



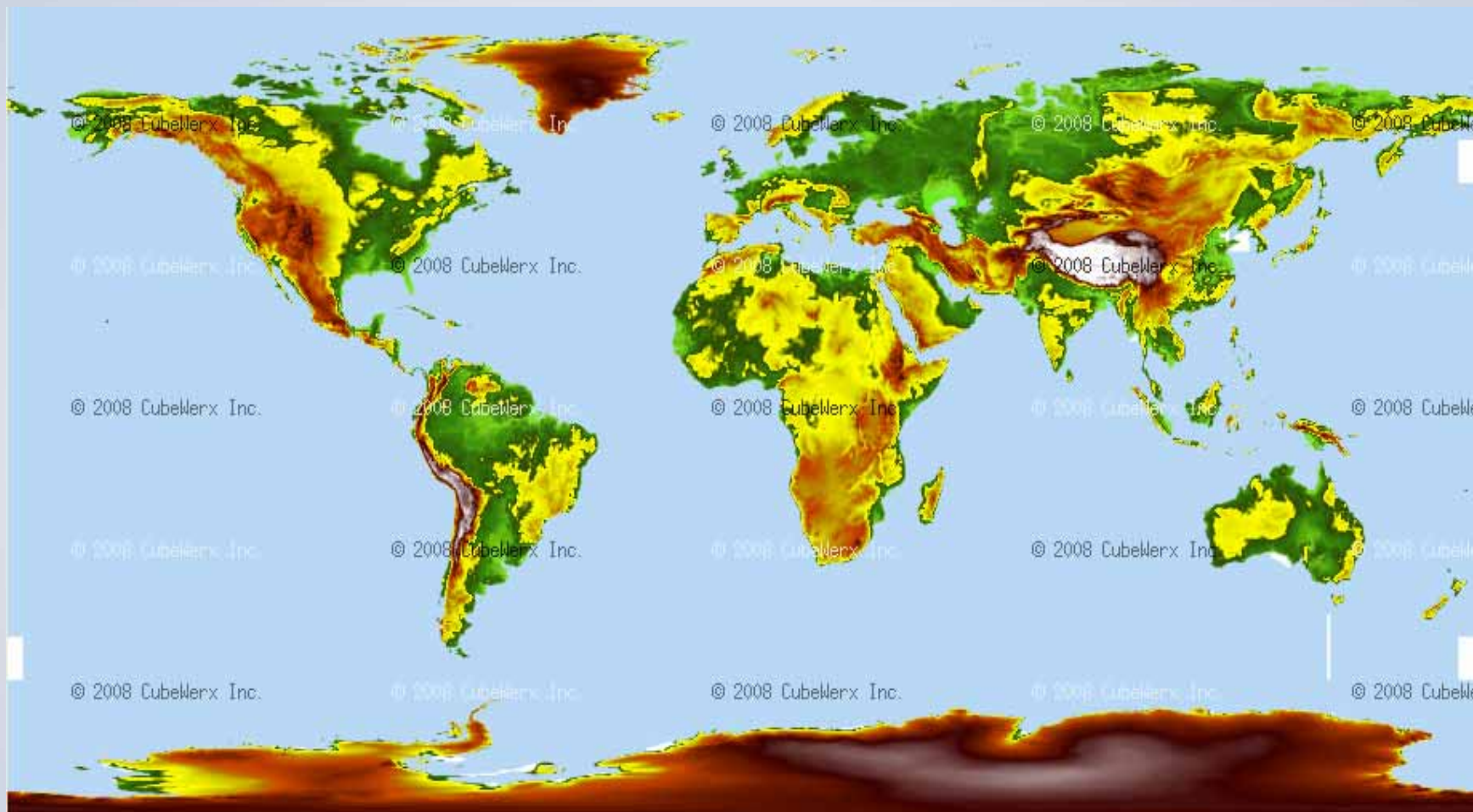
Publishing Imagery using WMS: How do the Open Source Products Fare?

FOSS4G2008

Bruce Tonkin, Michelle Douville
Province of British Columbia, Canada

Introduction

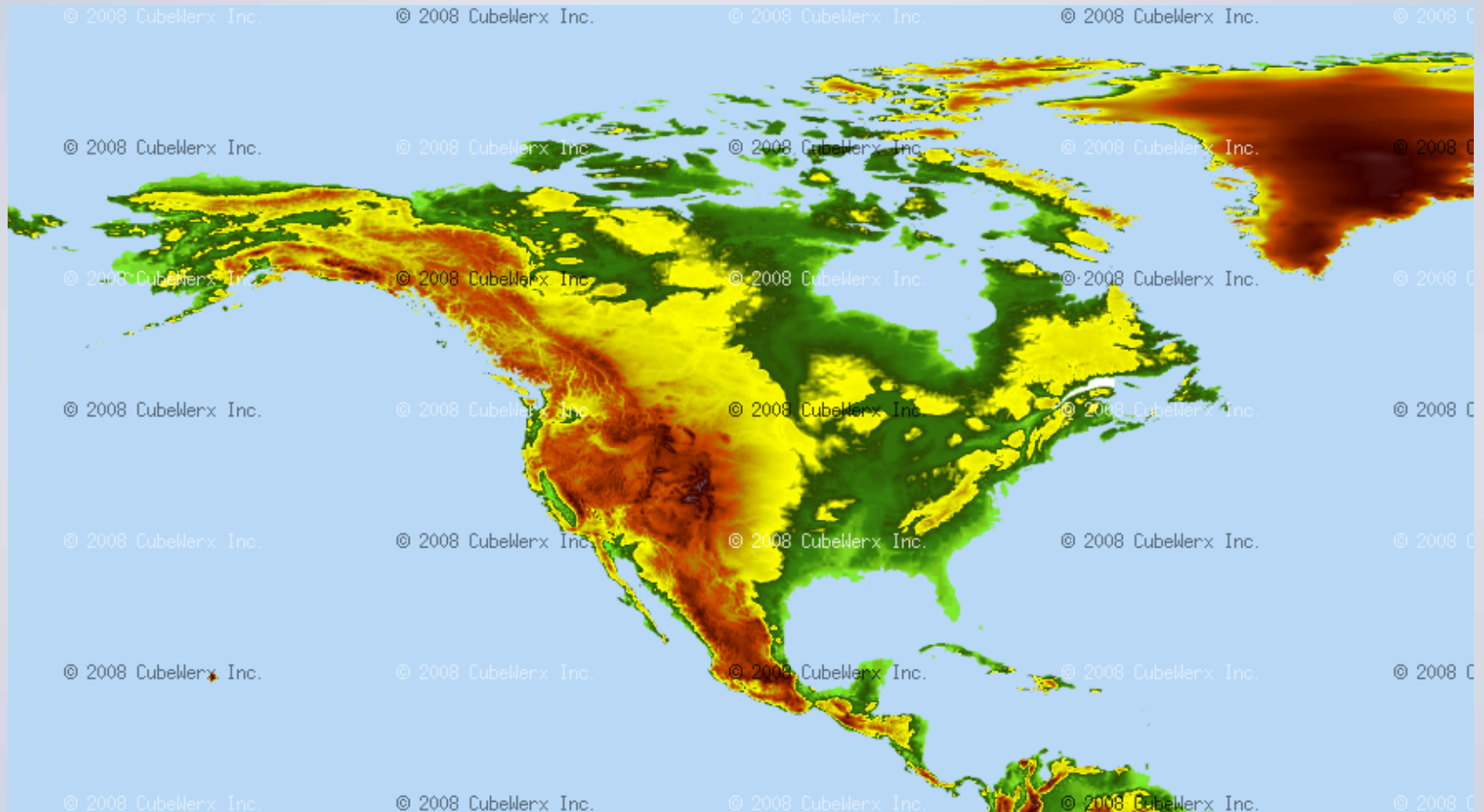
- Third largest province in Canada
- Larger than any state in the US except Alaska
- Province covers 950 000 km squared
- Four times larger than Great Britain
- Population of 3 900 000
- Capital of BC is Victoria (Host to FOSS4G2007)
- North is Yukon and NW Territories
- South is Washington, Idaho and Montana
- East is Alberta
- West is the Atlantic Ocean





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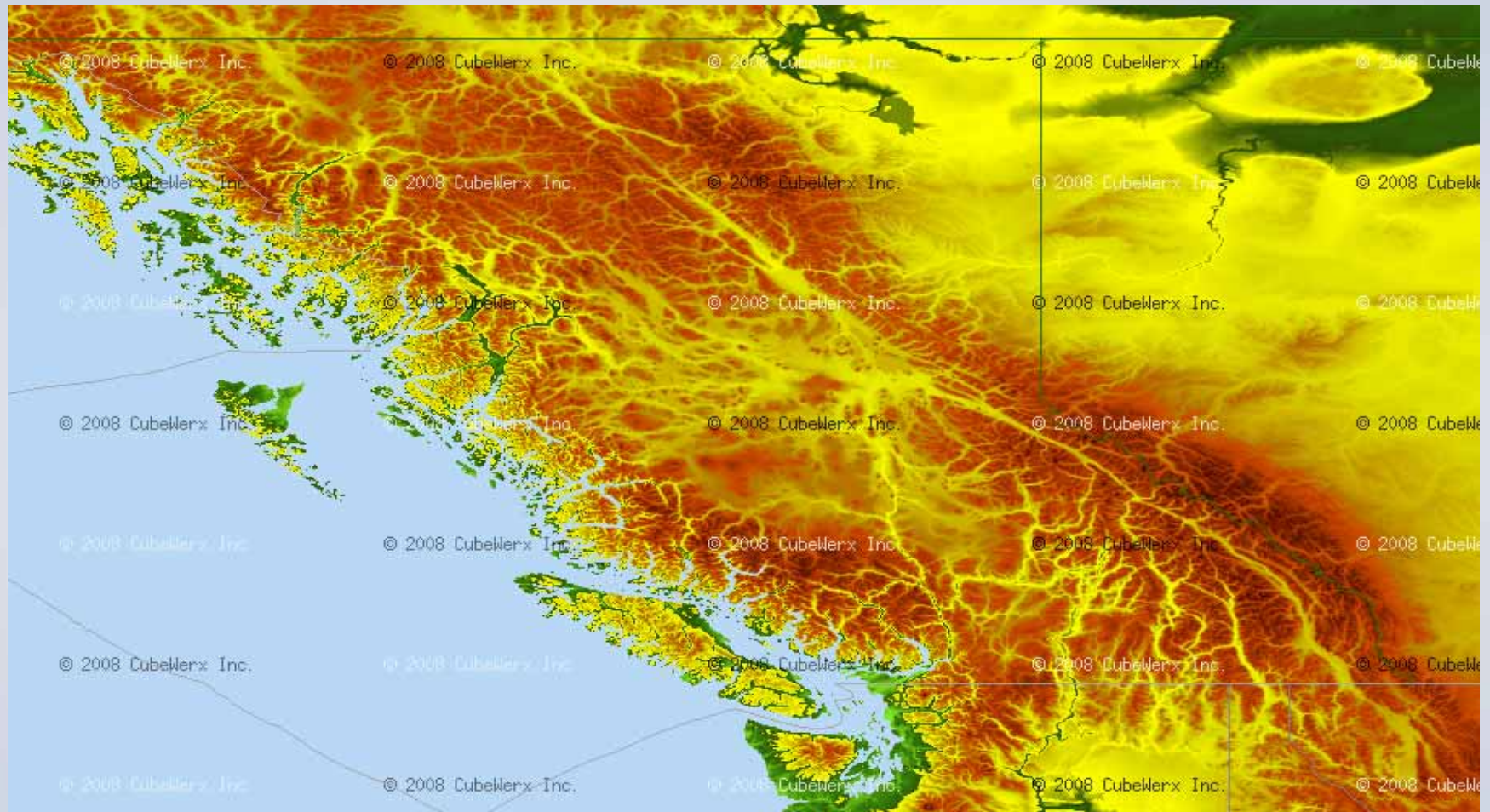
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What are we trying to show?

- 200TB of Digital Imagery
- Raw Airphoto's, AT Scans, OrthoPhotoMosaic's, Satellite Imagery and scanned conventional maps
- 25TB is available on-line by direct access or WMS
- OrthoPhotoMosaic's cover about 75% of the province
- Most data was collected from 1995 onwards, but some exists for 1937 and 1987
- 30m Landsat Imagery covers the whole province from 1999
- 5m Spot Imagery covers about 50% of the province from 2004
- Add about 50TB of data per year of which 5 to 10TB will be made available
- Formats include ECW, MrSid, JP2000 and Tiff.



Products

Evaluate the following applications ability to serve images using WMS:

- MapServer
- GeoServer
- ERDAS ER Mapper Image Web Server
- LizardTech Express Server
- ESRI's ArcGIS Image Server

Objective

To test each applications ability to support:

- Open standards
- Time required to prepare and publish the data
- Projection on the fly
- Image formats
- Stability
- Throughput and acceptable speed
- Integration with applications

What do we know about?

- MapServer
- GeoServer
- ERDAS ER Mapper Image Web Server
- LizardTech's Express Server
- ESRI's ArcGIS Image Server

MapServer

- Open Source Develop Environment using WMS and WFS
- Advanced cartographic output
- Support for scripting and development environments
- Cross-platform support
- Projection on the fly
- Supports multiple raster and vector formats
- Serves data using GDAL/OGR
- Easy to configure
- A layer can be a single image or image catalogue (grouping of multiple images)



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MapServer – Single Image

LAYER

NAME "L5_4225_20030829_BCALB_30M_B543_ENH"

DATA "I5_4225_20030829_bcalb_30m_b543_enh.jp2"

STATUS ON

TYPE RASTER

PROCESSING "ANDS=1,2,3"

PROCESSING "SCALE=AUTO"

PROCESSING "DITHER=YES"

UNITS Meters

PROJECTION

"init=epsg:3005"

END #projection

METADATA

...

END #metadata

END #layer

MapServer – Single Image Example



MapServer – Image-Catalogue

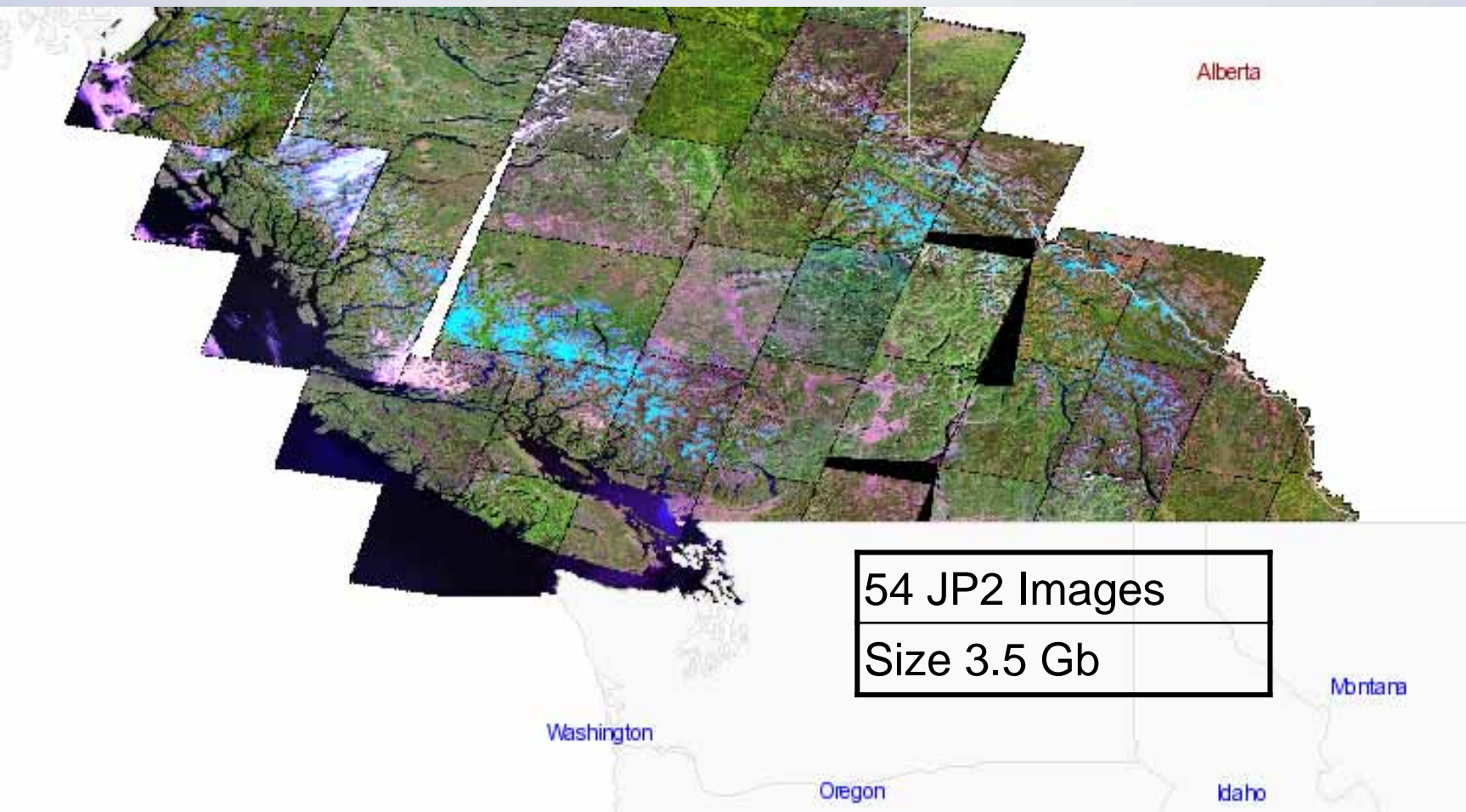
LAYER

Landsat2003.shp

NAME "Landsat2003"
TILEINDEX "Landsat2003.shp"
TILEITEM "Location"
STATUS ON
TYPE RASTER
OFFSITE 0 0 0
END #layer

location
\\server\share\$\file1.jp2
\\server\share\$\file2.jp2
\\server\share\$\file3.jp2
Etc...

MapServer – Image-Catalogue Example





MapServer – Observations

- Takes a while to configure
- Need to determine the correct OUTPUTFORMAT options

OUTPUTFORMAT

NAME png

DRIVER "GD/png24"

MIMETYPE "image/png"

IMAGEMODE RGBA

EXTENSION "png"

END #OUTPUTFORMAT

- Performance is pretty good
- Location of files are important

GeoServer

- Open Source Develop Environment using WMS and WFS
- Built on GeoTools
- Supports multiple input formats
- Produces KML, GML, Shapefile, GeoRSS, PDF and many others
- Cross-platform support
- Supports a GUI for configuration

GeoServer – Image Store Setup

[Welcome](#) | [Config](#) | [Data](#) | [CoverageStores](#) | [Edit](#)

Coverage Data Set Editor

Edit a source of spatial information

Coverage Data Set ID: test1

Enabled: ☒

Namespace:

Type:

* URL:

Description:

* = required field

GeoServer – Image Coverage Setup

Welcome | Config | Data | Coverages | Edit

Coverage Editor

Edit Coverage meta-data

Name: I5_4225_20070909_bcalb_30m_b321_enh

WMS Path: /

Style: raster

Style:

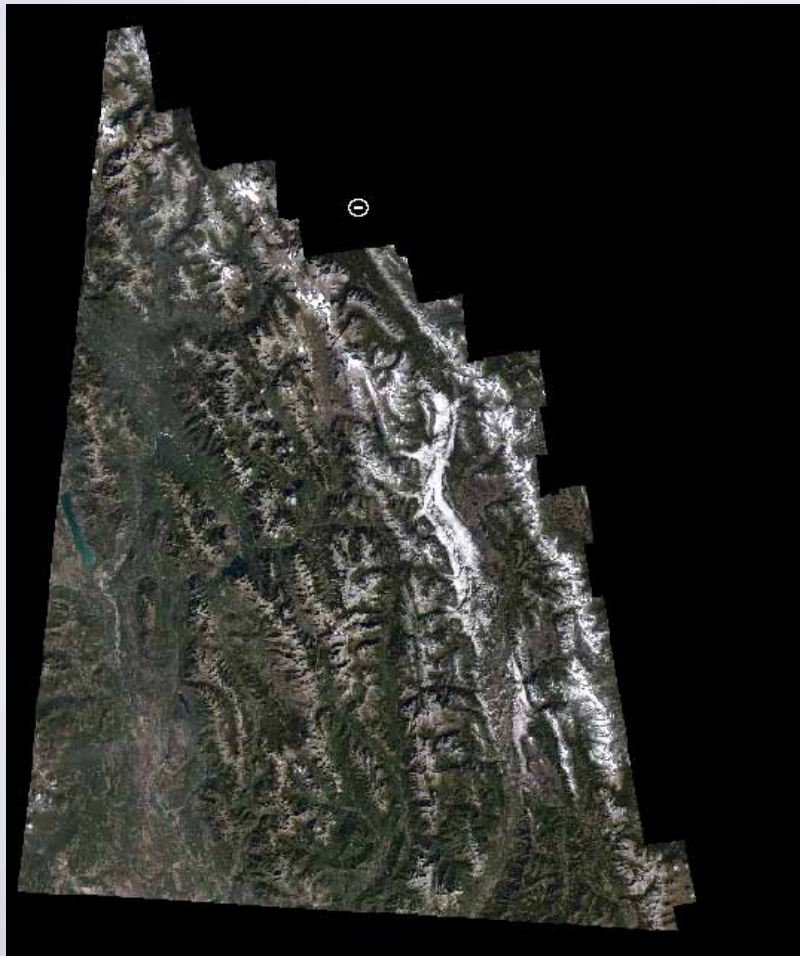
- APS_CENTRE_P
- APS_FLIGHTLINE
- APS_PHOTO_PC
- BIOT_TREES_AF
- Bathymetry
- Biot_non_sens
- SnowCourseStyle
- SnowPillowStyle
- WHSE_PARKS.P.
- WHSE_REFEREI
- WHSE_TERRES
- Well_Lithologies
- biot_occ_r_maske
- bnd7mil
- burg
- capitals
- cite_lakes
- dem
- drain7mil
- drainpoly7mil

>> <<

SRS: EPSG:3005

Lookup SRS SRS Help - SRS List

GeoServer – Image Example



TIF Image

Size 100 Mb



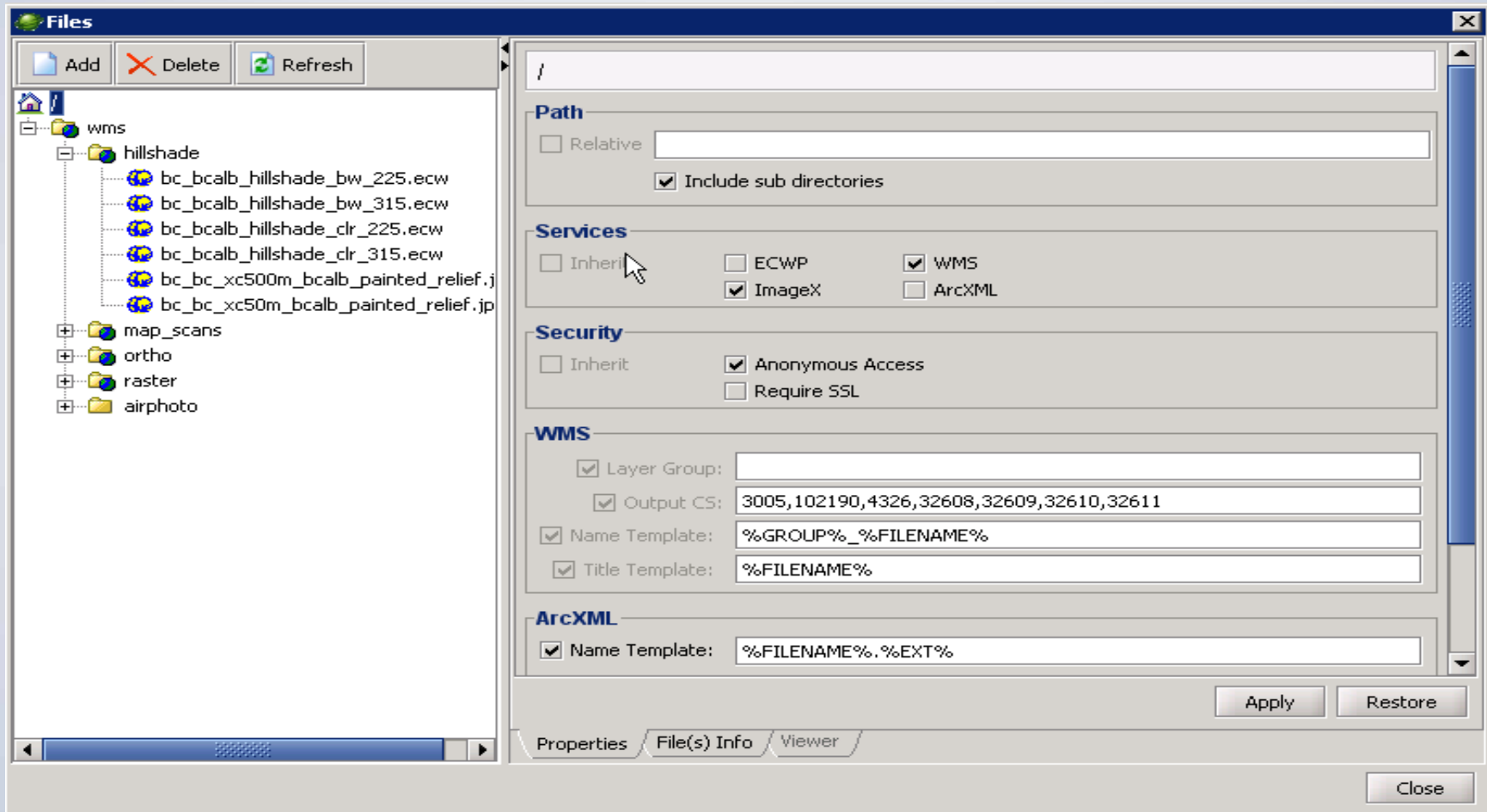
GeoServer – Observations

- Relatively easy to configure but does require two steps
- Need to define projection and bounding box
- Large images take a long time to draw and in some cases may fail
- Need to assign more memory to JVM for large files

ERDAS ER Mapper Image Web Server

- Designed to distribute large volumes of image data
- Reads images in ECW and JPEG 2000
- Projects data on the fly using the EPSG codes
- Reads directly from the file system
- Simple configuration
- Add data without restarting any services
- Configure multiple image services
- Name and group images independantly

ER Mapper Image Web Server - Setup



Files

Add Delete Refresh

wms

- hillshade
 - bc_bcalb_hillshade_bw_225.ecw
 - bc_bcalb_hillshade_bw_315.ecw
 - bc_bcalb_hillshade_clr_225.ecw
 - bc_bcalb_hillshade_clr_315.ecw
 - bc_bc_xc500m_bcalb_painted_relief.jp
 - bc_bc_xc50m_bcalb_painted_relief.jp
- map_scans
- ortho
- raster
- airphoto

Path

☐ Relative

☒ Include sub directories

Services

☐ Inherit ☐ ECWP ☒ WMS ☐ ArcXML

☒ ImageX

Security

☐ Inherit ☒ Anonymous Access ☐ Require SSL

WMS

☒ Layer Group:

☒ Output CS: 3005,102190,4326,32608,32609,32610,32611

☒ Name Template: %GROUP%_%FILENAME%

☒ Title Template: %FILENAME%

ArcXML

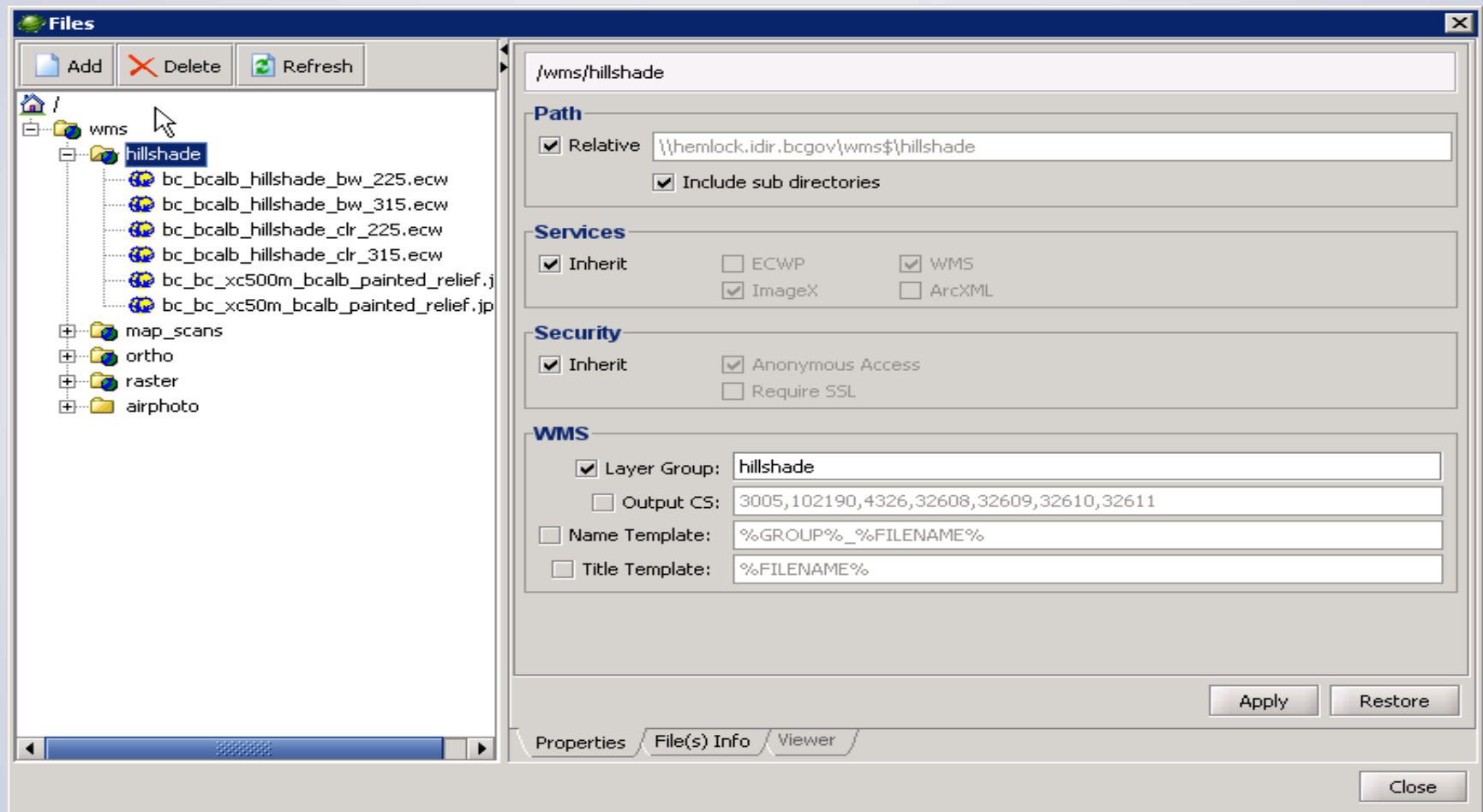
☒ Name Template: %FILENAME%.%EXT%

Apply Restore

Properties File(s) Info Viewer

Close

ER Mapper Image Web Server - Setup



Files

Add Delete Refresh

wms

- hillshade
 - bc_bcalb_hillshade_bw_225.ecw
 - bc_bcalb_hillshade_bw_315.ecw
 - bc_bcalb_hillshade_clr_225.ecw
 - bc_bcalb_hillshade_clr_315.ecw
 - bc_bc_xc500m_bcalb_painted_relief.j
 - bc_bc_xc500m_bcalb_painted_relief.jp
- map_scans
- ortho
- raster
- airphoto

/wms/hillshade

Path

☒ Relative \\hemlock.idir.bcgov\wms\$\hillshade

☒ Include sub directories

Services

☒ Inherit ☐ ECWP ☒ WMS

☒ ImageX ☐ ArcXML

Security

☒ Inherit ☒ Anonymous Access

☐ Require SSL

WMS

☒ Layer Group: hillshade

☐ Output CS: 3005,102190,4326,32608,32609,32610,32611

☐ Name Template: %GROUP%_%FILENAME%

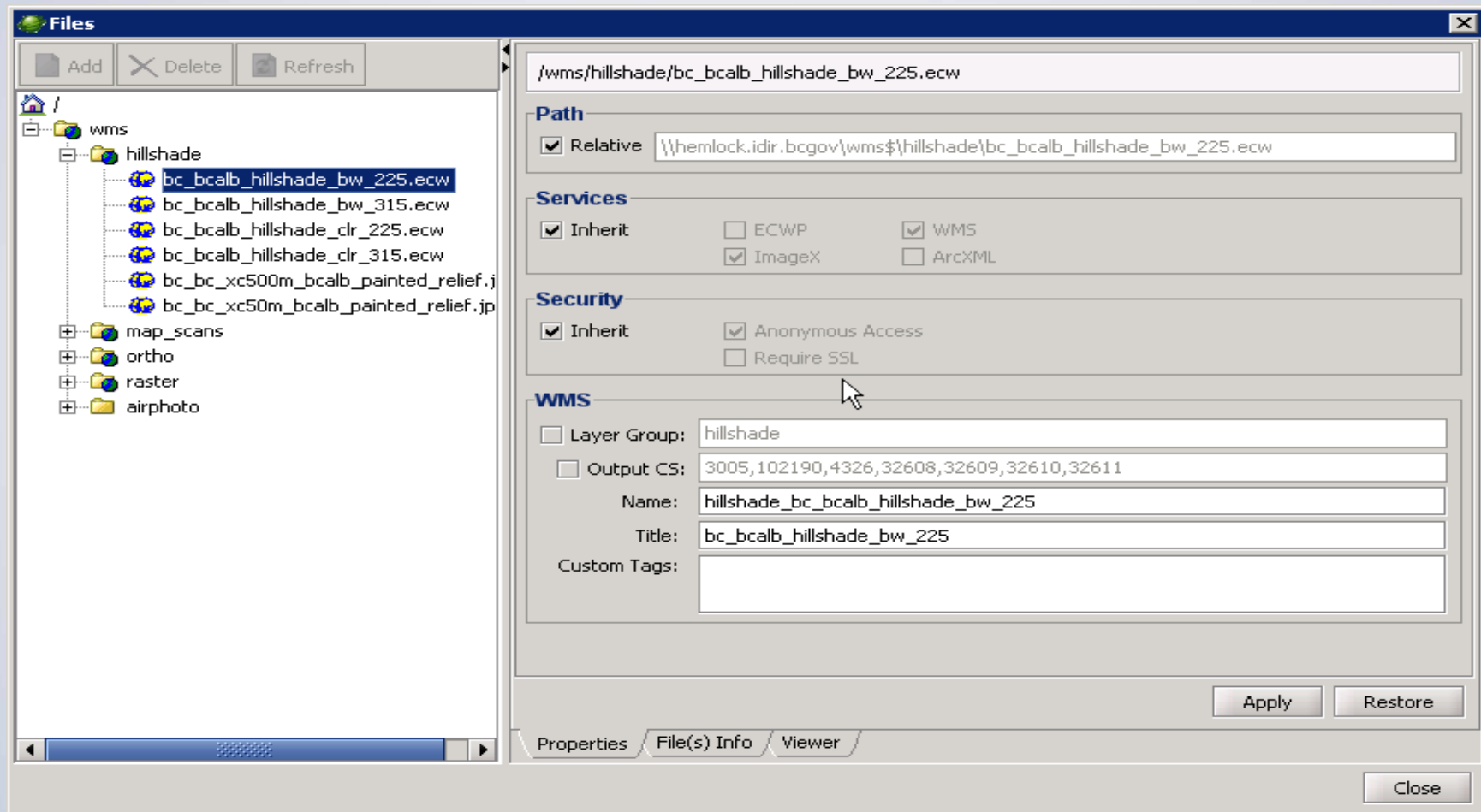
☐ Title Template: %FILENAME%

Apply Restore

Properties File(s) Info Viewer

Close

ER Mapper Image Web Server - Setup



Files

Buttons: Add, Delete, Refresh

File Tree:

- wms
 - hillshade
 - bc_bcalb_hillshade_bw_225.ecw (selected)
 - bc_bcalb_hillshade_bw_315.ecw
 - bc_bcalb_hillshade_clr_225.ecw
 - bc_bcalb_hillshade_clr_315.ecw
 - bc_bc_xc500m_bcalb_painted_relief.jp
 - bc_bc_xc500m_bcalb_painted_relief.jp
 - map_scans
 - ortho
 - raster
 - airphoto

Path: /wms/hillshade/bc_bcalb_hillshade_bw_225.ecw

Path

☒ Relative: \\hemlock.idir.bcgov\wms\$\hillshade\bc_bcalb_hillshade_bw_225.ecw

Services

☒ Inherit

☐ ECWP ☒ WMS

☒ ImageX ☐ ArcXML

Security

☒ Inherit

☒ Anonymous Access

☐ Require SSL

WMS

☐ Layer Group: hillshade

☐ Output CS: 3005,102190,4326,32608,32609,32610,32611

Name: hillshade_bc_bcalb_hillshade_bw_225

Title: bc_bcalb_hillshade_bw_225

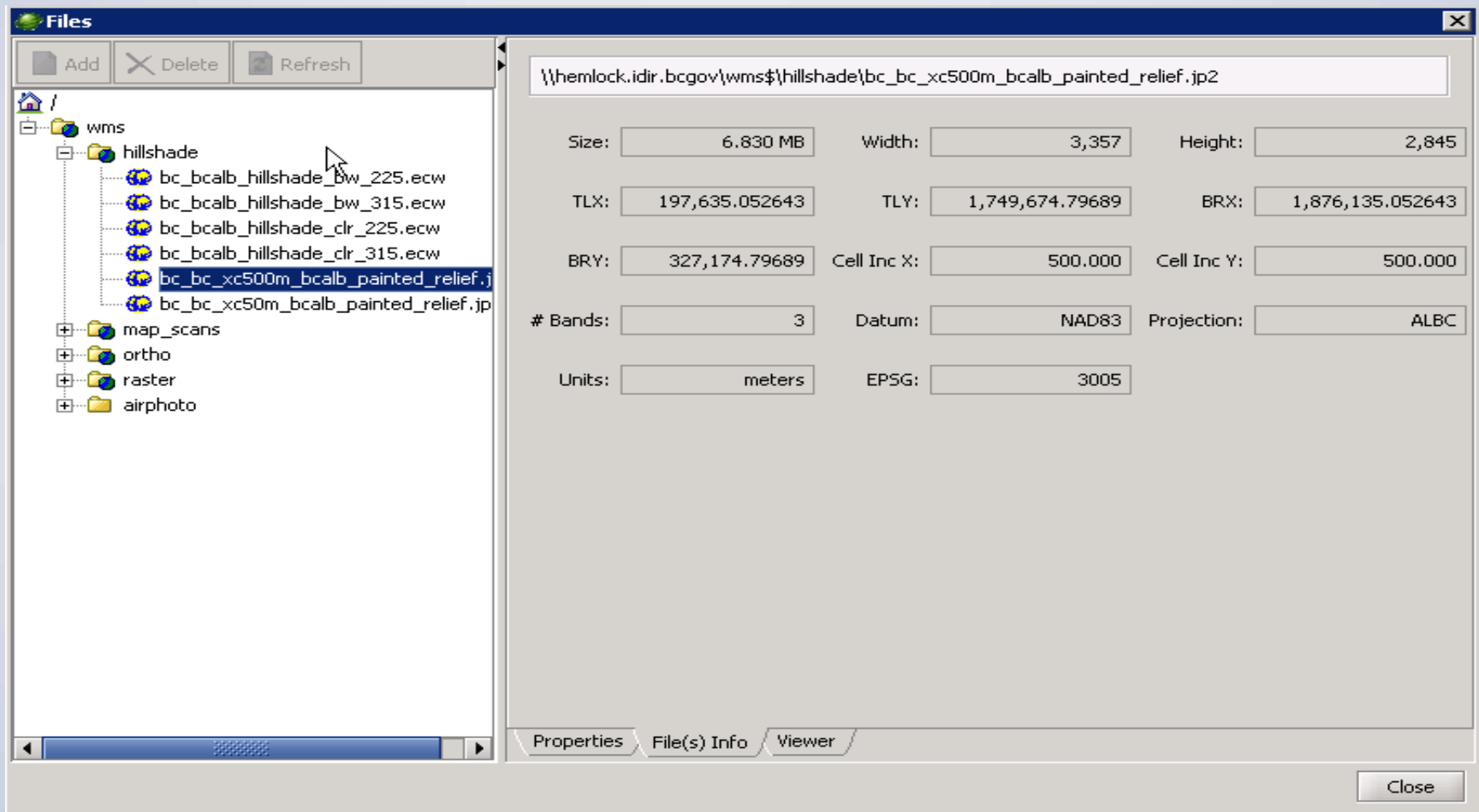
Custom Tags:

Buttons: Apply, Restore

Bottom Tabs: Properties, File(s) Info, Viewer

Close

ER Mapper Image Web Server - Setup



The screenshot displays a Windows File Explorer window titled "Files". The left pane shows a directory tree with the following structure:

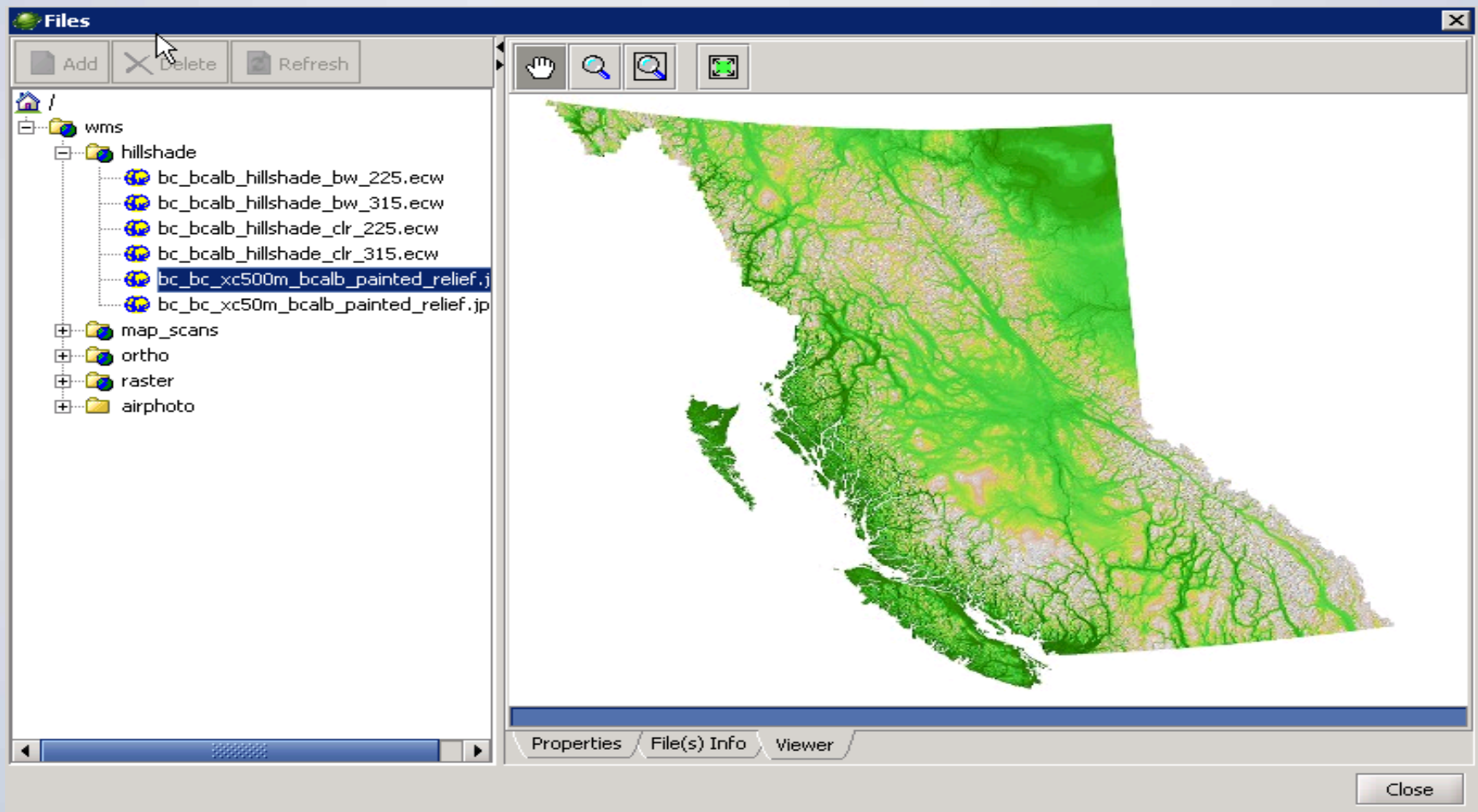
- wms
 - hillshade
 - bc_bcalb_hillshade_bw_225.ecw
 - bc_bcalb_hillshade_bw_315.ecw
 - bc_bcalb_hillshade_clr_225.ecw
 - bc_bcalb_hillshade_clr_315.ecw
 - bc_bc_xc500m_bcalb_painted_relief.jp2 (selected)
 - bc_bc_xc50m_bcalb_painted_relief.jp2
 - map_scans
 - ortho
 - raster
 - airphoto

The right pane shows the properties of the selected file, with the following details:

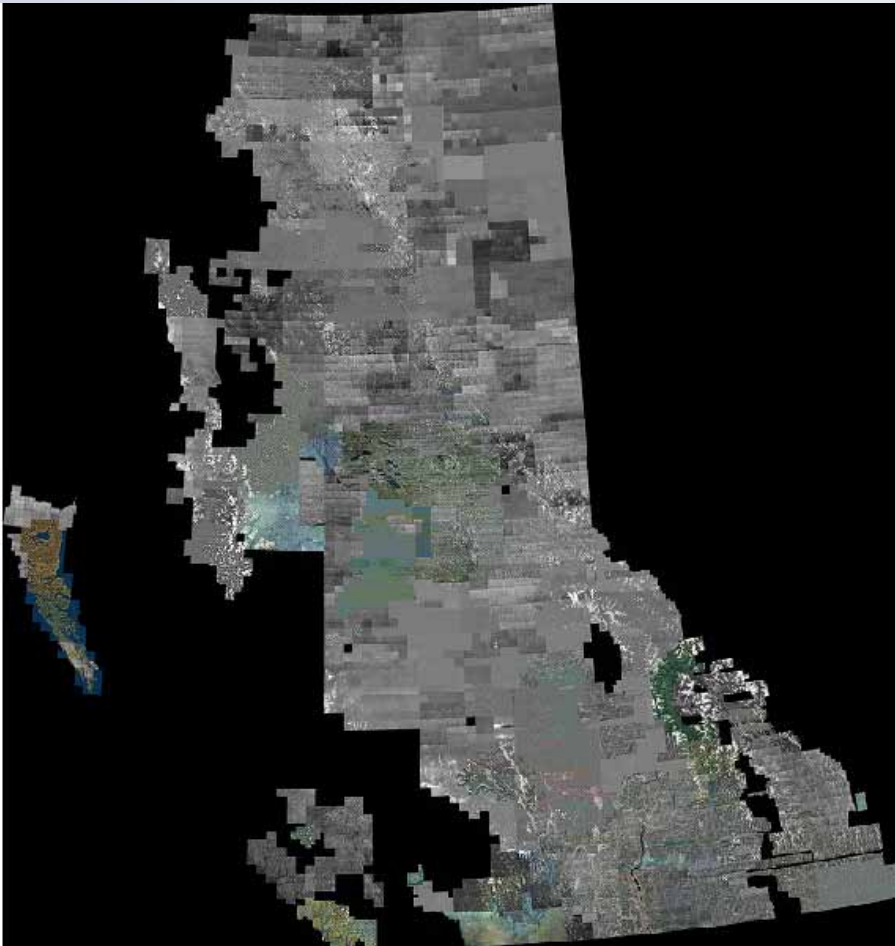
Property	Value
Size	6.830 MB
Width	3,357
Height	2,845
TLX	197,635.052643
TLY	1,749,674.79689
BRX	1,876,135.052643
BRY	327,174.79689
Cell Inc X	500.000
Cell Inc Y	500.000
# Bands	3
Datum	NAD83
Projection	ALBC
Units	meters
EPSG	3005

The bottom of the window features tabs for "Properties", "File(s) Info", and "Viewer", with "Properties" currently selected. A "Close" button is located in the bottom right corner.

ER Mapper Image Web Server - Setup



ER Mapper IWS – Sample Image



- 186Gb ecw file
- Covers entire Province
- Data collected from 1995 to 2004
- Created in 2005
- Took 2 weeks of processing
- Compiled on a 1.5GHz dual Xeon workstation

ER Mapper IWS - Observations

- May take a long time to prepare data
- Once setup, very easy to manage
- Add more files to the service with only a copy of the file/s
- Easy to add additional services using XML config files
- Response is extremely good
- Makes use of multiple cores if setup correctly

LizardTech's Express Server

- Designed to distribute large volumes of image data
- Reads images in MrSID and JPEG 2000
- Projects data on the fly using the EPSG codes
- Reads directly from the file system or Database
- Simple configuration
- Builds folder of images into a single catalogue
- Tools provided for building the catalogues
- Supports load balancing of servers
- Runs on Windows using either Apache or IIS



LizardTech's Express Server – Define Catalogue

```
<Catalog name="070">  
  <Property name="wms-layer-Title">  
    <Title>2006 Natural Colour UTM 10</Title>  
  </Property>  
  <Provider name="file" root="\DIM2_PROD19\imgwhse\2006\natural\utm10"  
    volume="\hemlock.idir.bcgov"/>  
  <SpatialIndex classID="{D090DD8B-3D12-4631-9787-0DC2CACDC3EA}"/>  
  <Property name="wms-layer-list-  
    SRS">EPSG:3005,EPSG:4326,EPSG:32608,EPSG:32609,EPSG:32610,EPSG:3261  
    1</Property>  
</Catalog>
```



LizardTech's Express Server – Build Catalogue

isindex -create -c 2006 Natural Colour UTM 10 -srs EPSG:32610

isindex -update -c 2006 Natural Colour UTM 10

isindex -overview create -c 2006 Natural Colour UTM 10



LizardTech's Express Server – View Catalogue





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LizardTech's Express Server – Observations

- Takes a little time to setup as each catalogue needs to be compiled ie about 1 minute per file
- Output quality not the best when viewing at a large scale, but pretty good when zoomed in
- Did observe some image artifacting

ESRI ArcGIS Image Server

- Designed to distribute large volumes of image data
- Reads images in many formats
- Projects data on the fly
- Reads directly from the file system or Database
- Multi-stage image preparation and publication
- On-the-fly image processing



ESRI ArcGIS Image Server - Observations

- Two components need to be installed – Server and Client Manager (ArcCatalog)
- Two licenses are required
- Server and Client versions need to match 100%
- Build of Image Catalogues takes a long time
- Need to copy/move catalogues to server once built
- Need to build a path mapping file for built catalogues

Demo...

<http://delivery.openmaps.gov.bc.ca/imfows13/imf.jsp?site=foss4g2008>



Any questions?



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For more information....

Contact:

Bruce.Tonkin@gov.bc.ca

or

Michelle.Douville@gov.bc.ca

Visit:

<http://GeoBC.gov.bc.ca>

Or

<http://OpenMaps.gov.bc.ca>