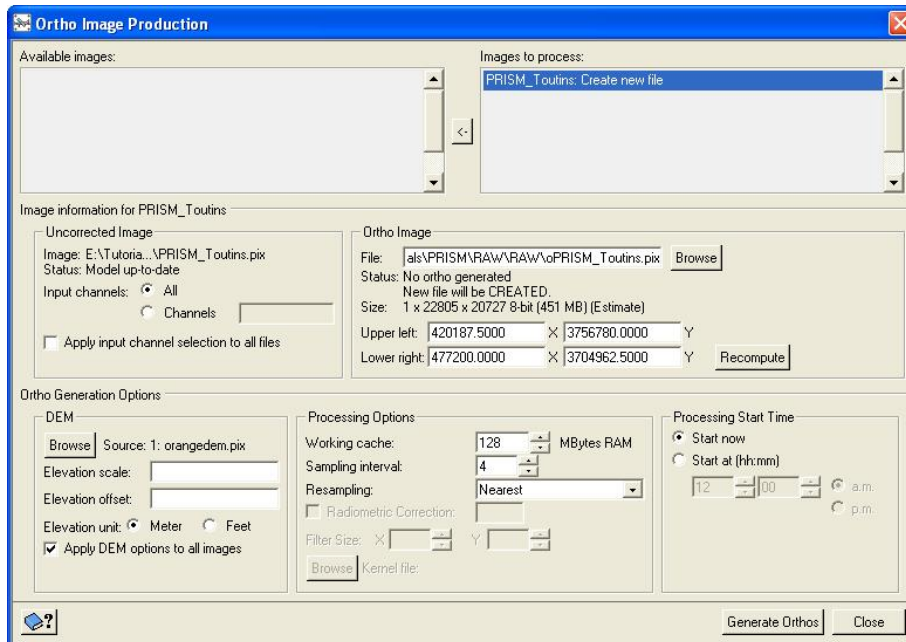
Select the 'GCP/TP Collection' processing step. GCP collection can be done using various options viz. 'Manual Entry', 'Geocoded Images/Vectors', 'Chip Database' or a 'Text File'.

For the ALOS PRISM 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.



### 1.4 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

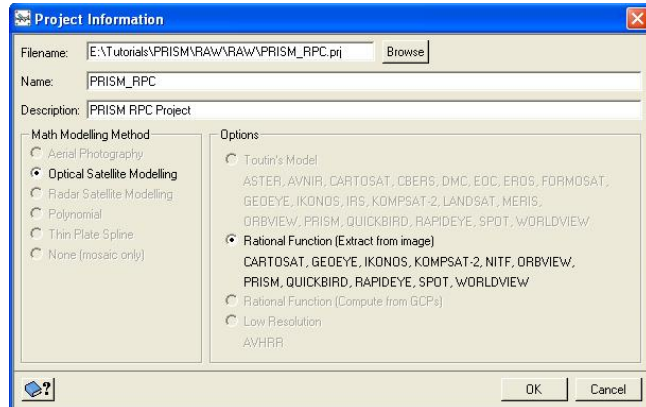


## 2.0 Rational Polynomial Coefficients (RPC)

ALOS PRISM data delivered with RPC files can be processed and corrected using Rational Function project, in the absence of adequate number of GCPs. Further addition of 1-4 GCPs into your project, in addition to the delivered RPCs can significantly improve the accuracy of your final Orthoimage.

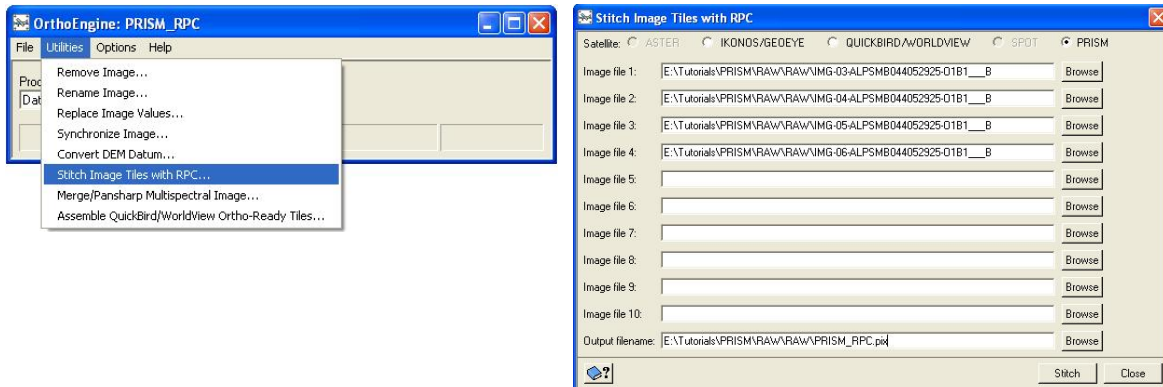
### 2.1 Initial Project Setup

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

While using Rational Function project, stitch the PRISM image tiles by '*Stitch Image Tiles with RPC*' functionality under '*Utilities*' menu. Stitching combines different image tiles into a single PIX file and generate a new RPC for the stitched image.



Browse for image files; provide an output PIX file name in the stitching window and click '*Stitch*' button. At the end of this process, user will be prompted to add-in the final PIX file into the OE project. Click '*Yes*' and the PIX file will be added into the OE project.

### 2.3 GCP Collection

At this stage an Orthoimage 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 1.3 of this document. The model will be automatically computed, and GCPs can be reviewed through Residual report.

**Note:** It is recommended to use 1<sup>st</sup> order RPC adjustment in a PRISM Rational Function project.

## 2.4 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 ortho image.

*Note: The new structure of ALOS PRISM 1B2R data (as shown below) will be supported in future versions of PCI Geomatica.*

Name	Size	Type	Date Modified
 RPC-ALAV2A171392890_O1B2R_U.txt	2 KB	Text Document	7/29/2009 10:12 PM
 IMG-04-ALAV2A171392890_O1B2R_U.tif	116,196 KB	TIF File	7/29/2009 10:12 PM
 IMG-03-ALAV2A171392890_O1B2R_U.tif	116,196 KB	TIF File	7/29/2009 10:13 PM
 IMG-02-ALAV2A171392890_O1B2R_U.tif	116,196 KB	TIF File	7/29/2009 10:13 PM
 IMG-01-ALAV2A171392890_O1B2R_U.tif	116,196 KB	TIF File	7/29/2009 10:14 PM
 HDR-ALAV2A171392890_O1B2R_U.txt	2 KB	Text Document	7/29/2009 10:14 PM