

LPS eATE

Commercial Software by Intergraph-ERDAS

High Density Image Matching for DSM Computation
and additional value for geospatial products

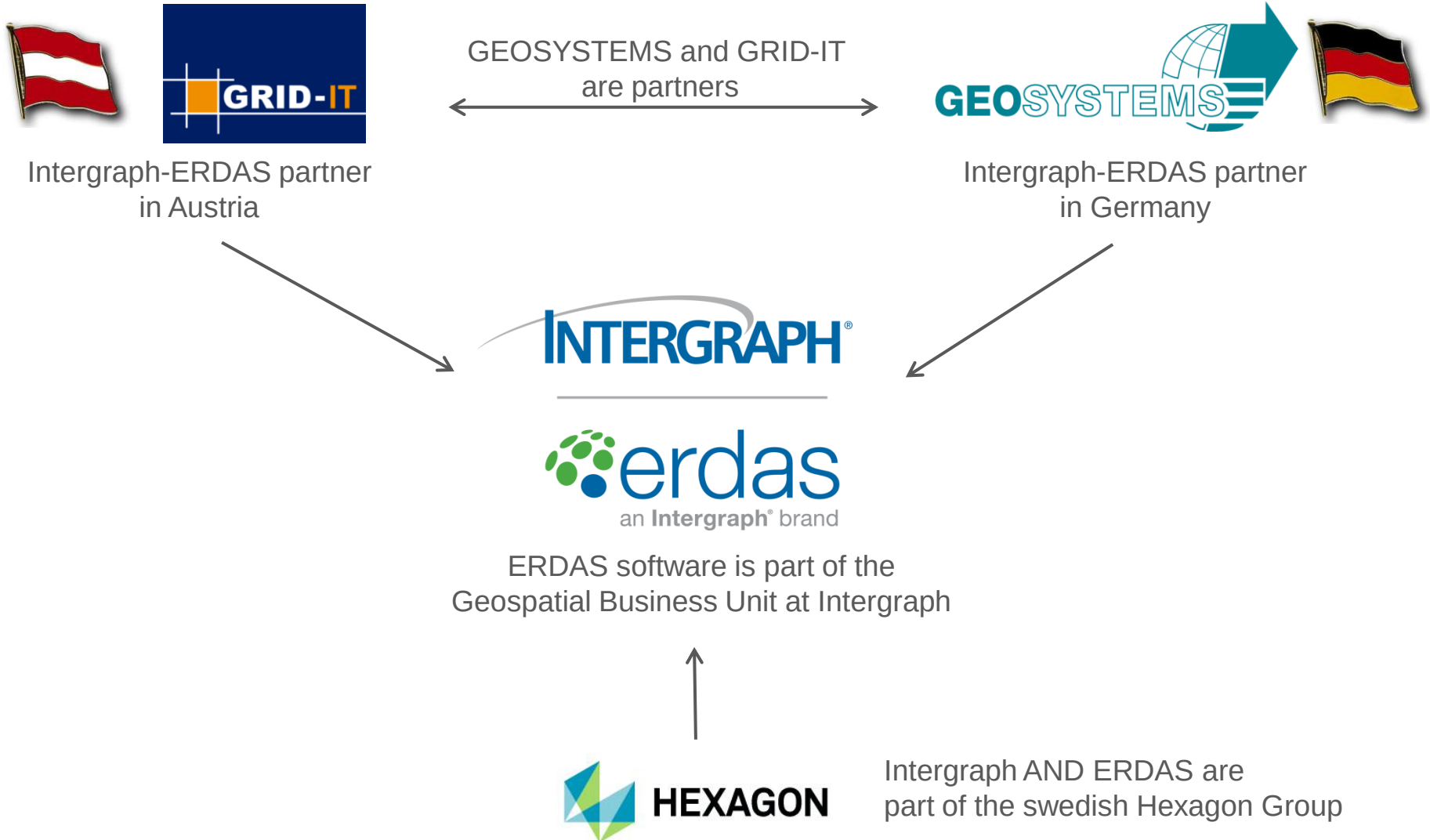
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ragg@grid-it.at



Company Overview



Portfolio

INTERGRAPH®

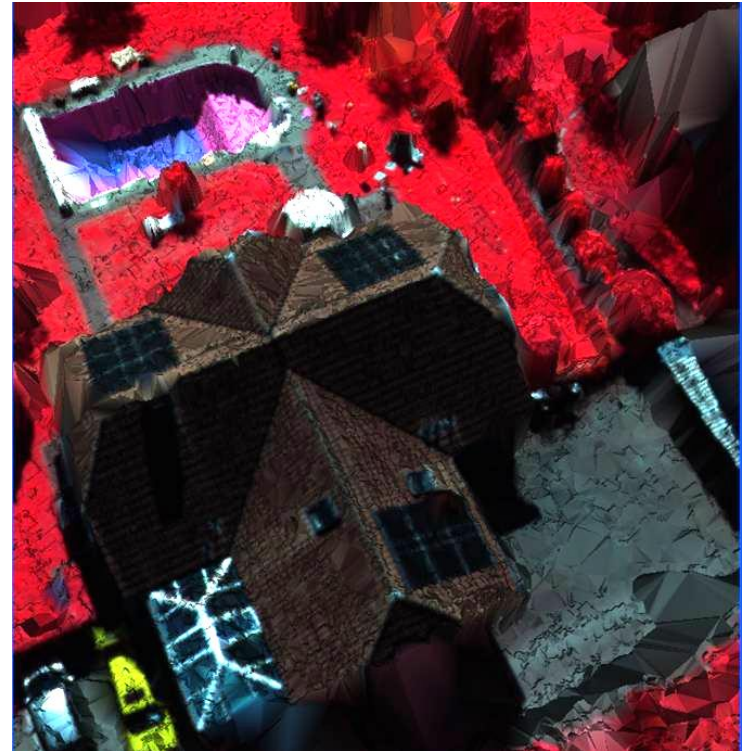
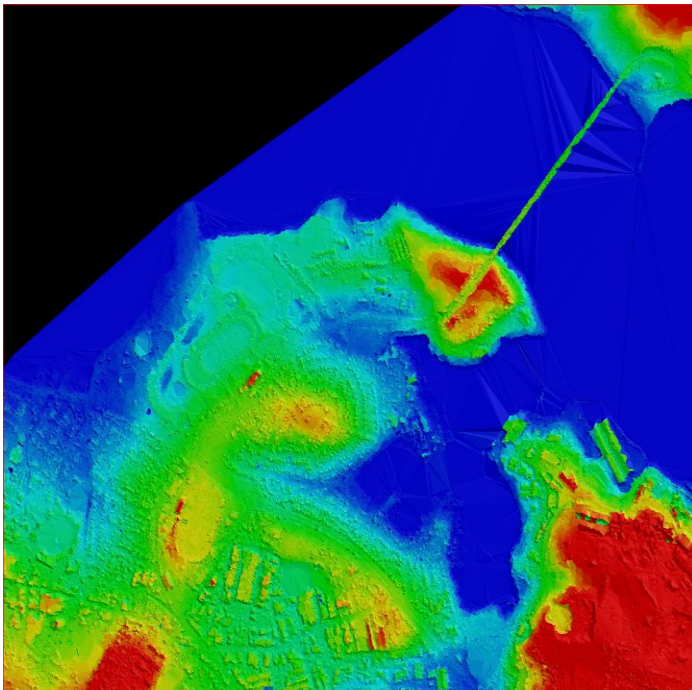
erdas
an Intergraph® brand





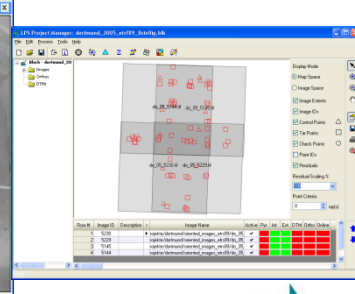
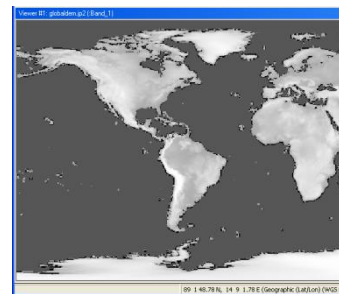
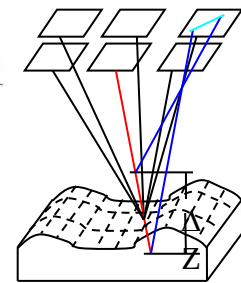
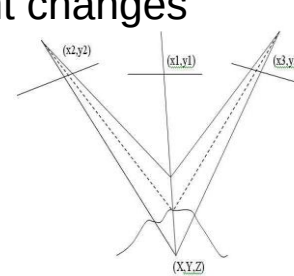
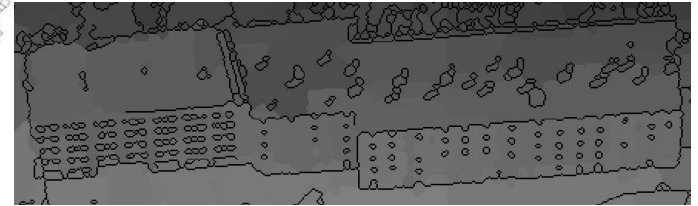
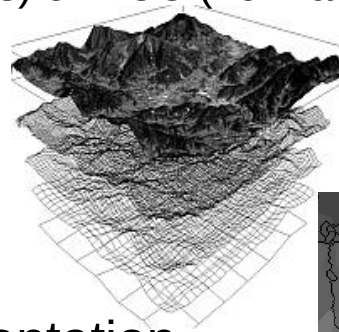
LPS eATE Concept – The Photogrammetric Point Cloud

- Point Cloud derived from **aerial** and **satellite** images
- **Every** pixel gets a height value
- **Classification algorithm** for buildings, vegetation and ground



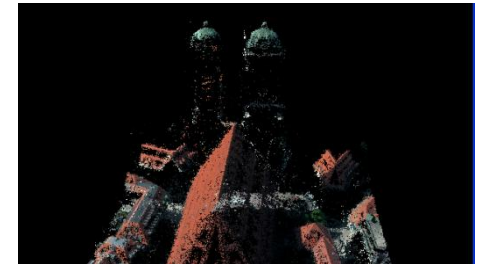
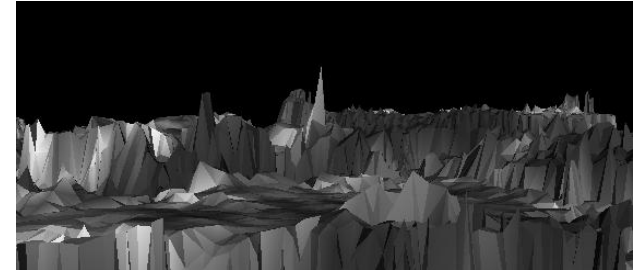
LPS eATE – Multi-Stage and Multi-Image Processing

- Correlation Method
 - SSD (Sum of squared differences) or NCC (normalized cross correlation) algorithms
- Use of all Image Pyramids
 - From coarse to fine
- Feature Matching using Segmentation
 - For edge detection and modelling the abrupt height changes
- Multi-Ray and Multi-Band Image Matching
 - For higher reliability and precision
- DGM Seed Surface
 - Global DTM (e.g. SRTM)
 - Local DTM (e.g. 25 m point distance)
 - Triangulated tie points and GCPs



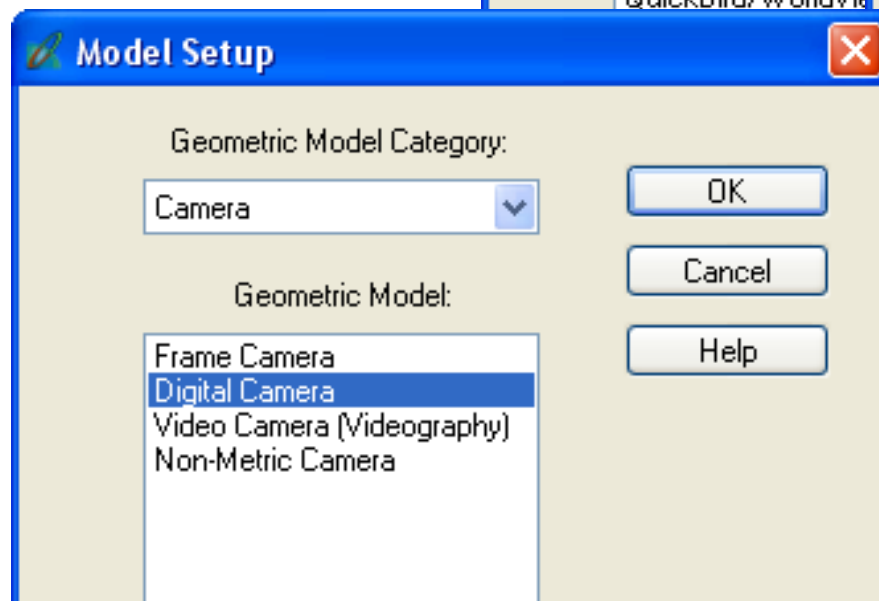
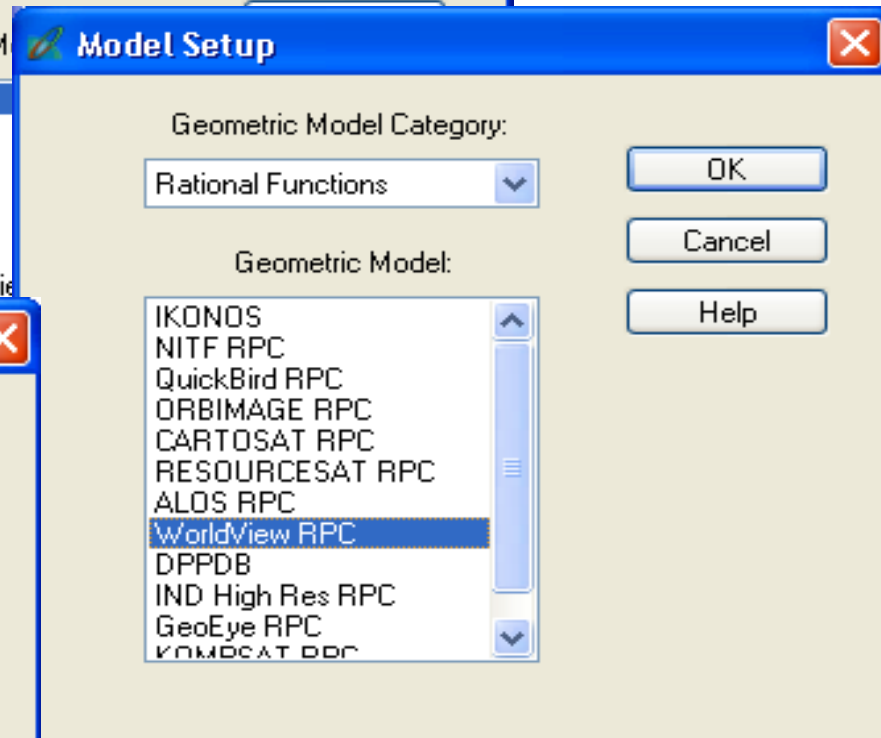
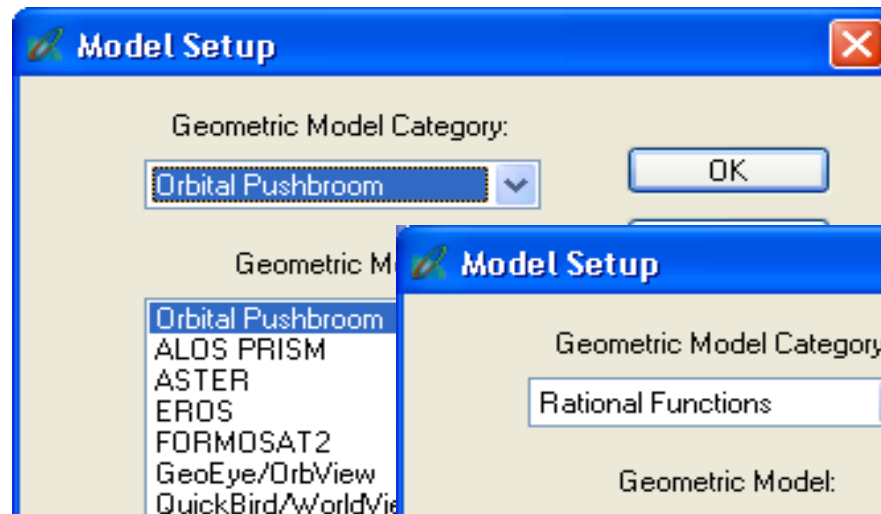
LPS eATE – Customizable Settings

- Blunder Elimination
 - Principal Components Analysis (PCA), RMSE threshold, for different sensors and tasks
- Customizable point density and quality for various applications (e.g. forest canopy, water shed analysis, solar potential, etc.)
- Use of all spectral data (RGBNir encoding)
- Primary processing band (e.g. Nir)
- Temporary creation of radiometrically improved input image layers



Sensor Support in LPS

- Orbital Pushbroom
- Rational Functions
- Camera





LPS eATE – Stereo Satellite Scenes

File

Edit

Process

Tools

Help

Automatic Tie Point Generation

Triangulate

Triangulation Report...

Project Graphic Status...

DTM Extraction

DTM Extraction Report...

Interactive Terrain Editing...

Ortho Rectification

Mosaic...

Feature Collection

10jan09072046-p1bs_r2c1-052310429060_01_p001.tif

10jan09072201-p1bs_r2c1-052310429060_01_p001.tif

Display Mode

☒ Map Space

☐ Image Space

☒ Image Extents

☒ Image IDs

☒ Control Points

☐ Tie Points

☒ Check Points

☐ Point IDs

☒ Residuals

Residual Scaling %

100

Point Criteria:

0

 ray(s)

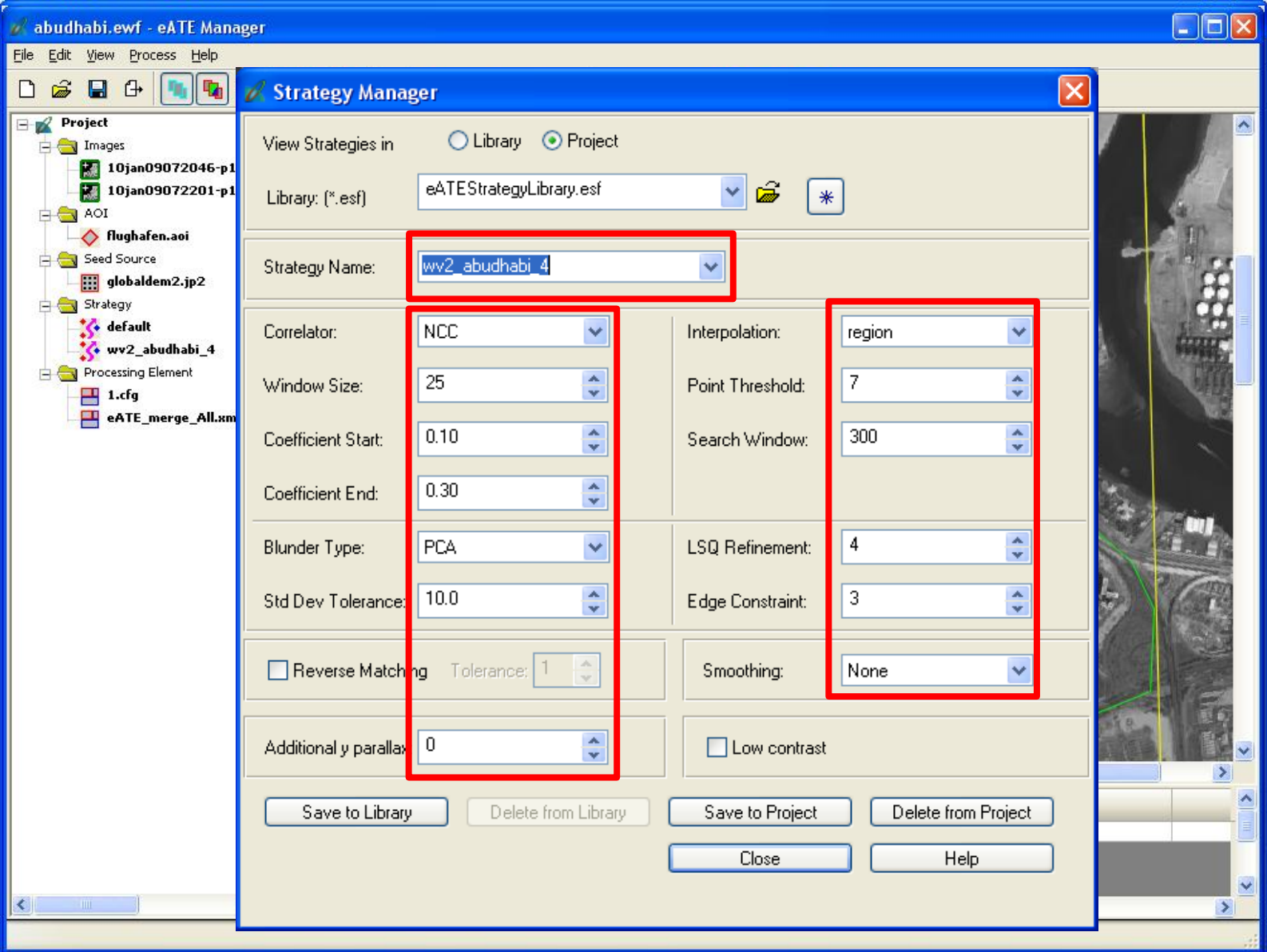
↑

↓

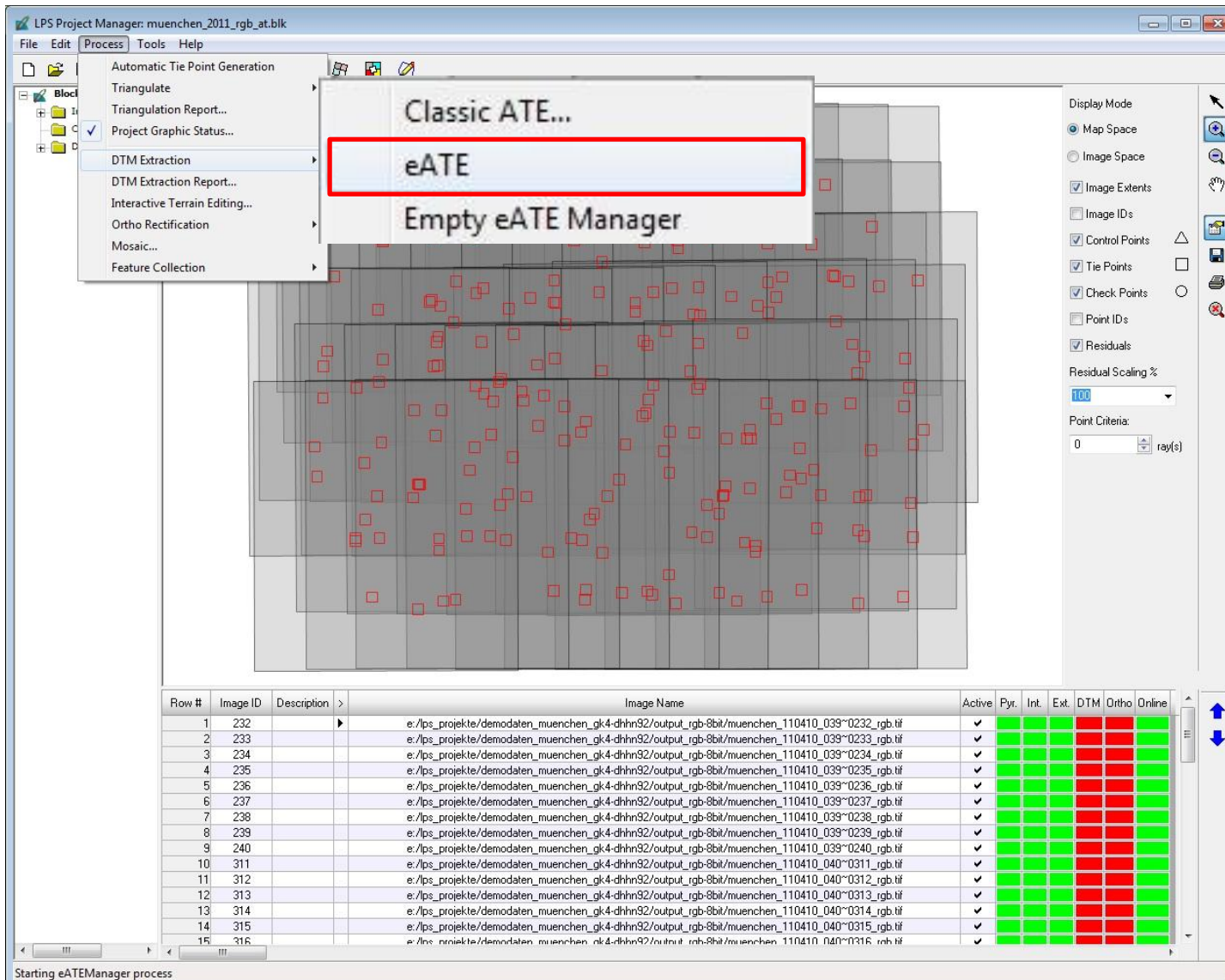
Row #	Image ID	Description	Image Name	Active	Pyr.	Int.	Ext.	DTM	Ortho	Online
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2	2		projekte/abudhabi/10jan09072201-p1bs_r2c1-052310429060_01_	✓						

Starting eATEManager process

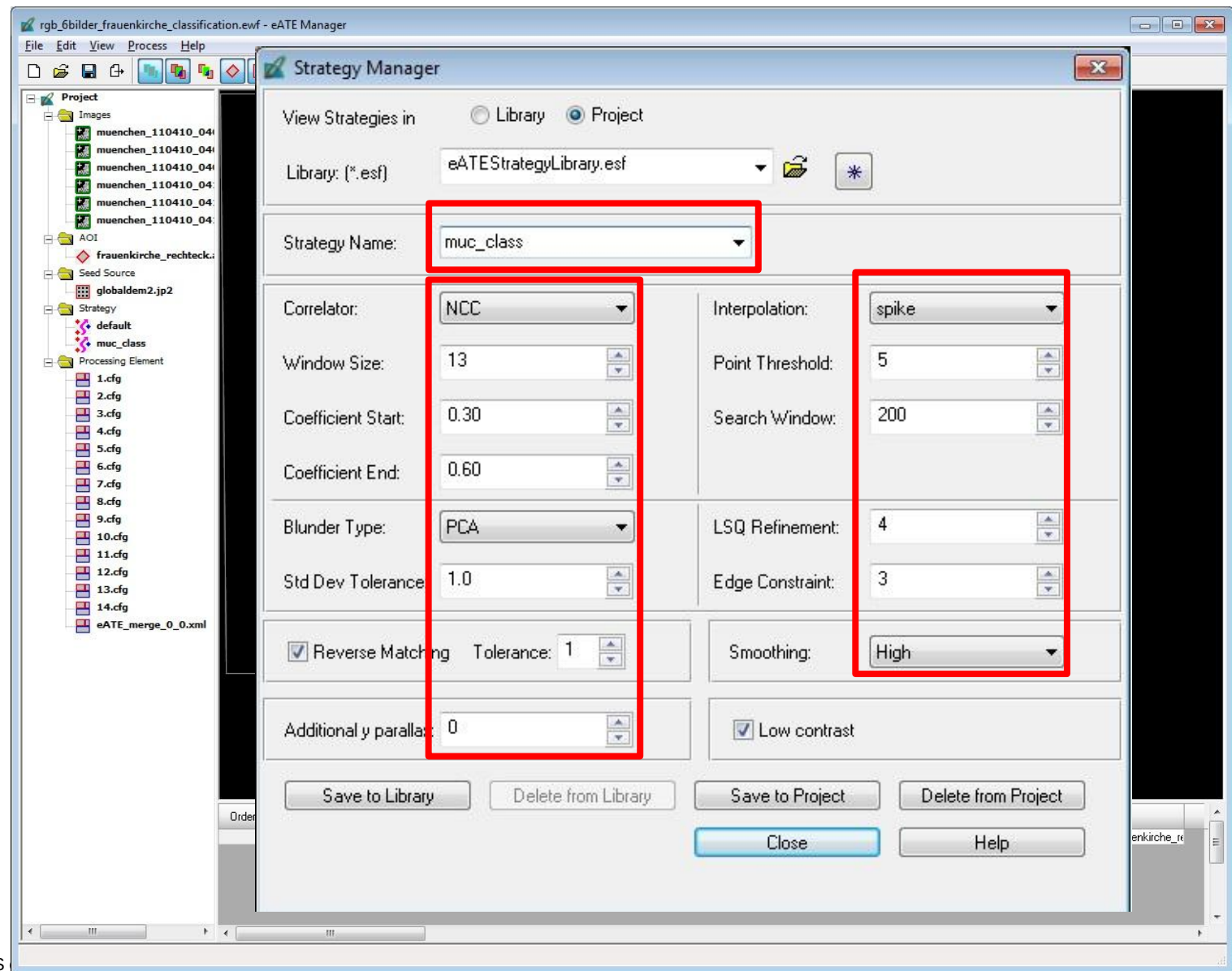
LPS eATE – Configuration for Worldview2 Data



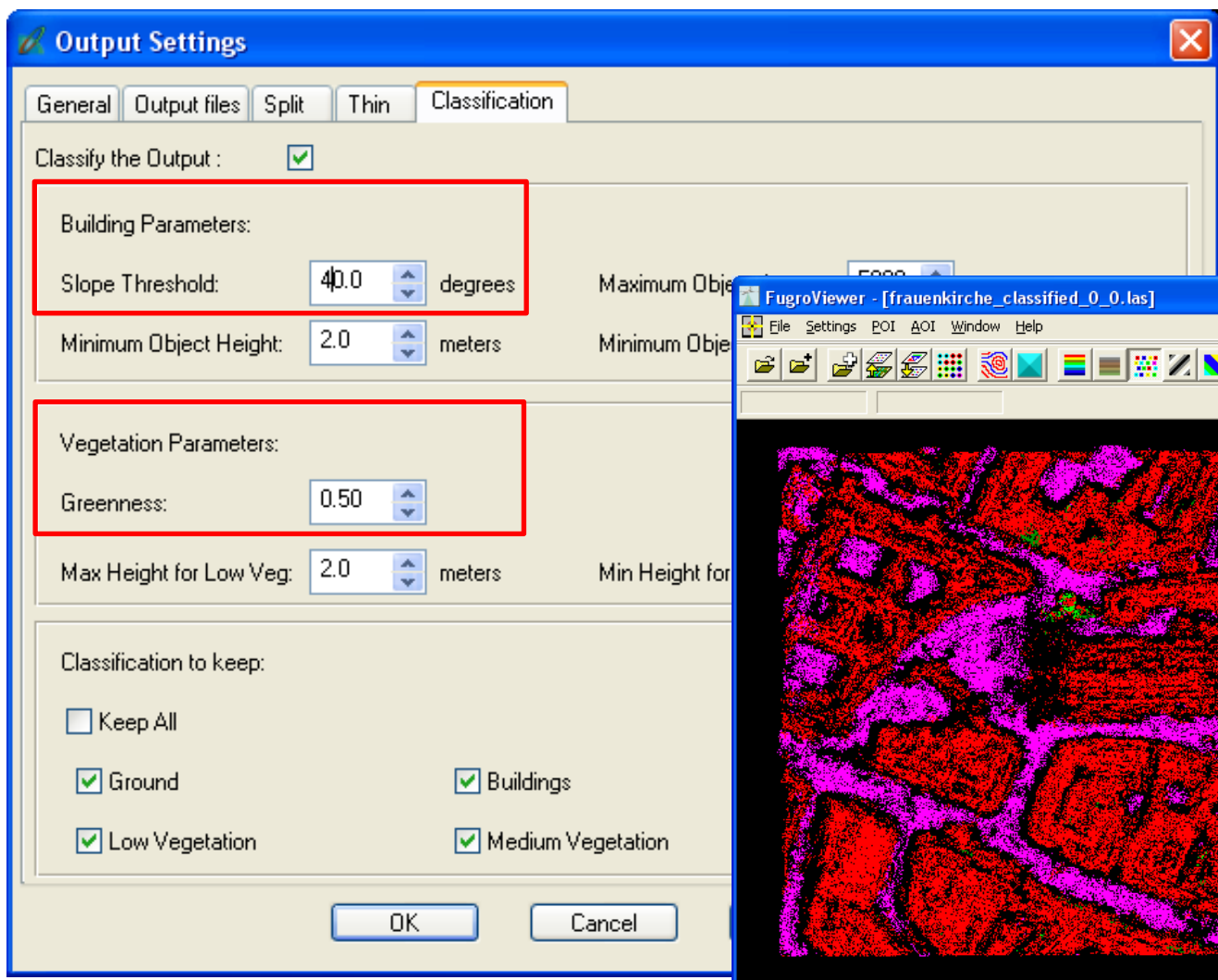
LPS eATE – Photogrammetric Block



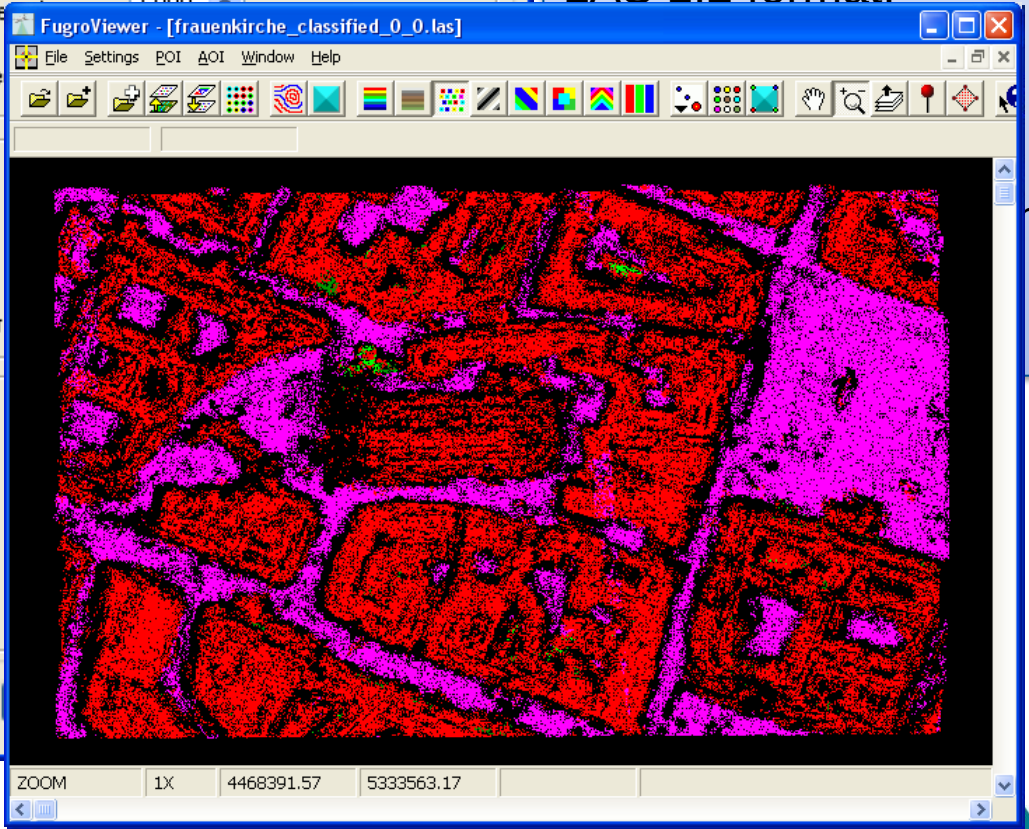
LPS eATE – Configuration for Aerial Images



Classification Parameter Set

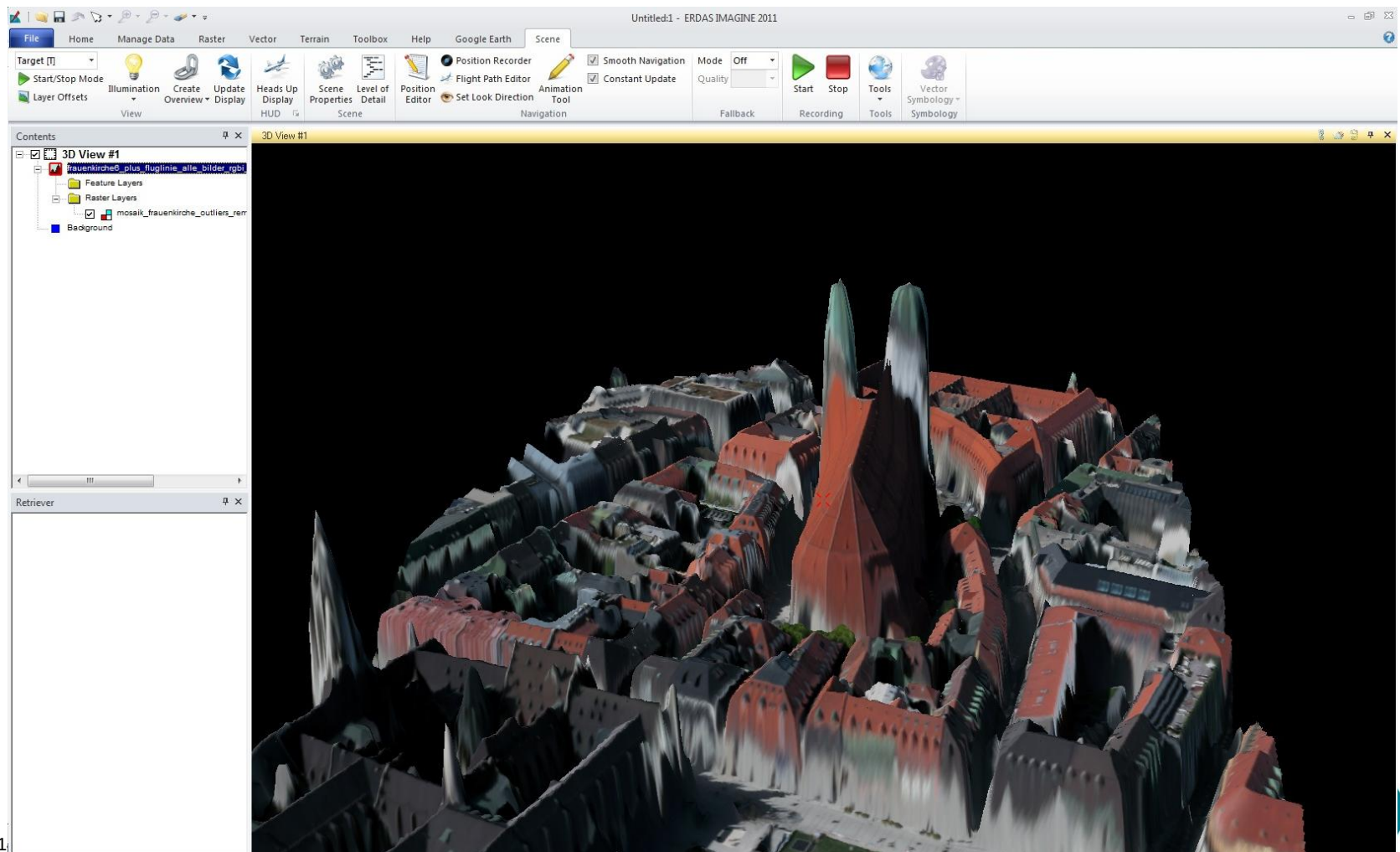


Classification –
The point cloud will be classified directly in the LAS 1.2 format.



LPS eATE – high resolution DSM from aerial images

- DSM from DMC II images, Munich Frauenkirche
- Flight with 80% length- and 60% sidelap, ≈ 10 cm pixel size

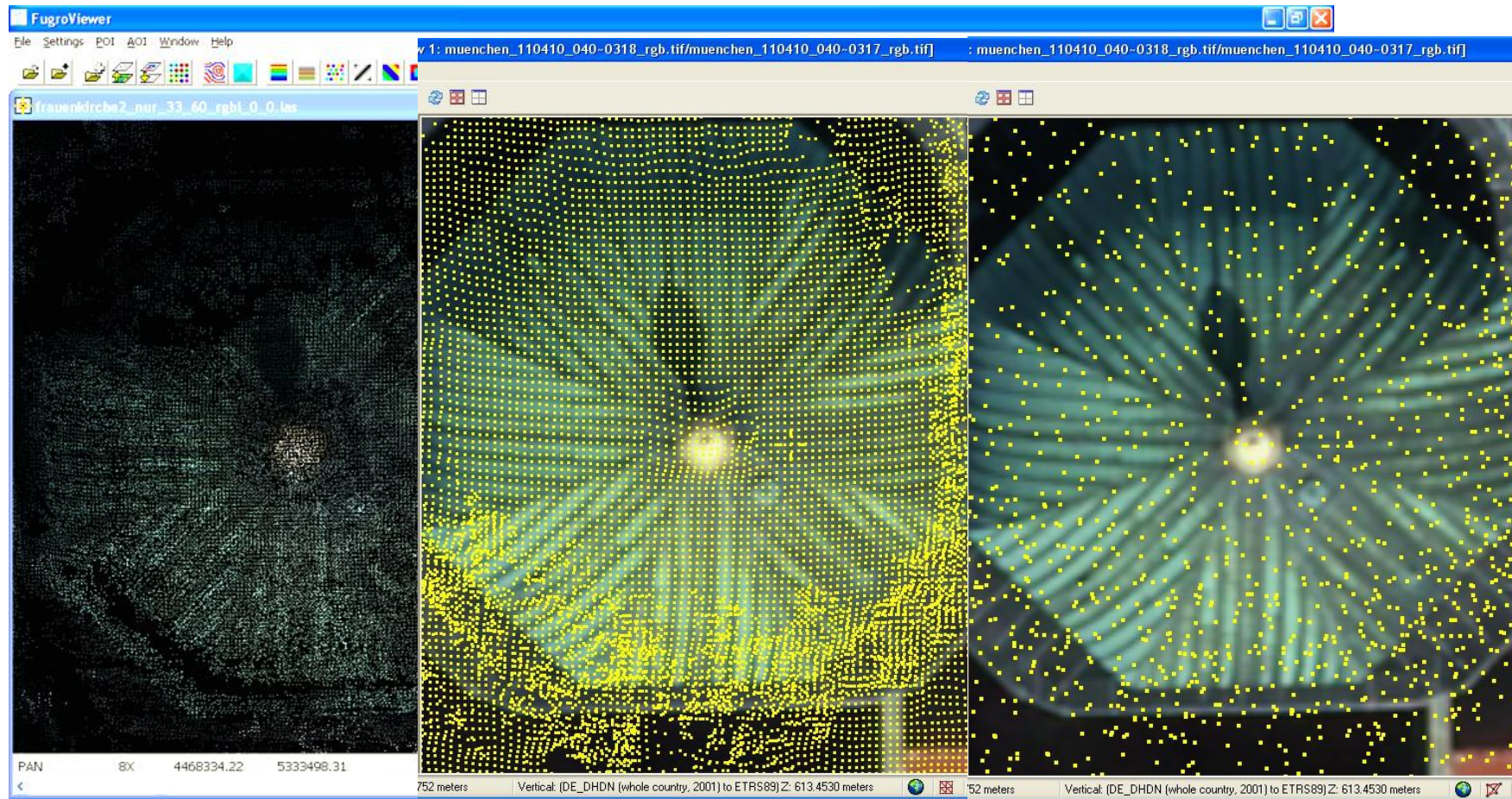


LPS eATE Output – 3 different file formats simultaneously

LAS 1.2

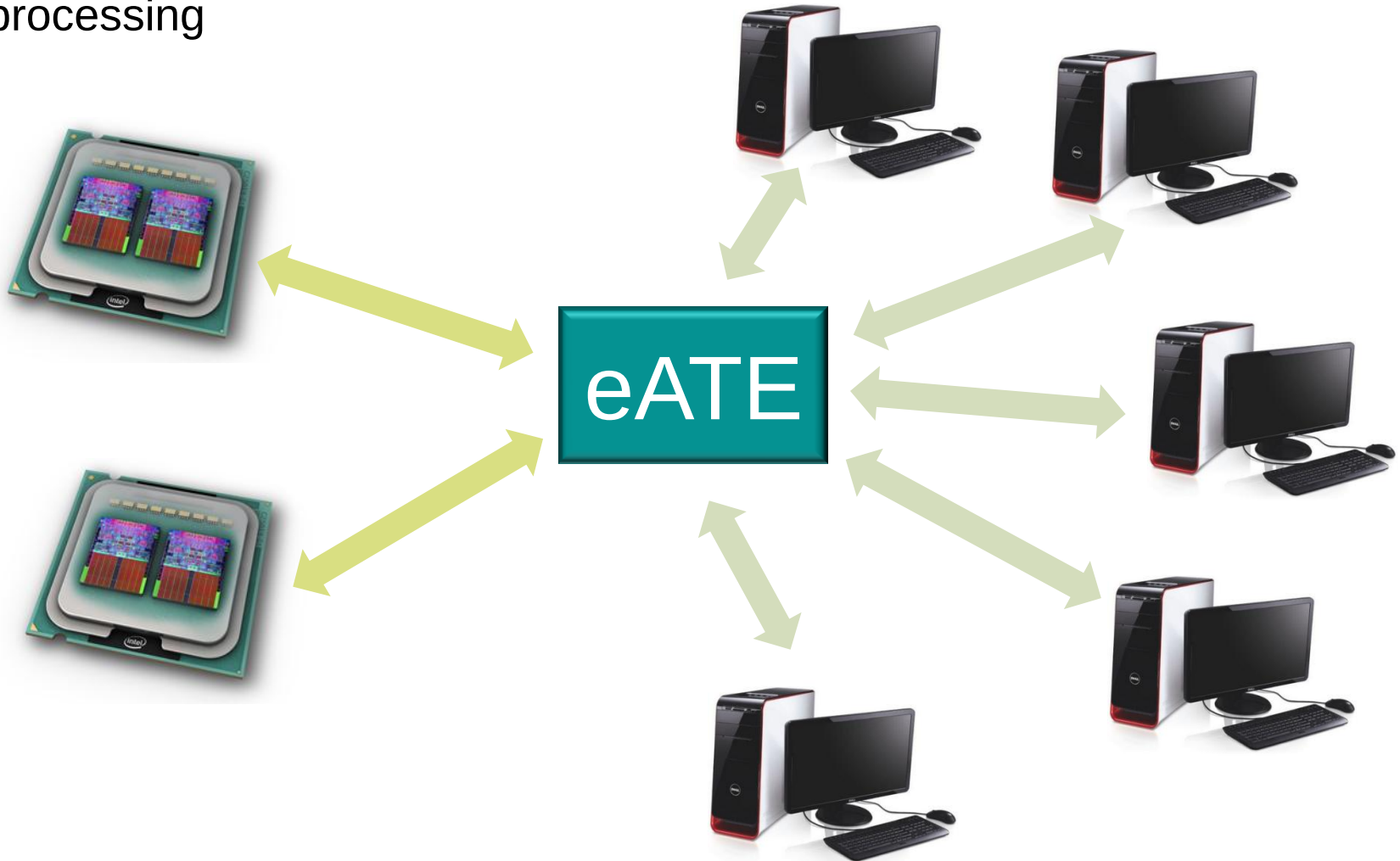
IMAGINE IMG

Leica Terrain Format LTF



LPS eATE – Hardware Concept

- The eATE architecture supports multicore as well as distributed processing

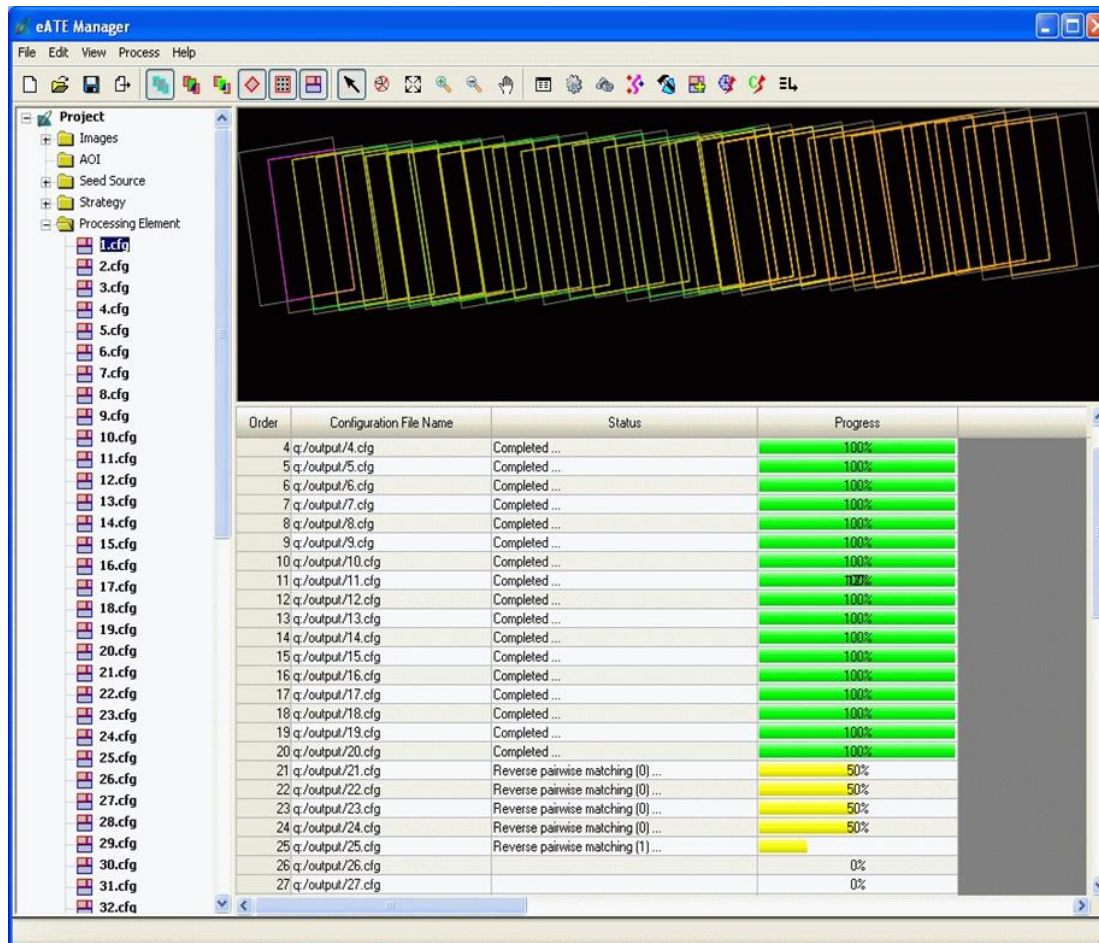


LPS eATE – parallel Processing



Condor
High Throughput Computing

- Condor for distributed processing within the computer network



```
Command Prompt
975.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 7.bat
976.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 8.bat
977.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 9.bat
978.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 10.bat
979.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 11.bat
980.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 12.bat
981.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 13.bat
982.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 14.bat
983.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 15.bat
984.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 16.bat
985.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 17.bat
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993.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 25.bat
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1003.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 35.bat
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1005.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 37.bat
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1008.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 40.bat
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1011.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 43.bat
1012.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 44.bat
1013.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 45.bat
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1044.0 Tester1 2/9 15:50 0+00:00:00 I 0 0.0 76.bat

121 jobs; 116 idle, 5 running, 0 held
C:\Documents and Settings\Tester1>
```

LPS eATE

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High Density Image Matching for DSM Computation
and additional value for geospatial products

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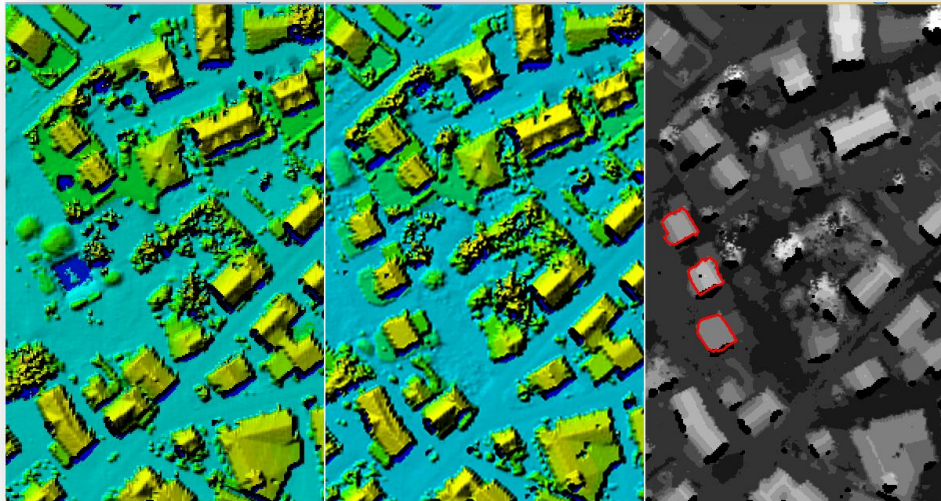


... Additional value for geospatial products



- Data Management and creating value-added data products on demand

- OGC Web Services (WMS, WPS, ...)
- Change Detection
- Metadata



- User's Point of view - Application Examples

- Flow Retention Estimation
- At Risk Analysis (Stabilization)
- Change Detection
- Contour Generation
- Watershed delineation

Use Case – Mount St. Helens (2950m / 2550m)



- Eruption in May 18, 1980
- Since then
 - Earthquakes
 - New Crater Glacier
 - New Rock Glaciers
 - New Lava Dome
 - Steam and ash plumes

Photos: National Geographic online

Use Case – Mount St. Helens (2950m / 2550m)

- Comprehensive Geodata-Management ERDAS APOLLO “all in one”
 - Orthophotos
 - Historical Arial Images
 - **LiDAR**
 - **Pixelmatching** XYZ, LAS
 - Camera Photos
 - State-wide WMS, WFS
- Data Discovery
- Data Delivery and Processing
 - OGC Services
 - Webviewer



Use Case – Mount St. Helens (2950m / 2550m)

The screenshot displays the ERDAS APOLLO Client web interface in a browser window. The URL is `apollopro.erdas.com/apollo-client/?nocombo=true`. The interface includes a top navigation bar with 'Navigate', 'Browse', 'Search', 'Edit', 'Filter', 'Process', and 'Clip-Zip-Ship' buttons. A 'Welcome admin' message with a 'Logout' link and a language dropdown is on the right. The main content area is divided into a left sidebar and a central map view.

Geo Processing Sidebar:

- Select My Processes**
- Processes**
 - Terrain_Portrayal
 - Terrain_Analysis
 - NDVI
 - Change_Detection
 - Change detection
 - QB Vegetation Health Change Detection
 - Elevation Change Detection
 - Vegetation Health Change Detection
 - Site_Selection
 - Pan_Sharp
 - Cloud_Percentage
 - GIS_Function
- Description**

Identify changes in elevation using two LAS files.
- Input Data**

Before Elevation: `http://apollopro.erdas.com`

Raster Bounding Box: [Draw box] [Reset]

After Elevation: []

[Execute]

Map View:

The map shows a 3D terrain model of Mount St. Helens. The central peak is highlighted in a reddish-pink color, while the surrounding areas are green. The map includes a coordinate system (X: -124.829, Y: 40.003, Scale: 72224, SRS: EPSG:3857) and a 'Bing Hybrid' map style selector. The map also shows labels for 'Goat Mountain', 'North Butte', 'Butte Camp D', and 'Mount St Helens National Volcanic Monument'.

Bottom Panel:

The bottom panel shows a list of processes under the 'Before Elevation' tab. The selected process is 'Mount_St_Helens'. The details for this process are:

- Name:** Mount_St_Helens
- Title:** Mount_St_Helens
- Description:** None
- Keywords:** LAS,LIDAR

Buttons for 'Index Metadata', 'ISO Metadata', 'Add to Map', and 'Select as: Before Elevation' are available. On the right, there is a 'Records 1 to 3, of 3' indicator and a 'WMS, WCS' access link. The acquisition date is 'Unspecified', the SRS is 'EPSG:2286', and the extents are '1199915.8, 301012.4, 1226175.9, 337027.7'.

Use Case – Mount St. Helens (2950m / 2550m)

The screenshot displays the ERDAS APOLLO Client web application. The browser address bar shows `apollopro.erdas.com/apollo-client/?nocombo=true`. The interface includes a top navigation bar with 'Navigate', 'Browse', 'Search', 'Edit', 'Filter', 'Process', and 'Clip-Zip-Ship' buttons. A 'Geo Processing' sidebar on the left lists various processes, with 'Change_Detection' expanded to show 'Change detection', 'QB Vegetation Health Change Detection', 'Elevation Change Detection', and 'Vegetation Health Change Detection'. The 'Description' section states: 'Identify changes in elevation using two LAS files.' The 'Input Data' section shows 'Before Elevation' as `http://apollopro.erdas.com` and 'After Elevation' as an empty field. A 'Raster Bounding Box' section has 'Draw box' and 'Reset' buttons. The main map area shows a 3D terrain model of Mount St. Helens with a red overlay indicating elevation changes. A green arrow points to the peak of the mountain. The map includes a scale bar, coordinate fields (X: -124.829, Y: 40.003), and a scale of 72224. The bottom right corner shows 'Records 1 to 3, of 3' and 'Access: WMS, WCS'. The bottom left corner has buttons for 'Index Metadata', 'ISO Metadata', 'Add to Map', and 'Select as: Before Elevation'.

ERDAS APOLLO Client

apollopro.erdas.com/apollo-client/?nocombo=true

Welcome admin Logout English

Navigate Browse Search Edit Filter Process Clip-Zip-Ship

Geo Processing

Select My Processes

Processes

- Terrain_Portrayal
- Terrain_Analysis
- NDVI
- Change_Detection
 - Change detection
 - QB Vegetation Health Change Detection
 - Elevation Change Detection
 - Vegetation Health Change Detection
- Site_Selection
- Pan_Sharpener
- Cloud_Percentage
- GIS_Function

Refresh

Description

Identify changes in elevation using two LAS files.

Input Data

Before Elevation `http://apollopro.erdas.com`

Raster Bounding Box

Draw box

Reset

After Elevation

Execute

Before Elevation After Elevation

Mount_St_Helens

Name Mount_St_Helens

Title Mount_St_Helens

Description None

Keywords LAS,LIDAR

Index Metadata ISO Metadata Add to Map Select as: Before Elevation

Records 1 to 3, of 3

Access: WMS, WCS

Acquisition Date: Unspecified

SRS: EPSG:2286

Extents: 1199915.8, 301012.4, 1226175.9, 337027.7

Use Case – Mount St. Helens (2950m / 2550m)

ERDAS APOLLO Client

apollopro.erdas.com/apollo-client/?nocombo=true

Welcome admin Logout English

Navigation: Navigate Browse Search Edit Filter Process Clip-Zip-Ship

Geo Processing

Select My Processes

Processes

- Terrain_Portrayal
- Terrain_Analysis
- NDVI
- Change_Detection
 - Change detection
 - QB Vegetation Health Change Detection
 - Elevation Change Detection
 - Vegetation Health Change Detection
- Site_Selection
- Pan_Sharp
- Cloud_Percentage
- GIS_Function

Refresh

Description

Identify changes in elevation using two LAS files.

Input Data

Before Elevation

Raster Bounding Box Draw box

Reset

After Elevation

Execute

Keywords LAS,LIDAR

Index Metadata ISO Metadata Add to Map Select as: After Elevation

Mount St Helens Nov 20 2004.las

Name Mount St Helens Nov 20 2004

Title Mount St Helens Nov 20 2004.las

Description Coverage

Keywords LAS,LIDAR

Index Metadata ISO Metadata Add to Map Select as: After Elevation

Access: WMS, WCS

Acquisition Date: Unspecified

SRS: EPSG:2286

Extents: 1201509.8, 301686.7, 1224273.8, 337027.7

Use Case – Mount St. Helens (2950m / 2550m)

The screenshot displays the ERDAS APOLLO Client web application interface. The main window shows a 3D terrain model of Mount St. Helens, with a green and red overlay indicating a specific area of interest. The interface includes a left sidebar with a 'Layers' panel listing various data layers, a top navigation bar with 'Navigate', 'Browse', 'Search', 'Edit', 'Filter', 'Process', and 'Clip-Zip-Ship' buttons, and a bottom panel showing metadata for the selected layer 'n22_prompt_user (TQ80U7ZKN_BEA)'. The metadata includes fields for Name, Title, Description, and Keywords. The main map area shows a 3D terrain model with a green and red overlay, and a 'bing' logo is visible in the bottom left corner of the map area.

ERDAS APOLLO Client

apollopro.erdas.com/apollo-client/?nocombo=true

Welcome admin

Layers

- n22_prompt_user (TQ80U7ZKN_BEA)
- Mount St Helens Nov 20 2004.las
- Mount St Helens Oct 4 2004.las
- N130690.las
- N130695.las
- Hospitals
- Fire Stations
- Marriott World Center
- Streets
- Census Tracts
- Brownfields
- Airport Noise Zones
- Zoning
- Commission Districts
- PhotoScience DMC orthos 2

n22_prompt_user

Select All | Select None | Download Selected

n22_prompt_user (TQ80U7ZKN_BEA)

Name: TQ80U7ZKN_BEA

Title: n22_prompt_user (TQ80U7ZKN_BEA)

Description: n22_prompt_user, GeoProcessing result from running the Elevation_Change_Detection spatial model.

Keywords: GeoProcessed, MAGNE SMS, Elevation_Change_Detection, admin_1_Band, n22_prompt_user

Index Metadata | ISO Metadata | Add to Map | Download

Records 1 to 1, of 1

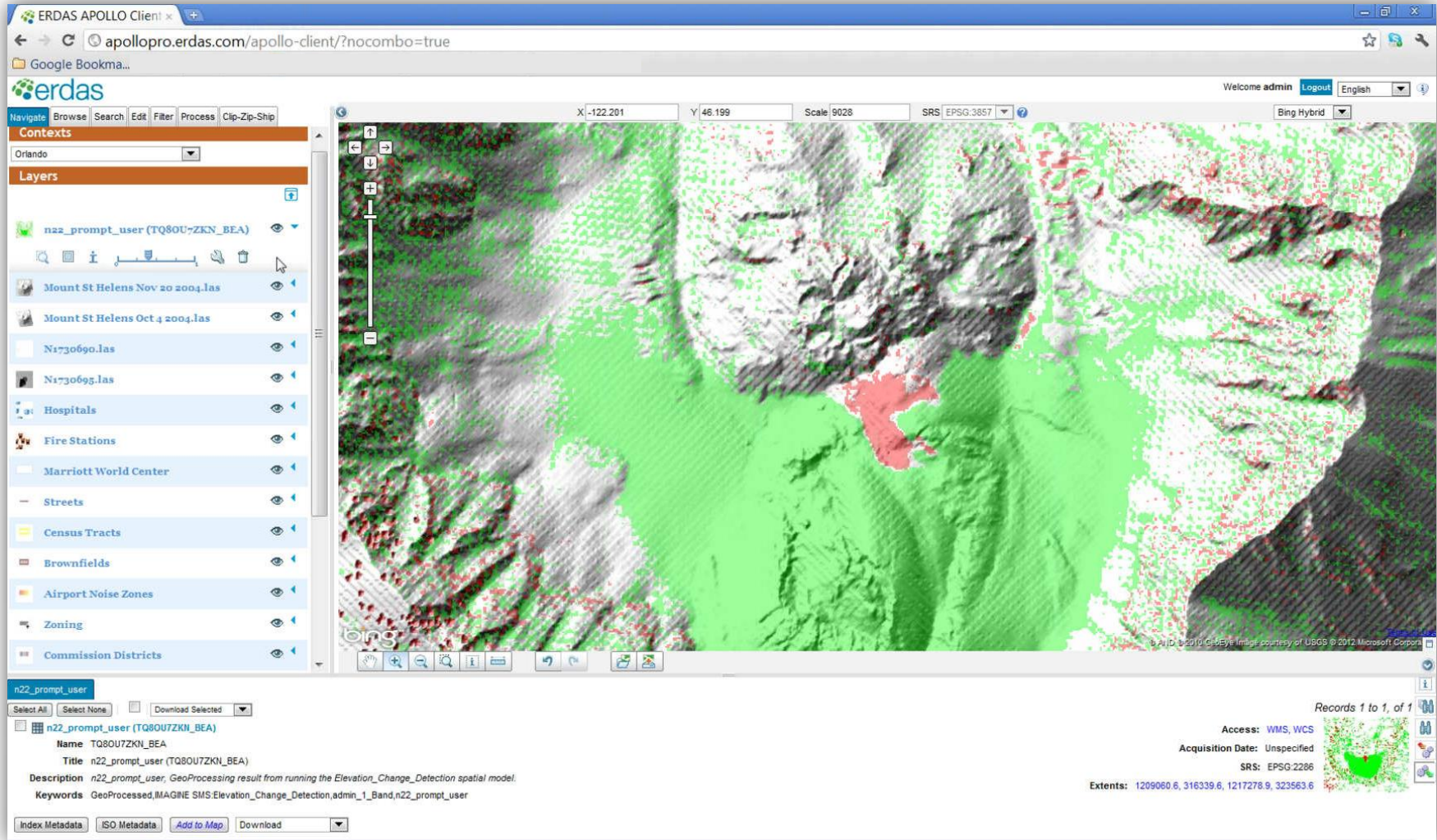
Access: WMS, WCS

Acquisition Date: Unspecified

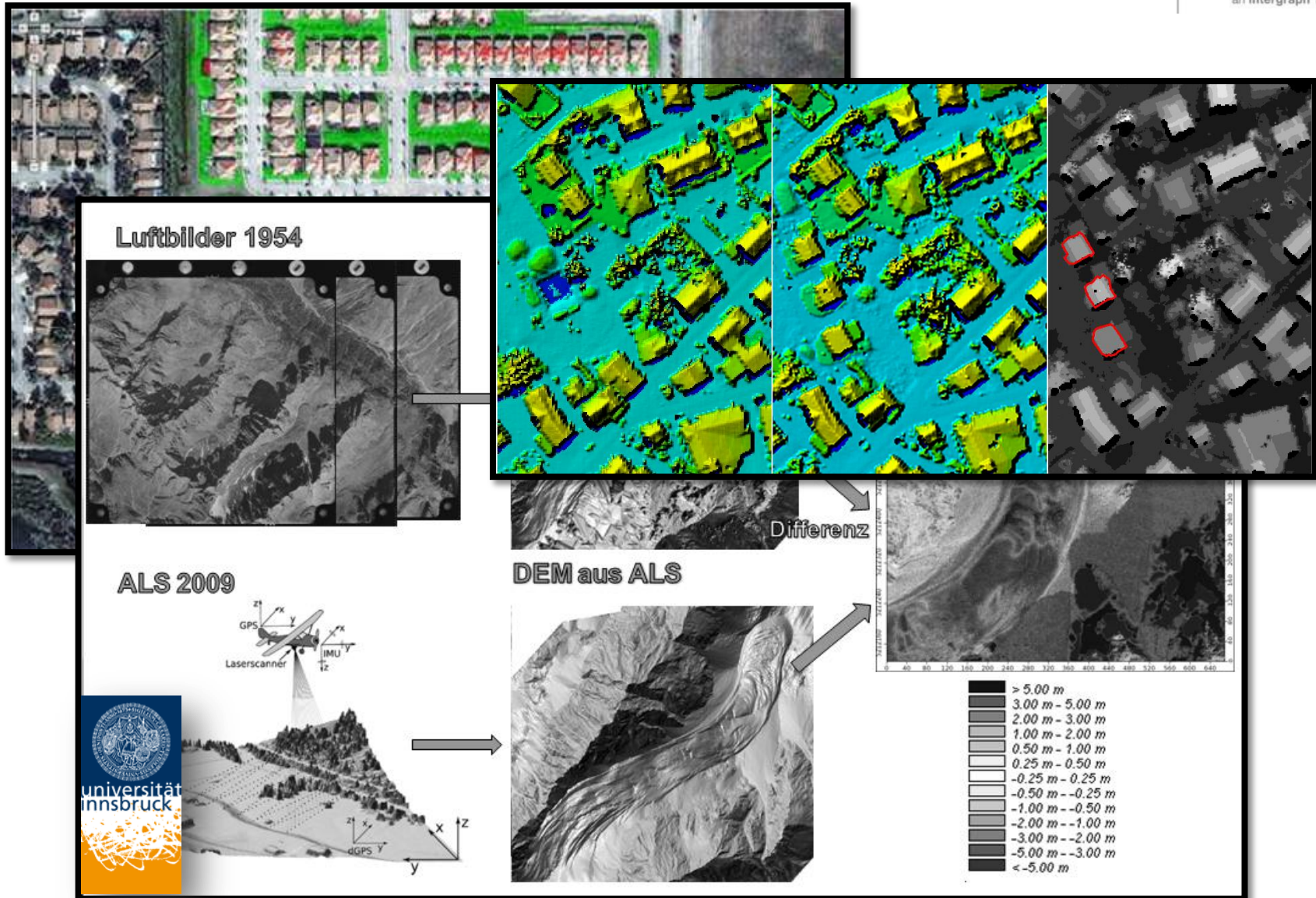
SRS: EPSG:2286

Extents: 1209060.6, 316339.6, 1217278.9, 323563.6

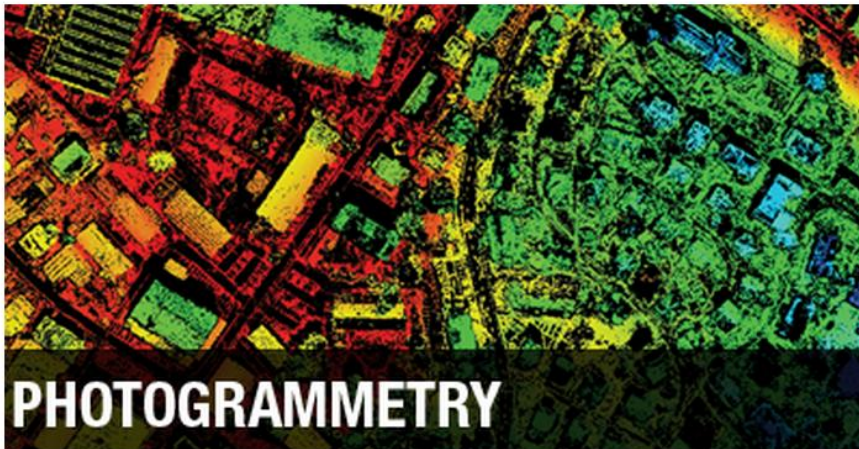
Use Case – Mount St. Helens (2950m / 2550m)



A wide field of application



Portfolio



Commercial Software by Intergraph-ERDAS



- **Easy to use**
- **Worldwide users**
- **Integrated workflows**
- **Forward looking solution**
- **Team**
 - **Development**
 - **Know How**
 - **Consulting**
 - **Support**

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Hansjörg Ragg, GRID-IT GmbH
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