PRODUCT DESCRIPTION

ERDAS IMAGINE® 2013

Product Features and Comparisons

PART OF HEXAGON

INTERGRAPH®

ERDAS IMAGINE®, the world's leading geospatial data authoring system, incorporates geospatial image processing and analysis, remote sensing, and GIS capabilities into a single powerful, convenient package. ERDAS IMAGINE enables users to easily create value-added products such as 2D and 3D images, 3D flythrough movies, and cartographic-quality map compositions from geospatial data.

Featuring a ribbon interface and custom workflow tabs so you can consolidate your favorite tools, ERDAS IMAGINE makes it easier to access what you need to work efficiently and productively. ERDAS IMAGINE also provides advanced tools for parallel batch processing, spatial modeling, map production, mosaicking, and change detection. In addition, ERDAS IMAGINE also incorporates the ERDAS ER Mapper algorithms and implements OGC standards.

Available in three different product tiers, ERDAS IMAGINE provides an ideal solution for a broad range of organizations and projects so everyone can achieve superior results.

Click on a link below for quick navigation:

IMAGINE Essentials®

IMAGINE Advantage®

IMAGINE Professional®

Features Comparison Chart

Functionality	Essentials	Advantage	Professional
Geographically connect files across viewers	●	●	●
Compress imagery into MrSID, ECW and JPEG2000 formats	●	●	●
Use more than 190 image and GIS data formats	●	●	●
Rapidly display and roam through imagery	●	●	●
Create and edit Esri®'s Arc coverages and shapefiles	●	●	●
Create and print maps in more than a thousand projected coordinate systems	●	●	●
Display and analyze data in Esri Geodatabases, and Oracle® 10g	●	●	●
2D, 3D, and profile viewing of point clouds	●	●	●
Virtual mosaic of imagery	●	●	●
Polynomial-based rectification of images	●	●	●
Batch processing	●	●	●
Parallel batch processing		●	●
Point cloud editing in 2D and profile view		●	●
Orthorectify images		●	●
Advanced image mosaic into a single image or image tiles		●	●
Interpolate surfaces with more than 50 million points		●	●
Perform spatial, radiometric and spectral enhancement		●	●
Analyze information in radar images			●
Classification of point cloud data			●
Perform advanced multispectral image classification and segmentation			●
Perform graphical spatial modeling			●
Extract information from hyperspectral imagery			●

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IMAGINE Essentials®

More than 30 years of geospatial research and software development has culminated in the ERDAS IMAGINE suite of software. IMAGINE Essentials is the entry-level tier of ERDAS IMAGINE. Other than IMAGINE Advantage and IMAGINE Professional, there is no more powerful and carefully designed product for creating, visualizing, geocorrecting, reprojecting and compressing geospatial data in single or batch modes than IMAGINE Essentials.

IMAGINE Essentials offers the basic tools for geospatial mapping, visualization, enhancement, and geocorrection, including enterprise-enabled access to OGC® web services and relational databases such as ArcSDE and Oracle Spatial. At the heart of IMAGINE Essentials is the viewer, which provides multi-threaded, high-performance interactive display and processing. The viewer displays, combines, geographically links, analyzes, and presents imagery and feature data from files or OGC web services in multiple geographic views and maps to facilitate understanding of geographic phenomena.

Key Features

Data Types and Integration

There are two types of file data format access: direct access to data formats for the use of files in their native format without conversion, and import and export routines for data exchange to a broader spectrum of data. ERDAS IMAGINE also supports the import and export of numerous satellite, GIS, point data, and image file formats.

Easy to Learn and Use

- Intuitive ribbon user interface
- Common interface used throughout the ERDAS IMAGINE suite
- Context-sensitive, hypertext-linked help
- Dock and undock elements in the user interface, including viewers
- Customize the layout, color, create custom workflows and quick access buttons
- Bubble help
- Extensive PDF help, including *ERDAS Field Guide*, and various user and tour guides
- Extensive preferences with keyboard search and tracks changes to defaults
- Optional use of the familiar Windows® file chooser

Data Visualization

The ERDAS IMAGINE viewer efficiently displays, combines, analyzes, and presents geographic data:

- Drag-and-drop data loading to the viewer
- International 2-byte fonts supported
- Overlay multiple feature and image data types
- Treat multiple image layers as
  - Discrete, independent files
  - Virtual mosaic
  - Virtual layer stack
- Arrange layers index

- Multi-view linking by
  - Geographical
  - Spectral
  - Real-time roam and rotation locking
- User-definable projection system for data display
- Base map as aerial maps or hybrid layer available from Open Street Maps, user-defined, or Bing® with a key
- Dynamic roam
- Fractional zoom, rectangle zoom, pyramid level zoom, and continuous zoom and continuous rotate
- Zoom to a specific scale
- Zoom to layer extent
- Font-to-symbol utility
- User-selectable resampling techniques
  - Nearest Neighbor
  - Bilinear Interpolation
  - Cubic Convolution
  - Bicubic Spline
- Rotation of data to user-defined angles
- Interactive north arrow and scale bar
- On-the-fly reprojection of image, RADAR, feature, and point data
- Print using Map Composer templates
- Area of Interest (AOI) definition
- Use AOI layers for masking
- Image histogram modification
  - Automatic statistics calculation option
  - Simple brightness/contrast tools
  - Piecewise linear adjustments
  - Standard, statistically-based automatic lookup tables (LUTs)
  - Full graphical histogram contrast adjustment tool
  - Save and reload multiple LUTs
- Window extent statistics
  - Avoids poor utilization of available screen contrast
  - Quickly calculate statistics for current viewer
- Pseudo color table editing for thematic layers
  - Define new attribute fields
  - Switch thematic layers classes on or off individually
  - Apply color patches

  - Statistical report generation
  - Attribute-based criteria selection and display
  - Point-and-click attribute selection
- Recode class values
- Filtering for thematic images (Neighborhood Analysis)
  - Filtering for continuous images
  - Standard smoothing, edge enhancement, and edge detection filters
  - Custom filter editor and librarian
- Interpolation methods for editing image regions
- General raster editing tools
- Visual change detection between any data types
  - Ribbonized for ease of use
  - Swipe
  - Blend
  - Flicker
  - Interactive direction swipe
  - Automatic Blend and swipe with fine controls over directions and speed
  - Detailed layer control
- Inquire cursor and inquire box
- Measurement tool
  - Point locations
  - Ribbonized for ease of use
  - Lengths, bearings, and angles
  - Polygonal areas and perimeters
  - Cylinder lying on ground
  - Ellipse
  - Region grow
  - Height from layover, shadow top, shadow base
  - Zenith and elevation
  - Control of units and coordinate systems for reporting
  - Write measure directly to vector attribute or on-screen annotation
- MGRS coordinate display and drive to
- Profile tools
  - Spectral profile for hyperspectral analysis
  - Spectral reference libraries
  - Spatial profile for cross-section, surface distance, and line-of-sight analysis
  - Surface profile for rapid isometric surface views

- Point Cloud Tools
  - Direct read of LAS in planimetric, 3D, and profile
  - Auto-roam along a profile
  - Measure in 2D and profile view
  - View by Classification, elevation, return, RGB, and intensity
  - Define colors and gradients
  - Link 2D and 3D views, clip to 2D extent and follow 2D
  - 3D terrain offset
  - Change z-scale and point size
- Image Drape tool for creating perspective views on platforms supporting OpenGL
  - Rendering of DEM or any surface information as a 2.5D view
  - Control vertical exaggeration
  - Specify observer position and viewing geometry
  - Customizable backgrounds
  - Atmospheric effects
  - Draping of multiple data layers
  - Retention of geographic coordinates
- Annotation layers
  - Manually digitize objects
  - Objects include text, polylines, rectangles, ellipses, polygons, symbols, arcs, and points
  - Style editor
  - Freehand (streaming) polyline editor
  - Lock annotation rotation angle
- Vector layers
  - Built-in ArcInfo® coverage, geodatabase, shapefile, and ArcSDE® vector data models
  - GeoMedia® Warehouse read and query access
  - Display and present as points, polygons, polylines, tics, or in combination
  - Select features by point-and-click, regional selection, or attribute-based criteria
  - Style editor, including attribute-based symbolization
  - Display and print all or selected features only
  - Zoom to selected feature(s)
- TerraModel layers
  - Define color palettes

Image analyst capabilities are found in the ERDAS IMAGINE ribbon interface. The features include:

- Multiple viewers embedded into a single dialog for easy screen management
- Dedicated “overview” linked window, ideal for dual monitor configurations
- DirectX hardware acceleration and multi-threaded for multi-CPU support
- Thumbwheels for brightness, contrast, zoom, and rotation control

- Percentage lookup table (ideal for 16-bit data such as IKONOS and QuickBird)
- Dynamic Range Adjustment (DRA) with user definable clipping parameters
- Snail trails
- Flicker-free raster and vector auto-roaming with regular or user-defined search paths
- Contextual magnifier (lens magnifier)
- Auto-rotate images
  - Grid north
  - True north
  - Sensor look angle (up is up)
  - Common rotation angles (45°, 90°, etc.)
- Lock rotation angles of GLT with overviews
- Image chipping
- Snapshot view content to standard image format
- Copy view content to Microsoft® Windows clipboard
- Feature Counting Tool with user-customizable categories and icons
- Ruler integration (Ruler 14 and 16.x)
- Intelligent (sensor-specific) band combination selectors
- Session saving and loading
- Jump roam to a user-selected location from overview
- Research and negation tools for multi-image change detection
- Automatic application of MTFC kernels
- Spectral Mixer tool for predefined weighted-band combinations
- Inset view
- Metadata insertion tool for map reports (NITF)
- Improved text layout including text wrapping and in-place editing
- Option to keep text horizontal to screen
- Support for recent items in the gallery
- Use Microsoft Windows fonts
- Manipulate all map template elements
- New and improved templates
- Automatically insert country map
- Multiple views in a map report template
- Automatically update scale bars, north arrow, etc.
- Improved GeoPoint tool
- Send view or map report to Microsoft PowerPoint®/Word or JPEG
- LPS Block File read

Raster Data Handling

- Write everywhere using raster DLLs for IMG, ECW, JPEG2000, TIFF (including GeoTIFF and TIFF World) and ESRI GRID Stack formats
- Create an unlimited number of ECW and JPEG2000 compressed images from input images up to 250 Gpixel with either export or direct-write.
- Create an unlimited number of MrSID images up to 50 MB with export; increase MrSID compression capabilities with the IMAGINE MrSID Encoders
- Enhanced TIFF, BigTIFF and JPEG file reading and creation
- I/O support for terabyte-sized images
- DLL extendible
- Default format filtering including “All Rasters” option
- Multi-threaded pyramid layer and statistics generation for rapid and visually accurate image zooming

Vector Data Handling

IMAGINE Essentials enables shapefile and coverage data to be rapidly viewed, created, and/or edited and provides extensive tools for this purpose through the viewer.

- Convert from GeoMedia warehouse to shapefile, and shapefile to GeoMedia warehouse
- GeoMedia utilities for creating supporting files
- GeoMedia warehouse read
- ArcSDE and Enterprise Geodatabase vector clients
- Esri shapefile, Arc coverage, and simple personal geodatabase read/write/create
- Create points, arcs, polygons, and tics
- Digitize and split existing polygons with shared boundaries
- Reshape an existing shape
- Create and enter attribute data
- Cut, copy, paste, and delete
- Unlimited undo levels
- User-defined symbolization
- Simple Windows context-based style galleries
- Node and arc snapping
- Split and unsplit arcs
- Specify weed and grain tolerance
- Splining, densifying, and generalization
- Node and polygon error detection
- Arc reshaping
- Drag and drop individual arc vertices or arc segments
- Continuous, “hands-free” roam while editing
- Automatic feature extraction

- Heads-up digitizing in viewer, digitizing tablet input, or keyboard data entry
- Rename, copy, delete, and external coverages
- Reproject to another projection
- Add hyperlinks to Microsoft Windows applications or web pages from vector features
- Subset shapefile

OGC Data Handling

ERDAS IMAGINE is a client application for consuming OGC services.

- WMS 1.0, WMS 1.1.1, WCS 1.0, WMS 1.3.0, WCS 1.0.0

Point Cloud Data Handling

IMAGINE Essentials enables LAS data to be rapidly viewed and imported.

- Direct read of LAS
- Direct read MrSID compressed LAS
- Uses pyramid layers and spatial indexing for rapid viewing
- Import from multiple point formats
- Measure in 2D and profile view
- View by Classification, elevation, return, RGB, and intensity
- Define colors and gradients using the style gallery
- Link 2D and 3D views, clip to 2D extent and follow 2D
- 3D terrain offset
- Change z-scale and point size
- Box and polyline profile
- Auto roam along a profile

File Management

IMAGINE Essentials provides several tools to manage imagery and feature data.

- IMAGINE Image Catalog for raster data, a database that serves as an image library, softcopy search, and information management system
  - Attribute-based querying of records (images)
  - View image footprints on reference maps
  - Customize reference maps
  - Display selected images
- Retriever provides quick drag and drop access to data in project
  - XML based, easy to create and modify
  - Can open quickly with a saved session, or close quickly to open more viewing space
  - Access ERDAS APOLLO Catalog and other OGC-compliant web services
  - Add images to the ERDAS APOLLO Catalog from ERDAS IMAGINE
  - Geocoding services available with a Bing key

Batch Wizard Processing

- Serial process many thousands of files (parallel processing available in IMAGINE Advantage)
- Record and repeat common functions
- Automation to provide multi-file input/output support
- Wildcard selection of files
- Drag-and-drop data loading
- Image Command tool for changing projection and map information and other image metadata

Geometric Correction

IMAGINE Essentials provides an intuitive set of tools to georeference raw image data.

- Automatic geometric correction from valid ephemeris information
- Manual georeferencing can be applied to any raster data
  - Affine
  - Polynomial (first to tenth order)
  - Rubber sheeting
  - Reprojection
- Edit Ground Control Points (GCPs)
  - Intuitive graphical user interface
  - GCP selection from map, image, vector, or keyboard
  - Automatic coordinate conversion
  - Automatic error reporting
  - Independent verification of accuracy with check points
  - Chip extraction (magnifier) viewers
  - Automatic drive-to-point
  - Automatic point prediction
  - Automatically position a predicted GCP
- Drop-point geocoding for fast and simple shift correction
- Image resampling to coordinate system
  - Nearest Neighbor, Bilinear, Cubic Convolution, or Bicubic Spline resampling
  - User-defined pixel sizes and geographic subsets
  - DLL extendible
- Over 1000 projected coordinate systems included
- Over 65 spheroids and 500 datums included
- User may add more spheroids and datums
- Vertical datums, including vertical datum transformations
- Support for both standard and user-defined projection libraries, allowing thousands of projection systems to be defined
- ArcInfo vector transformations: affine or projective

- Viewer geographic link by reproject
- Viewer reproject images on-the-fly
- Mapmaker reproject images on-the-fly
- Reproject command interface
- Read/create ESRI world files and projection files (.prj)

Simple Classification

Easy-to-use unsupervised classification routine (ISODATA) with only file names and the number of classes needed for input.

User control of:

- Number of iterations
- Number of classes
- Skip factors
- Initial class means on diagonal or principal axis
- Scaling of class ranges
- Color scheme initialization options
- Convergence threshold

Map Composer

Create or access individual custom maps of user-defined size.
Add any of the following:

- Copy and paste into any product using Microsoft clipboard (PowerPoint, Word, etc.)
- Multiple data frames containing one or more data layers each
- Automatically generated grid ticks, lines, and graticules
- Titles
- Lines, bounding boxes, and symbols
- Annotation
- Logos
- North arrows
- Scale bars
- Automatically generated legends
- User-definable styles
  - Build customized map templates
  - Automatically generate USGS maps at standard scales
  - Automatically generate international map series at any scale
  - Industry-standard printer languages and devices
  - Automatically populate dynamic elements in the map view
  - Automatically provide a map location overview

Google Earth™ Integration

ERDAS IMAGINE displays a Google Earth tab on the ribbon if Google Earth is detected on the computer. Users can match the Google Earth view to the ERDAS IMAGINE viewer and even synchronize the views. Users can also export image footprints and annotation layers from ERDAS IMAGINE to KML files.

General Tools and Utilities

- File chooser mechanism
  - File system and network navigation
  - Connection mechanism for database access
  - Recent list of files accessed
  - “Go to” list of directories accessed
  - Select multiple files at once
  - Preview thumbnail
  - Rename/delete/set permissions on files
  - “All Rasters” and “All Vectors” filters
- Enterprise database spatial selection tool, including:
  - User-customizable backdrop maps
  - MBR footprint display
  - Thumbnail image display
  - Image selection by attribute query, spatial and/or point and click criteria
- Quickly customize ERDAS IMAGINE to the production environment through the Preference Editor
- Access to peripherals and networks
- Text editor
- Layer information tools
- View binary data
- Coordinate calculator
- Subset tool
- Movie player and sequence editor
- Spreadsheet functionality via the CellArray™
- Convert fonts to symbol libraries

Extensibility

- ERDAS Macro Language (EML)
- Font manager

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IMAGINE Advantage®

More than 30 years of geospatial research and software development has culminated in the ERDAS IMAGINE suite of software. IMAGINE Advantage is the mid-level tier of ERDAS IMAGINE. Other than IMAGINE Professional, there is no more powerful and carefully designed product for creating, visualizing, geocorrecting, reprojecting, and compressing geospatial data in single or batch modes than IMAGINE Advantage.

IMAGINE Advantage builds upon the geospatial capabilities of IMAGINE Essentials to offer more advanced and precise mapping and image processing capabilities. IMAGINE Advantage gives GIS professionals, image analysts, and photogrammetrists more analysis capabilities to make better, more informed decisions. IMAGINE Advantage can provide strategic value to a variety of industries including data providers, agriculture, forestry, natural resource management, telecommunications, environmental engineering, and the extractive industries.

Please also review the IMAGINE Essentials® product description for the capabilities and features available for all levels of the ERDAS IMAGINE suite.

Key Features

Parallel Batch Processing

IMAGINE Advantage extends the serial process capabilities available within IMAGINE Essentials to introduce a parallel processing capability. Up to four processes, such as reprojection, compression, or image enhancement functions can be run simultaneously for each IMAGINE Advantage license. Multiple floating licenses of IMAGINE Advantage may be accessed to go far beyond four parallel processes.

Orthocorrection

IMAGINE Advantage expands the standard techniques available in IMAGINE Essentials to include sensor-based modeling and single-frame orthocorrection.

- Sensor models for orthocorrecting data
  - Frame camera
  - Digital camera
  - ALOS AVNIR Rigorous Orbital model
  - ALOS PRISM Rigorous Orbital model
  - ALOS PRISM with RPC
  - ASTER Rigorous Orbital model
  - CARTOSAT RPC
  - DEIMOS RPC
  - DPPDB
  - EROS 1A & 1B Rigorous Orbital model
  - FORMOSAT2 Rigorous Orbital model
  - GEOEYE-1 Rigorous Orbital model
  - GEOEYE RPC
  - IKONOS NITF
  - IKONOS RPCs
  - IND High Res RPC

  - IRS-1C/1D
  - KOMPSAT RPC
  - Landsat TM, MSS, ETM+
  - MODIS
  - NITF RPC
  - ORBIMAGE Rigorous Orbital model
  - PLEIADES RPC
  - QuickBird RPC
  - QuickBird/WorldView (including NCDRD format) Rigorous Orbital model
  - RADARSAT
  - RAPIDEYE RPC
  - RESOURCESAT
  - SPOT 5 Rigorous Orbital model
  - SPOT Pan, XS, XI
  - THEOS1 – Rigorous Orbital model
  - WorldView RPC
- Orthocorrection models for solving when ephemeris information is lacking
  - Direct Linear Transform (DLT)
  - Projective Transform
- Specify principal point and focal length for the camera
- Select fiducial layout type and record film location template
- Measure fiducial image locations
- Specify/calculate rotation angles for Omega, Phi, Kappa
- Specify/calculate perspective center position for X, Y, Z
- Account for the Earth's curvature
- User-specified number of iterations
- Specify output projection system
- Select GCP reference coordinates from map, image, vector, or keyboard
- Standard GCP editor extended to allow the definition of Z values

Raster Product Format (RPF) production

- Controlled Image Base (CIB)
- Compressed Arc Digital Raster Graphics (CADRG)

Increase in ECW / JPEG2000 Capability above IMAGINE Essentials

- Create an unlimited number of ECW and JPEG2000 compressed images from input images up to 500 Gpixel with export, direct-write, and MosaicPro.

GeoMedia Data Handling

- Buffer analysis for feature tables in a GeoMedia warehouse

Radar Analyst

- Real-time georeferences for RADARSAT 2, TerraSAR-X, and COSMO SkyMed
- Select display mode
  - Magnitude
  - Edge enhance with interactive illumination setting
  - Interactive level slice
- Show look direction
- Real-time AIS feed

Point Clouds

- Encode LAS files with raster pixel values such as RGB
- Edit (constant Z, Offset, Reclass, Delete)
- Subset, filter, split, merge
- LiDAR command tool for batch update of pyramids and projection information

Metric Accuracy Assessment (MAA) Tool

When delivering products derived from imagery, users should always be able to state the spatial accuracy of those products. The MAA tool enables calculation of the accuracy of mono or stereo pair imagery (stereo analysis restricted to RPC models) using photo-identifiable ground control points.

- Control (or Test & Evaluation – T&E) points can be manually entered or read from file
- Calculation of error statistics
- Individual point error and statistics report
- Error computations are based on MIL-STD-600001, with bias taken into account
- CE is computed using horizontal error as input to the LE formula with bias

Mosaicking

IMAGINE Advantage provides MosaicPro, the geospatial industry's most robust mosaicking tool. MosaicPro provides cutline creation and editing, color-balancing, illumination correction, feathering, dodging, and more for the creation of seamless mosaics and image tiles. From a pair of images to over 16,000 images, MosaicPro handles it all.

- MosaicPro user interface to manage all aspects of the mosaic process including graphics and image display options
- Mosaic Express for easy learning and rapid setup times
- Command line interface for production batch processing
- Mosaic multiple images with:
  - Differing or like resolution (pixel sizes)
  - Differing or like projection systems

    - Geometric calibration or finished orthorectification
- Select the images to mosaic individually, by all the files in the directory, or by all the files in a file list
- Use relatively positioned images or images with just map information in addition to fully georeferenced images.
- Load images directly from a LPS block file
- Select elevation sources in any supported raster format
- Control the image area considered for mosaicking
    - Use the entire image
    - Compute an active area
    - Use a template AOI
    - Use an individual AOI
    - Crop edges by percentages (provides for automatic clipping of fiducials from scanned frame imagery)
- Automatic image loading and unloading based on user setting for large product efficiency
- Multiple options for ordering and sorting imagery
    - Promote and demote individual images or selected groups
    - Order by source date, and write source date and image name metadata to output seamline shapefile
    - Sort images to minimize overlap areas
- For overlap areas, cutlines can be defined automatically or by the user
    - Save to/load from shapefile
    - Automatic geometry based cutlines
    - Automatic weighted cutlines
- Additional cutline options for triangulated data
    - Most Nadir
    - Most Nadir Narrow
    - Most Nadir by DTM
- Cutline editing in interface with WYSIWG (what you see is what you get) approach to provide real-time feedback of included imagery changes
- View reference seam polygons for working on geographically adjacent products
- Color Corrections
    - Exclude Areas
        - Manual or semi-automated
        - Define abnormal areas for exclusion from processing
    - Dodging
        - User definable grid size
        - Band dependent or independent
        - Dodge across images or individually
        - Manually editable correction settings
        - Preview

- Color Balancing
  - Adjustable or manual
  - Surface-fitting removes spatially varying illumination effects such as hot spots
  - Option to use existing lookup tables
  - Preview color balancing effects
- Histogram matching based on:
  - Image to image
  - Overlap areas only
  - Ideal target histogram
- Illumination equalization to adjust illumination variations (from sun glint, etc.)

- Full control over the algorithm applied at each image overlap region
- Radiometric seam smoothing and feathering
- Preview finished mosaic results in a local user-defined area including seam feathering, smoothing, radiometric adjustments, and output GSD changes. This allows for parametric optimization before running a full mosaic job.
- Output a single file or cut into project files
  - Union of all inputs to single file
  - User-defined AOI to single file
  - Multiple AOIs to separate files
  - Use Map Series file to output to multiple files on user defined grid pattern
  - ASCII sheet file definition
  - Rotated output sheets
  - Global clip boundary
- Specify output projection cell size and data type

Image Processing & Spatial Analysis

IMAGINE Advantage provides access to over 100 standard image processing and GIS techniques for enhancing and analyzing data.

- Radiometric enhancement
  - Look-Up table stretch
  - Rescale data
  - Noise reduction
  - Periodic noise removal
  - Landsat 7 reflectance and radiance conversion
  - Destripe Landsat
  - Replace bad lines
  - Histogram match
  - Brightness inversion
  - Histogram equalization
  - Topographic normalize

- Spatial enhancement
  - Resample/reproject
  - Degrade
  - Convolution filters
  - Non-directional edge detection
  - Texture analysis
  - Wallis adaptive filter
  - Crisp
  - Statistical filter
  - Homomorphic filter
  - Morphological operators
    - Open
    - Close
    - Erode
    - Dilate
  - Focal (neighborhood) analysis
  - Wallis adaptive filter
- Pan sharpen
  - Hyperspherical Color Space pan sharpening
    - Developed specifically for WorldView-2
  - Subtractive resolution merge
  - High Pass Filter (HPF) resolution merge
    - Trade color for sharpness, or vice versa
    - 2Two-pass process for high spatial-disparity images
  - Modified IHS resolution merge
    - Tailored to be sensor-specific
    - Maintains spectral radiometry
    - Merge multiple bands, not just three
  - Wavelet resolution merge
  - Ehlers Fusion
    - Wavelet based pan sharpening
    - Automatic or manual filtering schemes
  - Resolution merge
    - Principal Component
    - Multiplicative
    - Brovey Transform
- Spectral enhancement
    - Layer stack

    - Principal component
    - Inverse principal component
    - Independent component
    - Tasseled cap transformation
    - Decorrelation stretch
    - RGB to IHS
    - IHS to RGB
    - Spectral mixer
- Hyperspectral tools
    - Normalize spectrum
    - Internal Average Relative Reflectance (IARR)
    - Log residuals
    - 3D Rescale
    - Spectrum Average
    - Signal-to-noise ratio
    - Mean per pixel
    - Profile tools
- Thematic (GIS, many applicable for vector as well as raster)
    - Thematic to RGB
    - Random class colors
    - Recode
    - Neighborhood functions
    - Morphological
    - Search (buffer)
    - Clump, sieve and eliminate classes
    - Perimeter of clumps
    - Aggregation of thematic classes
    - Zonal attributes (parcel statistics)
    - Matrix union
    - Summary report of matrix union)
    - Overlay (minimum or maximum)
    - Index (weighted summation)
- Fourier analysis
    - Fourier transform
    - Graphical fourier transform editor
    - Inverse fourier transform
    - Fourier magnitude
- Classification

- Indices
  - Vegetation indices (VI, NDVI, TNDVI, etc.)
  - Other indices (iron oxide, clay minerals, ferrous minerals, mineral composite, etc.)
  - Sensor specific band selection
  - Adjust formulas with variables
  - Preview results in real time
- RGB clustering

- Terrain analysis
  - Terrain preparation (see above)
  - Anaglyph
  - Recalculate elevation values
  - Elevation library
  - Route intervisibility
  - Slope angle
  - Aspect facing
  - Painted relief
  - Shaded relief
  - Level slice
  - Raster contour
  - Image drape
- Functions
  - Two image mathematical union functions
  - Two image mathematical intersection functions
  - Single image mathematical functions
- Change detection
  - Zonal change detection
  - Image differencing
  - Discriminant Function Change
- Subset
  - NITF chip
  - Mask
  - Dice images
- Generic options
  - Restrict function to Area of Interest (AOI) or rectangular subset
  - Stretch to 8-bit data range
  - Ignore zero values in output statistics
  - Schedule for batch processing
  - Vector to raster

Modeling Language

The Spatial Modeling Language (SML) is highly flexible, enabling users to create and run customized models for image processing and GIS analysis. The Spatial Modeler fully supports the input of calibrated imagery and will output it to a specified projection system. The majority of Image Interpreter functions, which use the underlying Spatial Modeler programs, now also support multiple input projection systems and calibrated imagery.

- Model librarian with built-in editor
- Over 80 example SML scripts to customize
- Specify the projection system when inputting two or more images of differing projections into a model
- Function types (over 200 provided)
  - Point
  - Neighborhood (focal)
  - Global
  - Zonal
  - Layer
- Statements
  - Declarations
  - Assignments
  - Show, read, and write
  - Set
  - Macro definitions
  - Quit
  - Flow control
  - Statement blocks
- Object types
  - Scalar
  - Table
  - Matrix
  - Raster
  - Vector
- Data types
  - Binary
  - Integer
  - Float
  - Complex
  - Color
  - String
- Variables
- Windows

- Syntax error checking
- Calibration and reprojection support

Knowledge Classifier

Using knowledge bases created with IMAGINE Professional, IMAGINE Advantage users can classify geographic data with the simple, user-friendly Knowledge Classifier wizard interface.

- Evaluate classification classes
- Automatically identify missing files
- Output fuzzy sets, confidence layers and feedback layers, as well as classifications

Knowledge bases created by expert users in IMAGINE Professional can be distributed to IMAGINE Advantage users anywhere in the world to apply classification processes to their data. This portability is one of the keys to the strength of the expert systems approach. See the IMAGINE Expert Classifier™ section in the IMAGINE Professional Product Description for more details about the IMAGINE Expert Classifier.

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IMAGINE Professional®

More than 30 years of geospatial research and software development has culminated in the ERDAS IMAGINE suite of software. IMAGINE Professional is the top-level tier of ERDAS IMAGINE and is the most powerful and carefully-designed product in the world today for creating, visualizing, geo-correcting, re-projecting, modeling, classifying and compressing geospatial imagery.

IMAGINE Professional is a comprehensive geographic imaging package for advanced image processing, remote sensing and GIS professionals. IMAGINE Professional includes all the capabilities of IMAGINE Essentials and IMAGINE Advantage and advanced features such as graphical data modeling, advanced classification, and radar analysis tools. ERDAS IMAGINE is one of the first commercial software packages to enable users to create expert systems that use geographic data to solve geographic problems. With the IMAGINE Expert Classifier, IMAGINE Professional users have a tool for building and executing expert systems for image classification, post classification refinement, and advanced GIS modeling.

In addition, IMAGE Professional customers also receive ERDAS ER Mapper. Together, these products provide the most powerful image processing and raster GIS engine available on the same desktop. Please refer to the product pages at http://geospatial.intergraph.com for detailed information on ERDAS ER Mapper capabilities.

Please also review the IMAGINE Essentials® and IMAGINE Advantage® product descriptions for the capabilities and features available for all levels of the ERDAS IMAGINE suite.

Key Features

Spectral Analysis

Extending the hyperspectral tools found in IMAGINE Advantage, Spectral Analysis allows customers to quickly extract material mapping information with minimal effort and knowledge of hyperspectral image processing theory. Spectral Analysis tools include:

- Standard task-based workflows
  - Anomaly and target detection
  - Material mapping and identification
- Hyperspectral image preprocessing steps
  - Band wavelength/width specification
  - Bad band identification
  - Spectral and spatial subset
  - Atmospheric adjustment
  - Minimum noise fraction
- Spectral libraries
  - ASTER
  - JPL
  - USGS
  - Import new versions of the above libraries
  - Import SITAC libraries

  - Import SPECMIN libraries
- Spectral Analysis Workstation
  - Multi-pane workspace providing access to all the tools and viewers that enable interactive analysis of hyperspectral imagery, spectral signatures, and other data displays
  - Three geospatially-linked views (main view, an overview view of the whole image extent, and a zoom view showing magnified detail of a specific location)
  - Embedded spectral plot tools
  - Embedded spectral libraries
  - Drag and drop interaction between the image pixels, plots, and libraries
  - Access to all preprocessing and task processes
- Spectral Analysis Methodologies
  - Orthogonal Subspace Projection (OSP)
  - Spectral Angle Mapper (SAM)
  - Spectral Correlation Mapper (SCM)
  - Constrained Energy Minimization (CEM)

IMAGINE Expert Classifier

The IMAGINE Expert Classifier is made up of two components: the Knowledge Engineer and the Knowledge Classifier. Key features of the Knowledge Engineer include:

- A graphical drag-and-drop interface for building a knowledge base
- Confidence value definition and propagation—the ability to handle uncertainty
- The use of variables from various sources including images, vectors, scalars, graphical models, and other user-defined programs
- The ability to include prompts for particular data files for the creation of portable knowledge bases
- Quick feedback on the results of a classification to aid in developing and fine-tuning a knowledge base
- Access to other ERDAS IMAGINE tools, such as Model Maker, for defining spectral/spatial operators

The Knowledge Classifier enables users to apply a knowledge base to geographic data with the simple user-friendly Knowledge Classifier wizard interface.

- Perform classifications
- Evaluate classification classes
- Automatically identify missing files
- Output fuzzy sets, confidence layers, and feedback layers, as well as classifications

While the Knowledge Engineer is a standard part of IMAGINE Professional, the Knowledge Classifier is a standard part of IMAGINE Advantage. Consequently, expert users who design and test knowledge bases using IMAGINE Professional can distribute them to IMAGINE Advantage users anywhere in the world to apply the classification process to their data.

Multispectral Classification

- Unsupervised classification
  - ISODATA algorithm
  - Initialize class means from image statistics or optional signature file means
  - Set convergence threshold, maximum iterations and skip factors
  - Classify only the AOI
  - Output a signature set
  - Specify the number of classes and color scheme in the output cluster file
- Open and modify indices in the Spatial Modeler with all presets from GUI
- Grouping Tool for assigning classes to land cover types
  - Define target land cover classes
  - Interactively select and highlight working groups of classes
  - Boolean operators to compare and separate working groups
  - Highlight similarity/conflict geographically
  - Dendrogram tool visually represents similarity of classes
    - Distance measures
      - Euclidean
      - Mean scaled
      - Divergence
      - Spectral angle
    - Agglomeration methods
      - Simple linkage
      - Complete linkage
      - Simple average linkage
      - Average linkage
      - Centroid
      - Median
      - Save grouped classes to image
- Fuzzy classification, fuzzy convolution filtering, and fuzzy recode
- Accuracy assessment through use of ancillary data to measure errors of commission/omission
- Post-classification class editing
  - Chi-square or Euclidean distance class thresholding
  - Threshold interactively on a histogram display
  - Threshold based on statistics or graphic editing
  - Preview threshold results
- Classification accuracy assessment
  - Random or user-defined ground truth locations

- Automatically generate accuracy reports with Kappa statistics, error matrices, and accuracy totals
    - Supervised classification
- Control of automatically generated statistical attribute fields in an output classified file
- Output a distance file for use in thresholding
- Control the classification
    - Non-parametric signatures may be ignored or classified by parallelepiped limits or feature space masking
    - Pixel overlap rule
        - By parametric rule
        - Classify by order
        - Leave unclassified
    - Unclassified pixels: evaluate by parametric rule or leave unclassified
    - Parametric signatures evaluated by maximum likelihood, Mahalanobis distance, parallelepiped, or minimum distance rules
    - Hybrid parametric/non-parametric classification
- Select, evaluate, and edit signatures
    - Signature creation
        - Automatic region growing
        - Selected vector objects
        - User-defined AOI point, ellipse, rectangle, polygon, or polyline objects
- Sophisticated feature-space signature editing, extraction, and evaluation
- Signature evaluation and manipulation
    - Contingency matrices
    - Separability measures
        - Euclidean
        - Divergence
        - Transformed divergence
        - Jefferies-Matusita
        - User-specified bands per combination
- Image alarm, including overlap indication
- Mean per band or histogram plots
- Univariate and covariance statistics
- Feature space (scattergram) plotting
    - User-specified band combinations
    - Signature ellipse plotting
    - Image to feature space linking
- Non-parametric signature extraction
- Signature merge, delete, and replace
- Set layers to use in classification process

- Manual editing of parallelepiped limits
- Set output class values, colors, a priori probabilities, and classification order

Subpixel Classification

The IMAGINE Subpixel Classifier characterizes the scene being processed by the amount (fraction) of one specific material, rather than multiple materials, in each image pixel. This allows the classification of objects smaller than the spatial resolution of the sensor.

- Train the classifier
- Perform environmental corrections
- Develop training signatures
- Combine signatures
- Perform quality assurance

Point Clouds

Classify point clouds as bare earth, buildings, or vegetation.

Area Frame Sampling

A statistical approach to estimating land cover extent within a given region, based on interpretation of higher resolution imagery samples.

- Project manager and wizard
- Stratum file definition
- Sampling grid generation
- Graphical sample selection
- Dot grid analysis to label samples
- Polygon analysis to label samples
- Calculate estimates and error tolerances

Model Maker

The first object-based graphical geospatial data modeling tool.

- Based on Spatial Modeler Language (SML)
- Over 50 prepackaged models
- Use graphical flow charts to quickly perform sophisticated GIS analysis
- Combine GIS and image processing functions in the same spatial model
- Combine raster, vector, and attribute data in a single model
- Use GeoMedia vector and grid operators
- Enhance and build models with Python
- Apply a model to new data or a different geographical area at the push of a button
- Double-click to define objects
- Function object
  - Access to over 200 separate functions
  - Function syntax “prototypes”

  - Use and output attribute information
- Set operating geographic window and resolution
- Accepts calibrated images
- Reproject input data on-the-fly
- Quickly modify and rerun the model
- Run a model directly or generate an SML script for integration with EML
- Publish models to ERDAS APOLLO as a Web Processing Service (WPS)

Unlimited ECW / JPEG2000 Compression Capability

- Create an unlimited number of ECW and JPEG2000 images of unlimited size with export, direct-write, and MosaicPro

IMAGINE Radar Interpreter™

- Sensor merge
  - Principal components
  - Intensity Hue Saturation (IHS)
  - Multiplicative, radar data re-map options, etc.
- Texture enhancement
  - Variance
  - Skewness
  - Kurtosis
  - Mean Euclidean distance
- Speckle suppression
  - Mean
  - Median
  - Lee-Sigma
  - Local region
  - Lee
  - Frost
  - Gamma-MAP
- Edge enhancement
- Wallis adaptive filter
  - Bandwise, IHS, or Principal Component
  - User-defined scene contrast multiplier
- Luminance modification
  - Produce high-luminance or low-luminance images with no image degradation
  - Specify local luminance intercept
  - Normalize illumination in the range direction
  - User-defined scene contrast multiplier

- Correct luminance in row or column
- Slant-to-ground range adjustment
  - Specify sensor
    - Depression angle
    - Beam width
  - Adjust to flat plain or user-defined spheroid
- Radar Conversions
  - Domain
    - Magnitude and Phase (MP)
    - Intensity and Phase
    - Real and Imaginary (IQ)
    - Magnitude Only (M)
    - Intensity Only
    - Phase Only (P)
  - Radiometric
    - Media DN to Beta-Naught (Linear)
    - Media DN to Beta-Naught (Decibels)
    - Linear to Decibels and Decibels to Linear
  - Radiometric Terrain Correction, producing
    - Radar backscatter coefficient Sigma-Nought
    - Incidence angle mask

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ABOUT INTERGRAPH

Intergraph helps the world work smarter. The company's software and solutions improve the lives of millions of people through better facilities, safer communities and more reliable operations.

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