ENVI. Get the Information You Need from Imagery.

ENVI® is the premier software solution to quickly, easily, and accurately extract information from geospatial imagery.

Engineered for life
Easy to Use Tools. Proven Functionality. Fast Results.

The growing reliance on geospatial information makes it increasingly important for you to quickly find and define features in imagery. Tools and processes that help you easily and accurately extract information from imagery are essential for commercial, government, and research applications.

Today’s imagery analysts, scientists, and GIS professionals in a wide variety of disciplines choose products from the ENVI® line of premier software solutions for extracting information from geospatial imagery. ENVI provides advanced, user-friendly tools to read, explore, prepare, analyze and share information extracted from all types of imagery.

Developed by the experts in image processing and data visualization, ENVI is built on an extensible platform that allows you to easily expand and customize ENVI to suit your needs. A robust suite of add-on modules also allows you to expand your image processing capabilities to address your specific needs. And, with its broad cross platform support, ENVI is your solution regardless of whether you are in a Windows®, Macintosh, Linux or UNIX environment.

Learn more about how ENVI can be your solution for extracting information from geospatial imagery.
**Read** Virtually Any Imagery Type and Format

ENVI supports imagery types gathered from today's popular satellite and airborne sensors including panchromatic, multispectral, hyperspectral, radar, thermal, lidar, and more. ENVI can read over 70 data formats and includes HDF, GeoTIFF and JITC compliant NITF support. ENVI also allows you to easily drag and drop files from Windows Explorer, search results, and ArcGIS® making it easy to access and integrate information into ENVI from other desktop applications. And, ENVI also delivers enterprise capabilities that allow you to quickly and easily access imagery from OGC and JPIP compliant servers within your organization or over the internet.

**Prepare Your Imagery**

ENVI provides automated pre-processing tools that allow you to quickly and easily prepare your imagery for viewing or additional analysis. With ENVI you can:

- Orthorectify imagery
- Register two or more images
- Calibrate imagery
- Correct imagery for atmospheric distortions
- Create vector overlays
- Identify regions of interest (ROIs)
- Create digital elevation models (DEM)
- Perform pan sharpening, masking, and mosaicking
- Resize, rotate, or convert the data type

**Explore Your Imagery**

ENVI gives you an intuitive user interface and easy-to-use tools that allow you to quickly and easily view and explore your imagery. You can use ENVI to view large datasets and metadata, visually compare imagery, create powerful 3D visualizations, create scatter plots, explore pixel signatures, and more. ENVI also allows you to display ArcGIS layers with your imagery, giving you the ability to view vector information with the same styling, symbology and rendering as your GIS applications.
Process & Analyze Your Imagery

ENVI provides the leading image processing and analysis functionality you need to extract information for your research, intelligence or planning purposes. ENVI provides a complete suite of tools based on proven scientific methods to help you analyze your imagery. And, ENVI provides unique, automated processes and procedures to make processing and analyzing your imagery easier than ever.

Data Analysis Tools

Understanding your imagery often involves discerning information about your image. ENVI includes a comprehensive suite of data analysis tools that allow you to access proven algorithms to quickly, easily and accurately analyze imagery.

- Create geospatial statistics such as autocorrelation and semi-variance
- Calculate image statistics such as mean, min/max, standard deviation
- Extract linear features
- Synthesize radar imagery
- Calculate principal components
- Detect change
- Measure features
- Model topographic characteristics
- Apply common and user-defined filters
- Perform custom band and spectral math functions

Spectral Analysis Tools

Spectral analysis allows you to use pixel responses at different wavelengths to obtain information about the materials within each pixel. ENVI has the most advanced yet easy-to-use spectral analysis tools that give you access to established, scientific methods for imagery analyses. ENVI’s spectral analysis tools allow you to:

- Classify your imagery using supervised and unsupervised methods
- Identify spectral signatures using robust libraries
- Detect and identify targets
- Identify features of interest
- Analyze & map materials of interest
- Perform whole-pixel and sub-pixel analyses
- Use a suite of post classification tools to refine your results
- Calculate forest health with vegetation analysis tools

Automated Workflows

ENVI gives you automated workflows that step you through today’s popular image processing functions. This unique automation takes the complexity out of common image analysis methods and makes advanced image analysis accessible regardless of your experience level.

ENVI’s automated workflows give you step by step windows with instructions and recommended settings, based on proven scientific methods, for each step of the process. Subsequent steps automatically update while prompting you for required information. ENVI includes workflows that automate a wide range of image exploitation tasks that include preparing imagery, finding features, detecting change over time, and classifying similar materials. Whether you are new to ENVI or an experienced user, ENVI’s automated workflows will save you time and effort in getting the results you need from imagery.
Share Your Information

ENVI easily integrates into your existing workflow, allowing you to share maps, reports and presentations with colleagues in virtually any environment. Information extracted from imagery in ENVI can be easily saved directly to your computer, your geodatabase, or other server environment as image files, shapefiles or Microsoft® PowerPoint® files. And, with its tight integration with ArcGIS, ENVI outcomes can also be output as map products, using the popular ArcGIS map templates and printing dialogs directly from the ENVI interface.

Customize Your Geospatial Image Application

ENVI is built on a powerful development language, IDL, allowing its features and functionality to be easily extended or customized to fit your specific application. This powerful and flexible platform allows you to create batch processes, customize menus, add your own algorithms and tools, integrate C++ and Java code into your tools, and much more.

Extend Your ENVI Functionality

ENVI’s image processing and analysis functionality is robust, and can be even further extended by adding any one of these modules to expand its core capabilities:

- **ENVI Orthorectification Module** – provides geospatial imagery users with simple but robust tools to accurately register imagery to ground coordinates and remove geometric distortions.

- **ENVI NITF Module** – allows you to access, read, write, process, and share imagery in the government standard NITF file format.

- **ENVI DEM Extraction Module** – improves the image analysis workflow by allowing you to create spatially accurate 3-D data representations directly within ENVI.

- **SARscape Modules for ENVI** – provide a unique set of functionality to read, process, analyze and output SAR data and integrate results with other remotely sensed data and geospatial tools.

- **ENVI Atmospheric Correction Module** – removes challenging atmospheric conditions from imagery using both the proven FLAASH and QUAC algorithms.

Easy-to-use tools. Proven functionality. Fast results.

ENVI provides all this, in an easy to use solution. From reading and preparing, to exploring, analyzing and sharing — you’ll find what you need in ENVI to get information from your imagery quickly and easily.
Today's imagery analysts and scientists in a wide variety of disciplines choose ENVI®, the premier software solution for extracting information from geospatial imagery. ENVI provides advanced, user-friendly tools to access, analyze, and share information from geospatial imagery.
Operating Systems
Windows XP SP2 (Intel/AMD 32- & 64-bit)
Windows Vista (Intel/AMD 32- & 64-bit)
Windows 7 (Intel/AMD 32- & 64-bit)
Linux Kernel 2.6.x (Intel/AMD 32- & 64-bit)
Mac OS X 10.5.x (Intel 32- & 64-bit)
Max OS X 10.6 (Intel 32- & 64-bit)
Sun Solaris 10 (SPARC 32- & 64-bit)

Data Import
Raster Formats:
- ADRG
- ArcView Raster BIL
- ASCII (x,y,z & gridded)
- Binary (flat)
- BMP
- CADRG
- CIB
- DPPDB (with license)
- DTED (levels 0, 1, 2)
- ECW
- ENVI Raster
- ENVI Gzip Compressed
- ER Mapper ERS
- ERDAS IMAGINE (.img)
- ERDAS GRID
- GeoP2 / GeoJ2K
- GeoTIFF
- HDF4
- HDF-EOS
- JPEG
- JPEG2000
- M3SID (including MG3)
- NITF 1.1, 2.0, 2.1 (with license)
- NSIF 1.0 (with license)
- PCI PIX
- PDS
- PICT
- PNG
- RemoteView R-Set (with license)
- SRF
- SRTM DEM
- TIFD (with license)
- TIFF
- USGS DOQ
- USGS DRG
- USGS Native DEM
- USGS SDTS DEM
- XWD

Vector Formats:
- ARC/INFO Interchange
- AutoCAD DXF
- ENVI Vector File
- ESRI Geodatabase Feature Class:
  - Personal (.mdb)
  - File (.gdb)
  - Enterprise (.sde)
- ESRI Shapefile
- MapInfo MIF
- Microstation DGN
- USGS DLG

LiDAR Formats:
- ASCII
- LAS

Multispectral Sensors:
- ADRS40
- ALOS AVNIR-2
- ALOS PRISM
- ALSAT-1
- ASTER
- ATSR
- AVHRR
- CARTOSAT-1
- DMSP (NOAA)
- ENVISAT AATSR
- ENVISAT MERIS
- EROS
- FORMOSAT-2
- GeoEye-1
- IKONOS
- IRS
- KOMPSAT-2
- Landsat MSS, TM, ETM+
- MAS-50
- MASTER
- MODIS
- NigeriaSat-1
- OrbView-3
- RapidEye
- SeaWIFS
- QuickBird
- SPOT
- TIMS
- UK-DMC Satellite
- WorldView-1
- WorldView-2

Hyperspectral Sensors:
- AISA
- ARTEMIS (with license)
- AVIRIS
- CASI
- HyMap
- Hyperion
- HyperScan
- HySpex
- MIVIS
- PROBE-1
- Prospector

Radar Sensors:
- AIRSAR
- ALOS PALSAR
- COSMO-SkyMed
- ENVISAT ASAR
- ERS
- JERS
- RADARSAT-1
- RADARSAT-2
- SIR-C / X-SAR
- TOPSAR

Remote Connections:
- IAS Server
- JPIP
- OGCS WCS
- OGCS WMS

Spectral Libraries:
- ASCII
- ENVI SLI
- ASD Indico
- MRSL

Annotations:
- ENVI Annotation
- ENVI Zoom Annotation

Output Formats
Raster Formats:
- ArcView Raster BIL
- ASCII (x,y,z & gridded)
- BMP
- DTED (levels 0, 1, 2)
- ENVI Raster
- ENVI Gzip Compressed
- ER Mapper ERS
- ERDAS IMAGINE (.img)
- ESRI Geodatabase Raster Dataset:
  - Personal (.mdb)
  - File (.gdb)
  - Enterprise (.sde)
- ESRI GRID
- GeoP2 / GeoJ2K
- GeoTIFF
- HDF4
- JPEG
- JPEG2000
- NITF 2.0, 2.1 (with license)
- PICT
- PCI PIX
- PNG
- SRF
- TIFF
- XWD

Vector Formats:
- AutoCAD DXF
- ENVI EVF
- ESRI Geodatabase Feature Class:
  - Personal (.mdb)
  - File (.gdb)
  - Enterprise (.sde)
- ESRI Shapefile

Other Formats:
- Direct To Printer
- Google Earth KML
- MPEG
- PostScript
- VRML
- Chip Display To:
  - ArcMap
  - ENVI Raster
  - ESRI Geodatabase Raster Dataset
  - JPEG
  - JPEG2000 / GeoP2
  - NITF 2.0, 2.1 (with license)
  - PowerPoint PPT
  - Printer
  - TIFF / GeoTIFF

Export Map To:
- AI
- BMP
- EMF
- EPS
- GIF
- JPEG
- PDF
- PNG
- Printer
- SVG
**ENVI tools for ArcGIS®**

- Auto-Threshold Difference Raster
- Calculate Image Difference
- Calculate Thematic Change
- Classification Raster To Vector
- Classify With Training
- Classify Without Training
- Cleanup Classification Raster
- Convert Raster Format
- Detect Anomalies
- Filter With Convolution
- Intersect Rasters
- LiDAR To Raster
- Threshold By Percentage
- Workflow Models with Cleanup

**Display Functions**

- Chip To:
  - File
  - PowerPoint
  - Print
  - ArcMap
- Drag/Drop from:
  - ArcGIS
  - File System
  - Windows Explorer
  - Data Manager
- Drag/Drop to the:
  - Display
  - Process
  - Workflows
- GeoLink with ArcMap
- Color Mapping
- Color Tables:
  - Pre-built Tables
  - Interactive Color Table Editor
- Cursor Query for Data/Screen Value, Elevation, Map Coordinates
- Dynamic Overlays (unlimited displays)
- Histogram Matching Between Displays
- Image Flickering and “Movies”
- Image Overlays:
  - Annotation
  - Classification Results
  - Contour Lines
  - Density (gray level) Color Slicing
  - Grid Lines
  - Regions of Interest
  - Vector Layers
- Interactive 2-D Scatter Plotting
- Interactive Histograms & Stretching:
  - Arbitrary Stretching
  - Auto Apply Stretchs
  - Gaussian Stretching
  - Histogram Equalization Stretching
  - Histogram Matching Between Displays
  - Linear, Piecewise Linear Stretching
  - Square Root Stretching
  - Import/Export ASCII Look Up Tables
  - User-Defined Look Up Tables
- Interactive Pixel Editor
- Line-of-Sight (Viewshed) Analysis
- Link Unlimited Displays
- Measurement Tool
- Output Displays PowerPoint:
  - Create New Presentation
  - Append to Existing Presentation
- Output Displays to File or Printer
- Output Displays of Zoom Window
- Quick Filters:
  - Sharpen
  - Smooth
  - Median
  - Quick Color-Infrared, True-Color Displays
  - Save and/or Restore Display Group
  - Select Display Bands from Spectral Plots
  - Set Default Display Bands
  - Spatial and Spectral Pixel Editing
  - Spatial and Spectral Profiles
  - Sub-Pixel Cursor Location
  - Unlimited Number of Displays
  - Virtual Mosaic
  - Vector Overlays & GIS Capabilities

**Regions of Interest**

- Buffer Zones Around ROIs
- Classification Images from ROIs
- Export ROIs to Vectors
- Input ROIs from ASCII
- Interactive, Easy-to-use ROI Definition:
  - Draw Polygons, Polylines, Pixels
  - Draw ROIs with Interior Spaces (Donuts)
  - ROIs from Intersection of Other ROIs
  - Multiple Objects Within One ROI
  - ROI Definition via Scatter Plots
  - Threshold Images to ROI
  - Merge ROIs
  - Import ROIs from Vectors
  - Output ROIs to ASCII
  - ROI Save & Restore
  - Reconcile ROIs between Images via Map Coordinates
  - ROI Growing Based on Statistics
  - ROI Statistics

**Data Preparation**

- Create New Standard or Virtual Image File from Existing Bands
- Generate Test Image
- Mask Generation From:
  - Annotation
  - Image Data Values
  - ROIs
  - Intersection of ROIs
  - Vectors
  - NaN
- Mosaic Functions:
  - Color Mosaic Preview
  - Outline & Edge Feathering
  - Interactively Mosaic Multiple Bands, Files
  - Mosaic by Pixel (Line, Sample) or Map Coordinates
  - Automatic Color Balancing
  - Standard Image or Virtual Mosaic Output
  - Define Spatial Subset by:
    - Drawing on Display
    - File, Map Coordinates
    - Region of Interest
    - Other Image Extent
    - Meta Scroll Extent
- NITF Metadata Browser
- Rotate/Flip Data
- Spatial and Spectral Subsets
- Storage Order (Interleave) Conversions:
  - BSQ, BIL, BIP
  - New File or Replace Original Stretch Data
  - Subsample Images

**Pre-processing & Calibration**

- Apply Gain & Offset
- Bad Band Identification
- Bad Line Replacement
- Bad Pixel Replacement
- Cross-Track Illumination Correction
- Dark Subtraction
- Destripe Data
- Empirical Line Calibration
- ERS and Radarsat Data Calibration
- Flat Field Calibration
- Ignore Pixel Value
- Internal Average Relative Reflectance Calibration
- Log Residuals
- MODIS Bowtie Correction
- Radiometric Calibrations:
  - AVHRR
  - Landsat MSS, TM, ETM
  - TIMS
  - QuickBird
  - Sea Surface Temperature From AVHRR
  - Thermal Atmospheric Correction

**Registration & Rectification**

- Associate DEM With Image
- Automatic Georeferencing of ASTER, AVHRR, AATSR, ASAR, MERIS, MODIS, Radarsat, SeaWIFS, SPOT
- Subpixel Ground Control Point Locations
- Georectify SPOT Using Information From Leader File
- Ground Control Points Prediction
- Image-to-Map Registration
- Image-to-Image Registration
- Interactive Ground Control Point Collection
- Import Ground Control Points from File
- Orthorectification:
  - Aerial Photographs (Digital and Frame)
  - ASTER
  - CARTOSAT-1
  - Generic RPC
  - Generic Pushbroom Sensors
  - IKONOS
  - OrbView-3
  - GeoEye-1
  - WorldView & WorldView-2
  - FORMOSAT-2
  - Kompsat-2
  - QuickBird
  - SPOT 1-5
  - Radial Resampling
  - Rational Polynomial Coefficients (RPCs) Support
  - Replacement Sensor Model (RSM)
  - Real-time GPS Link
  - Rotated Projections
  - Save Transformation Matrix to ASCII
  - Warp Resampling Methods:
    - Bilinear
    - Cubic Convolution
    - Nearest Neighbor
  - Warping Methods:
    - Delaunay Triangulation
    - Polynomial
    - Rotation, Scaling, Translation (RST)

**Map Projection Support**

- Datum Support (90)
- Dozens of Prebuilt Map Projections (Examples Include):
  - Universal Transverse Mercator (UTM)
  - State Plane
  - Albers Conical Equal Area
  - Lambert Conformal Conic
  - Miller Cylindrical
  - Ellipsoidal Support (35)
  - Pseudo-Projections from RPCs and RSM
Vector GIS Functions
Drag/Drop ArcGIS Layers
ArcGIS Layer Attribute Viewing
Add Nodes to Vectors
Annotate Vector Windows
Attributes:
- Create New Vector Attributes
- Edit Query Vector Attributes
- Import from ArcView Shapefiles, ASCII
- Query to Create New Vector Layer
- Burn-in Vectors on Raster Image
- Convert Vector Layer Projection
- Create Contour Vectors from Raster Data
- Create New Vector Layers
- Create Vector Boundaries:
  - Countries, States, Coasts, Rivers
  - Whole World
  - For Lat/Long Boundaries
- Direct Printing of GIS Layers
- Display Vectors with Different Projections in the Same Window
- Drag/Drop to Arrange Layer Order
- Edit Layer Characteristics
- Export Vector Data to Common GIS Formats
- Export Vector Attributes
- GPS Input
- Heads-up (On-screen) Digitizing
- Intelligent Digitizer
- Import Common GIS Formats:
  - ESRI Shapefiles
  - Arc Interchange
  - AutoCAD DXF
  - MapInfo
  - Microstation DGN
  - USGS DLG
  - USGS SDTS
  - ENVI Native Vector Format
- Import from ArcGIS GeoDatabase
- Interactive Vector Layer Querying
- Join Vectors
- Multiple Vector Selection
- On-the-fly Vector Projection Conversion
- Raster to Vector Conversions
- Save Vectors to ArcGIS GeoDatabase
- Split Vectors
- Vector Cursor Query
- Vector Display Zooming
- Vector Editing
- Vector to Raster Conversion

Spectral Analysis Tools
Adaptive Coherence Estimator (ACE)
Anomaly Detection
Automated Corner Clustering in N-D Scatter Plot
Band/Max Band Optimization
Constrained Energy Minimization (CEM)
Continuum Removal of Images, Spectra
Decision Tree Classifier
Extraction of Endmember Spectra
Integrated Spectral Viewing & Analysis
Linear Spectral Unmixing
Least Squares (LS) Fit
Matched Filtering
Mixture Tuned Matched Filtering
Mixture Tuned Target - Constrained Interference - Minimized Filter (MTTCMF)
N-Dimensional Visualizer (Scatter Plot)
Orthogonal Subspace Projection (OSP)
Pixel Editing
Pixel Purity Index (PPI)
SAM Target Finder With BandMax
SMACC Endmember Extraction & Sub-pixel Analysis

SPEAR Tools:
- Anomaly Detection
- Change Detection - Two Color Multi-view (ZCMV)
- Change Detection - PCA
- Change Detection - Subtractive
- Google Earth Bridge
- Image-to-Map Registration
- Independent Component Analysis
- LOC - Lines of Communication - Roads
- LOC - Lines of Communication - Water
- Metadata Browser
- Orthorectification
- Pan Sharpening
- Relative Water Depth
- Terrain Categorization (TERCAT)
- Vegetation Delineation
- Vertical Stripe Removal
- Watercraft Finder

Transforms
Adaptive Coherence Estimator (ACE)
Band Ratios
Color Transforms:
- RGB to HSV, HSL, or Munsell HSV
- HSV, HSL, or Munsell HSV to RGB
- De correlation Stretch
- Independent Components Analysis
- Image Sharpening:
  - Color Normalized Spectral
  - Gram-Schmidt Spectral
  - HSIV and Brovey
- PC Spectral
- Preserving Spectral Integrity
- Minimum Noise Fraction (MNF)
- Normalized Difference Vegetation Index (NDVI)
- Pan Sharpening (see Image Sharpening)
- Principal Components Rotation
- Saturation Stretch
- Synthetic Color Image
- Tasseled Cap

Filters
Adaptive Filters:
- Frost, Enhanced Frost Gamma, Kuan, Lee
- Enhanced Local Sigma, Bit Error
- Convolution Filters:
  - High & Low Pass, Laplacian, Directional,
    Gaussian, Median, Sobel, Roberts
- Filtering Preview
- Interactive Fourier Filtering:
  - Forward Transform
  - Interactive Frequency Domain Masking
  - Inverse Transform
- Morphology Filters:
  - Dilate, Erode, Opening, Closing
- Texture Filters:
  - Data Range, Mean, Variance, Entropy,
    Skewness, Homogeneity, Contrast, Dissimilarity,
    Second Moment, Correlation
- User-Defined Filter Kernels

Mathematics & Statistics
Auto correlation
Band Histograms
Band Math and Spectral Math:
- Boolean Operators
- Trigonometric Functions
- Data Type Conversion Functions
- Relational Operators
- Many Other Mathematical Expressions
- Correlograms
- Display Statistics:
  - Minimum, Maximum, Mean, Standard Deviation
- Image Statistics:
  - Band Minimum, Maximum, Mean, Standard Deviation, Eigenvalues, Eigenvectors,
    Covariance, Correlation Matrices
- Output Matrix Stats to Image Files:
  - Covariance Matrix
  - Correlation Matrix
  - Eigenvectors
- Semivariograms

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**Image Classification**

Adaptive Coherence Estimator (ACE)  
Accuracy Assessment  
AIRSAR Scattering Mechanism Classifier  
Automatic Legends for Classified Images  
Change Detection - PCA  
Change Detection - 2CMV (2 Color Multi-view)  
Change Detection - Subtractive  
Change Detection, Thematic and Grayscale Images  
Classification Preview  
Class Statistics  
Classification Image from ROIs  
Constrained Energy Minimization (CEM)  
Decision Trees  
Density Slicing  
Interactive User-Defined Rule Classifier  
Independent Components Analysis  
Orthogonal Subspace Projection (OSP)  
Mixture Tuned Target-Constrained Interference-Minimized Filter (MTICMIF)  
Receiver Operating Characteristic (ROC) Curves:  
• Find Optimal Classification Thresholds  
• Decrease False Classifications  
Separate Classification Thresholds for Each Class  
Supervised Classifications:  
• Binary Encoding  
• Parallelepiped  
• Mahalanobis Distance  
• Minimum Distance  
• Maximum Likelihood  
• Neural Network  
• Spectral Angle Mapper (SAM)  
• Spectral Information Divergence (SID)  
• Support Vector Machine (SVM)  
• TERCAT (Terrain Categorization)  
Target-Constrained Interference-Minimized Filter (TCIMIF)  
Training Data From:  
• Regions of Interest  
• Pixel Spectra  
• Library Spectra  
Unsupervised Classifications:  
• K-Means  
• ISODATA  
Vegetation Guided Workflows:  
• Fire Fuel Load  
• Agricultural Stress  
• Forest Health

**Post Classification Tools**

Accuracy Assessment:  
• Kappa Coefficient  
• Confusion Matrix  
Classification to Vector  
Class Statistics  
Interactive Class Overlay Tool  
Reassign Class Colors, Names  
Spatial Functions:  
• Buffer Zones Around Classes  
• Clump, Sieve, Combine  
• Majority & Minority Analysis  
• Segmentation Image  
Stratified Random Point Generation

**Topographic Analysis**

Associate DEM with Image  
Calculate Slope and Aspect Images  
Calculate Shaded Relief Image  
Create DEM From Vector Elevation Contours  
Hillshade (Shaded Relief Combined with RGB Image)  
Line-of-Sight (Viewshed) Analysis  
Rasterize Point Data  
Topographic Measures:  
• Convexity  
• Plan Convexity  
• Longitudinal Convexity  
• Cross Sectional convexity  
• Minimum Curvature  
• Maximum Curvature  
Three-Dimensional Visualization  
Topographic Feature Extraction (Classification):  
• Ridge, Channel, Plane, Peak, Pit

**3-D SurfaceView**

Animated 360° Visualization  
Associate DEM With Image  
Change View Interactively Using Mouse  
Create Fly-Through Sequence:  
• Interpolate Between User Selected Views  
• Follow Annotation Line  
Custom Background Color  
Drape Image Over 3-D Surface  
Output Fly-Through Sequence:  
• MPEG, VRML 2.0  
Overlay Vectors, Regions Of Interest  
Set Vertical Exaggeration  
Smooth Image, DEM

**Annotation and Map Composition**

Map/Print Layout utilizing ArcGIS Templates  
Utilize ArcGIS Layout Templates  
Automatic Contour Labeling  
Automatic Legends for Classified Images, Scale Bars, and Color Ramps Text, Polygons, Polylines, Points, Symbols  
Burn-in or Overlay Annotations  
Cartographic Symbols  
Contour Lines from DEM, Other Images  
Counting Tool  
Create Reusable Map Templates  
Grid Lines: Pixel, Lat/Long &/or Map Grids  
Inset Images (e.g., Logos) or Vector Plots  
Interactive Map Composition Using Image Displays  
Interactively Reposition Annotation and Map Elements  
Interactive Plot Scaling  
Rotated Map Projections  
Save & Restore All Parameters  
TrueType® Fonts (Plus Add Your Own)  
User Definable Arrows, Declination Diagrams (True, Grid and Magnetic North)  
Vector Overlays

**Radar Functionality**

Adaptive (Speckle Reduction) Filters:  
• Frost  
• Enhanced Frost  
• Gamma  
• Kuan  
• Lee  
• Enhanced Lee  
• Local Sigma  
• Bit Error  
Antenna Pattern Correction  
AIRSAR Scattering Mechanism Classifier  
CEOS Tape Reading  
Convert integrated TOPSAR to:  
• C-band VV data  
• Correlation image  
• Digital Elevation Model (DEM)  
• Incident Angle image  
• L- and P-band polarimetric AIRSAR Data  
Display and Analyze Radar Data Using Standard

**ENVI tools**

Edge Enhancement Filters  
Import ASAR, ERS, JERS, RADARSAT, AIRSAR, TOPSAR, SIR-C/X-SAR, ALOS  
Incident Angle Images  
Multi-Look SIR-C Data  
Pedestal Height Images  
Phase Difference Images  
Polarization Signatures from ROIs & Single Pixels  
RADARSAT - 2 Endorsement  
Slant-to-Ground Range Conversion  
Synthetic Color Image  
Synthesize Images from Compressed, Complex Scattering Matrix Data  
Texture Measures  
View CEOS Headers

**General Interface & Operation**

8- and 24-Bit Color, Multiple Displays  
Access to IDL Functions*  
Add Custom Routines to Menu  
Batch Recording, Queuing, and Playback  
Build Scripts for Common Functions*  
Command Line Use of ENVI Routines *  
Context-Sensitive Mouse Descriptions  
Cursor Coordinates (Pixel & Map), Data Values, and Elevations  
Direct Link to GPS Devices (Real-time Input)  
Edit ENVI Header Information  
Efficient Memory Management  
Extensive Preferences Settings  
Geo-Browser Image Selection from Graphical Index Map  
Logical Menu-Based GUI (Graphical User Interface)  
Multi-Processor Aware Algorithms  
Platform-Independent Operation  
Recursive Directory Scanning for Files  
Support for Files Greater than 2GB  
User-Configurable Menus & Buttons

**Modules**

ENVI Atmospheric Correction Module  
ENVI Certified NITF Module:  
• ENVI Certified NITF Module with TFRD  
ENVI DEM Extraction Module for Stereo Images  
ENVI Feature Extraction Module  
ENVI Orthorectification Module  
SARscape Family of Modules for ENVI

**Documentation**

Context-Sensitive Help  
Module Documentation  
On-line, Hyperlinked Documentation  
Printed Documentation  
Programmer's Guide (with Examples)  
Training Manuals  
Tutorials & Sample Data  
User's Guide  
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Regardless of your industry, from forestry and agriculture to defense and intelligence, your reliance on geospatial imagery as a source of important geographic information continues to grow. ENVI is the premier software solution for extracting information from geospatial imagery. ENVI delivers innovative, time saving ways to get information from imagery, while making it easy to incorporate image processing and analysis into your existing workflow.

Now, the latest release of ENVI delivers features and functionality to further streamline your workflow and reduce the time you spend on image processing and analysis. ENVI 4.8 makes it seamless to update a GIS with current information from geospatial imagery by delivering image analysis tools directly from the ArcGIS environment. A new, high performance LiDAR viewer allows you to easily incorporate information from LiDAR data with your other geospatial data, and a new workflow for viewshed analysis automates and streamlines a multi-step process. And, because ENVI is built on a fully extensible platform, you can easily customize it to your specific imagery needs.

**ENVI Image Analysis Tools Now Available in ArcGIS®**

In the past, updating a GIS with valuable information obtained from geospatial imagery required multiple tools. With ENVI 4.8, image analysis capabilities are fully integrated with ArcGIS, eliminating the need to switch between software packages.

ENVI 4.8 completes the integration with ArcGIS from Esri – delivering for the first time, advanced image processing and analysis tools directly from the ArcGIS desktop and ArcGIS® Server environments. Because ENVI 4.8 is completely compatible with ArcGIS 10 and 9.3, you can now include imagery in your workflow while taking advantage of the latest technology that Esri has to offer.

The new ENVI tools for ArcGIS are available in a familiar ArcGIS toolbox, exposing ENVI functionality through geoprocessing scripts that operate in both desktop and server environments. ENVI provides you with nearly 20 pre-built tools to easily perform a variety of advanced image processing and analysis tasks without leaving ArcGIS, allowing you to:

- Detect change over time
- Find and extract features of interest
- Classify features or land cover
- Identify anomalies
- Much more

For ArcGIS® Server users, ENVI tools can also be delivered to your entire organization using the newest addition to the ENVI product line, ENVI for ArcGIS® Server.
Easily Add LiDAR Data to Your Workflow

Geospatial information comes in a variety of formats, all of which help to build a complete picture about a geographic area. With ENVI 4.8, you’ll have the tools you need to combine different data sources and the information they provide to piece together a complete picture of an area of interest.

ENVI 4.8 introduces the LiDAR viewer, extending the existing ENVI LiDAR functionality by adding a high performance, 3-dimensional viewer that efficiently works with very large LiDAR data sets. And, with the ability to quickly and easily display point clouds in a variety of colors and ranges, the new LiDAR viewer will help you visually interpret your data and give you a more complete understanding of a particular area of interest.

Use the ENVI LiDAR viewer to:

- Filter by return, elevation, or point classification
- Display your data with a variety of surface types
- Measure height or volume of any structure
- Add custom color palettes

And, with the high performance ENVI LiDAR viewer, you can easily underlay a satellite or airborne image with your LiDAR display to create important situational awareness.

New Automated Workflow for Viewshed Analysis

In recent releases, ENVI introduced automated workflows to make a variety of tasks less labor intensive. ENVI workflows deliver scientifically proven methods for processing and analyzing imagery in step-by-step, wizard-like processes that make advanced functionality available to users of any experience level.

The new viewshed analysis workflow in ENVI 4.8 guides you through the multi-step process of viewshed analysis, providing you with the information you need to make important tactical decisions, such as where to strategically place a cell tower for maximum coverage, determining the safest path for troop movement, or indentifying out-of-site locations for concealing landfills and wastewater treatment centers. The ENVI viewshed workflow allows you to easily exploit a DEM and determine visible areas from a variety of view sources, including points, lines, or polygons, so you can easily:

- Export results directly to raster, vector, or an ArcGIS geodatabase
- Define multiple, simultaneous viewshed points, polylines, or polygons
- Determine viewshed and view range independently

A new ENVI workflow guides you through the multi-step process to perform a viewshed analysis.

Imagery becomes information.

See the other ways ENVI 4.8 can help streamline your image analysis workflow. Learn more today at www.ittvis.com/ENVI, or call your ENVI representative at 303-786-9900.

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ENVI Orthorectification Module
Orthorectify Your Imagery Quickly and Easily.

Engineered for life
Rigorous Orthorectification.
Simple Workflow. Trusted Method.

The Need for Orthorectification

Satellite and aerial imagery is used increasingly in GIS and scientific applications for the rich information it provides about a geographic area. If you use imagery as a source of information, you’ve encountered a need to perform orthorectification - the process of accurately registering imagery to ground coordinates and geometrically correcting it to remove distortions that occur during image capture.

A Rigorous Solution from ENVI

Previously, methods for orthorectifying imagery required extensive knowledge of the process and complex software systems that were not necessarily available to the typical image consumer. Now, the add-on ENVI Orthorectification Module delivers a trusted, rigorous orthorectification method and robust capabilities, all distilled into an easy-to-use workflow.

This solution creates a seamless data transition, easily taking you from data ingest to orthorectification and further exploitation of results using your ENVI software. Designed for use by non-expert and expert users alike, the wizard-based interface guides users through orthorectification steps to quickly produce accurate results.

Trusted Method for Rigorous Orthorectification

The method in the ENVI Orthorectification Module is based on the mathematical model for rigorous orthorectification designed by worldwide ortho experts, Spacemetric. Spacemetric’s engineers have worked closely with satellite and aerial providers for many years, optimizing their models to accurately work with today’s most popular airborne and satellite sensors.

This extensive research and development has produced a solid, truly rigorous method that is widely accepted as an industry standard in image orthorectification technology. Spacemetric’s highly optimized software allows imagery users to produce high quality results quickly. Since this trusted method is now combined with the image processing and analysis capabilities in ENVI, you can trust that your orthorectification results are scientifically accurate and of the highest quality.

Orthorectify your imagery quickly and easily. ENVI
Automated Workflow

ENVI is known for making scientifically advanced image processing and analysis capabilities accessible to all levels of geospatial imagery users by incorporating easy-to-use, automated processes and procedures. Now, the ENVI Orthorectification Module delivers orthorectification capabilities in an automated, wizard-based workflow, so you can perform advanced techniques, regardless of your experience with image processing or orthorectification.

And, since ENVI is integrated with ArcGIS, you can seamlessly output your results to a GIS without ever interrupting your workflow.

Steps to Orthorectify an Image with the ENVI Orthorectification Module:

Select Input Imagery and DEM

The first step in the ENVI Orthorectification workflow is to load your imagery and digital elevation models by simply choosing files from the current available bands list.

- Include multiple data files, even from multiple sensors
- Restore a project file to work with previously saved results

Collect and Edit Ground Control Points

Once input data is defined, this optional step allows you to associate image pixels with points on the ground whose locations are known through geographic coordinate data.

- Manually enter ground control points or restore points from a previous session
- View the distribution of ground control points over the project area
- Evaluate errors between the ground control points and the model solution
Collect and Edit Tie Points

When multiple images are orthorectified and mosaicked, you may choose to establish tie points in areas of image overlap.

- Restore previously created tie point files
- Add new tie points
- Edit existing tie points

Reorder Images and Define Cutlines

Once tie points are collected, you can define the image extent and specify which areas between two or more overlapping images should appear in the final output.

- Define the hierarchy of each image relative to all others
- Define an optional cutline for the image by simply drawing a polygon or polyline on the image

Select Output Parameters

In the final step of the workflow, you will specify the output map projection, pixel size, filename and path.

- Perform automatic image-to-image color balancing
- Preview option will show you preliminary results before the entire result is processed
Robust Capabilities

The ENVI Orthorectification Module delivers a rigorous method for precision orthorectification. When compared with simple geometric registration or the RPC method, ENVI’s rigorous method is far more accurate and essential to applications where precision matters, such as engineering roadways or bridges, or targeting specific objects of interest.

Orthorectify Using an Automated Workflow
A wizard-based interface guides you through the rigorous orthorectification process step-by-step to achieve expert level results.

Utilize Imagery from a Broad Range of Sensors
The ENVI Orthorectification Module comes with built-in sensor model support for the following sensors: SPOT 1-5, IKONOS-2, QuickBird-2, WorldView-1, EROS A1, Landsat 4-5, Landsat 7 ETM+, ERS SAR, Radarsat-1, IRS P6, CARTOSAT-1, FORMOSAT-2, OrbView-3, KompSat-2, and ASTER. You can also add your own sensor model via custom coding.

Perform Block Bundle Adjustment
Achieve optimized results and minimize model error using GCP’s and tie points.

Create Mosaics Using Cutlines
Easily draw cutlines for control of multiple image output seams.

Preview Your Results
Try different parameters and preview your results before processing the entire image.

Extend the Module’s Functionality
Add custom sensor support using XML sensor definition files. Additionally, access the module programmatically using IDL to automate your workflow and perform batch processing.

ENVI Orthorectification Module
Orthorectifying your imagery is easier than ever.

To learn more about the ENVI Orthorectification Module or about our custom implementation services, visit www.ittvis.com/ENVI/Ortho.
Today's imagery analysts and scientists in a wide variety of disciplines choose ENVI®, the premier software solution for extracting information from geospatial imagery. ENVI provides advanced, user-friendly tools to access, analyze, and share information from geospatial imagery.