

OrthoEngine Cartosat Module

ORTHOENGINE CARTOSAT MODULE

PCI Geomatics has achieved complete certification for its flagship software, Geomatica® to be used for processing data from the CARTOSAT-1 satellite, from the Indian government-contracted ANTRIX Corporation.

The CARTOSAT-1 satellite was launched on May 5, 2005 by the Indian Space Research Organization (ISRO). With two panchromatic cameras that deliver a spatial resolution of 2.5 meters, CARTOSAT-1 provides stereo data suitable for 3-D feature extraction and advanced, large-scale mapping applications. The data are also optimal for generating digital terrain models (DTMs) and digital elevation models (DEMs).

PCI Geomatics offers several software modules for the exploitation of CARTOSAT-1 data.

MODULE PREREQUISITES

Read CARTOSAT-1 data directly from the distribution CD format (CDCARTOSAT) requires Geomatica Core.

Read and orthorectify CARTOSAT-1 data using the Rational Functions Math Model requires a CARTOSAT-1 module.

Rigorous orthorectification of CARTOSAT-1 data requires a High-Resolution Satellite Models module. For more information on using rigorous orthorectification for CARTOSAT-1 data refer to the OrthoEngine High-Resolution Math Models Technical Specifications.

DEM extraction from stereo CARTOSAT-1 imagery requires the Automatic DEM Extraction module. For more information about automatic DEM extraction for CARTOSAT-1 data refer to the OrthoEngine Auto DEM Extraction Technical Specifications.

Stereo 3D feature extraction from CARTOSAT-1 data requires the OrthoEngine 3D Stereo module. For more information about stereo 3D feature extraction for CARTOSAT-1 data refer to the OrthoEngine 3D Technical Specifications.

READ CARTOSAT-1 DATA DIRECTLY FROM THE DISTRIBUTION CD FORMAT

- The CDCARTOSAT task will read channels and the satellite ephemeris data (orbital information) from the CD and save it to a PCIDSK file.
- The CDCARTOSAT task is an operation which can be included in a script workflow

ORTHORECTIFY CARTOSAT-1 DATA USING THE RATIONAL FUNCTIONS MATH MODEL

- The RPC orthorectification model accounts for the distortions caused by the platform (position, velocity, and orientation), the sensor (orientation, integration time, and field of view) the Earth (geoid, ellipsoid, and relief), and the cartographic projection (ellipsoid and cartographic).
- The RPC model builds a correlation between the pixels and their ground locations
- The RPC math model obtains RPC data with images and imports coefficients automatically
- The RPC math model calculates the polynomial coefficients from GCPs
- The RPC math model supports RPC data refinement with one or more GCPs and zero- or first-order GCP refinement

GROUND CONTROL

The OrthoEngine Satellite Models support GCP and tie-point ground controls.

Technical Specifications

GCP Collection

GCPs can be collected manually or by using:

- A geocoded image
- Geocoded vectors
- A chip database
- A digitizing tablet
- An imported text file

Other features include:

- Stereo-GCP collection
- Conversion of GCPs to check points to exclude from model calculation
- Display of individual and overall RMS error for GCPs

Tie-Point Collection

Tie points:

- Extend ground control over areas without GCPs
- Identify how images in a project relate to each other
- Ensure the best fit for all images in a project
- Let you enter tie-point elevations manually or extract them from a DEM
- Let you import and export tie points
- Show individual and overall RMS errors

Residual Report

Using residual reports, you can:

- Show GCP, check point, tie point, and Stereo-GCP error information in one report
- Edit points in a residual report and update bundle adjustments
- View in ground units or pixel units
- Print the report to a file

Overall Layout

The OrthoEngine Satellite Models are quality control tools that display image footprints, distribution of GCPs, and tie points for your project.

ORTHORECTIFICATION

Orthorectification:

- Lets you perform batch processes
- Utilizes a DEM for terrain correction
- Increases working cache for processing

- Increases sampling interval for faster processing

Offers the following resampling methods:

- Nearest Neighbor
 - Bilinear Interpolation
 - Cubic Convolution
 - 8-pt SinX/X
 - 6-pt Sin X/X
 - Average filter
 - Median filter
 - Gaussian filter
 - User-defined filter
- Clips the image size upon orthorectification
 - Lets you set a starting time for processing
 - Provides approximately one-third of a pixel accuracy for VIR satellite images, and approximately one pixel for radar images when quality ground control coordinates are used

MOSAICKING

With manual mosaicking, you can:

- Define a mosaic area
- Collect cutlines manually by:
 - Importing and exporting cutlines
 - Blending seams using Blend Width
- Perform manual color balancing:
 - Based on samples identified in overlap between images
 - By using samples (match areas) to compute look-up tables (LUTs) to adjust new images to match an existing mosaic
 - By adjusting the dark end or light end
 - By importing and exporting LUTs for color balancing

ALGORITHMS INCLUDED

- RFMODEL - computes the math model of one or more images using the rational function math modelling method

Technical Specifications

CERTIFICATION

This certification states that Geomatica Version 10.0.2 has complied with all six identified levels, which includes:

Level of Certification	Functionality Tested	Processing Result / Accuracy
Level 1- Image Import and Image Processing	<ol style="list-style-type: none"> 1. Geotiff Reading 2. Importing Geotiff into PCI native file format (.pix) 3. Mono Orthokit Reading 4. Stereo Orthokit 5. AOI 	Cleared
Level 2 - Single image traingulation Mono Orthokit used	<ol style="list-style-type: none"> 1. Georeference without GCPs 2. Georeference with GCPs 3. Georeference with GCPs and External DEM 	Cleared
Level 3 - Stereo pair triangulation, Stereo Orthokit used	<ol style="list-style-type: none"> 1. DEM & Orthoimage generation without GCPs 2. DEM & Orthoimage generation with GCPs 	Cleared
Level 4 - Block Traingulation for mono imagery, mono Orthokit of	<ol style="list-style-type: none"> 1. Block Georeference product generation without GCPs 2. Block 	Cleared

adjacent scenes are used	Georeference product generation with GCPs	
Level 5 - Block triangulation for stereo imagery, stereo Orthokit as input for successive scenes	<ol style="list-style-type: none"> 1. Block Orthoimage & DEM product generation without GCPs 2. Block Orthoimage & DEM product generation with GCPs 	Cleared
Level 6 - Digital Topogra- phic Mapping	<ol style="list-style-type: none"> 1. Mapping Tools 2. 3-D Feature Coding 	Cleared

CARTOSAT TUTORIAL:

http://www.pcigeomatics.com/services/support_center/tutorials/pdf/Cartosat.pdf

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