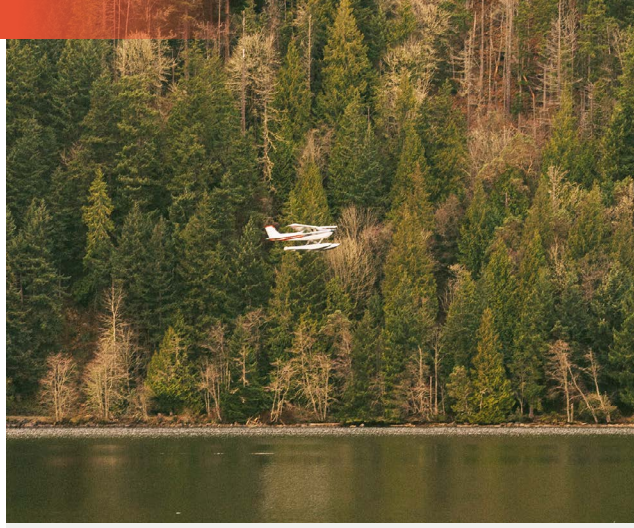
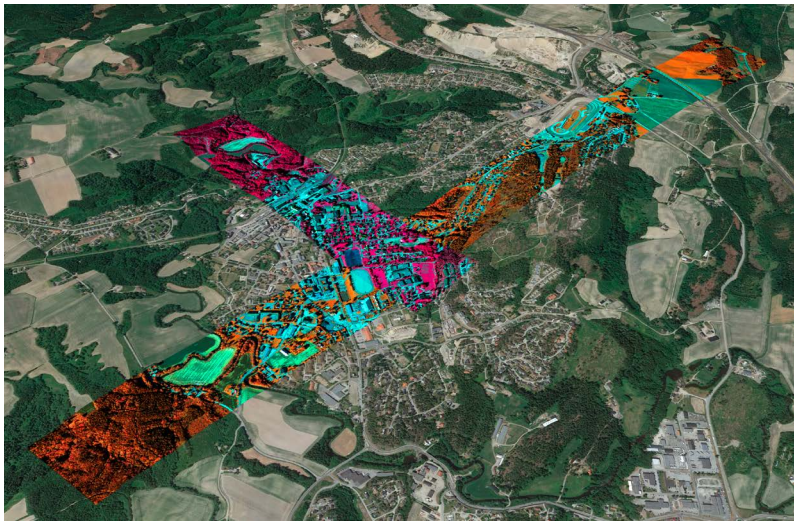
parge.com

PARGE

Orthorectification for Airborne Scanners

PARGE® is a direct geocoding and orthorectification software. It exactly reconstructs the scanning geometry for each image pixel using position and attitude of the airplane in conjunction with (optional) terrain elevation data. It is specially suited for the application with hyperspectral airborne line scanners.





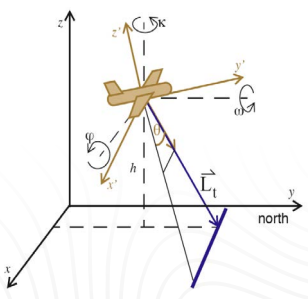
NEO Mjolnir boresight alignment experiment

Compatibility

- Consistent and open data structure optimized for airborne hyperspectral instruments,
- Support for Corning Shark, HAIP BlackBird V2, Headwall Hyperspec Nano, NEO HySpex Mjolnir, Resonon Pika, Specim AISA/AFX and more,
- Operating system independent operation,
- Based on IDL technology and calculation outputs to ENVI formats (NV5 Inc.),
- Orthorectified mosaics or 3D point cloud outputs, and
- Oblique an horizontal view data processing.

Accuracy

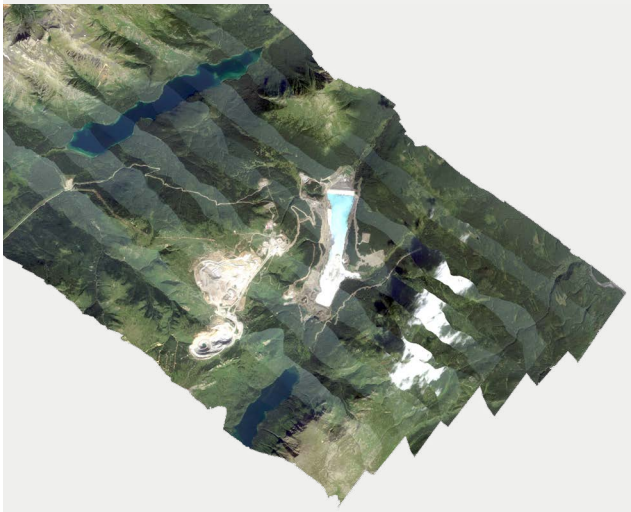
- Sub-pixel accurate geometric calculation and DEM intersection,
- Automatic boresight alignment of sensor system based on ground reference data,
- Optimized choice of resampling techniques.



Scan Geometry

FLEXIBILITY

- Sophisticated graphical user interface for all functions with integrated on-line help system,
- Side output of pixel scan geometry for BRDF research and atmospheric correction,
- Tools for parameter filtering and correction,
- Support for complete directory based batch processing.



Hymap large scale fully automatic boresighting processing and mosaicking solution (Hyvista Corp. Australia)

SUPPORT AND CUSTOMIZATION

- Introduction of user specified sensors and data format is supported upon request,
- Detailed user manual includes full description of functionality, procedures, and internal data format.

TECHNICAL CONDITIONS

- Windows, Linux, or Mac OS X.
- RAM: min. 16 GB allocated to IDL,
- ENVI™ license recommended, but not a condition.

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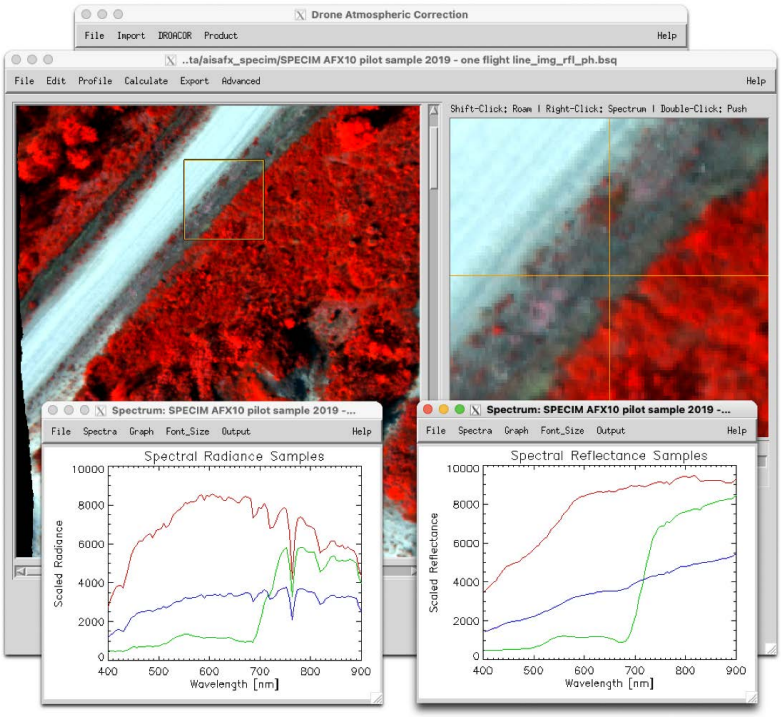
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droacor.com

DROACOR

Drone Atmospheric Correction

A new generation for reflectance retrieval from UAV based imagery designed for hyperspectral and multispectral instruments.
Automatic directory based processing with fully physical self-adjusting calculation.



DROACOR spectral reflectance retrieval from AISA FX imagery (data courtesy of Specim Inc, Finland)

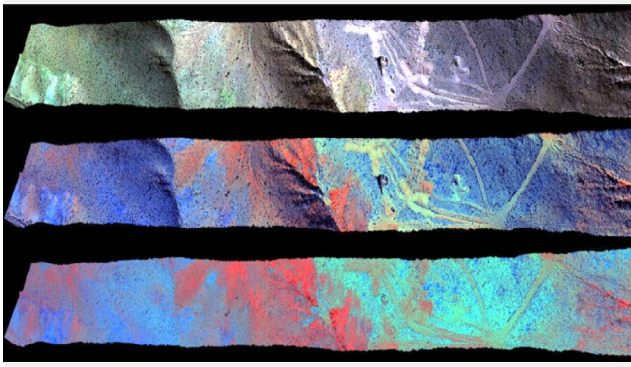
Fully Featured

- Automatic physical reflectance retrieval method,
- LibRadtran radiative transfer model based parameters,
- Inflight radiometric calibration,
- Specific low flight altitude adjacency irradiance correction,
- Topographic illumination correction,
- Cloud shadow correction,
- Spectral calibration for VNIR and SWIR using oxygen band positions,
- Water vapor retrieval by spectral fitting technique,
- Aerosol optical thickness estimate by enhanced method,
- Adaptive atmospheric feature treatment, and
- Custom spectral polishing.



ADVANCED TOOLS

- Below-cloud reflectance retrieval,
- Ground based/horizontally acquired data correction,
- Mosaic cloud deshading and BRDF correction,
- Multi-file multi-index vegetation index , calculation,
- Spectral angle mineral mapping,
- Thermal Infrared data processing,
- Topographic illumination correction based on digital surface model input, and
- Built-in GLIMPS image analysis tool.



DROACOR tmineralogy results for Cuprite Nevada. NEO Hyspex Mjolnir VS-620 scene - data courtesy of Echo Labs Inc, Canada.

EASE OF USE

DROACOR® can be used out of the box for supported sensor systems (see below).

The mostly automatic data import and preconfigured atmospheric correction makes it usable without expert knowledge about

atmospheric compensation.

SUPPORTED SENSOR SYSTEMS

Automated data import and processing is supported for:

- Multispectral: Micasense RedEdge, Standard RGB TIFFs, Vexcel UltraCam.
- Hyperspectral: Corning Shark, HAIP BlackBird V2, Headwall Hyperspec Nano, NEO HySpex Mjolnir, Resonon Pika, Specim AISA/AFX.
- More systems and thermal sensors upon request.

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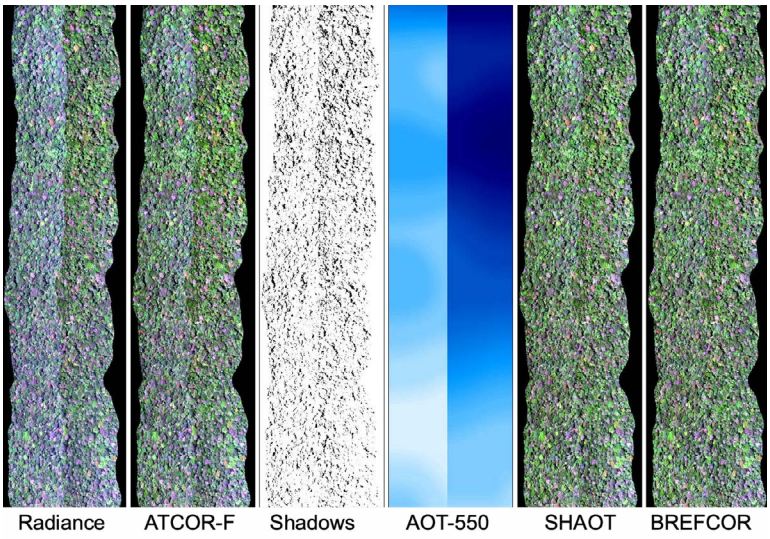
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atcor.com

ATCOR

Atmospheric & Topographic Correction

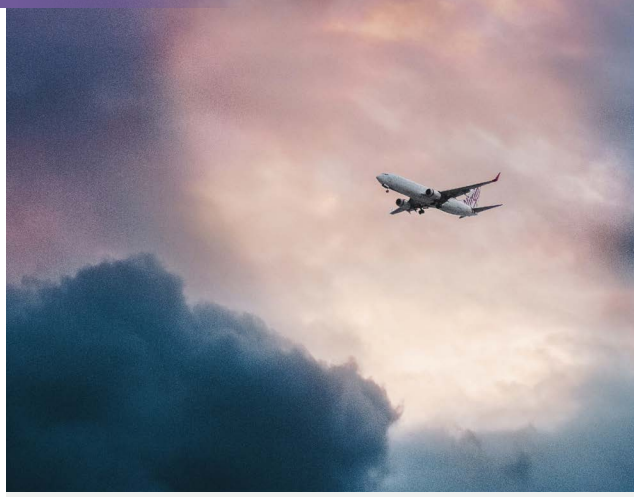
The ATCOR software family derives surface reflectance, emissivity, and temperature from calibrated images by atmospheric and topographic correction. The model is applicable to all optical remote sensing systems with special focus on imaging spectroscopy data



ATCOR-4, aerosol scattering detection, removal and BRDF correction.

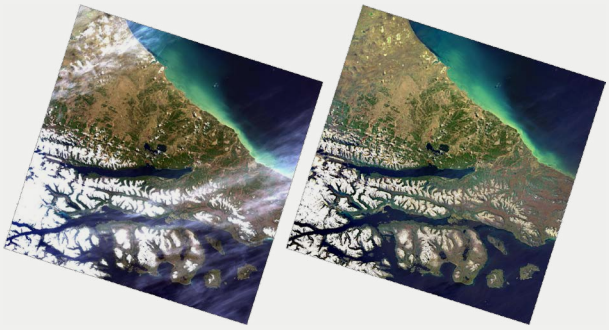
Fully Featured

- Complete graphical interface for the atmospheric & topographic correction based on IDL (NV5 Inc),
- Based on ENVI™ file formats,
- Batch processing and logging capabilities for operational processing,
- Using high-accuracy MODTRAN® radiative transfer calculations,
- ATCOR-S support for ASTER, DMC, Dragonette, Ikonos, Landsat, Orbview, Planet, Pléiades, Sentinel, SPOT Superview, Quickbird, VENuS, Worldview and more,
- ATCOR-S hyperspectral option for ENMAP, EMIT, PRISMA, and others,
- ATCOR-A support for airborne multispectral, hyperspectral and thermal line scanner instruments,
- Automatic aerosol type and aerosol optical thickness retrieval,
- Flexible water vapor retrieval and correction,
- Removal of haze, cloud shadow, and cirrus clouds,
- Capability for in-flight vicarious radiometric and spectral calibration and validation,
- Sensor simulation tool for at-sensor radiance cube from reflectance imagery,
- Correction for spectral smile,
- Cast shadow correction with adaptive diffuse irradiance calculation, and
- Physical model based BRDF correction (BREFCOR method).



ATMOSPHERIC COMPENSATION

- ATCOR-S for small and medium FOV satellite imagery, for rugged terrain, and
- ATCOR-A for airborne imaging spectroscopy, mulutscanner imagery , all terrain



ATCOR--3 correction and haze removal for Sentinel-2.

COMPLETE SOLUTION

ATCOR is the major, state-of-the-art software suite available on the market which includes the capability for radiometric correction in rugged terrain considering cast shadow and illumination calculations. It is based on the reliable MODTRAN® radiative transfer code and more than 30 years of research in physical atmospheric correction.

REQUIREMENTS

- IDL virtual machine provided with software distribution,
- Linux, MacOS, or Windows,
- RAM: min. 16 GB allocated to IDL,
- ENVI™ license recommended, but not a condition.

The MODTRAN® trademark is being used with the express permission of the owner, the United States of America, as represented by the United States Air Force and by Spectral Sciences, Inc. (for use outside of the USA). MODTRAN® software used in this product is licensed from the United States of America, as represented by the United States Air Force, under U.S. Patent Nos. 5,884,226, 7,433,806 and 7,593,835 B2.

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based on ATCOR method originally developed by Dr. Rudolf Richter German Aerospace Center

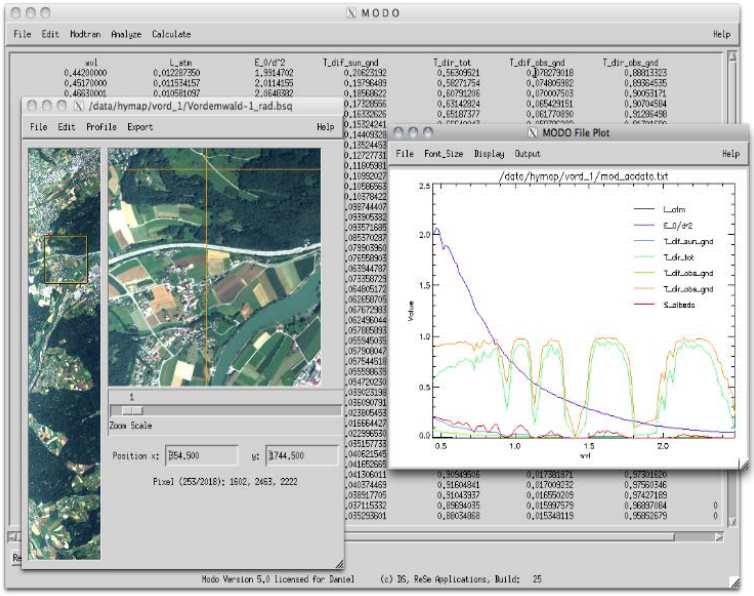
DLR

modo-modtran.com

MODO

MODTRAN® for Remote Sensing Research

Scientific tool used to analyse signatures at various sensor systems, design hyperspectral instruments, calibrate and validate operational sensors, propagate surface reflectance signatures, learn about radiative transfer, and investigate atmospheric gases and aerosols.



Fully Featured

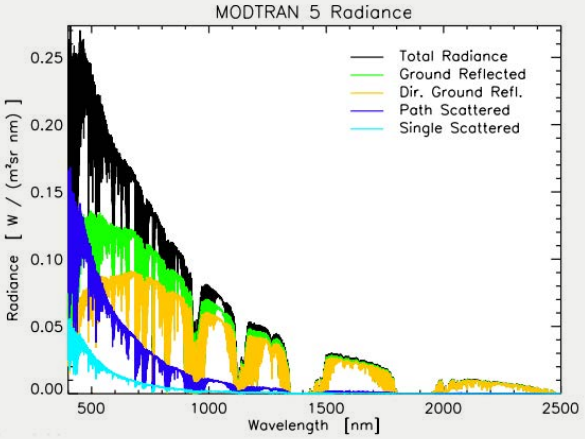
- Graphical interface to the original MODTRAN® software as developed by SSI/AFGL,
- Direct call of embedded MODTRAN® code,
- Import/export of MODTRAN® tape5 or json control files,
- Import/export of reflectance reference spectra,
- Support for ENVI® spectral libraries,
- Optionally includes original executable code and full license of MODTRAN® v6.0,
- Extraction of radiance/transmittance/solar flux components from original MODTRAN® output,
- Plotting of standard MODTRAN® outputs (tape7 / flux),
- Direct at-sensor radiance simulation for remote sensing systems,
- Broad collection of sensor response functions for airborne and spaceborne optical and thermal instruments,
- Sensitivity analysis by series of critical parameters,
- Helper functions for visibility determination and solar angles calculation,
- Simple atmospheric correction (SACO) module for ENVI® formatted imagery,
- ENVI® file display and extraction of spectra, and
- Complete, linked documentation.



EASE OF USE

MODO provides access to the MODTRAN® radiative transfer code through a graphical user interface. It has been designed for use by the remote sensing specialists and research applications.

Moreover, it is well suited for generic use of MODTRAN® and for educational purposes.



Full Resolution Radiance Components.

TECHNICAL REQUIREMENTS

- IDL virtual machine provided with software distribution,
- 9 GB storage for complete MODTRAN® installation,
- Windows, Linux, or MacOS.

The MODTRAN® trademark is being used with the express permission of the owner, the United States of America, as represented by the United States Air Force and by Spectral Sciences, Inc. (for use outside of the USA). MODTRAN® software used in this product is licensed from the United States of America, as represented by the United States Air Force, under U.S. Patent Nos. 5,884,226, 7,433,806 and 7,593,835 B2.

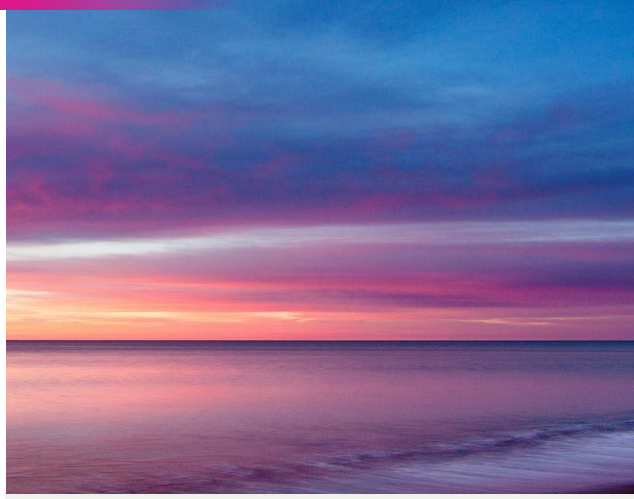
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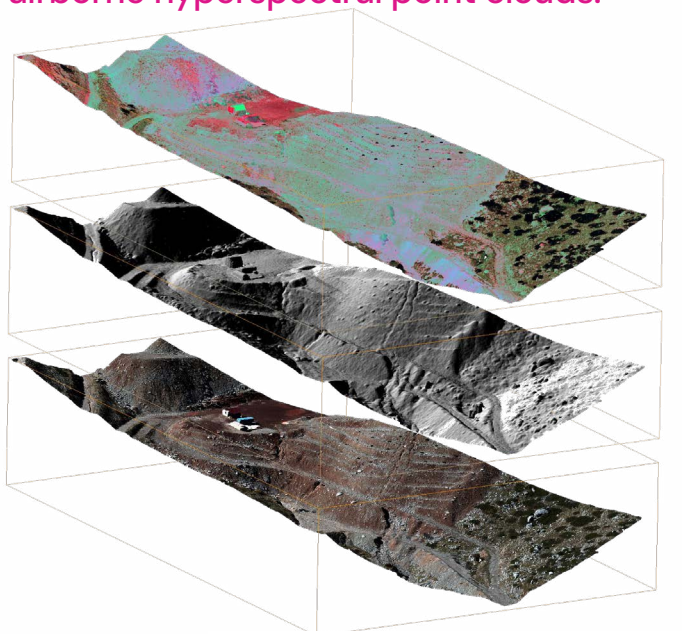
intacor.com

INTACOR

Integrated Automatic Correction of Airborne Hyperspectral Imagery



Automatic correction and processing pipeline for airborne hyperspectral point clouds.



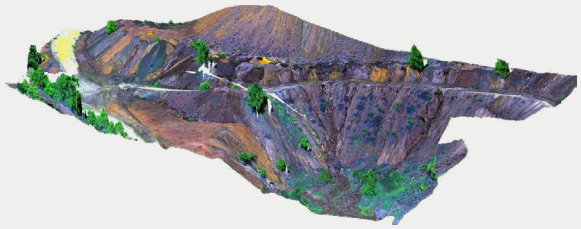
Combined reflectance retrieval and high precision Lidar data processing leads to valuable insights into a Bauxit mine in Greece.

Fully Featured

- INTACOR® integrates radiometric and spectral calibration, geocoding, atmospheric correction, reflectance retrieval, product generation, rectification and mosaicking for hyperspectral imaging in one single workflow,
- Tailored sensor support: The integrated workflow is optimized for each supported sensor,
- Automatization: Once set up, large data volumes can be processed without user interaction,
- Lidar DSM files (LAS format) can be directly integrated into the process and being used for geometric and radiometric corrections,
- Input data quality is checked by image based signal-to-noise estimation and quality layer production,
- Data calibration and spectral recalibration is included,
- Integrated PARGE® Geocoding and DROACOR® Processing for topographic and Radiometric correction,
- Products integration: A link to ENVI/IDL based product generation routines allows to include user defined products to the workflow,
- The optimized workflow comes in cleary structured steps and may be repeated on demand from all major levels of processing,
- The integrated outputs can be either rectified mosaics of the created products or 3D point clouds of the input image series.

AUTOMATED DATA PROCESSOR

Automated hyperspectral imaging (HSI) data processor from raw data acquisition to geocoded products. The processing from raw data to surface reflectance and products can be done at the desired timescales without critical user interaction.



Integrated hyperspectral point cloud of five adjacent images over an abondened mining area in Cyprus, with 45 degrees observation geometry; displayed bands: R (550 nm) G (1050 nm) B (2250 nm).

CALIBRATION

The process starts with raw data as delivered by the sensor provider and applies radiometric and on-the-fly spectral (re-)calibration of the data for optimal results.

TOPOGRAPHIC & RADIOMETRIC CORRECTION

Best performing standard configurations for topographic illumination correction and angular reflectance anisotropy (BRDF) correction are invoked out of the box.

REQUIREMENTS

- IDL virtual machine provided with software distribution,
- Linux, MacOS, or Windows,
- RAM: min. 16 GB allocated to IDL,
- ENVI™ license recommended, but not a condition.

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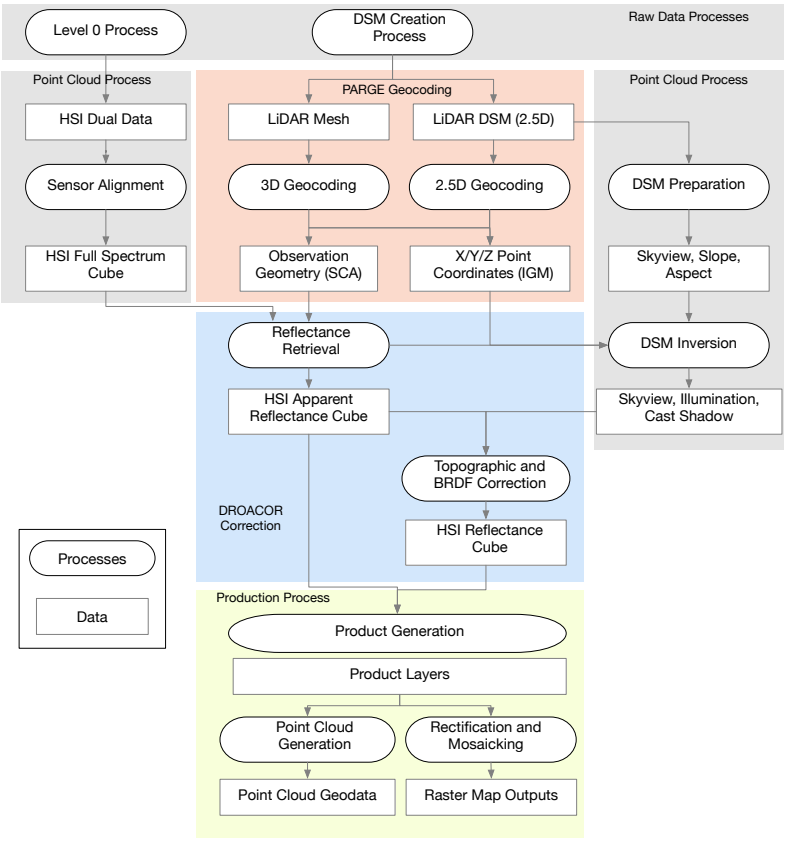
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xacor.com

XACOR

Research & Development Projects by ReSe Applications LLC

Educational, research and commercial projects by ReSe Applications LLC. Going steps ahead in remote sensing data processing. Support for the development of new analysis methods and tailored processing pipelines.



INTACOR® Workflow.

Activities

- Engaged in educational, research and commercial projects,
- Collaborations (e.g.): DLR, PCI Geomatics, Geosystems, HAIP, NEO, NORCE, VEXCEL, Wyvern and more,
- Expertise in geocoding, radiative transfer and atmospheric correction,
- Specialization on imaging spectroscopy for satellite, airborne and drone imagery,
- Projects dedicated to the development of remote sensing software applications for pre-processing of multispectral and hyperspectral images,
- Focused on high-end processing of optical and thermal remote sensing data,
- Active since 2000 and ready as ever to address new challenges and to deliver powerful solutions for processing improvements.



SPECIALIZATION

We are focused on remote sensing data processing, and specifically on imaging spectroscopy. Our company is dedicated to the development of remote sensing software applications for pre-processing of multispectral and hyperspectral images.



m4mining.eu, A hyperspectral imaging system integrated with a 3D lidar, RGB camera and a inertial navigation system for mining.

EXPERTISE

Our expertise is in geometric and atmospheric modeling of radiation in optical remote sensing, as well as the geometric and atmospheric preprocessing of optical remote sensing data. A special focus has been put so far in the processing of airborne and drone hyperspectral imagery.

COMPLETE SOLUTIONS

We are proud to provide our software products and development services to a broad community of customers worldwide. Our applications are used at universities, scientific institutes, sensor system operators and commercial entities over all continents.

CONTACT US

If you have any questions or are interested in our research & developement services please provide us with your full address, your institute or company affiliation, the kind of project in which you are working or are interested on and the name of your supervisor/advisor (if appicable).

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