

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

FOSS4G2008

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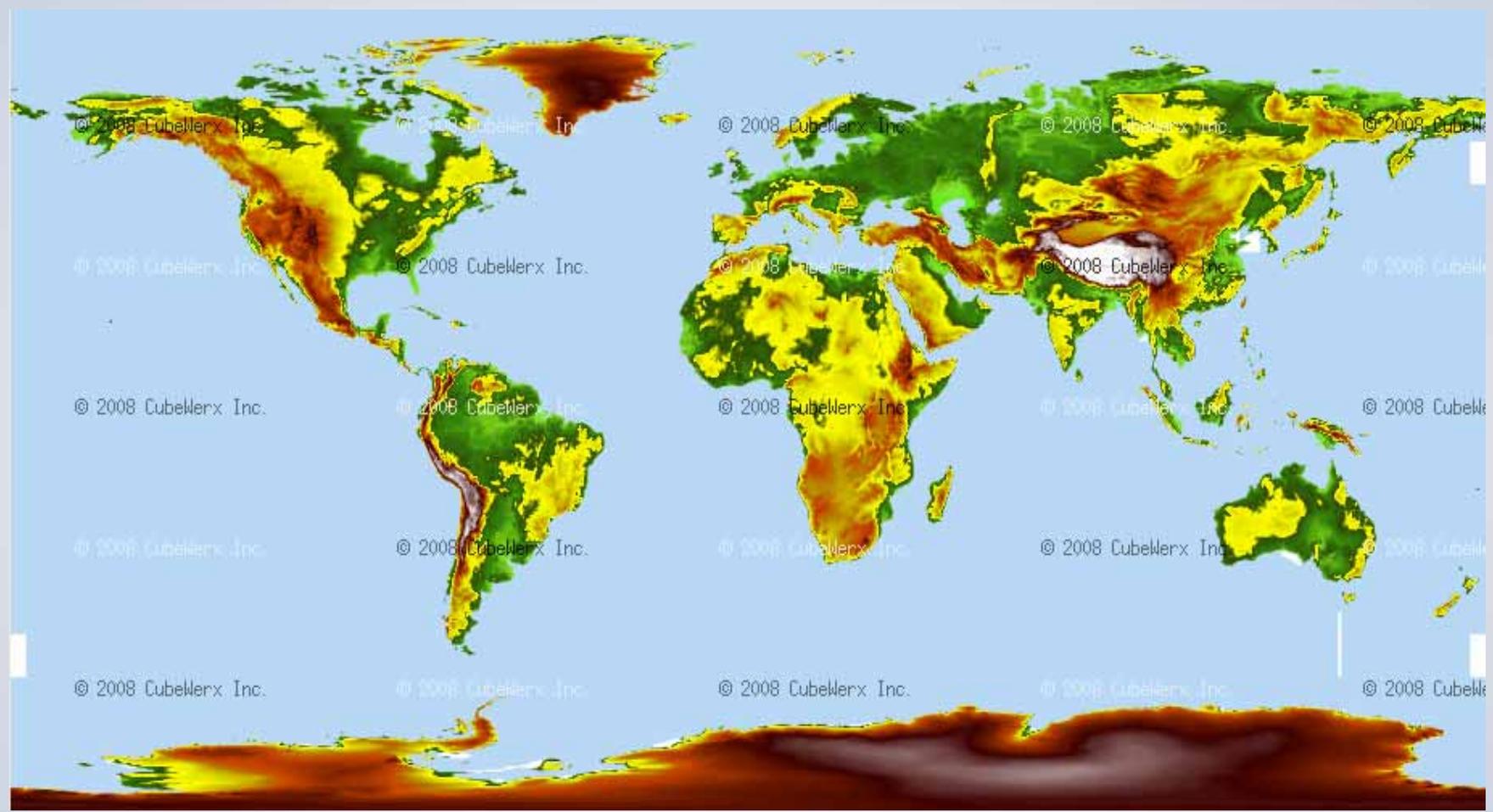
Introduction

- 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



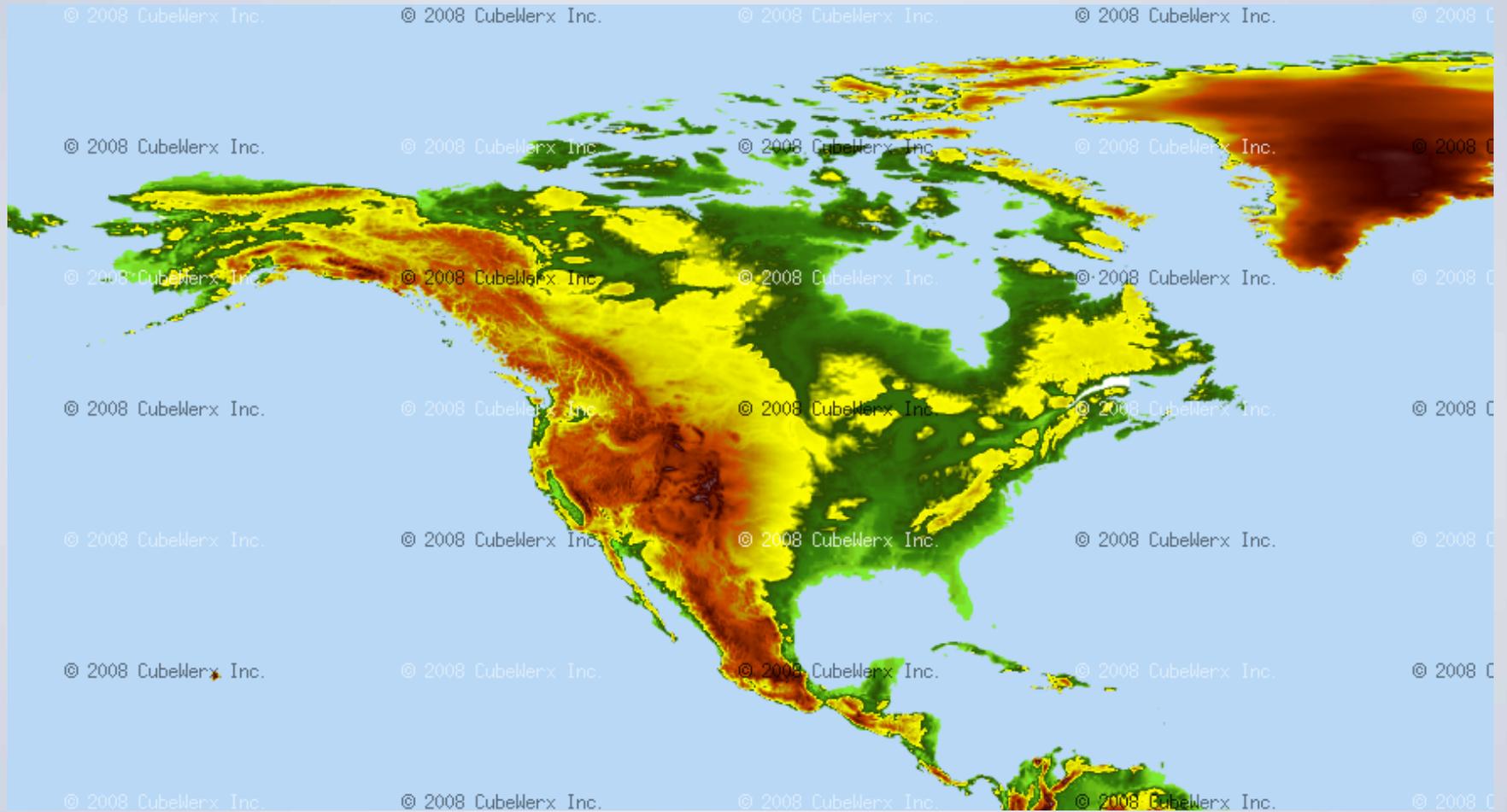
Integrated Land Management Bureau

Ministry of Agriculture and Lands



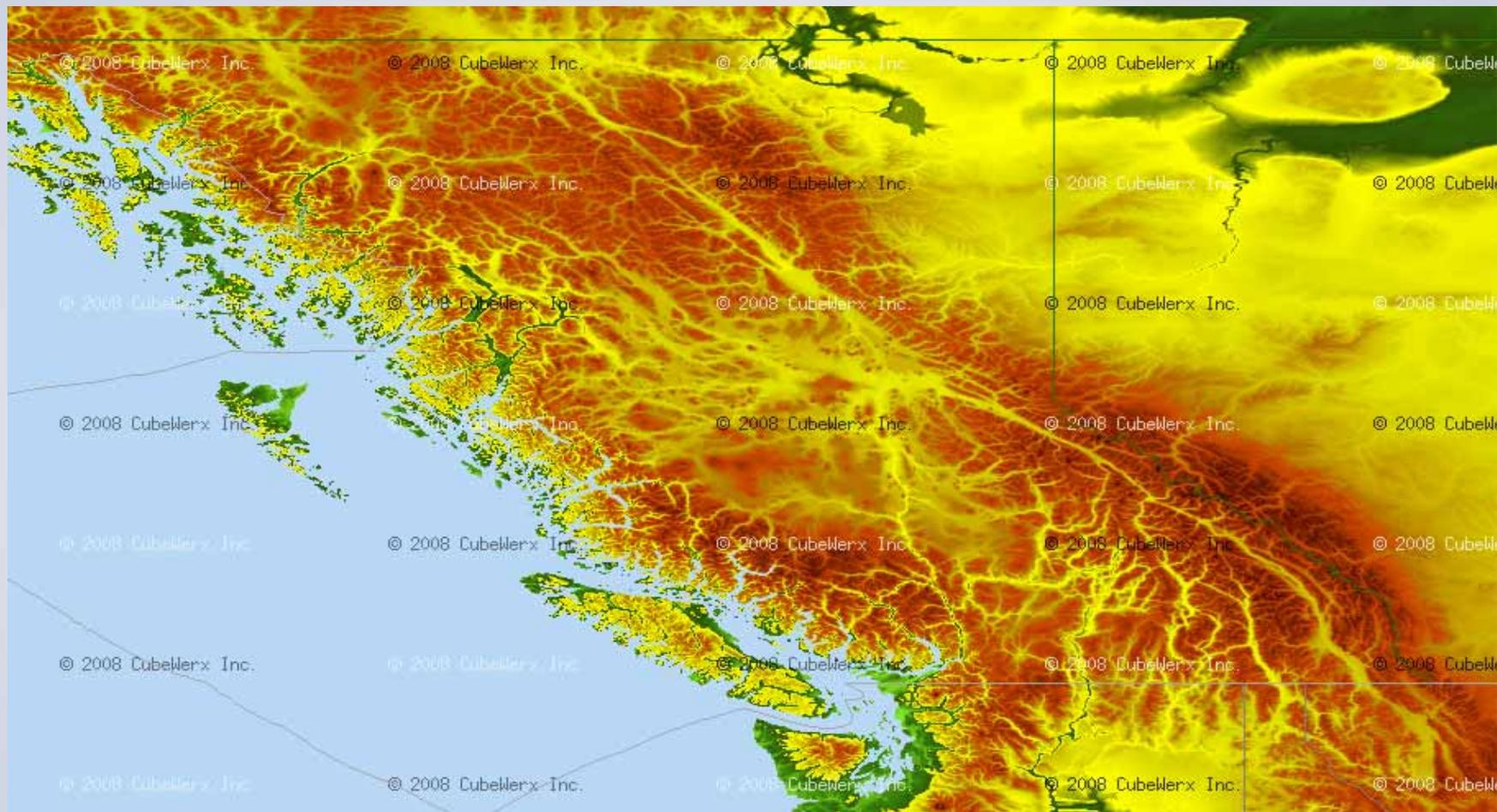
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What are we trying to show?

- 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)

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



JP2 Image

Size 23Mb

MapServer – Image-Catalogue

LAYER

NAME "Landsat2003"

TILEINDEX "Landsat2003.shp"

TILEITEM "Location"

STATUS ON

TYPE RASTER

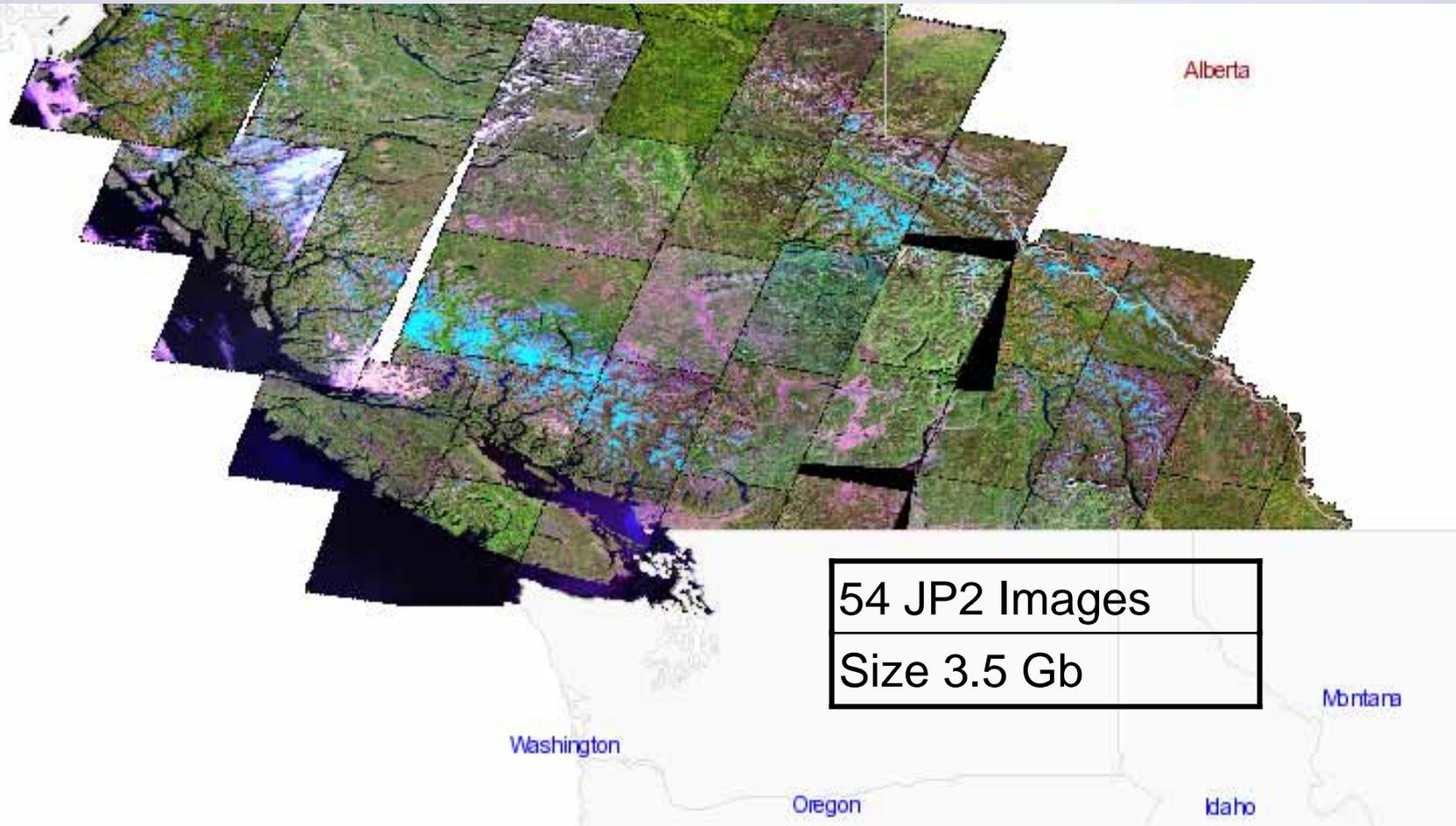
OFFSITE 0 0 0

END #layer

Landsat2003.shp

| |
|----------------------------|
| 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_REFEREN
WHSE_TERRES
Well_Lithologies
biot_occr_maske
bnd7mil
burg
capitals
cite_lakes
dem
drain7mil
drainpoly7mil

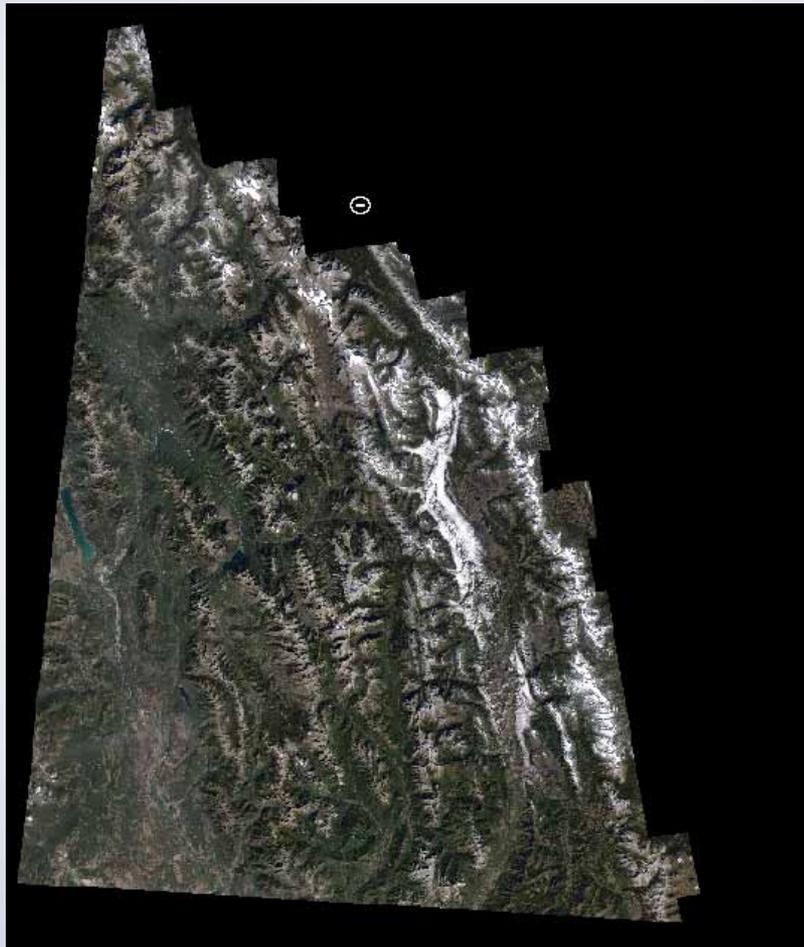
>> <<

SRS: EPSG:3005

Lookup SRS

[SRS Help](#) - [SRS List](#)

GeoServer – Image Example



TIF Image

Size 100 Mb

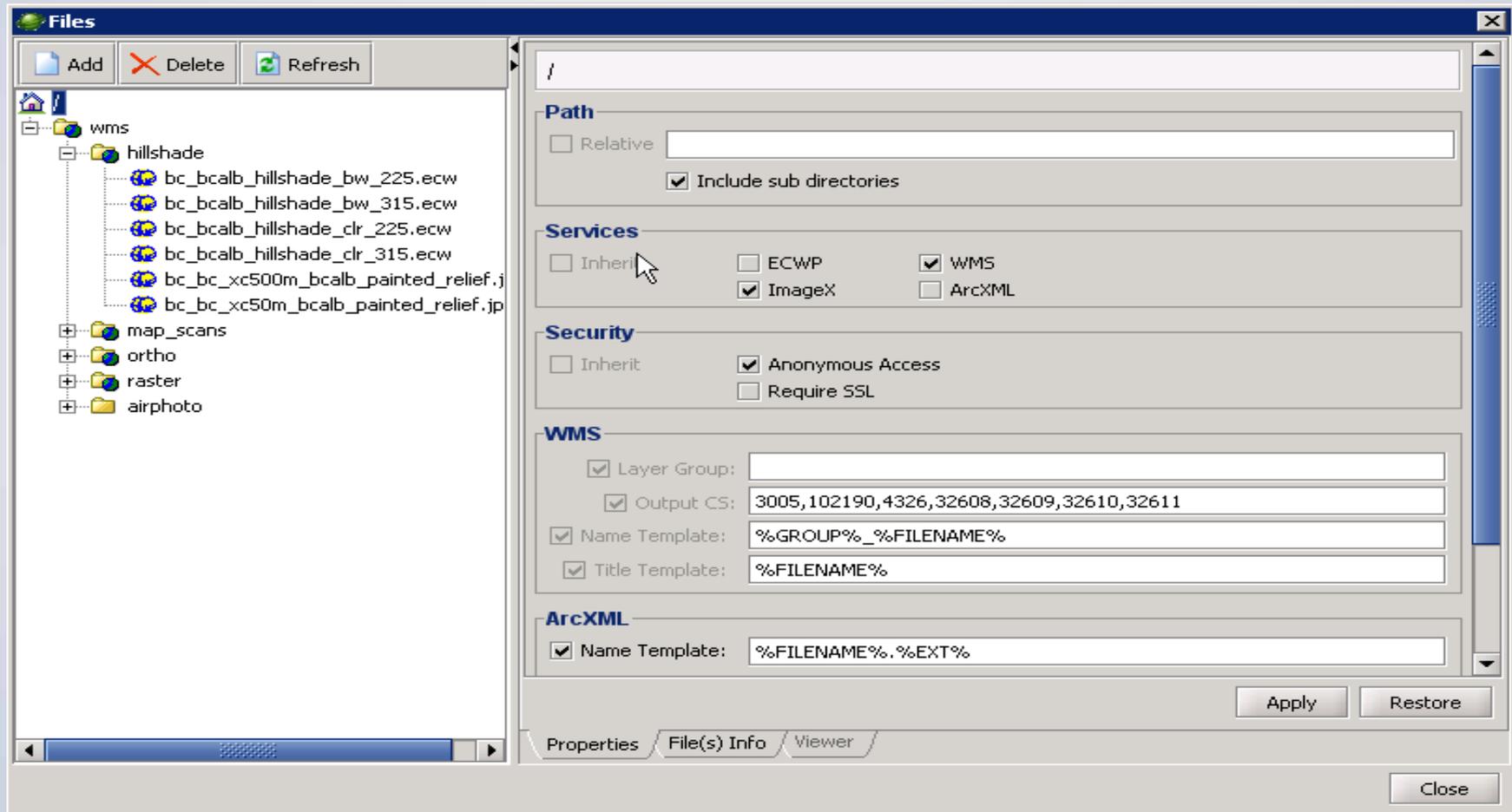
GeoServer – Observations

- 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

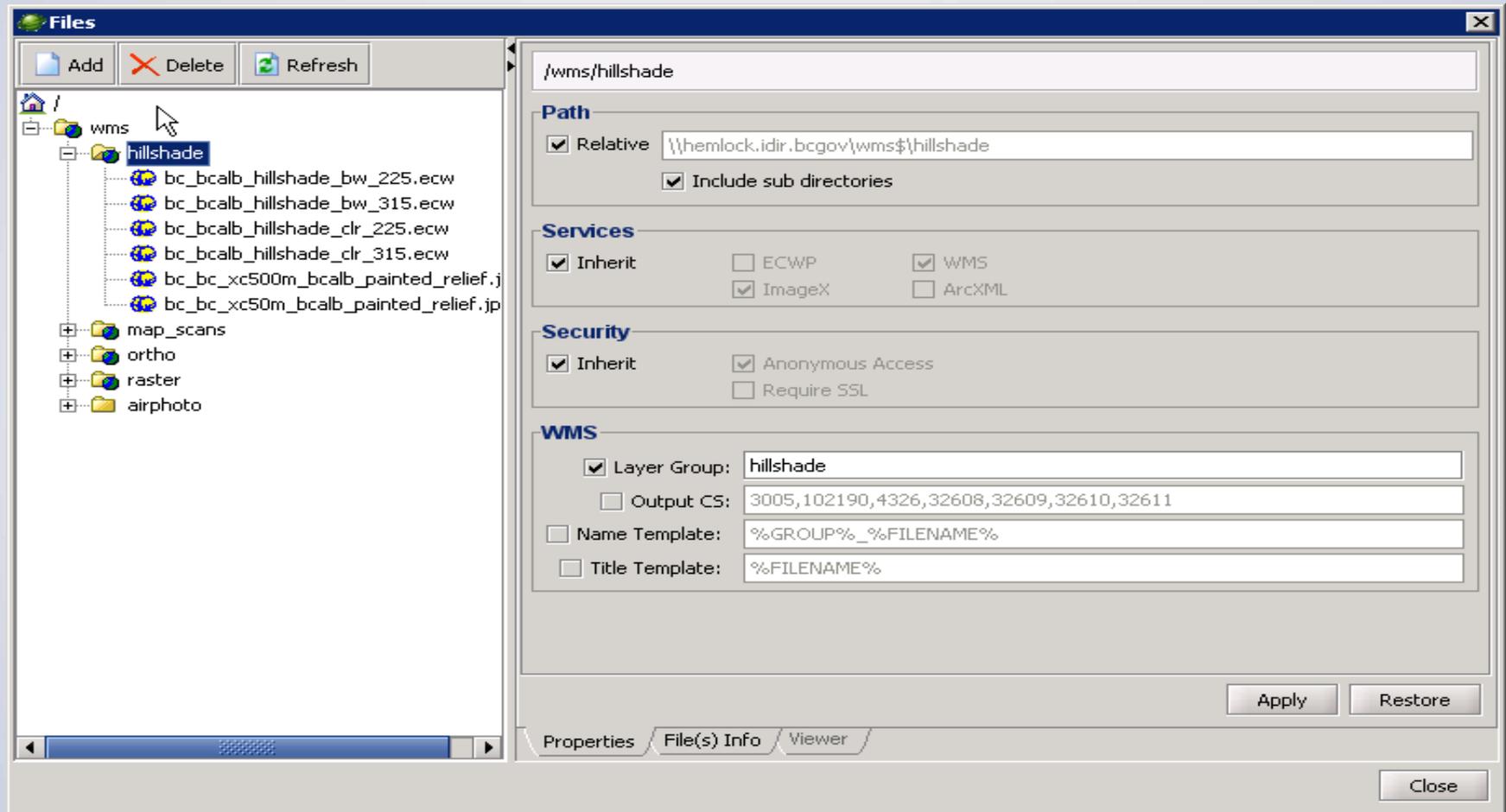


The screenshot shows a Windows File Properties dialog box for a directory. The left pane shows a file tree with folders like 'wms', 'hillshade', 'map_scans', 'ortho', 'raster', and 'airphoto'. The right pane shows the following settings:

- Path:** /
 Relative
 Include sub directories
- Services:**
 Inherit
 ECWP
 ImageX
 WMS
 ArcXML
- 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%

Buttons: Apply, Restore, Close

ER Mapper Image Web Server - Setup



The screenshot displays the Windows File Explorer interface for configuring the ER Mapper Image Web Server. The left pane shows the folder structure, with the 'hillshade' folder selected under the 'wms' directory. The right pane shows the properties for the 'hillshade' folder, including the Path, Services, Security, and WMS settings.

Path

- Relative: \\hemlock.idir.bcgov\wms\$\hillshade
- Include sub directories

Services

- Inherit
- ECWP
- WMS
- ImageX
- ArcXML

Security

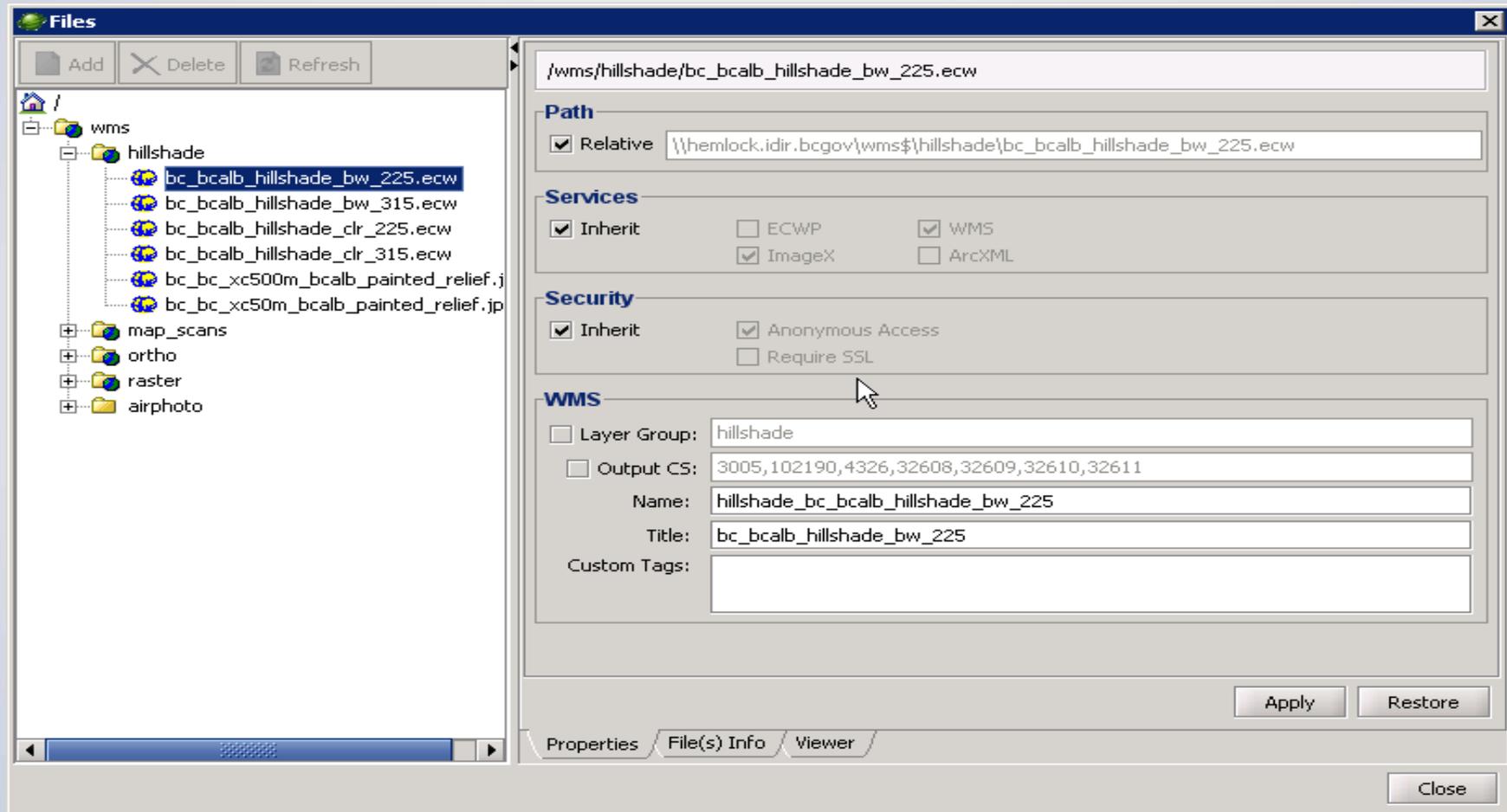
- Inherit
- Anonymous Access
- Require SSL

WMS

- Layer Group: hillshade
- Output CS: 3005,102190,4326,32608,32609,32610,32611
- Name Template: %GROUP%_%FILENAME%
- Title Template: %FILENAME%

Buttons: Apply, Restore, Close

ER Mapper Image Web Server - Setup



Files

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

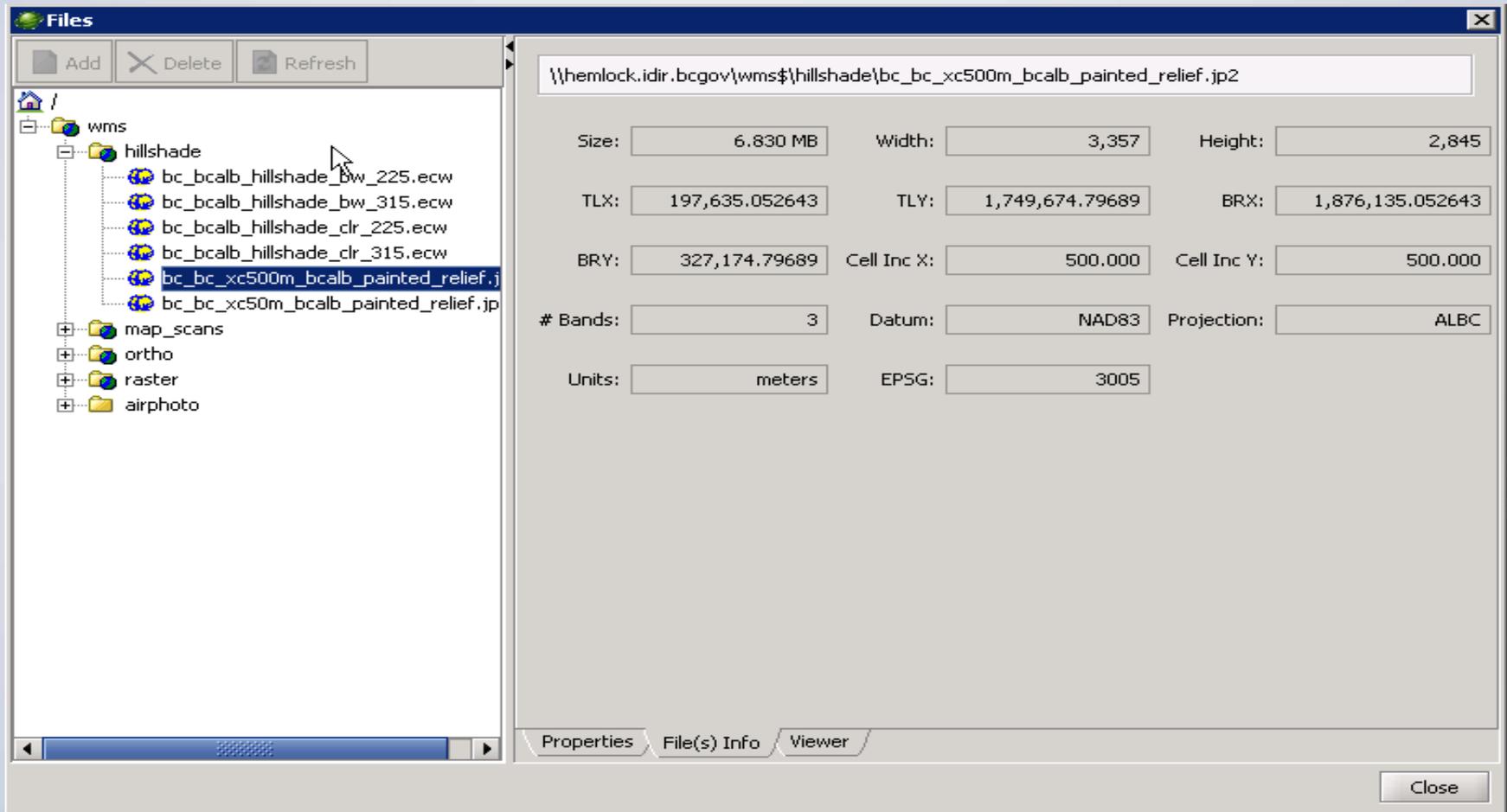
Custom Tags:

Apply Restore

Properties File(s) Info Viewer

Close

ER Mapper Image Web Server - Setup

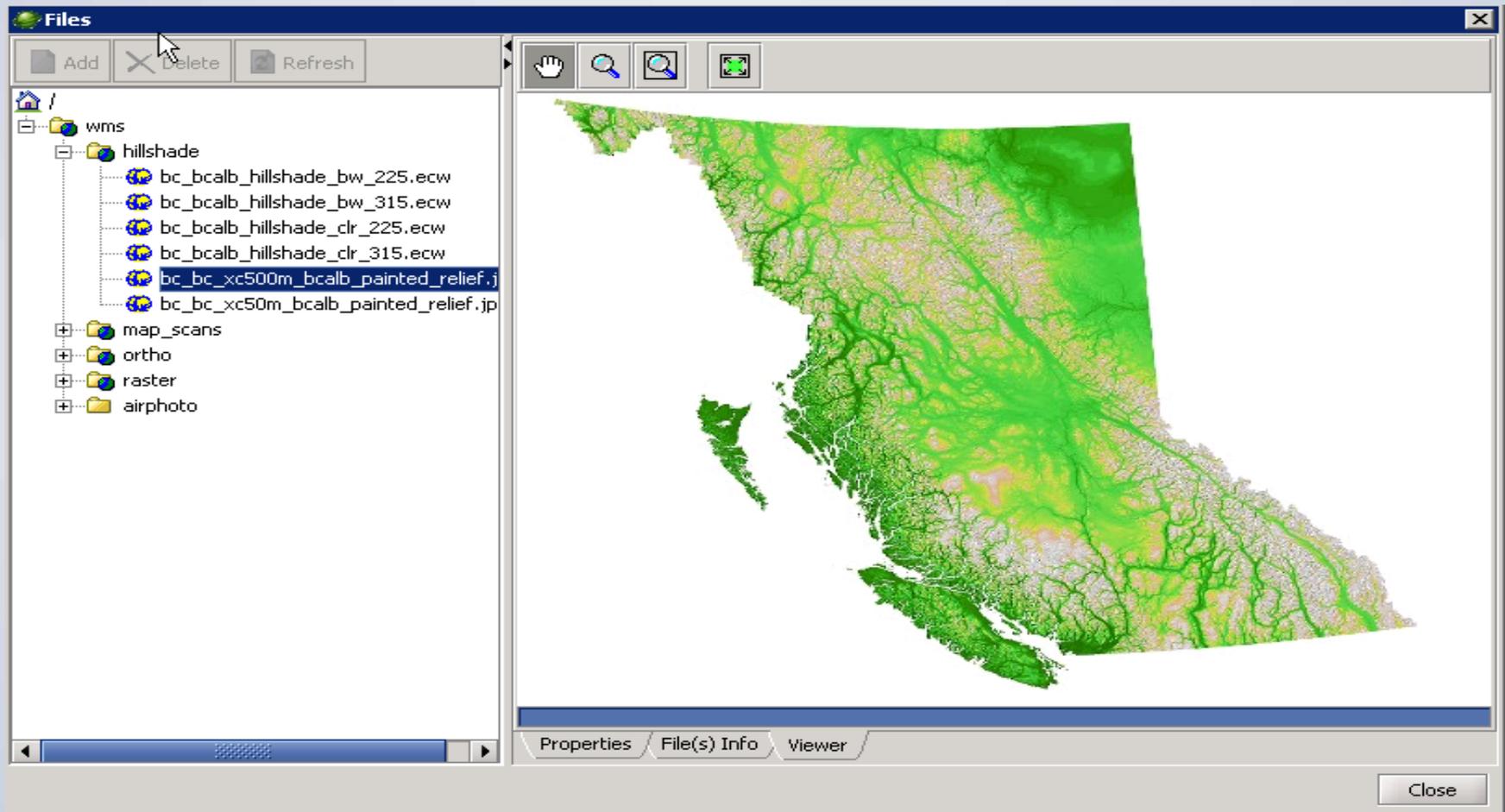


The screenshot shows a Windows File Explorer window with the following details:

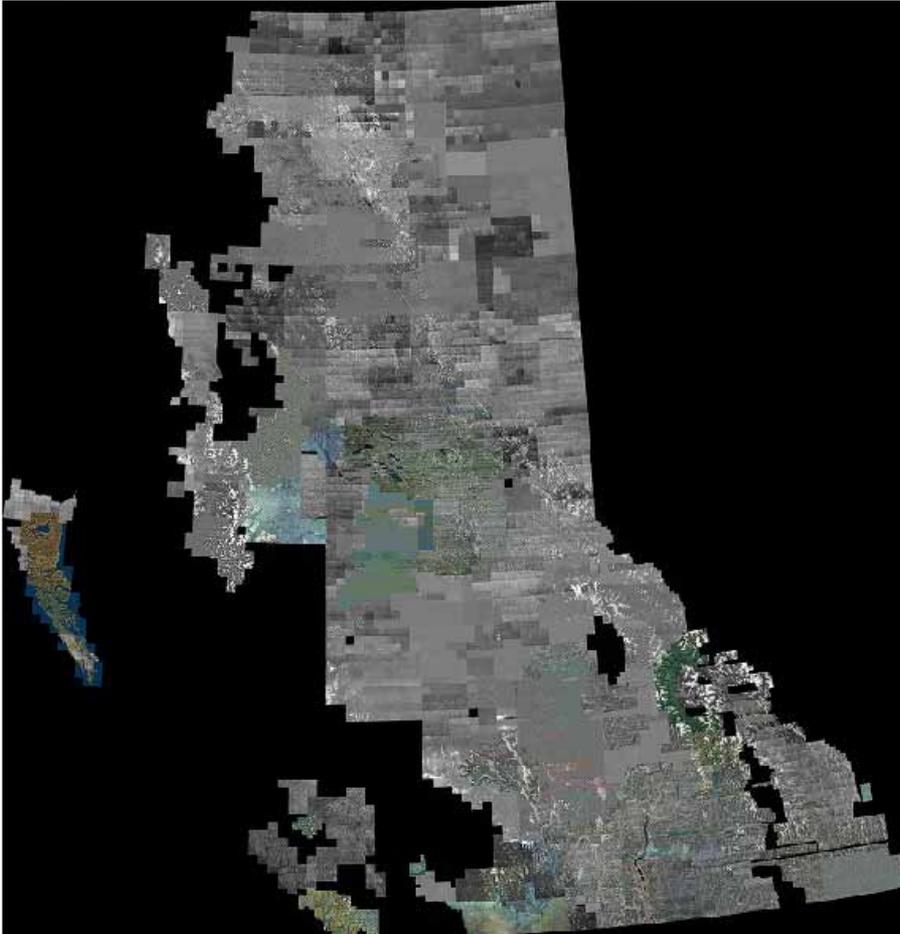
- File Name:** \\hemlock.idir.bc.gov\wms\$\hillshade\bc_bc_xc500m_bcalb_painted_relief.jp2
- Size:** 6.830 MB
- Width:** 3,357
- Height:** 2,845
- TLX:** 197,635.052643
- TLY:** 1,749,674.79689
- BRX:** 1,876,135.052643
- BRY:** 327,174.79689
- Cell Inc X:** 500.000
- Cell Inc Y:** 500.000
- # Bands:** 3
- Datum:** NAD83
- Projection:** ALBC
- Units:** meters
- EPSG:** 3005

The left pane shows a folder structure with 'wms' containing a sub-folder 'hillshade' where the selected file is located. Other folders include 'map_scans', 'ortho', 'raster', and 'airphoto'.

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



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>



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Any questions?

For more information....

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Visit:

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

Or

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