

Geomatica OrthoEngine V10.3 Tutorial

Orthorectifying AVNIR-2 Data Rigorous and RPC Modeling

AVNIR-2 stands for Advanced Visible and Near Infrared Radiometer Type 2. It is a successor of AVNIR-1 and is one of the three sensors on-board the ALOS satellite; the other two sensors are PRISM and PALSAR. The main improvement in AVNIR-2 over AVNIR-1 is the image resolution. While AVNIR-1 produced 16 meter resolution images, AVNIR-2 is capable of producing 10 meter resolution multi-spectral images.

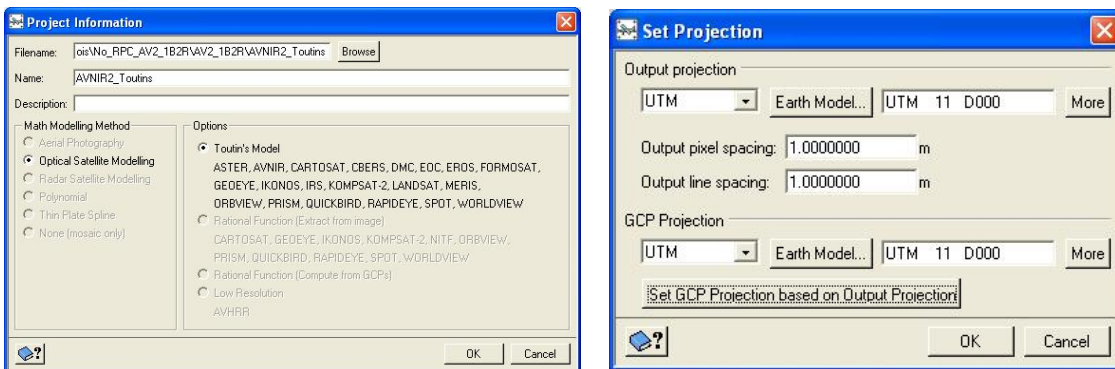
AVNIR-2 is designed for observing land and coastal zones. The images can provide a basis for land coverage and land-use classification maps for monitoring regional environments. In addition, the instrument has across track pointing capability which is useful for quick response applications such as disaster monitoring.

PCI Geomatica 10.3 supports AVNIR-2 1A, 1B1 and 1B2R data (with or without Rational Functions). Geomatica V10.2 supported all formats of AVNIR-2 except 1B2R with Rational Functions. This tutorial explains AVNIR-2 orthorectification using rigorous modeling and rational polynomial coefficients.

1.0 Rigorous Modeling

1.1 Initial Project Setup

Start OrthoEngine and click 'New' on the File menu to start a new project. Enter a project '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 enter the projection information for the output files, the output pixel spacing, and the GCP projection information.

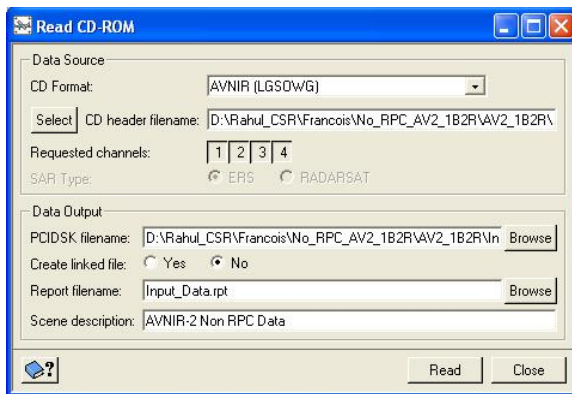


1.2 Data Input

AVNIR-2 data is distributed with 4 separate image files. These files are simply the four image channels (or bands). The image below illustrates the typical file naming convention used for non-RPC AVNIR-2 data.

Name	Size	Type	Date Modified
IMG-01-ALAV2A003502990-O1B2R_U	51,886 KB	File	4/10/2006 5:01 PM
LED-ALAV2A003502990-O1B2R_U	23 KB	File	4/10/2006 5:01 PM
TRL-ALAV2A003502990-O1B2R_U	10 KB	File	4/10/2006 5:01 PM
VOL-ALAV2A003502990-O1B2R_U	3 KB	File	4/10/2006 5:01 PM
Divide_Info.txt	1 KB	Text Document	4/10/2006 5:02 PM
IMG-02-ALAV2A003502990-O1B2R_U	51,886 KB	File	4/10/2006 5:02 PM
IMG-03-ALAV2A003502990-O1B2R_U	51,886 KB	File	4/10/2006 5:02 PM
IMG-04-ALAV2A003502990-O1B2R_U	51,886 KB	File	4/10/2006 5:02 PM
Restore_DOS.bat	1 KB	MS-DOS Batch File	4/10/2006 5:02 PM
Restore_UNIX.csh	1 KB	CSH File	4/10/2006 5:02 PM
summary.txt	3 KB	Text Document	4/10/2006 5:02 PM

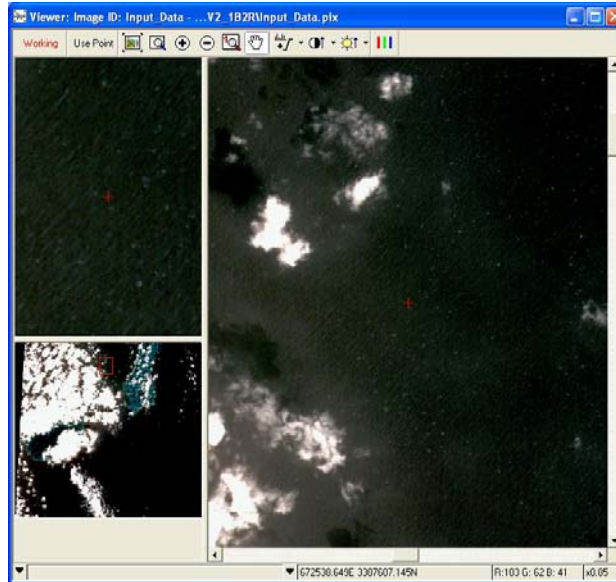
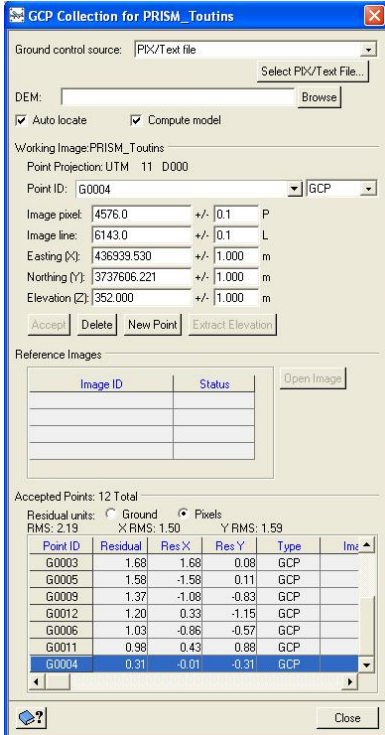
Under the 'Processing Step' select 'Data Input' and click on 'Read CD-ROM'. Select 'AVNIR (LGSOWG)' as the CD Format and **VOL file** as the header file. Since the data is available in 4 channels press all 4 channels as the 'Requested Channels'. Provide a PIX file name and click 'Read'. This will automatically merge the 4 raw bands, import them into a single PIX file and will add it to the OE project.



1.3 Collect GCPs and Tie Points

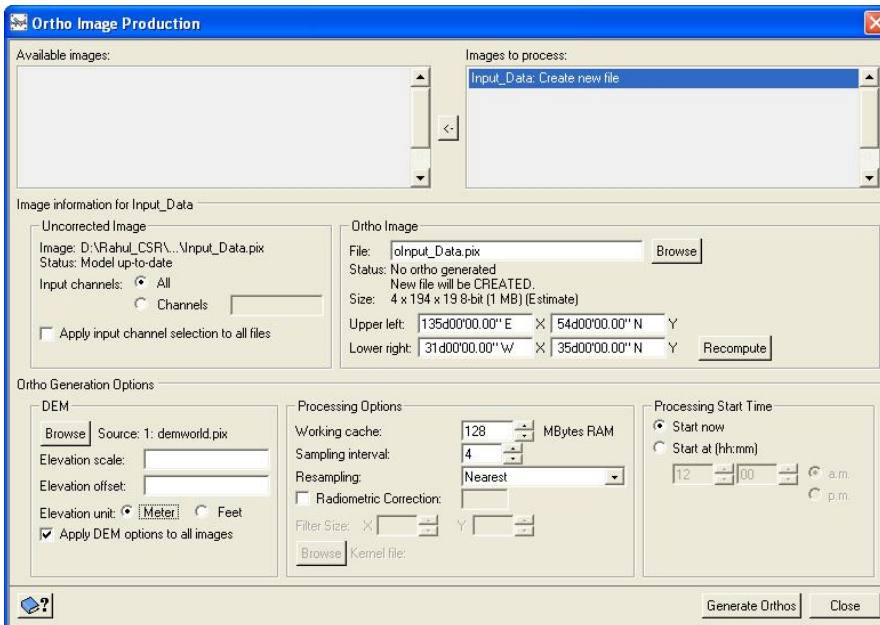
Select the 'GCP/TP Collection' processing step. GCP collection can be done using various options: 'Manual Entry', 'Geocoded Images/Vectors', 'Chip Database' or a 'Text File'.

For the AVNIR-2 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 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

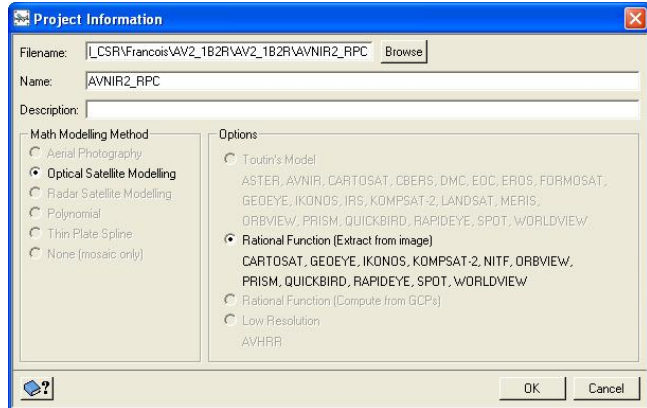


2.0 Rational Polynomial Coefficients (RPC)

AVNIR-2 data delivered with RPC files can be processed and corrected using Rational Functions 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 ortho image.

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.



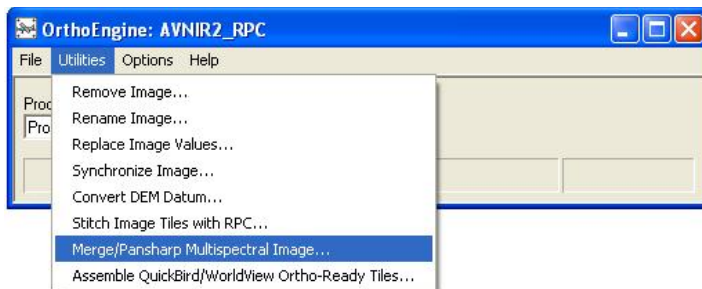
2.2 AVNIR-2 Data with Rational Functions

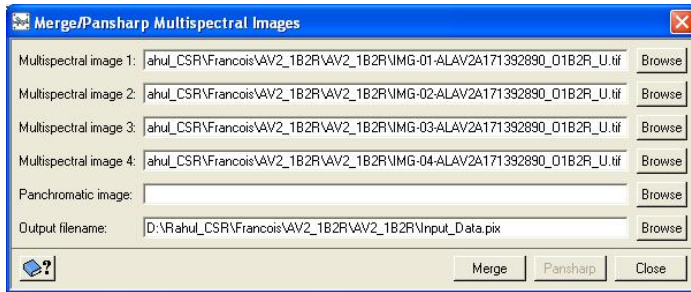
The image below illustrates the typical file naming convention used for RPC AVNIR-2 data

Name	Size	Type	Date Modified
HDR-ALAV2A171392890_O1B2R_U.txt	2 KB	Text Document	8/4/2009 11:59 AM
IMG-01-ALAV2A171392890_O1B2R_U.tif	116,196 KB	Microsoft Office Do...	8/4/2009 3:17 PM
IMG-02-ALAV2A171392890_O1B2R_U.tif	116,196 KB	Microsoft Office Do...	8/4/2009 4:09 PM
IMG-03-ALAV2A171392890_O1B2R_U.tif	116,196 KB	Microsoft Office Do...	8/4/2009 4:09 PM
IMG-04-ALAV2A171392890_O1B2R_U.tif	116,196 KB	Microsoft Office Do...	8/4/2009 4:09 PM
RPC-ALAV2A171392890_O1B2R_U.txt	2 KB	Text Document	8/4/2009 11:59 AM

2.3 Data Merging

AVNIR-2 data with RPC is distributed as 4 separated channels/bands. OrthoEngine 'Merge / Pansharp Multispectral Image...' functionality can be used to merge the 4 raw bands into one single PIX file





Browse for raw image bands; provide an output PIX file name in the Merge window and click 'Merge' button. At the end of this process, the user will be prompted to add the final PIX file into the OrthoEngine project. Click 'Yes' and the PIX file will be added to the OrthoEngine project.

2.4 GCP Collection

At this stage an ortho image 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 1st order RPC adjustment in an AVNIR-2 Rational Function project.*

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 ortho image.