

ER Mapper Image Compressor

Changing Geospatial Imagery Landscape

Released in March this year, ER Mapper Image Compressor is set to begin a new era of low-cost geospatial image compression bringing the value of geospatial imagery into the daily workflow of a wide geospatial user community. For this reason, we invited this month's interviewee Mark Sheridan, ER Mapper R & D Manager, to reveal some of the latest information on the newest image compression solution from ER Mapper.

By Joc Triglav

ER Mapper is a well known company in the geoinformation business community for its geospatial imagery solutions, especially for its ER Mapper Professional, Image Web Server, Image Integration Framework products. How and where does your newest product ER Mapper Image Compressor fit into your product line?

ER Mapper Image Compressor is at the foundation of our imagery solutions. It puts imagery into a useable format by turning 100s or more image tiles into a single, seamless compressed JPEG 2000 or ECW image mosaic.

Image mosaics make imagery easier-to-use. They're fast to open in GIS or other desktop applications and you can see the whole area without hopping through image files. They also save management time and basic hard disk space requirements. 1000GB of raw imagery can be turned into 10GB of compressed imagery.

JPEG 2000 and ECW are also the file formats

of choice for ER Mapper Image Web Server, our high-speed, specialized server application that efficiently distributes large volumes of geospatial image data over an internal network or the internet.

A key feature of ER Mapper Image Compressor is its high-speed image compression to the open standard JPEG 2000 format. Please outline from the technological point of view the main similarities and the main differences between the JPEG 2000 and ECW compression, especially regarding the dataset size, performance, bit depth, compatibility, lossy or lossless compression and similar.

JPEG 2000 and ECW are both wavelet compression formats. This means that they offer a high-level of compression without compromising visual integrity. JPEG 2000 is an ISO standard format,

whereas ECW was developed by ER Mapper. There are a number of differences between JPEG 2000 and ECW. JPEG 2000 provides a plethora of features intended to enable the format to be used in almost any conceivable imagery application from digital cameras to spatial imagery and medical. ECW was designed specifically for large geospatial images. ECW supports 8-bit data per band (24-bit RGB) whereas JPEG 2000 supports 28-bit precisions per band. ECW and JPEG 2000 are both capable of lossy compression, but JPEG 2000 can also employ lossless compression.

Lossy compression sacrifices some of the precision of the original data in order to get a high degree of compression. In other words you 'lose' data as part of the compression process. However this 'lost' data usually isn't visually noticeable up to a compression ratio of about 15:1 (though this can vary with the image and the level of detail that will typically be examined). Lossless compression doesn't sacrifice any image data, but you don't get as much compression (typically up to 4:1).

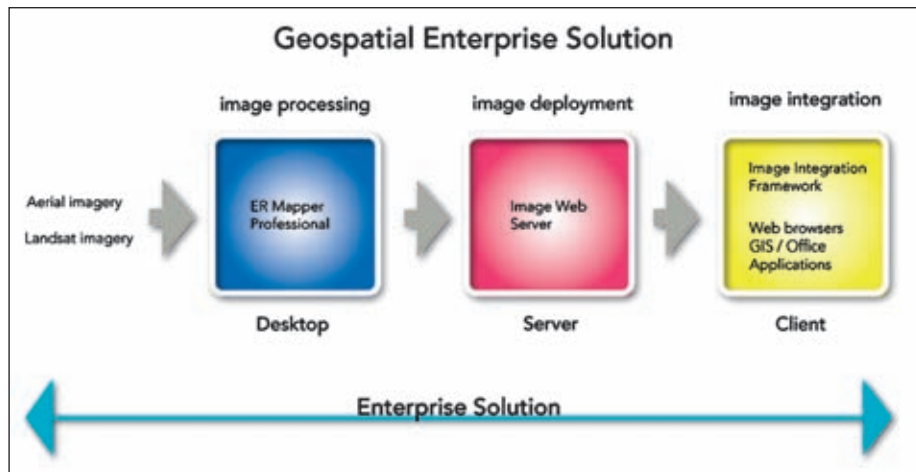
90% of geospatial imagery applications are suitable for using lossy imagery. Anything that requires a human, visual analysis is appropriate for lossy-based compression. For example, integrations of aerial or satellite photography with a GIS should use a lossy compression method. Lossless based imagery is necessary for scientific based image processing where pixel-for-pixel fidelity is required. Many of the processes undertaken by geologists require lossless imagery.

ECW tends to be faster than JPEG 2000. ECW has a single purpose, whereas the scope for JPEG 2000 is very broad.

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Mark Sheridan,
ER Mapper
R & D Manager.





Enterprise diagram.

Again, you can create larger image mosaics with ECW than JPEG 2000, mainly due to the maturity of the format. Having said this, we are spending a lot of time on our own JPEG 2000 libraries – using what we have learned with ECW – to create what we believe is the best performing JPEG 2000 implementation available. We are the only geospatial company out there that has developed our own JPEG 2000 library specifically for geospatial data use. The needs for spatial imagery are significantly more demanding than most applications of JPEG 2000, yet unfortunately, many of the implementations available are shoehorned into spatial software with little regard for addressing their many shortcomings. Most have problems dealing with the image sizes we typically deal with on a daily basis. We actually do a fair bit of business selling our JPEG 2000 SDK to other spatial software vendors to replace their existing solution because a lot of them benchmark well on a 50MB file but are completely useless with 2TB files, despite everyone claiming compliance with the specifications.

Whom do you see as the potential users ER Mapper Image Compressor and which main new image compression and usage benefits are available to these users? In this regard, please explain also the flexible multi-tiered licensing model based on input-file sizes.

At one end of the spectrum, we are sure that the Image Compressor will appeal to the many established imagery users, but we are also hopeful that Image Compressor will usher in a user where imagery use is relatively new. These users are now seeing how imagery can benefit them. The more people can do with imagery, the more they use it the better outcomes will be generated for their organization. These novice users and organizations may still be using single image tiles. The adoption of

Image Compressor is going to make a big difference to these organizations. Simply converting these files to a seamless mosaic is going to benefit the organization greatly with better management, the ability to share data easily, etc. The other features, such as the clip regions and reprojection are also going to add a lot of value to an organization. ER Mapper Image compressor's flexible 'pay-once' licensing model is multi-tiered to fit an organizations budget and imagery assets. The tiered licensing levels are based on uncompressed input-file sizes – not per megabyte compression charging. You can create as many 100GB compressed images as you want with a 100GB license. The licensing tiers we have are: 1GB, 10GB, 100GB and Unlimited.

Which raster image file format does ER Mapper Image Compressor support as input and output files?

Read	Write
<ul style="list-style-type: none"> ER Mapper Algorithm (.alg) ER Mapper Raster Dataset (.ers) ESRI BIL and GeoSPOT (.hdr) Windows BMP (.bmp) RESTEC/NAASA CEOS (.dat) USGS Digital Ortho Quad (.doq) ER Mapper Compressed Wavelet (.ecw) JPEG 2000 (.jpf, .jpx, .jpc, .j2c, .j2k, .jp2) Landsat 7 FastL7A (.fst) National Imagery Transmission Format (.ntf) ArcInfo ASCII Grid (.asc) ERDAS Imagine (.img) GeoTIFF/TIFF (.tif, .tiff) Portable Network Graphics (.png) USGS ASCII DEM (.dem) USGS SDTS DEM (.ddf) Military Elevation Data (.dt1, .dt0) Aster/Modis/Landsat7/EODIS/Spot Vegetation (.l1g, .l1r, .met, .hdf) JPEG (.jpg) 	<ul style="list-style-type: none"> ER Mapper Raster Dataset (.ers) ER Mapper Virtual Dataset (.ers) ER Mapper Compressed Wavelet (.ecw) JPEG 2000 (.jpf, .jpx, .jpc, .j2c, .j2k, .jp2) GeoTIFF/TIFF (.tif, .tiff) National Imagery Transmission Format (.ntf) ER Mapper Algorithm (.alg) ESRI BIL and GeoSPOT (.hdr) Windows BMP (.bmp) JPEG (.jpg) World files (.<code><xx>.w</code>)
<p>ECWP – images served with Image Web Server</p>	

Input and output files.

We have endeavored to make ER Mapper Image Compressor as versatile as possible for our customers. One thing we are particularly proud of is our new 'Smart open' feature. When you open an image file, ER Mapper Image Compressor detects the format and various configurations are automatically adjusted so the image looks 'right' straight away. Smart open works well for RGB, satellite imagery, height data and most imagery data in general.

Please explain shortly the ER Mapper wizard-driven operations, like mosaic, balance, reprojection and clip regions wizards that are available in ER Mapper Image Compressor.

Image Compressor's wizards are simple to use, whilst 'under the hood' some very intensive and complicated computing is going on. The wizard's let any user get up and running in no time at all. The mosaicking and balancing function takes 100s or 1000s of image tiles and stitches them together into a single mosaic. The color balancing feature removes the 'black-edges' from the original images so that you have a 'seamless' image mosaic. It is near impossible to detect where the joins of the tiles are. The amazing thing about this feature is that it only takes about 5 mouse clicks and you are done. You don't have to be an expert or guru – although if you are experienced you can make additional adjustments. Clip regions wizard allows you to cut out an area of interest from an image. It can import a shape file to create the regions dimensions for this operation. Datums and projections are a central component for imagery use. Image compressor can reproject your datasets or via batch reprojection – if you need to convert a number of images.

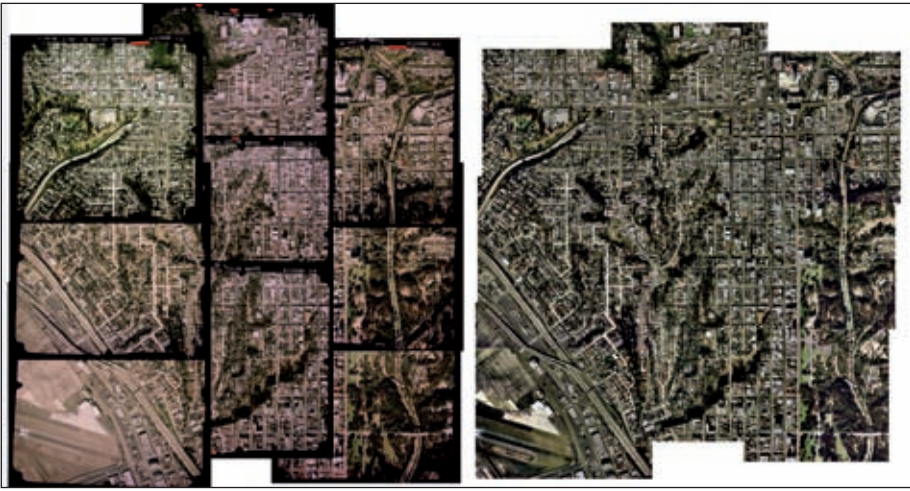


Image tiles to seamless compressed image mosaic.

How can a user choose, edit and define his coordinate system, datum and projection inside the ER Mapper Image Compressor? Is the compatibility with all major GIS and industry standard organizations like OGC supported in this regard?

ER Mapper Image Compressor supports both the older ER Mapper GDT (datum/projection) system, as well as a brand new system based

on standard EPSG codes (www.epsg.org) and descriptions. The program allows the user to customize the projection mapping between the two to support older image formats. When the projection of an image is not recognized by the Image Compressor, the user can open the projection chooser, which allows them to select a coordinate system, based on familiar text descriptions or EPSG codes (e.g. 'NAD83/California zone1' or code 2225). Most major applications use a projection sys-

tem based on the EPSG system. This should make interoperability with the Image Compressor relatively painless. The Image Compressor will write out JPEG 2000 files using new OGC standard 'GML in JP2' (as well as the older 'GeoJP2') which is being adopted by most major product vendors.

Where is a free or trial version of ER Mapper Image Compressor available and which are its file size limits?

We provide a free trial with some sample data along with some simple evaluation instructions on our website at www.ermapper.com. The file size limit of the free version is 50 Mb. If you want a tour of the software, we also host the web seminar that was presented by our US Technical manager that is available on the site as well.

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