



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)
 Mac 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)
- BigTIFF
- 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, .ige, .lan)
- ESRI Geodatabase Raster Dataset:
 - Personal (.mdb)
 - File (.gdb)
 - Enterprise (.sde)
- ESRI GRID
- GeoJP2 / GeoJ2K
- GeoTIFF
- HDF4
- HDF-EOS
- JPEG
- JPEG2000
- MrSID (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
- TFRD (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 Layer
- ESRI Shapefile
- MapInfo MIF
- Microstation DGN
- USGS DLG

LiDAR Formats:

- ASCII
- LAS

Multispectral Sensors:

- ADS40
- 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
- MISR
- MODIS
- NigeriaSat-1
- OrbView-3
- RapidEye
- SeaWiFS
- QuickBird
- SPOT
- TIMS
- UK-DMCSat-1
- WorldView-1
- WorldView-2

Hyperspectral Sensors:

- AISA
- ARTEMIS (with license)
- AVIRIS
- CASI
- HyMap
- Hyperion
- HyperScan
- HySpex
- MIVIS
- PROBE-1
- ProspecTIR

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

- OGC WCS
- OGC WMS

Spectral Libraries:

- ASCII
- ENVI SLI
- ASD Indico
- MRSL

Annotations:

- ENVI 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
- GeoJP2 / 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 / GeoJP2
- 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
- TIFF

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

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 Stretches
- 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

- 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
- Cutline & 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

Ellipsoid 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
- For 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

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

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
BandMax 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 (MTTCIMF)
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:
• Change Detection - Two Color Multi-view (2CMV)
• Change Detection - PCA
• Change Detection - Subtractive
• Pan-Sharpener
• Lines of Communication - Water
• Lines of Communication - Roads
• Watercraft Finder
• Relative Water Depth
• Vegetation Delineation and Stress Detection
• Spectral Analogues
• TERCAT (Terrain Categorization)
Spectral Resampling:
• Predefined Sensor Band Filters
• User Defined Filters
• Spectral Libraries and Images
Spectral Analyst for Material Identification
Spectral Angle Mapper (SAM)
Spectral Feature Fitting (SFF)
Spectral Hourglass Wizard
Spectral Information Divergence (SID)
Spectral Libraries Included:
• Minerals, Vegetation, Rocks, Water, Soils, Snow,
Manmade
• VNIR, SWIR, MWIR, LWIR
Spectral Library Builder/Importer
Spectral Library Viewer
Spectral Math
Spectral Plots:
• Boxcar Average of Pixel Spectra
• Continuum Removal
• Cursor Query of X,Y Plot Values
• Drag and Drop Spectra Among Plot
• From 3D SurfaceView
• From Image Pixels (Z Profile)
• From Spectral Libraries
• From ROI Averages
• Link Spectral Plots from Multiple Images
• Plot Stacked Spectra
• User-Defined Plot Functions
• Wavenumber or Wavelength
Subspace Background Suppression

Spectral Slices
Target - Constrained Interference - Minimized Filter (TCIMF)
Target Detection Wizard
Vegetation Guided Workflows:
• Fire Fuel Load
• Agricultural Stress
• Forest Health
Vegetation Indices:
• Greenness
• Light-use Efficiency
• Canopy Nitrogen
• Senescent Carbon
• Canopy Water
• Leaf Pigment
Vegetation Suppression Algorithm

SPEAR Tools

Anomaly Detection
Change Detection - 2 Color Multi-view (2CMV)
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
Spectral Analogues
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
Decorrelation Stretch
Independent Components Analysis
Image Sharpening:
• Color Normalized Spectral
• Gram-Schmidt Spectral
• HSV 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 Lee, 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

Autocorrelation
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

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 (MTTCIMF)
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 (TCIMF)
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

Sigma nought and Beta nought from ERS,

Radarsat

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

* Only available in ENVI+IDL.

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