

OGC Time-enabled WMS: an Introduction with Deployment into Google Earth

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Presentation at the Summer ESIP Federation Meeting

Durham, New Hampshire, 7-15-2008

Overview

Open Standards and Demonstrations

Architecture

Applications Used in the Implementation

Concluding Remarks

Where are We?

Open Standards & Demonstrations

Architecture

Applications Used in the Implementation

Concluding Remarks

OGC Standards

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Web Map Services (WMS)

Images representing geospatial data (GIF, PNG, JPEG)

Support for temporal requests (if implemented by server)

OGC Standards

Web Map Services (WMS)

Images representing geospatial data (GIF, PNG, JPEG)

Support for temporal requests (if implemented by server)

KML

XML-based representation description language

May include embedded features (i.e. geometries)

May reference imagery accessible via web requests (including WMS)

WMS Examples

WMS Examples

Basic WMS Request Form

`http://host/server_app?parameter1&...¶metern`

WMS Examples

Basic WMS Request Form

`http://host/server_app?parameter1&...¶meterN`

Sample GetCapabilities Request

`http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?
SERVICE=WMS&REQUEST=GetCapabilities`

GetCapabilities XML File

```
<?xml version="1.0" encoding="ISO-8859-1" standalone="no" ?>
<!DOCTYPE WMT_MS_Capabilities SYSTEM "http://schemas.opengis.net/wmts/1.1.1/WMTS_MS_Capabilities.dtd"
[
  <!-- ELEMENT VendorSpecificCapabilities EMPTY -->
]>
<!-- end of DOCTYPE declaration -->

<WMT_MS_Capabilities version="1.1.1">

  <!-- MapServer version 5.0.0 OUTPUT=GIFF OUTPUT=PNG OUTPUT=JPEG OUTPUT=WBMP OUTPUT=SVG SUPPORTS=PROJ SUPPORTS=FREETYPE
  SUPPORTS=WMS_SERVER SUPPORTS=WMS_CLIENT SUPPORTS=WFS_SERVER SUPPORTS=WFS_CLIENT SUPPORTS=WCS_SERVER
  SUPPORTS=THREADS SUPPORTS=GEOSS INPUT=EPPL7 INPUT=POSTGIS INPUT=OGR INPUT=GDAL INPUT=SHAPEFILE -->

  <Service>
    <Name>OGC:WMS</Name>
    <Title>EDAC Imagery OGC WMS Map Services</Title>
    <Abstract>General Purpose WMS service for EDAC&#39;s imagery collection</Abstract>
    <KeywordList>
      <Keyword>DOQQ</Keyword>
      <Keyword> Remota Sensing</Keyword>
      <Keyword> New Mexico</Keyword>
    </KeywordList>
    <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/>
    <ContactInformation>
      <ContactPersonPrimary>
        <ContactPerson>Karl Benedict</ContactPerson>
        <ContactOrganization>Earth Data Analysis Center, University of New Mexico</ContactOrganization>
      </ContactPersonPrimary>
      <ContactPosition>Sr. Research Scientist</ContactPosition>
      <ContactAddress>
        <AddressType>Mailing address</AddressType>
        <Address>Earth Data Analysis Center, MSC01 1110, 1 University of New Mexico</Address>
        <City>Albuquerque</City>
        <StateOrProvince>NM</StateOrProvince>
        <PostCode>87131</PostCode>
        <Country>US</Country>
      </ContactAddress>
      <ContactVoiceTelephone>(505) 277-3622 x234</ContactVoiceTelephone>
      <ContactFacsimileTelephone>(505) 277-3614</ContactFacsimileTelephone>
      <ContactElectronicMailAddress>kbene@edac.unm.edu</ContactElectronicMailAddress>
    </ContactInformation>
    < Fees>none</Fees>
    <AccessConstraints>none</AccessConstraints>
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            <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
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        </DCPType>
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    </Request>
    <GetMap>
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      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/png,mode=24bit</Format>
      <Format>image/wbmp</Format>
      <Format>image/tiff</Format>
      <Format>image/svg+xml</Format>
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        <HTTP>
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        </HTTP>
      </DCPType>
    </GetMap>
    <GetFeatureInfo>
      <Format>text/plain</Format>
      <Format>application/vnd.ogc.gml</Format>
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        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
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    </DescribeLayer>
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    </GetLegendGraphic>
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  <Exception>
    <Format>application/vnd.ogc.se_xml</Format>
    <Format>application/vnd.ogc.se_inimage</Format>
    <Format>application/vnd.ogc.se_blank</Format>
  </Exception>
  <VendorSpecificCapabilities />
  <UserDefinedSymbolization SupportSLD="1" UserLayer="0" UserStyle="1" RemoteWFS="0"/>

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more ...

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      <Keyword>Remote Sensing</Keyword>
      <Keyword>New Mexico</Keyword>
    </KeywordList>
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    </ContactInformation>
    < Fees>none</Fees>
    <AccessConstraints>none</AccessConstraints>
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      <GetCapabilities>
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      <GetMap>
        <Format>image/jpeg</Format>
        <Format>image/png</Format>
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        <Format>image/tiff</Format>
        <Format>image/svg+xml</Format>
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      <GetFeatureInfo>
        <Format>text/plain</Format>
        <Format>application/vnd.ogc.gml</Format>
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        </DCPType>
      </DescribeLayer>
      <GetLegendGraphic>
        <Format>image/jpeg</Format>
        <Format>image/png</Format>
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        <Format>image/png,mode=24bit</Format>
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      </GetStyles>
    </Request>
    <Exception>
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      <Format>application/vnd.ogc.se_inimage</Format>
      <Format>application/vnd.ogc.se_blank</Format>
    </Exception>
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    <UserDefinedSymbolization SupportSLD="1" UserLayer="0" UserStyle="1" RemoteWFS="0"/>
  </Capability>
</WMT_MS_Capabilities>
```

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```

```
<WMT_MS_Capabilities version="1.1.1">
```

```
<!-- MapServer version 5.0.0 OUTPUT=GIF OUTPUT=PNG OUTPUT=JPEG OUTPUT=WBMP
OUTPUT=SVG SUPPORTS=PROJ SUPPORTS=FREETYPE SUPPORTS=WMS_SERVER
SUPPORTS=WMS_CLIENT SUPPORTS=WFS_SERVER SUPPORTS=WFS_CLIENT SUPPORTS=WCS_SERVER
SUPPORTS=THREADS SUPPORTS=GEOS INPUT=EPPL7 INPUT=POSTGIS INPUT=OGR INPUT=GDAL
INPUT=SHAPEFILE -->
```

more ...

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<?xml version="1.0" encoding="ISO-8859-1" standalone="no" ?>
<!DOCTYPE WMT_MS_Capabilities SYSTEM "http://schemas.opengis.net/wmts/1.1.1/WMT_MS_Capabilities.dtd"
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    <Title>EDAC Imagery OGC WMS Map Services</Title>
    <Abstract>General Purpose WMS service for EDAC&#39;s imagery collection</Abstract>
    <KeywordList>
      <Keyword>DOQQ</Keyword>
      <Keyword> Remota Sensing</Keyword>
      <Keyword> New Mexico</Keyword>
    </KeywordList>
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      <ContactPersonPrimary>
        <ContactPerson>Karl Benedict</ContactPerson>
        <ContactOrganization>Earth Data Analysis Center, University of New Mexico</ContactOrganization>
      </ContactPersonPrimary>
      <ContactPosition>Sr. Research Scientist</ContactPosition>
      <ContactAddress>
        <AddressType>Mailing address</AddressType>
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        <StateOrProvince>NM</StateOrProvince>
        <PostCode>87131</PostCode>
        <Country>US</Country>
      </ContactAddress>
      <ContactVoiceTelephone>(505) 277-3622 x234</ContactVoiceTelephone>
      <ContactFacsimileTelephone>(505) 277-3614</ContactFacsimileTelephone>
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      <Format>image/tiff</Format>
      <Format>image/svg+xml</Format>
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      <Format>application/vnd.ogc.gml</Format>
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    </GetStyles>
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  <Exception>
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    <Format>application/vnd.ogc.se_inimage</Format>
    <Format>application/vnd.ogc.se_blank</Format>
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```

more ...

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      <ContactPerson>Karl Benedict</ContactPerson>
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      <Format>application/vnd.ogc.wms_xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetCapabilities>
    <DescribeLayer>
      <Format>text/xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </DescribeLayer>
    <GetLegendGraphic>
      <Format>image/jpeg</Format>
      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/png;mode=24bit</Format>
      <Format>image/wbmp</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetLegendGraphic>
    <GetStyles>
      <Format>text/xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetStyles>
    <Request>
      <Exception>
        <Format>application/vnd.ogc.se_xml</Format>
        <Format>application/vnd.ogc.se_inimage</Format>
        <Format>application/vnd.ogc.se_blank</Format>
      </Exception>
    </Request>
    <UserDefinedSymbolization SupportSLD="1" UserLayer="0" UserStyle="1" RemoteWFS="0"/>
  </Capability>
</WMT_MS_Capabilities>
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<Service>
  <Name>OGC:WMS</Name>
  <Title>EDAC Imagery OGC Web Map Services</Title>
  <Abstract>General Purpose WMS service for EDAC's imagery collection</
Abstract>
  <KeywordList>
    <Keyword>DOQQ</Keyword>
    <Keyword>Remote Sensing</Keyword>
    <Keyword>New Mexico</Keyword>
  </KeywordList>
  <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://
edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/>
  <ContactInformation>
    <ContactPersonPrimary>
      <ContactPerson>Karl Benedict</ContactPerson>
      <ContactOrganization>Earth Data Analysis Center, University of New
Mexico</ContactOrganization>
      <ContactPersonPrimary>
      <ContactPosition>Sr. Research Scientist</ContactPosition>
      <ContactAddress>
        <AddressType>Mailing address</AddressType>
        <Address>Earth Data Analysis Center, MSC01 1110, 1 University of New
Mexico</Address>
        <City>Albuquerque</City>
        <StateOrProvince>NM</StateOrProvince>
        <PostCode>87131</PostCode>
        <Country>US</Country>
      </ContactAddress>
      <ContactVoiceTelephone>(505) 277-3622 x234</ContactVoiceTelephone>
      <ContactFacsimileTelephone>(505) 277-3614</ContactFacsimileTelephone>
      <ContactElectronicMailAddress>kbene@edac.unm.edu</
ContactElectronicMailAddress>
    </ContactInformation>
    <Fees>none</Fees>
    <AccessConstraints>none</AccessConstraints>
  </Service>

<Capability>
  <Request>
    <GetCapabilities>
      <Format>application/vnd.ogc.wms_xml</Format>
      <DCPType>
        <HTTP>
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xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetCapabilities>
    <GetMap>
      <Format>image/jpeg</Format>
      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/png;mode=24bit</Format>
      <Format>image/wbmp</Format>
      <Format>image/tiff</Format>
      <Format>image/svg+xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetMap>
    <GetCapabilities>
      <Format>application/vnd.ogc.wms_xml</Format>
      <DCPType>
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xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetCapabilities>
    <DescribeLayer>
      <Format>text/xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </DescribeLayer>
    <GetLegendGraphic>
      <Format>image/jpeg</Format>
      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/png;mode=24bit</Format>
      <Format>image/wbmp</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetLegendGraphic>
    <GetStyles>
      <Format>text/xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetStyles>
    <Request>
      <Exception>
        <Format>application/vnd.ogc.se_xml</Format>
        <Format>application/vnd.ogc.se_inimage</Format>
        <Format>application/vnd.ogc.se_blank</Format>
      </Exception>
    </Request>
    <UserDefinedSymbolization SupportSLD="1" UserLayer="0" UserStyle="1"
RemoteWFS="0"/>
  </Capability>
</WMT_MS_Capabilities>
```

more ...

GetCapabilities XML File

```
<?xml version="1.0" encoding="ISO-8859-1" standalone="no" ?>
<!DOCTYPE WMT_MS_Capabilities SYSTEM "http://schemas.opengis.net/wmts/1.1.1/WMTS_MS_Capabilities.dtd"
[
  <!-- ELEMENT VendorSpecificCapabilities EMPTY -->
]>
<!-- end of DOCTYPE declaration -->

<WMT_MS_Capabilities version="1.1.1">

  <!-- MapServer version 5.0.0 OUTPUT=GIFF OUTPUT=PNG OUTPUT=JPEG OUTPUT=WBMP OUTPUT=SVG SUPPORTS=PROJ SUPPORTS=FREETYPE
  SUPPORTS=WMS_SERVER SUPPORTS=WMS_CLIENT SUPPORTS=WFS_SERVER SUPPORTS=WFS_CLIENT SUPPORTS=WCS_SERVER
  SUPPORTS=THREADS SUPPORTS=GEOSS INPUT=EPPL7 INPUT=POSTGIS INPUT=OGR INPUT=GDAL INPUT=SHAPEFILE -->

  <Service>
    <Name>OGC:WMS</Name>
    <Title>EDAC Imagery OGC WMS Map Services</Title>
    <Abstract>General Purpose WMS service for EDAC&#39;s imagery collection</Abstract>
    <KeywordList>
      <Keyword>DOQQ</Keyword>
      <Keyword> Remota Sensing</Keyword>
      <Keyword> New Mexico</Keyword>
    </KeywordList>
    <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/>
    <ContactInformation>
      <ContactPersonPrimary>
        <ContactPerson>Karl Benedict</ContactPerson>
        <ContactOrganization>Earth Data Analysis Center, University of New Mexico</ContactOrganization>
      </ContactPersonPrimary>
      <ContactPosition>Sr. Research Scientist</ContactPosition>
      <ContactAddress>
        <AddressType>Mailing address</AddressType>
        <Address>Earth Data Analysis Center, MSC01 1110, 1 University of New Mexico</Address>
        <City>Albuquerque</City>
        <StateOrProvince>NM</StateOrProvince>
        <PostCode>87131</PostCode>
        <Country>US</Country>
      </ContactAddress>
      <ContactVoiceTelephone>(505) 277-3622 x234</ContactVoiceTelephone>
      <ContactFacsimileTelephone>(505) 277-3614</ContactFacsimileTelephone>
      <ContactElectronicMailAddress>kbene@edac.unm.edu</ContactElectronicMailAddress>
    </ContactInformation>
    < Fees>none</Fees>
    <AccessConstraints>none</AccessConstraints>
  </Service>

  <Capability>
    <Request>
      <GetCapabilities>
        <Format>application/vnd.ogc.wms_xml</Format>
        <DCPType>
          <HTTP>
            <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
            <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
          </HTTP>
        </DCPType>
      </GetCapabilities>
    </Request>
    <GetMap>
      <Format>image/jpeg</Format>
      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/png,mode=24bit</Format>
      <Format>image/wbmp</Format>
      <Format>image/tiff</Format>
      <Format>image/svg+xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetMap>
    <GetFeatureInfo>
      <Format>text/plain</Format>
      <Format>application/vnd.ogc.gml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetFeatureInfo>
    <DescribeLayer>
      <Format>text/xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </DescribeLayer>
    <GetLegendGraphic>
      <Format>image/jpeg</Format>
      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/png,mode=24bit</Format>
      <Format>image/wbmp</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetLegendGraphic>
    <GetStyles>
      <Format>text/xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetStyles>
  </Request>
  <Exception>
    <Format>application/vnd.ogc.se_xml</Format>
    <Format>application/vnd.ogc.se_inimage</Format>
    <Format>application/vnd.ogc.se_blank</Format>
  </Exception>
  <VendorSpecificCapabilities />
  <UserDefinedSymbolization SupportSLD="1" UserLayer="0" UserStyle="1" RemoteWFS="0"/>

```

more ...

GetCapabilities XML File

```
<?xml version="1.0" encoding="ISO-8859-1" standalone="no" ?>
<!DOCTYPE WMT_MS_Capabilities SYSTEM "http://schemas.opengis.net/wmts/1.1.1/WMTS_MS_Capabilities.dtd"
[
  <ELEMENT VendorSpecificCapabilities EMPTY>
]>
<!-- end of DOCTYPE declaration -->

<WMT_MS_Capabilities version="1.1.1">

  <!-- MapServer version 5.0.0 OUTPUT=GIFF OUTPUT=PNG OUTPUT=JPEG OUTPUT=WBMP OUTPUT=SVG SUPPORTS=PROJ SUPPORTS=FREETYPE
  SUPPORTS=WMS_SERVER SUPPORTS=WMS_CLIENT SUPPORTS=WFS_SERVER SUPPORTS=WFS_CLIENT SUPPORTS=WCS_SERVER
  SUPPORTS=THREADS SUPPORTS=GEOSS INPUT=EPPL7 INPUT=POSTGIS INPUT=OGR INPUT=GDAL INPUT=SHAPEFILE -->

  <Service>
    <Name>OGC:WMS</Name>
    <Title>EDAC Imagery OGC WMS Map Services</Title>
    <Abstract>General Purpose WMS service for EDAC&#39;s imagery collection</Abstract>
    <KeywordList>
      <Keyword>DOQQ</Keyword>
      <Keyword>Remote Sensing</Keyword>
      <Keyword>New Mexico</Keyword>
    </KeywordList>
    <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/>
    <ContactInformation>
      <ContactPersonPrimary>
        <ContactPerson>Karl Benedict</ContactPerson>
        <ContactOrganization>Earth Data Analysis Center, University of New Mexico</ContactOrganization>
      </ContactPersonPrimary>
      <ContactPosition>Sr. Research Scientist</ContactPosition>
      <ContactAddress>
        <AddressType>Mailing address</AddressType>
        <Address>Earth Data Analysis Center, MSC01 1110, 1 University of New Mexico</Address>
        <City>Albuquerque</City>
        <StateOrProvince>NM</StateOrProvince>
        <PostCode>87131</PostCode>
        <Country>US</Country>
      </ContactAddress>
      <ContactVoiceTelephone>(505) 277-3622 x234</ContactVoiceTelephone>
      <ContactFacsimileTelephone>(505) 277-3614</ContactFacsimileTelephone>
      <ContactElectronicMailAddress>kbene@edac.unm.edu</ContactElectronicMailAddress>
    </ContactInformation>
    <Fees>none</Fees>
    <AccessConstraints>none</AccessConstraints>
  </Service>

  <Capability>
    <Request>
      <GetCapabilities>
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        <DCPType>
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            <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
            <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
          </HTTP>
        </DCPType>
      </GetCapabilities>
      <GetMap>
        <Format>image/jpeg</Format>
        <Format>image/png</Format>
        <Format>image/gif</Format>
        <Format>image/png; mode=24bit</Format>
        <Format>image/wbmp</Format>
        <Format>image/tiff</Format>
        <Format>image/svg+xml</Format>
        <DCPType>
          <HTTP>
            <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
            <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
          </HTTP>
        </DCPType>
      </GetMap>
      <GetFeatureInfo>
        <Format>text/plain</Format>
        <Format>application/vnd.ogc.gml</Format>
        <DCPType>
          <HTTP>
            <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
            <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
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        </DCPType>
      </GetFeatureInfo>
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            <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
          </HTTP>
        </DCPType>
      </DescribeLayer>
      <GetLegendGraphic>
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        <Format>image/png</Format>
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        <Format>image/png; mode=24bit</Format>
        <Format>image/wbmp</Format>
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            <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
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      </GetLegendGraphic>
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            <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
          </HTTP>
        </DCPType>
      </GetStyles>
    </Request>
    <Exception>
      <Format>application/vnd.ogc.se_xml</Format>
      <Format>application/vnd.ogc.se_image</Format>
      <Format>application/vnd.ogc.se_blank</Format>
    </Exception>
    <VendorSpecificCapabilities />
    <UserDefinedSymbolization SupportSLD="1" UserLayer="0" UserStyle="1" RemoteWFS="0"/>
  </Capability>
</WMT_MS_Capabilities>
```

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<Capability>
  <Request>
    <GetCapabilities>
      <Format>application/vnd.ogc.wms_xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetCapabilities>
    <GetMap>
      <Format>image/jpeg</Format>
      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/png; mode=24bit</Format>
      <Format>image/wbmp</Format>
      <Format>image/tiff</Format>
      <Format>image/svg+xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetMap>
    <GetFeatureInfo>
      <Format>text/plain</Format>
      <Format>application/vnd.ogc.gml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetFeatureInfo>
    <DescribeLayer>
      <Format>text/xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </DescribeLayer>
    <GetLegendGraphic>
      <Format>image/jpeg</Format>
      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/png; mode=24bit</Format>
      <Format>image/wbmp</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetLegendGraphic>
    <GetStyles>
      <Format>text/xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetStyles>
  </Request>
  <Exception>
    <Format>application/vnd.ogc.se_xml</Format>
    <Format>application/vnd.ogc.se_image</Format>
    <Format>application/vnd.ogc.se_blank</Format>
  </Exception>
  <VendorSpecificCapabilities />
  <UserDefinedSymbolization SupportSLD="1" UserLayer="0" UserStyle="1" RemoteWFS="0"/>
</Capability>
```

more ...

GetCapabilities XML File

```
<?xml version="1.0" encoding="ISO-8859-1" standalone="no" ?>
<!DOCTYPE WMT_MS_Capabilities SYSTEM "http://schemas.opengis.net/wmts/1.1.1/WMTS_MS_Capabilities.dtd"
[
  <!-- ELEMENT VendorSpecificCapabilities EMPTY -->
]>
<!-- end of DOCTYPE declaration -->

<WMT_MS_Capabilities version="1.1.1">

  <!-- MapServer version 5.0.0 OUTPUT=GIF OUTPUT_PNG OUTPUT_JPEG OUTPUT_WBMP OUTPUT_SVG SUPPORTS=PROJ SUPPORTS=FREETYPE
  SUPPORTS=WMS_SERVER SUPPORTS=WMS_CLIENT SUPPORTS=WFS_SERVER SUPPORTS=WFS_CLIENT SUPPORTS=WCS_SERVER
  SUPPORTS=THREADS SUPPORTS=GEOS INPUT=EPPL7 INPUT_POSTGIS INPUT_OGR INPUT_GDAL INPUT_SHAPEFILE -->

  <Service>
    <Name>OGC:WMS</Name>
    <Title>EDAC Imagery OGC Web Map Services</Title>
    <Abstract>General Purpose WMS service for EDAC&#39;s imagery collection</Abstract>
    <KeywordList>
      <Keyword>DOQQ</Keyword>
      <Keyword> Remota Sensing</Keyword>
      <Keyword> New Mexico</Keyword>
    </KeywordList>
    <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/>
    <ContactInformation>
      <ContactPersonPrimary>
        <ContactPerson>Karl Benedict</ContactPerson>
        <ContactOrganization>Earth Data Analysis Center, University of New Mexico</ContactOrganization>
      </ContactPersonPrimary>
      <ContactPosition>Sr. Research Scientist</ContactPosition>
      <ContactAddress>
        <AddressType>Mailing address</AddressType>
        <Address>Earth Data Analysis Center, MSC01 1110, 1 University of New Mexico</Address>
        <City>Albuquerque</City>
        <StateOrProvince>NM</StateOrProvince>
        <PostCode>87131</PostCode>
        <Country>US</Country>
      </ContactAddress>
      <ContactVoiceTelephone>(505) 277-3622 x234</ContactVoiceTelephone>
      <ContactFacsimileTelephone>(505) 277-3614</ContactFacsimileTelephone>
      <ContactElectronicMailAddress>kbene@edac.unm.edu</ContactElectronicMailAddress>
    </ContactInformation>
    < Fees>none</Fees>
    <AccessConstraints>none</AccessConstraints>
  </Service>

  <Capability>
    <Request>
      <GetCapabilities>
        <Format>application/vnd.ogc.wms_xml</Format>
        <DCPType>
          <HTTP>
            <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
            <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
          </HTTP>
        </DCPType>
      </GetCapabilities>
    </Request>
    <GetMap>
      <Format>image/jpeg</Format>
      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/png,mode=24bit</Format>
      <Format>image/wbmp</Format>
      <Format>image/tiff</Format>
      <Format>image/svg+xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetMap>
    <GetFeatureInfo>
      <Format>text/plain</Format>
      <Format>application/vnd.ogc.gml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetFeatureInfo>
    <DescribeLayer>
      <Format>text/xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </DescribeLayer>
    <GetLegendGraphic>
      <Format>image/jpeg</Format>
      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/png,mode=24bit</Format>
      <Format>image/wbmp</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetLegendGraphic>
    <GetStyles>
      <Format>text/xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetStyles>
  </Request>
  <Exception>
    <Format>application/vnd.ogc.se_xml</Format>
    <Format>application/vnd.ogc.se_inimage</Format>
    <Format>application/vnd.ogc.se_blank</Format>
  </Exception>
  <VendorSpecificCapabilities />
  <UserDefinedSymbolization SupportSLD="1" UserLayer="0" UserStyle="1" RemoteWFS="0"/>

```

more ...

GetCapabilities XML File

```
<?xml version="1.0" encoding="ISO-8859-1" standalone="no" ?>
<!DOCTYPE WMT_MS_Capabilities SYSTEM "http://schemas.opengis.net/wmts/1.1.1/WMTS_MS_Capabilities.dtd"
[
  <!-- ELEMENT VendorSpecificCapabilities EMPTY -->
]>
<!-- end of DOCTYPE declaration -->

<WMT_MS_Capabilities version="1.1.1">

  <!-- MapServer version 5.0.0 OUTPUT=GIF OUTPUT_PNG OUTPUT_IPEG OUTPUT_WBMP OUTPUT_SVG SUPPORTS=PROJ SUPPORTS=FREETYPE
  SUPPORTS=WMS_SERVER SUPPORTS=WMS_CLIENT SUPPORTS=WFS_SERVER SUPPORTS=WFS_CLIENT SUPPORTS=WCS_SERVER
  SUPPORTS=THREADS SUPPORTS=GEOS INPUT=EPPL7 INPUT_POSTGIS INPUT_OGR INPUT_GDAL INPUT_SHAPEFILE -->

  <Service>
    <Name>OGC:WMS</Name>
    <Title>EDAC Imagery OGC Web Map Services</Title>
    <Abstract>General Purpose WMS service for EDAC&#39;s imagery collection</Abstract>
    <KeywordList>
      <Keyword>DOQQ</Keyword>
      <Keyword>Remote Sensing</Keyword>
      <Keyword>New Mexico</Keyword>
    </KeywordList>
    <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/>
    <ContactInformation>
      <ContactPersonPrimary>
        <ContactPerson>Karl Benedict</ContactPerson>
        <ContactOrganization>Earth Data Analysis Center, University of New Mexico</ContactOrganization>
        <ContactPersonPosition>
          <ContactPosition>Sr. Research Scientist</ContactPosition>
        <ContactAddress>
          <AddressType>Mailing address</AddressType>
          <Address>Earth Data Analysis Center, MSC01 1110, 1 University of New Mexico</Address>
          <City>Albuquerque</City>
          <StateOrProvince>NM</StateOrProvince>
          <PostalCode>87131</PostalCode>
          <Country>US</Country>
        </ContactAddress>
        <ContactVoiceTelephone>(505) 277-3622 x234</ContactVoiceTelephone>
        <ContactFacsimileTelephone>(505) 277-3614</ContactFacsimileTelephone>
        <ContactElectronicMailAddress>kbene@edac.unm.edu</ContactElectronicMailAddress>
      </ContactInformation>
      <Fees>none</Fees>
      <AccessConstraints>none</AccessConstraints>
    </Service>

    <Capability>
      <Request>
        <GetCapabilities>
          <Format>application/vnd.ogc.wms_xml</Format>
          <DCPType>
            <HTTP>
              <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
              <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
            </HTTP>
          </DCPType>
        </GetCapabilities>
        <GetMap>
          <Format>image/jpeg</Format>
          <Format>image/png</Format>
          <Format>image/gif</Format>
          <Format>image/png; mode=24bit</Format>
          <Format>image/wbmp</Format>
          <Format>image/tiff</Format>
          <Format>image/svg+xml</Format>
          <DCPType>
            <HTTP>
              <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
              <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
            </HTTP>
          </DCPType>
        </GetMap>
        <GetFeatureInfo>
          <Format>text/plain</Format>
          <Format>application/vnd.ogc.gml</Format>
          <DCPType>
            <HTTP>
              <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
              <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
            </HTTP>
          </DCPType>
        </GetFeatureInfo>
        <DescribeLayer>
          <Format>text/xml</Format>
          <DCPType>
            <HTTP>
              <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
              <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
            </HTTP>
          </DCPType>
        </DescribeLayer>
        <GetLegendGraphic>
          <Format>image/jpeg</Format>
          <Format>image/png</Format>
          <Format>image/gif</Format>
          <Format>image/png; mode=24bit</Format>
          <Format>image/wbmp</Format>
          <DCPType>
            <HTTP>
              <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
              <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
            </HTTP>
          </DCPType>
        </GetLegendGraphic>
        <GetStyles>
          <Format>text/xml</Format>
          <DCPType>
            <HTTP>
              <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
              <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
            </HTTP>
          </DCPType>
        </GetStyles>
      </Request>
      <Exception>
        <Format>application/vnd.ogc.se_xml</Format>
        <Format>application/vnd.ogc.se_inimage</Format>
        <Format>application/vnd.ogc.se_blank</Format>
      </Exception>
      <VendorSpecificCapabilities />
      <UserDefinedSymbolization SupportSLD="1" UserLayer="0" UserStyle="1" RemoteWFS="0"/>
    </Capability>
  </Service>
</WMT_MS_Capabilities>
```

```
<GetFeatureInfo>
  <Format>text/plain</Format>
  <Format>application/vnd.ogc.gml</Format>
  <DCPType>
    <HTTP>
      <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
      <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
    </HTTP>
  </DCPType>
</GetFeatureInfo>
<DescribeLayer>
  <Format>text/xml</Format>
  <DCPType>
    <HTTP>
      <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
      <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
    </HTTP>
  </DCPType>
</DescribeLayer>
<GetLegendGraphic>
  <Format>image/jpeg</Format>
  <Format>image/png</Format>
  <Format>image/gif</Format>
  <Format>image/png; mode=24bit</Format>
  <Format>image/wbmp</Format>
  <DCPType>
    <HTTP>
      <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
      <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
    </HTTP>
  </DCPType>
</GetLegendGraphic>
```

more ...

GetCapabilities XML File

```
<?xml version="1.0" encoding="ISO-8859-1" standalone="no" ?>
<!DOCTYPE WMT_MS_Capabilities SYSTEM "http://schemas.opengis.net/wmts/1.1.1/WMT_MS_Capabilities.dtd"
[
  <!ELEMENT VendorSpecificCapabilities EMPTY >
]>
<!-- end of DOCTYPE declaration -->

<WMT_MS_Capabilities version="1.1.1">

  <!-- MapServer version 5.0.0 OUTPUT=GIFF OUTPUT=PNG OUTPUT=JPEG OUTPUT=WBMP OUTPUT=SVG SUPPORTS=PROJ SUPPORTS=FREETYPE
  SUPPORTS=WMS_SERVER SUPPORTS=WMS_CLIENT SUPPORTS=WFS_SERVER SUPPORTS=WFS_CLIENT SUPPORTS=WCS_SERVER
  SUPPORTS=THREADS SUPPORTS=GEOSS INPUT=EPPL7 INPUT=POSTGIS INPUT=OGR INPUT=GDAL INPUT=SHAPEFILE -->

  <Service>
    <Name>OGC:WMS</Name>
    <Title>EDAC Imagery OGC Web Map Services</Title>
    <Abstract>General Purpose WMS service for EDAC&#39;s imagery collection</Abstract>
    <KeywordList>
      <Keyword>DOQQ</Keyword>
      <Keyword> Remota Sensing</Keyword>
      <Keyword> New Mexico</Keyword>
    </KeywordList>
    <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/>
    <ContactInformation>
      <ContactPersonPrimary>
        <ContactPerson>Karl Benedict</ContactPerson>
        <ContactOrganization>Earth Data Analysis Center, University of New Mexico</ContactOrganization>
      </ContactPersonPrimary>
      <ContactPosition>Sr. Research Scientist</ContactPosition>
      <ContactAddress>
        <AddressType>Mailing address</AddressType>
        <Address>Earth Data Analysis Center, MSC01 1110, I University of New Mexico</Address>
        <City>Albuquerque</City>
        <StateOrProvince>NM</StateOrProvince>
        <PostCode>87131</PostCode>
        <Country>US</Country>
      </ContactAddress>
      <ContactVoiceTelephone>(505) 277-3622 x234</ContactVoiceTelephone>
      <ContactFacsimileTelephone>(505) 277-3614</ContactFacsimileTelephone>
      <ContactElectronicMailAddress>kbene@edac.unm.edu</ContactElectronicMailAddress>
    </ContactInformation>
    < Fees>none</Fees>
    <AccessConstraints>none</AccessConstraints>
  </Service>

  <Capability>
    <Request>
      <GetCapabilities>
        <Format>application/vnd.ogc.wms_xml</Format>
        <DCPType>
          <HTTP>
            <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
            <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
          </HTTP>
        </DCPType>
      </GetCapabilities>
    </Request>
    <GetMap>
      <Format>image/jpeg</Format>
      <Format>image/png</Format>
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      <Format>image/wbmp</Format>
      <Format>image/tiff</Format>
      <Format>image/svg+xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetMap>
    <GetFeatureInfo>
      <Format>text/plain</Format>
      <Format>application/vnd.ogc.gml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
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      </DCPType>
    </GetFeatureInfo>
    <DescribeLayer>
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      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </DescribeLayer>
    <GetLegendGraphic>
      <Format>image/jpeg</Format>
      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/png,mode=24bit</Format>
      <Format>image/wbmp</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetLegendGraphic>
    <GetStyles>
      <Format>text/xml</Format>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
      </DCPType>
    </GetStyles>
  </Request>
  <Exception>
    <Format>application/vnd.ogc.se_xml</Format>
    <Format>application/vnd.ogc.se_inimage</Format>
    <Format>application/vnd.ogc.se_blank</Format>
  </Exception>
  <VendorSpecificCapabilities />
  <UserDefinedSymbolization SupportSLD="1" UserLayer="0" UserStyle="1" RemoteWFS="0"/>

```

more ...

GetCapabilities XML File

```
<?xml version="1.0" encoding="ISO-8859-1" standalone="no" ?>
<!DOCTYPE WMT_MS_Capabilities SYSTEM "http://schemas.opengis.net/wmts/1.1.1/WMTS_MS_Capabilities.dtd"
[
  <ELEMENT VendorSpecificCapabilities EMPTY >
] >
<!-- end of DOCTYPE declaration -->

<WMT_MS_Capabilities version="1.1.1">

  <!-- MapServer version 5.0.0 OUTPUT=GIFF OUTPUT=PNG OUTPUT=JPEG OUTPUT=WBMP OUTPUT=SVG SUPPORTS=PROJ SUPPORTS=FREETYPE
  SUPPORTS=WMS_SERVER SUPPORTS=WMS_CLIENT SUPPORTS=WFS_SERVER SUPPORTS=WFS_CLIENT SUPPORTS=WCS_SERVER
  SUPPORTS=THREADS SUPPORTS=GEOSS INPUT=EPPL7 INPUT=POSTGIS INPUT=OGR INPUT=GDAL INPUT=SHAPEFILE -->

  <Service>
    <Name>OGC:WMS</Name>
    <Title>EDAC Imagery OGC Web Map Services</Title>
    <Abstract>General Purpose WMS service for EDAC&#39;s imagery collection</Abstract>
    <KeywordList>
      <Keyword>DOQQ</Keyword>
      <Keyword> Remota Sensing</Keyword>
      <Keyword> New Mexico</Keyword>
    </KeywordList>
    <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/>
    <ContactInformation>
      <ContactPersonPrimary>
        <ContactPerson>Karl Benedict</ContactPerson>
        <ContactOrganization>Earth Data Analysis Center, University of New Mexico</ContactOrganization>
      </ContactPersonPrimary>
      <ContactPosition>Sr. Research Scientist</ContactPosition>
      <ContactAddress>
        <AddressType>Mailing address</AddressType>
        <Address>Earth Data Analysis Center, MSC01 1110, 1 University of New Mexico</Address>
        <City>Albuquerque</City>
        <StateOrProvince>NM</StateOrProvince>
        <PostCode>87131</PostCode>
        <Country>US</Country>
      </ContactAddress>
      <ContactVoiceTelephone>(505) 277-3622 x234</ContactVoiceTelephone>
      <ContactFacsimileTelephone>(505) 277-3614</ContactFacsimileTelephone>
      <ContactElectronicMailAddress>kbene@edac.unm.edu</ContactElectronicMailAddress>
    </ContactInformation>
    <Fees>none</Fees>
    <AccessConstraints>none</AccessConstraints>
  </Service>

  <Capability>
    <Request>
      <GetCapabilities>
        <Format>application/vnd.ogc.wms_xml</Format>
      </GetCapabilities>
      <DCPType>
        <HTTP>
          <Get><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Get>
          <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
        </HTTP>
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    </Request>
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      </DCPType>
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    <GetMap>
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    <DescribeLayer>
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      <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
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    <GetLegendGraphic>
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    </DCPType>
  </GetCapabilities>
  </Request>
  <Exception>
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    <Format>application/vnd.ogc.se_inimage</Format>
    <Format>application/vnd.ogc.se_blank</Format>
  </Exception>
  <VendorSpecificCapabilities />
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  <Post><OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?"/></Post>
</HTTP>
</DCPType>
</GetStyles>
</Request>
<Exception>
  <Format>application/vnd.ogc.se_xml</Format>
  <Format>application/vnd.ogc.se_inimage</Format>
  <Format>application/vnd.ogc.se_blank</Format>
</Exception>
<VendorSpecificCapabilities />
<UserDefinedSymbolization SupportSLD="1" UserLayer="0" UserStyle="1"
RemoteWFS="0"/>
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more ...

GetCapabilities XML File

A bunch of layers ...

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version=1.1.1&amp;service=WMS&amp;request=GetLegendGraphic&amp;layer=mircoog_2006_idx&amp;format=image/png"/>
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</Style>
</Layer>
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<BoundingBox SRS="EPSG:2258"
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<BoundingBox SRS="EPSG:32613"
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</Layer>
</Layer>
</Capability>
</WMT_MS_Capabilities>
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GetCapabilities XML File

A bunch of layers ...

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<BoundingBox SRS="EPSG:32613"
  minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e+06" />
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</Layer>
</Capability>
</WMT_MS_Capabilities>
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<Layer>

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minx="-109.5" miny="31" maxx="-102.5" maxy="37.5" />

GetCapabilities XML File

A bunch of layers ...

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<BoundingBox SRS="EPSG:2258"
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  minx="140691" miny="3.48308e+06" maxx="366509" maxy="4.10615e+06" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>landstat_idx</Name>
<Title>New Mexico Landstat Mosaic Tile Index</Title>
<SR>EPSG:32613</SR>
<LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655" maxy="37.4977" />
<BoundingBox SRS="EPSG:32613"
  minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e+06" />
<Style>
<Name>default</Name>
<Title>default</Title>
<LegendURL width="20" height="10">
<Format>image/png</Format>
<OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlinktype="simple" xlinkhref="http://edc.wms.unm.edu/cgi-bin/mapfiles/imagery_wms?
version=1.1.1&amp;service=WMS&amp;request=GetLegendGraphic&amp;layer=landstat_idx&amp;format=image/png"/>
</LegendURL>
</Style>
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>landstat</Name>
<Title>New Mexico Landstat Mosaic</Title>
<SR>EPSG:32613</SR>
<LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655" maxy="37.4977" />
<BoundingBox SRS="EPSG:32613"
  minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e+06" />
<ScaleHint min="23.9473367246226" max="498.902848429637" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>landstat_nolimit</Name>
<Title>New Mexico Landstat Mosaic - No Scale Limit</Title>
<SR>EPSG:32613</SR>
<LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655" maxy="37.4977" />
<BoundingBox SRS="EPSG:32613"
  minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e+06" />
</Layer>
</Layer>
</Layer>
</Capability>
</WMT_MS_Capabilities>
```


GetCapabilities XML File

A bunch of layers ...

```
<Layer>
<Name>imagery_wms</Name>
<Title>EDAC Imagery OGC Web Map Services</Title>
<SR>epsg:4326</SR>
<LatLonBoundingBox minx="-109.5" miny="31" maxx="-102.5" maxy="37.5" />
<BoundingBox SRS="EPSG:4269"
  minx="-109.5" miny="31" maxx="-102.5" maxy="37.5" />

<Layer queryable="0" opaque="0" cascaded="0">
<Name>mircoog_2006_idx</Name>
<Title>MRG COG 6-inch Imagery (2006) Tile Index</Title>
<SR>EPSG:2258</SR>
<LatLonBoundingBox minx="-106.963" miny="34.2521" maxx="-106.14" maxy="35.6396" />
<BoundingBox SRS="EPSG:2258"
  minx="-1.4287e+06" miny="1.18384e+06" maxx="1.67321e+06" maxy="1.68808e+06" />
<Style>
<Name>default</Name>
<Title>default</Title>
<LegendURL width="20" height="10">
<Format>image/png</Format>
<OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlinktype="simple" xlinkhref="http://edc.wms.unm.edu/cgi-bin/mapfiles/imagery_wms?
version=1.1.1&amp;service=WMS&amp;request=GetLegendGraphic&amp;layer=mircoog_2006_idx&amp;format=image/png"/>
</LegendURL>
</Style>
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>mircoog_2006_rast</Name>
<Title>MRG COG 6-inch Imagery (2006)</Title>
<SR>EPSG:2258</SR>
<LatLonBoundingBox minx="-106.963" miny="34.2521" maxx="-106.14" maxy="35.6396" />
<BoundingBox SRS="EPSG:2258"
  minx="-1.4287e+06" miny="1.18384e+06" maxx="1.67321e+06" maxy="1.68808e+06" />
<ScaleHint min="0" max="5.98683418115565" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>mircoog_2006_rast_noscale</Name>
<Title>MRG COG 6-inch Imagery (2006) - No Scale Limit</Title>
<SR>EPSG:2258</SR>
<LatLonBoundingBox minx="-106.963" miny="34.2521" maxx="-106.14" maxy="35.6396" />
<BoundingBox SRS="EPSG:2258"
  minx="-1.4287e+06" miny="1.18384e+06" maxx="1.67321e+06" maxy="1.68808e+06" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>doqq05_idx</Name>
<Title>New Mexico 1-m Imagery - 2005 NM DOQQ Collection Tile Index</Title>
<SR>EPSG:26913</SR>
<LatLonBoundingBox minx="-109.039" miny="31.4268" maxx="-106.405" maxy="37.0922" />
<BoundingBox SRS="EPSG:26913"
  minx="140691" miny="348308e+06" maxx="366509" maxy="4.10615e+06" />
<Style>
<Name>default</Name>
<Title>default</Title>
<LegendURL width="20" height="10">
<Format>image/png</Format>
<OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlinktype="simple" xlinkhref="http://edc.wms.unm.edu/cgi-bin/mapfiles/imagery_wms?
version=1.1.1&amp;service=WMS&amp;request=GetLegendGraphic&amp;layer=doqq05_idx&amp;format=image/png"/>
</LegendURL>
</Style>
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>doqq05</Name>
<Title>New Mexico 1-m Imagery - 2005 NM DOQQ Collection</Title>
<SR>EPSG:26913</SR>
<LatLonBoundingBox minx="-109.039" miny="31.4268" maxx="-106.405" maxy="37.0922" />
<BoundingBox SRS="EPSG:26913"
  minx="140691" miny="348308e+06" maxx="366509" maxy="4.10615e+06" />
<ScaleHint min="5.98683418115565" max="23.9473367246226" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>doqq05_noscale</Name>
<Title>New Mexico 1-m Imagery - 2005 NM DOQQ Collection - No Scale Limit</Title>
<SR>EPSG:26913</SR>
<LatLonBoundingBox minx="-109.039" miny="31.4268" maxx="-106.405" maxy="37.0922" />
<BoundingBox SRS="EPSG:26913"
  minx="140691" miny="348308e+06" maxx="366509" maxy="4.10615e+06" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>landstat_idx</Name>
<Title>New Mexico Landstat Mosaic Tile Index</Title>
<SR>EPSG:32613</SR>
<LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655" maxy="37.4977" />
<BoundingBox SRS="EPSG:32613"
  minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e+06" />
<Style>
<Name>default</Name>
<Title>default</Title>
<LegendURL width="20" height="10">
<Format>image/png</Format>
<OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlinktype="simple" xlinkhref="http://edc.wms.unm.edu/cgi-bin/mapfiles/imagery_wms?
version=1.1.1&amp;service=WMS&amp;request=GetLegendGraphic&amp;layer=landstat_idx&amp;format=image/png"/>
</LegendURL>
</Style>
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>landstat</Name>
<Title>New Mexico Landstat Mosaic</Title>
<SR>EPSG:32613</SR>
<LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655" maxy="37.4977" />
<BoundingBox SRS="EPSG:32613"
  minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e+06" />
<ScaleHint min="23.9473367246226" max="498.902848429637" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>landstat_nolimit</Name>
<Title>New Mexico Landstat Mosaic - No Scale Limit</Title>
<SR>EPSG:32613</SR>
<LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655" maxy="37.4977" />
<BoundingBox SRS="EPSG:32613"
  minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e+06" />
</Layer>
</Layer>
</Layer>
</Capability>
</WMT_MS_Capabilities>
```


GetCapabilities XML File

A bunch of layers ...

```
<Layer>
<Name>imagery_wms</Name>
<Title>EDAC Imagery OGC Web Map Services</Title>
<SRSEpsg>4326</SRSEpsg>
<LatLonBoundingBox minx="-109.5" miny="31" maxx="-102.5" maxy="37.5" />
<BoundingBox SRS="EPSG:4269"
  minx="-109.5" miny="31" maxx="-102.5" maxy="37.5" />

<Layer queryable="0" opaque="0" cascaded="0">
<Name>mirrcog_2006_idx</Name>
<Title>MRG COG 6-inch Imagery (2006) Tile Index</Title>
<SRSEpsg>2258</SRSEpsg>
<LatLonBoundingBox minx="-106.963" miny="34.2521" maxx="-106.14" maxy="35.6396" />
<BoundingBox SRS="EPSG:2258"
  minx="-1.4287e+06" miny="1.18384e+06" maxx="1.67321e+06" maxy="1.68808e+06" />
<Style>
<Name>default</Name>
<Title>default</Title>
<LegendURL width="20" height="10">
<Format>image/png</Format>
<OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlinktype="simple" xlinkhref="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?
version=1.1.1&amp;service=WMS&amp;request=GetLegendGraphic&amp;layer=mirrcog_2006_idx&amp;format=image/png"/>
</LegendURL>
</Style>
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>mirrcog_2006_rast</Name>
<Title>MRG COG 6-inch Imagery (2006) Tile Index</Title>
<SRSEpsg>2258</SRSEpsg>
<LatLonBoundingBox minx="-106.963" miny="34.2521" maxx="-106.14" maxy="35.6396" />
<BoundingBox SRS="EPSG:2258"
  minx="-1.4287e+06" miny="1.18384e+06" maxx="1.67321e+06" maxy="1.68808e+06" />
<ScaleHint min="0" max="5.98683418115565" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>mirrcog_2006_rast_noscale</Name>
<Title>MRG COG 6-inch Imagery (2006) - No Scale Limit</Title>
<SRSEpsg>2258</SRSEpsg>
<LatLonBoundingBox minx="-106.963" miny="34.2521" maxx="-106.14" maxy="35.6396" />
<BoundingBox SRS="EPSG:2258"
  minx="-1.4287e+06" miny="1.18384e+06" maxx="1.67321e+06" maxy="1.68808e+06" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>doqq05_idx</Name>
<Title>New Mexico 1-m Imagery - 2005 NM DOQQ Collection Tile Index</Title>
<SRSEpsg>26913</SRSEpsg>
<LatLonBoundingBox minx="-109.039" miny="31.4268" maxx="-106.405" maxy="37.0922" />
<BoundingBox SRS="EPSG:26913"
  minx="-140691" miny="3.48308e+06" maxx="366509" maxy="4.10615e+06" />
<Style>
<Name>default</Name>
<Title>default</Title>
<LegendURL width="20" height="10">
<Format>image/png</Format>
<OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlinktype="simple" xlinkhref="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?
version=1.1.1&amp;service=WMS&amp;request=GetLegendGraphic&amp;layer=doqq05_idx&amp;format=image/png"/>
</LegendURL>
</Style>
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>doqq05</Name>
<Title>New Mexico 1-m Imagery - 2005 NM DOQQ Collection</Title>
<SRSEpsg>26913</SRSEpsg>
<LatLonBoundingBox minx="-109.039" miny="31.4268" maxx="-106.405" maxy="37.0922" />
<BoundingBox SRS="EPSG:26913"
  minx="-140691" miny="3.48308e+06" maxx="366509" maxy="4.10615e+06" />
<ScaleHint min="5.98683418115565" max="23.9473367246226" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>doqq05_noscale</Name>
<Title>New Mexico 1-m Imagery - 2005 NM DOQQ Collection - No Scale Limit</Title>
<SRSEpsg>26913</SRSEpsg>
<LatLonBoundingBox minx="-109.039" miny="31.4268" maxx="-106.405" maxy="37.0922" />
<BoundingBox SRS="EPSG:26913"
  minx="-140691" miny="3.48308e+06" maxx="366509" maxy="4.10615e+06" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>landsat_idx</Name>
<Title>New Mexico Landsat Mosaic Tile Index</Title>
<SRSEpsg>32613</SRSEpsg>
<LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655" maxy="37.4977" />
<BoundingBox SRS="EPSG:32613"
  minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e+06" />
<Style>
<Name>default</Name>
<Title>default</Title>
<LegendURL width="20" height="10">
<Format>image/png</Format>
<OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlinktype="simple" xlinkhref="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?
version=1.1.1&amp;service=WMS&amp;request=GetLegendGraphic&amp;layer=landsat_idx&amp;format=image/png"/>
</LegendURL>
</Style>
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>landsat</Name>
<Title>New Mexico Landsat Mosaic</Title>
<SRSEpsg>32613</SRSEpsg>
<LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655" maxy="37.4977" />
<BoundingBox SRS="EPSG:32613"
  minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e+06" />
<ScaleHint min="23.9473367246226" max="498.902848429637" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
<Name>landsat_nolimit</Name>
<Title>New Mexico Landsat Mosaic - No Scale Limit</Title>
<SRSEpsg>32613</SRSEpsg>
<LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655" maxy="37.4977" />
<BoundingBox SRS="EPSG:32613"
  minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e+06" />
</Layer>
</Capability>
</WMT_MS_Capabilities>
```

```
<Layer queryable="0" opaque="0" cascaded="0">
  <Name>landsat_idx</Name>
  <Title>New Mexico Landsat Mosaic Tile Index</Title>
  <SRSEpsg>32613</SRSEpsg>
  <LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655"
  maxy="37.4977" />
  <BoundingBox SRS="EPSG:32613"
    minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e
+06" />
  <Style>
    <Name>default</Name>
    <Title>default</Title>
    <LegendURL width="20" height="10">
      <Format>image/png</Format>
      <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:type="simple" xlink:href="http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?
version=1.1.1&amp;service=WMS&amp;request=GetLegendGraphic&amp;layer=landsat_idx&amp;fo
rmat=image/png" />
    </LegendURL>
  </Style>
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
  <Name>landsat</Name>
  <Title>New Mexico Landsat Mosaic</Title>
  <SRSEpsg>32613</SRSEpsg>
  <LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655"
  maxy="37.4977" />
  <BoundingBox SRS="EPSG:32613"
    minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e
+06" />
  <ScaleHint min="23.9473367246226" max="498.902848429637" />
</Layer>
<Layer queryable="0" opaque="0" cascaded="0">
  <Name>landsat_nolimit</Name>
  <Title>New Mexico Landsat Mosaic - No Scale Limit</Title>
  <SRSEpsg>32613</SRSEpsg>
  <LatLonBoundingBox minx="-109.577" miny="30.681" maxx="-102.655"
  maxy="37.4977" />
  <BoundingBox SRS="EPSG:32613"
    minx="94802.8" miny="3.40189e+06" maxx="707403" maxy="4.15009e
+06" />
</Layer>
```


WMS Request

WMS Request

Sample GetMap Request

```
http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?  
WMTVER=1.1.1&  
SERVICE=WMS&  
REQUEST=GetMap&  
SRS=EPSG:4326&  
FORMAT=image/jpeg&  
STYLES=&  
LAYERS=modis_nm&  
TRANSPARENT=TRUE&  
WIDTH=200&  
HEIGHT=200&  
bbox=-110.1387,35.5,-107.7387,37.9
```



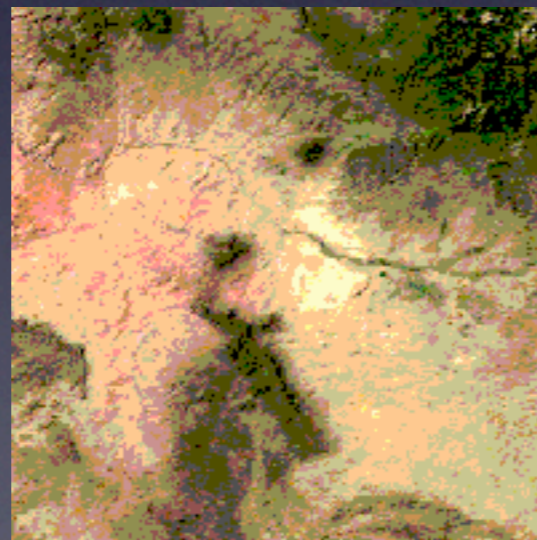
[Open in Browser](#)

WMS Request

WMS Request

Sample GetMap Request

```
http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?  
WMTVER=1.1.1&  
SERVICE=WMS&  
REQUEST=GetMap&  
SRS=EPSG:4326&  
FORMAT=image/gif&  
STYLES=&  
LAYERS=modis_nm&  
TRANSPARENT=TRUE&  
WIDTH=200&  
HEIGHT=200&  
bbox=-110.1387,35.5,-107.7387,37.9
```



New

[Open in Browser](#)



Original

[Open in Browser](#)

WMS Request



WMS Request

Sample GetMap Request

```
http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?  
WMTVER=1.1.1&  
SERVICE=WMS&  
REQUEST=GetMap&  
SRS=EPSG:4326&  
FORMAT=image/jpeg&  
STYLES=&  
LAYERS=modis_nm&  
TRANSPARENT=TRUE&  
WIDTH=300&  
HEIGHT=300&  
bbox=-110.6387,35.0,-107.2387,38.4
```



New

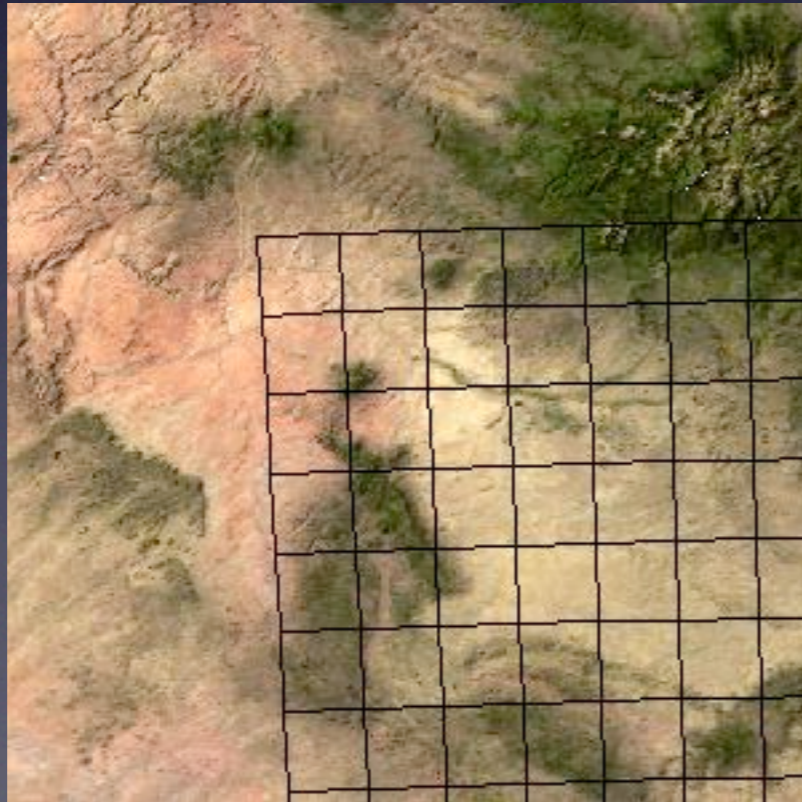
[Open in Browser](#)



Original

[Open in Browser](#)

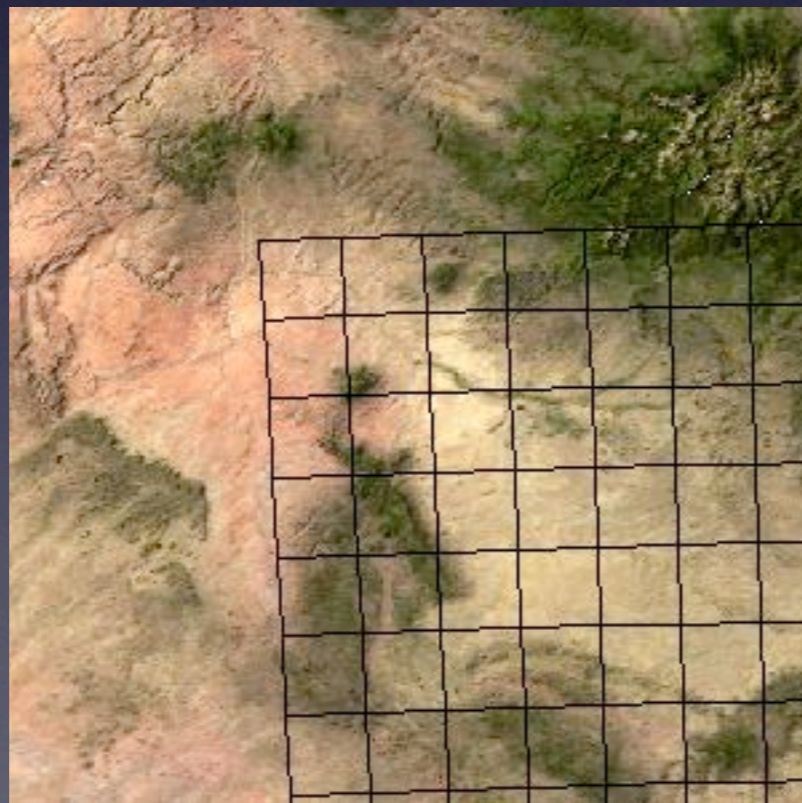
WMS Request



WMS Request

Sample GetMap Request

```
http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?  
WMTVER=1.1.1&  
SERVICE=WMS&  
REQUEST=GetMap&  
SRS=EPSG:4326&  
FORMAT=image/jpeg&  
STYLES=&  
LAYERS=modis_nm,landsat_idx&  
TRANSPARENT=TRUE&  
WIDTH=300&  
HEIGHT=300&  
bbox=-110.6387,35.0,-107.2387,38.4
```



New

[Open in Browser](#)



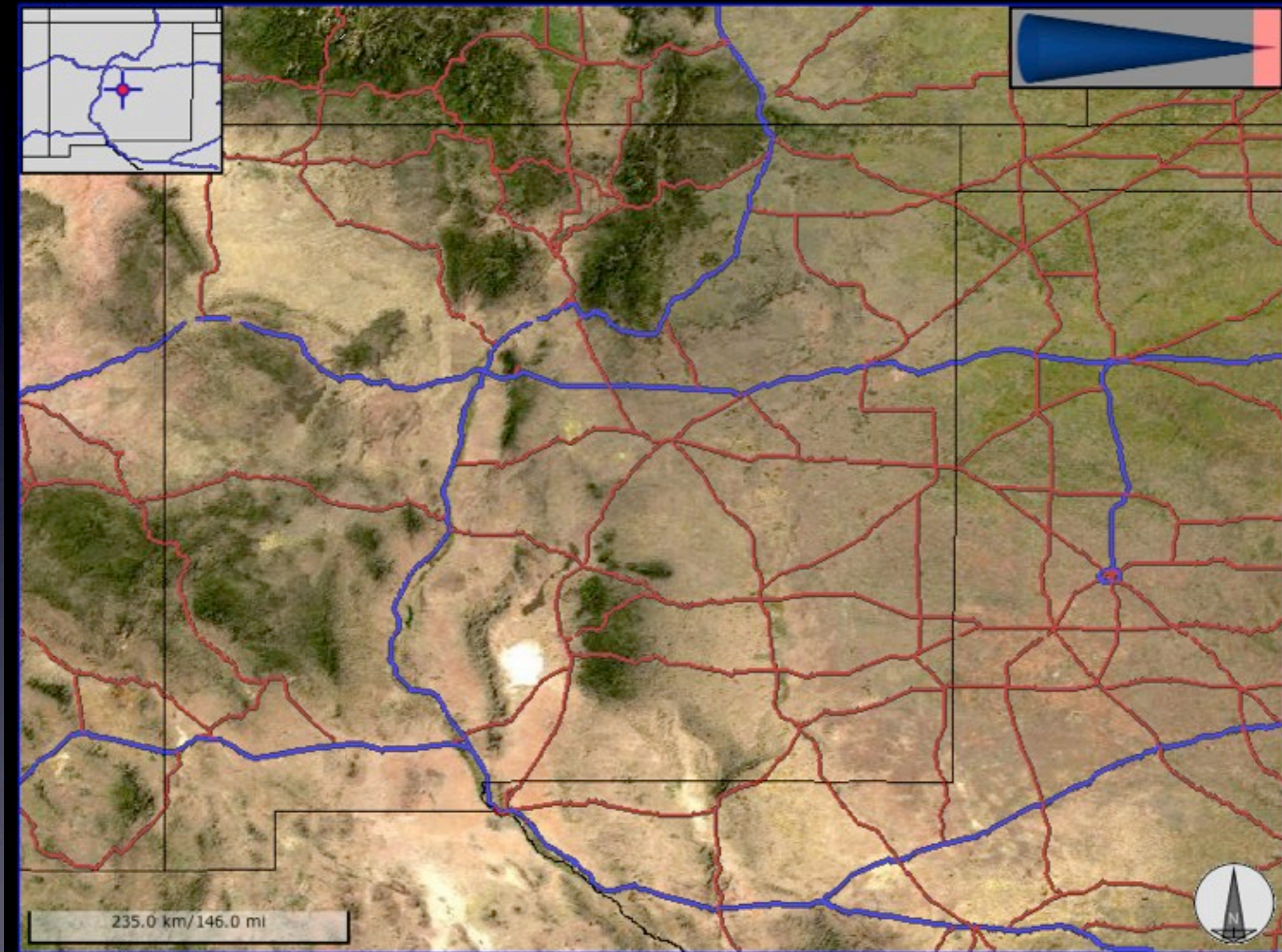
Original

[Open in Browser](#)

WMS Client Demonstration



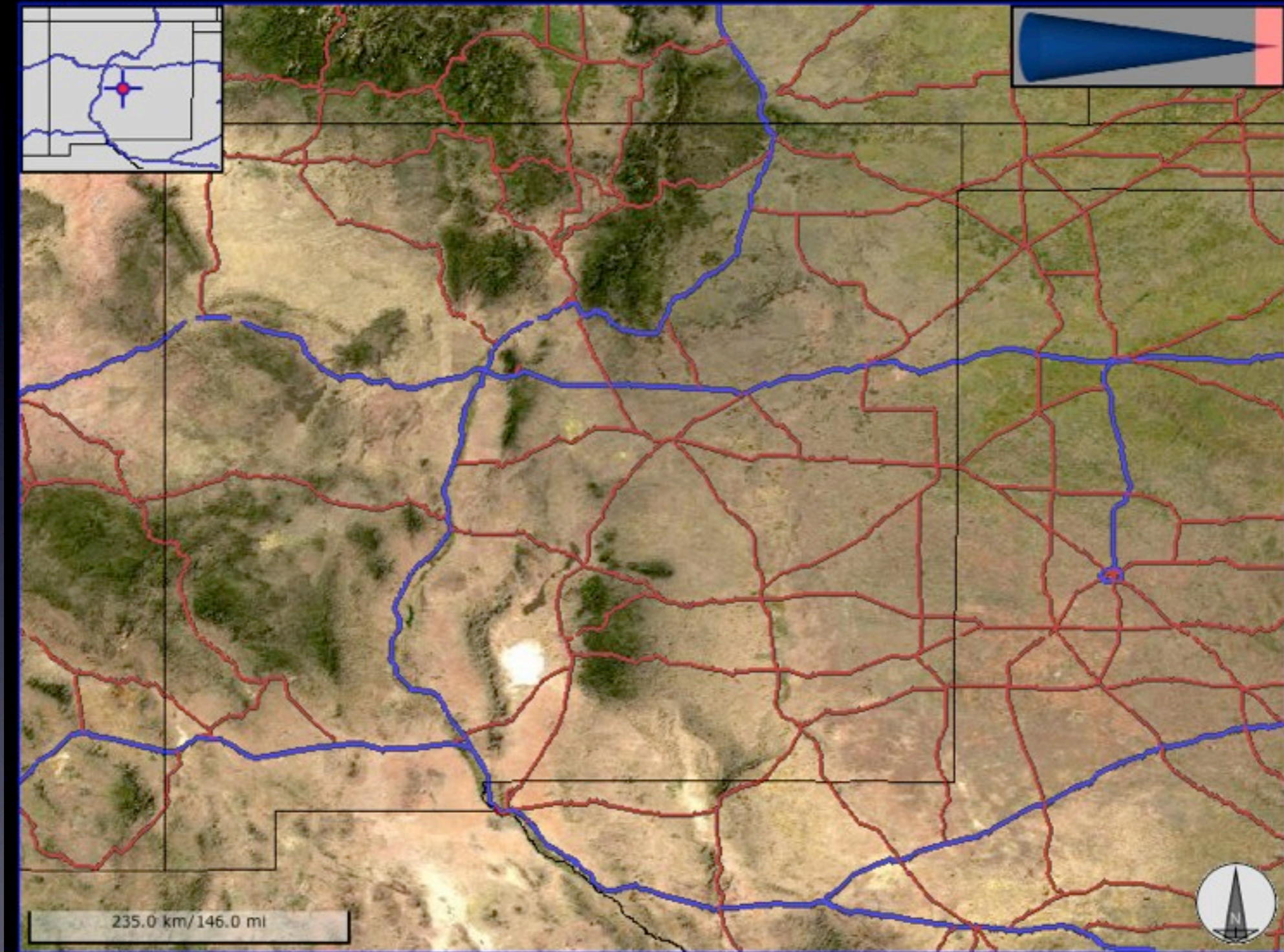
RGIS Data Viewer



WMS Client Demonstration



RGIS Data Viewer



http://rgis.unm.edu/mapper/index_cluster.html

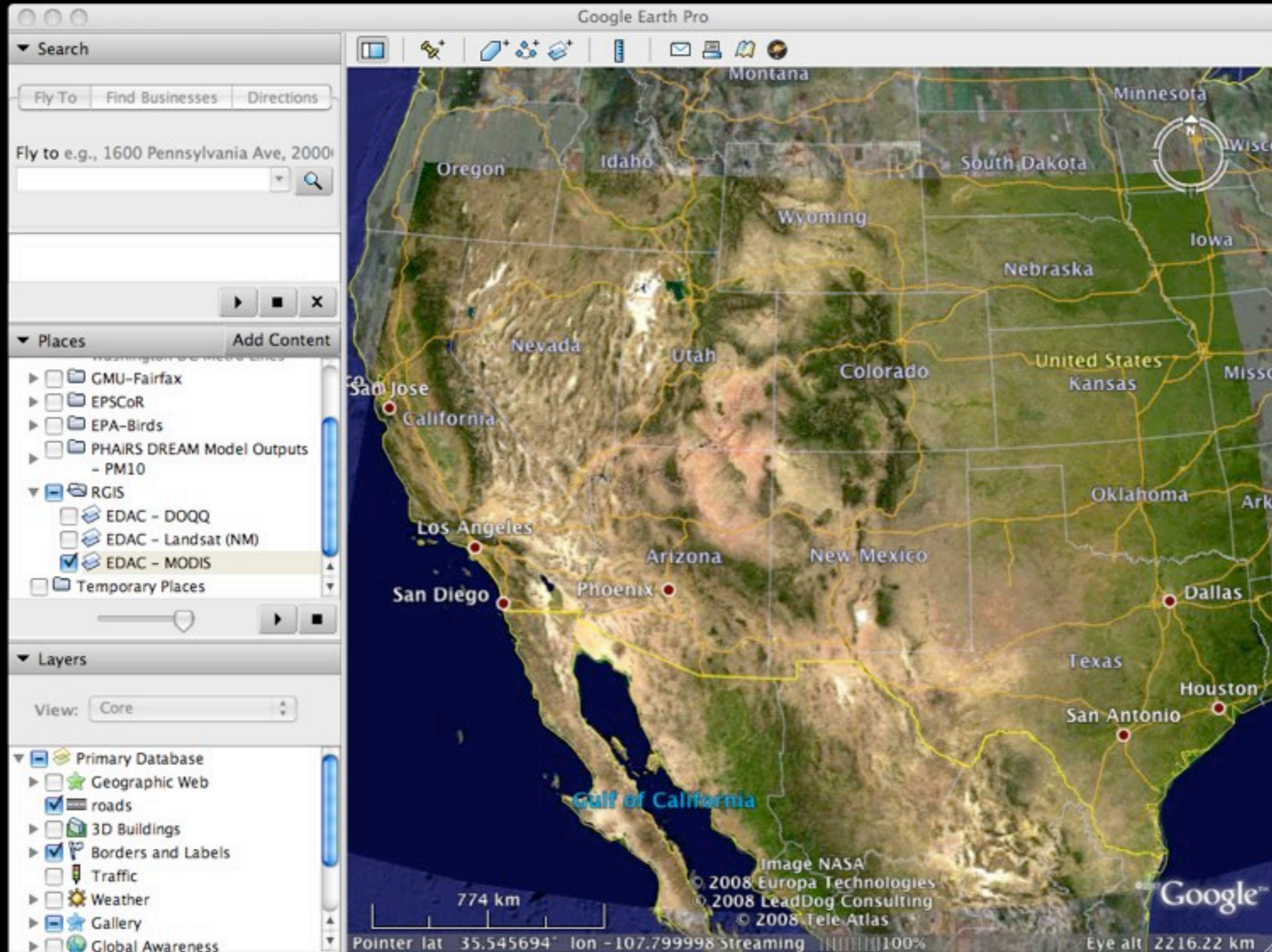
Google Earth Demonstration I

Google Earth Demonstration I

Sample KML File

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.2">
<GroundOverlay>
  <name>EDAC - Landsat (NM)</name>
  <visibility>0</visibility>
  <open>1</open>
  <color>a1ffffff</color>
  <Icon>
    <href>http://edacwms.unm.edu/cgi-bin/mapfiles/imagery_wms?
VERSION=1.1.1&REQUEST=GetMap&SRS=EPSG:
4326&LAYERS=landsat&TRANSPARENT=TRUE&FORMAT=image/
jpeg&STYLES=&WIDTH=1024&HEIGHT=1024</href>
    <viewRefreshMode>onStop</viewRefreshMode>
    <viewBoundScale>0.75</viewBoundScale>
  </Icon>
  <LatLonBox>
    <north>45.96516337199642</north>
    <south>22.11575127750376</south>
    <east>-84.730482521371</east>
    <west>-122.5309905906474</west>
  </LatLonBox>
</GroundOverlay>
</kml>
```


Google Earth Demonstration I



Time-enabled WMS

Time-enabled WMS

GetCapabilities Request

```
http://phairs-devel.unm.edu/cgi-bin/mapserv_5.0.0?  
map=mapmodule_wms.map&SERVICE=WMS&REQUEST=GetCapabilities  
es
```


Time-enabled WMS

GetCapabilities Request

```
http://phairs-devel.unm.edu/cgi-bin/mapserv_5.0.0?
map=mapmodule_wms.map&SERVICE=WMS&REQUEST=GetCapabilities
```

Sample Time-enabled Layer Block from the Capabilities XML file

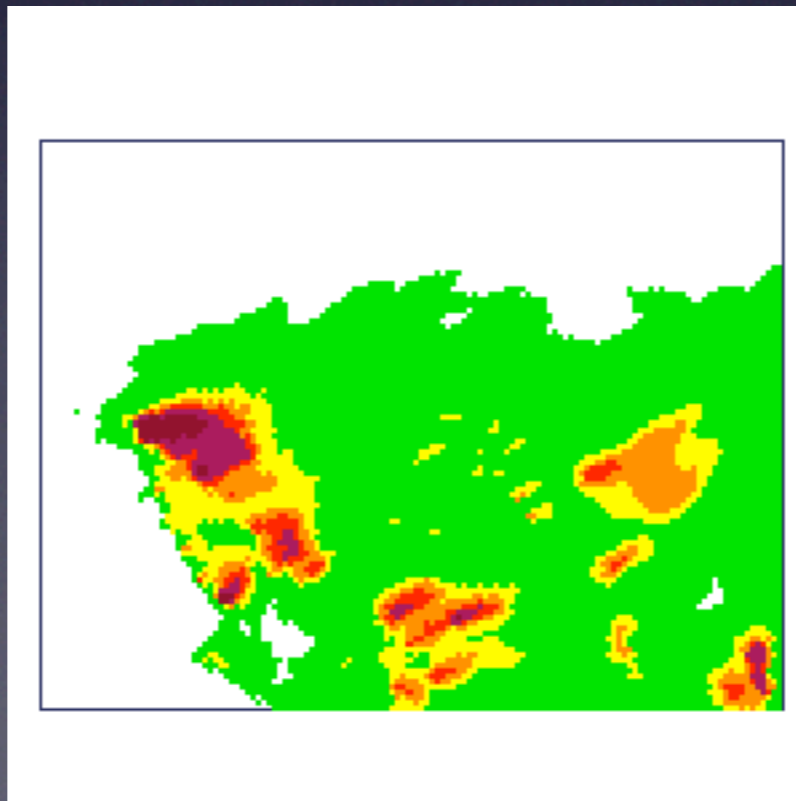
```
<Layer queryable="0" opaque="0" cascaded="0">
  <Name>dream_pm10_classed</Name>
  <Title>DREAM dust output PM10 - Classified</Title>
  <Abstract>DREAM model dust output - Date:12/15/03 Time:00 hrs UTC
Particle Size Class: PM10</Abstract>
  <KeywordList>
    <Keyword>DREAM dust model</Keyword>
    <Keyword> PM10</Keyword>
  </KeywordList>
  <SRS>EPSG:4326</SRS>
  <LatLonBoundingBox minx="-120" miny="26" maxx="-96" maxy="43" />
  <BoundingBox SRS="EPSG:4326"
    minx="-120" miny="26" maxx="-96" maxy="43" />
  <Dimension name="time" units="ISO8601"/>
  <Extent name="time" default="2007-02-24T00:00:00Z"
nearestValue="0">2003-01-01T00:00:00Z/2008-10-05T23:00:00Z</Extent>
</Layer>
```


Time-enabled WMS

Time-enabled WMS

GetMap Request

```
http://phairs-devel.unm.edu/cgi-bin/mapserv_5.0.0?map=mapmodule_wms.map&  
SERVICE=WMS&  
VERSION=1.1.1&  
REQUEST=GetMap&  
TRANSPARENT=TRUE&  
STYLES=&  
FORMAT=image/png&  
SRS=EPSG:4326&  
Width=300&  
Height=300&  
Layers=model_domain,dream_pm10_classed&  
BBOX=-121,23,-96,48&  
TIME=2008-01-07T00:00:00Z
```



[Open in Browser](#)

Time-enabled WMS

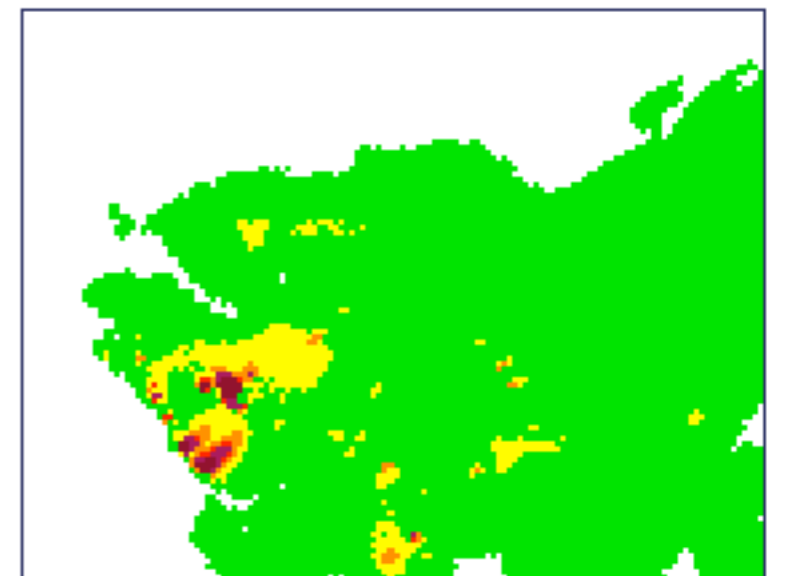
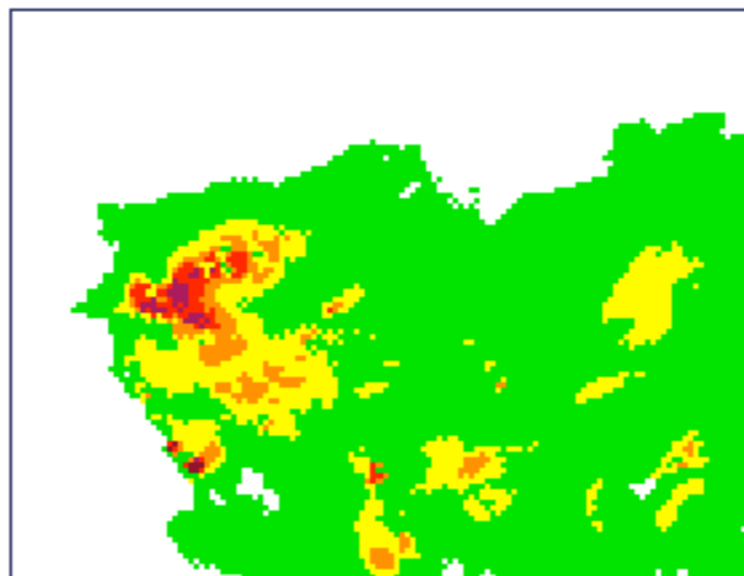
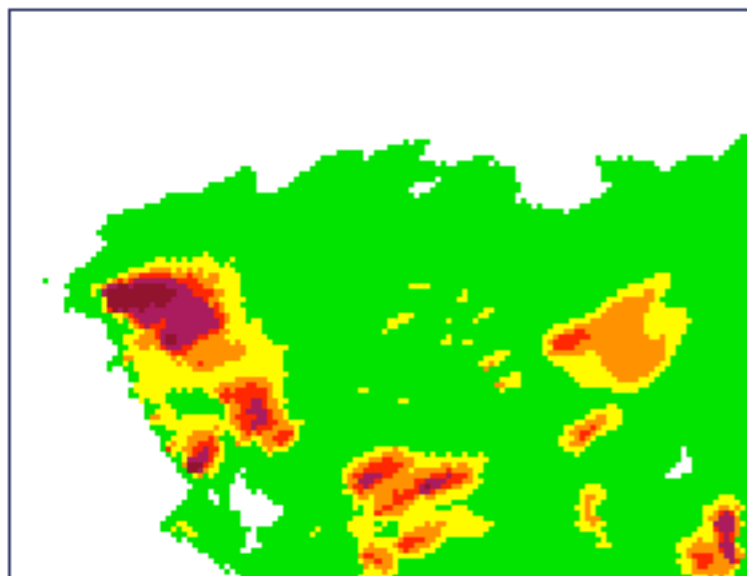
GetMap Request

```
http://phairs-devel.unm.edu/cgi-bin/mapserv_5.0.0?map=mapmodule_wms.map&  
SERVICE=WMS&  
VERSION=1.1.1&  
REQUEST=GetMap&  
TRANSPARENT=TRUE&  
STYLES=&  
FORMAT=image/png&  
SRS=EPSG:4326&  
Width=300&  
Height=300&  
Layers=model_domain,dream_pm10_classed&  
BBOX=-121,23,-96,48&
```

TIME=2008-01-07T00:00:00Z

TIME=2008-01-07T06:00:00Z

TIME=2008-01-07T12:00:00Z



Time-enabled WMS

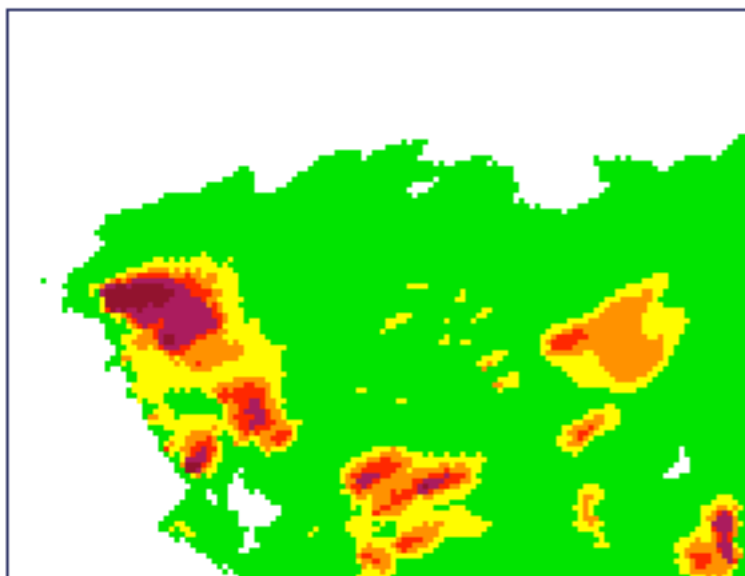
GetMap Request

```
http://phairs-devel.unm.edu/cgi-bin/mapserv_5.0.0?map=mapmodule_wms.map&  
SERVICE=WMS&  
VERSION=1.1.1&  
REQUEST=GetMap&  
TRANSPARENT=TRUE&  
STYLES=&  
FORMAT=image/png&  
SRS=EPSG:4326&  
Width=300&  
Height=300&  
Layers=model_domain,dream_pm10_classed&  
BBOX=-121,23,-96,48&
```

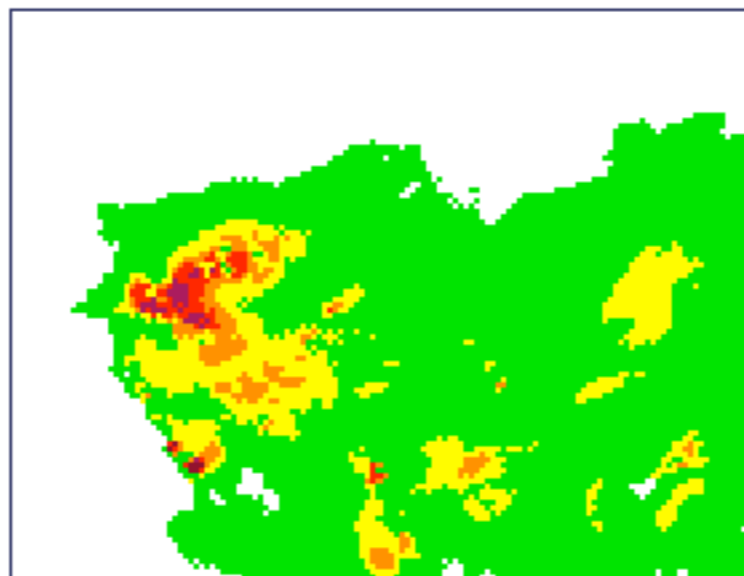
TIME=2008-01-07T00:00:00Z

TIME=2008-01-07T06:00:00Z

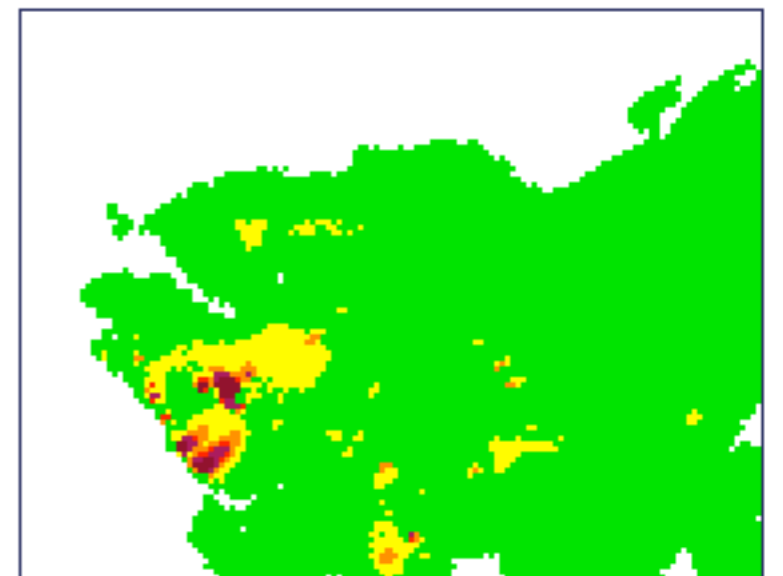
TIME=2008-01-07T12:00:00Z



[Open in Browser](#)



[Open in Browser](#)



[Open in Browser](#)

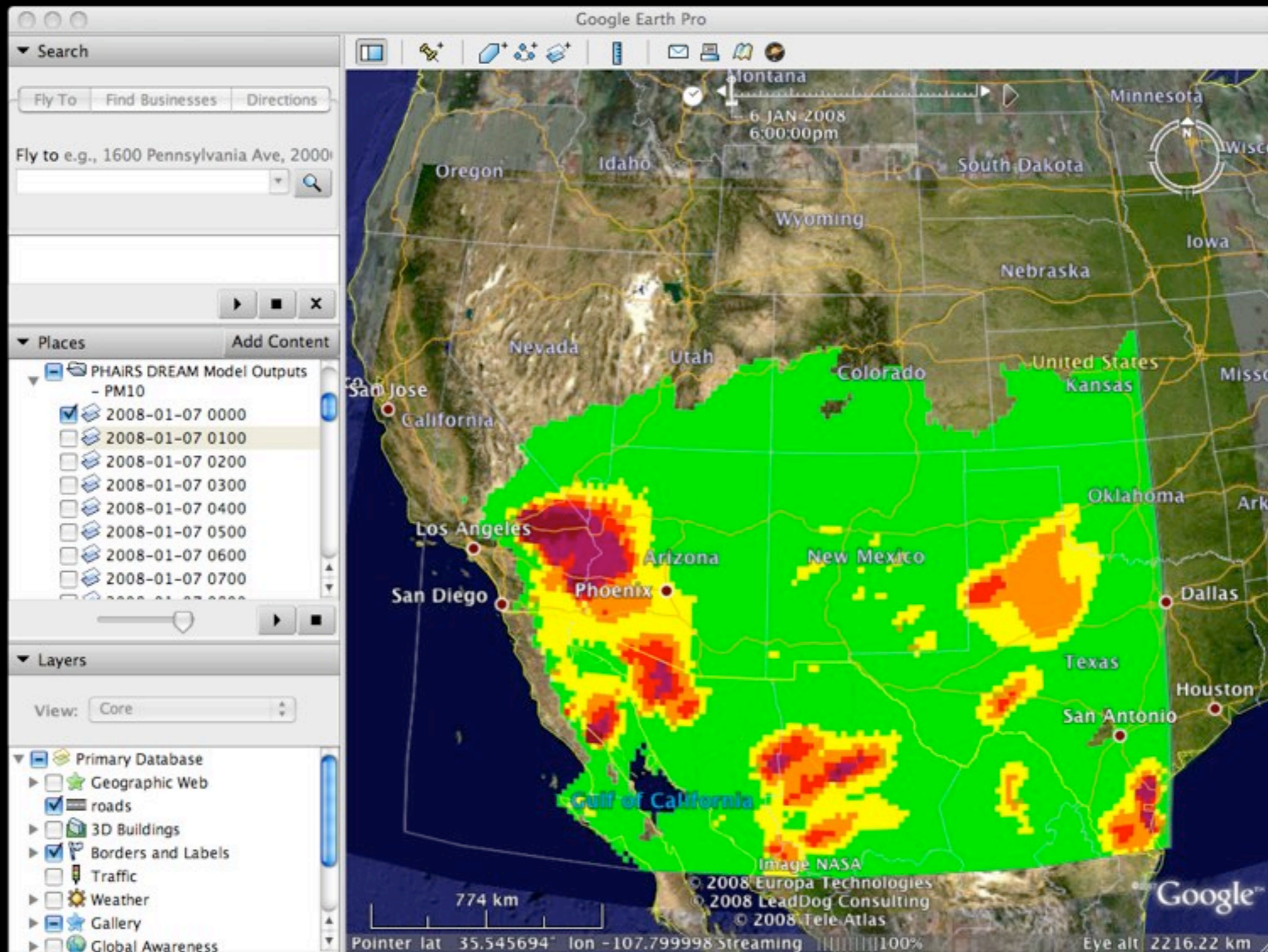
Time-enabled KML

Time-enabled KML

Single Time-enabled KML Layer

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.2">
<GroundOverlay>
  <name>2008-01-07 0000</name>
  <TimeSpan>
    <begin>2008-01-07</begin>
    <end>2008-01-07T00:59:59Z</end>
  </TimeSpan>
  <Icon>
    <href>http://phairs-devel.unm.edu/cgi-bin/mapserv_5.0.0?
map=mapmodule_wms.map&SERVICE=WMS&VERSION=1.1.1&REQUEST=GetMap&TRANSPARENT=TRUE
&STYLES=&FORMAT=image/png&SRS=EPSG:
4326&Width=1000&Height=1000&Layers=model_domain,dream_pm10_classed&TIME=2008-01
-07T00:00:00Z&</href>
    <viewRefreshMode>onStop</viewRefreshMode>
  </Icon>
  <LatLonBox>
    <north>47.27095924579043</north>
    <south>21.70728635014849</south>
    <east>-88.17114244590216</east>
    <west>-127.6960528895366</west>
  </LatLonBox>
</GroundOverlay>
</kml>
```


Google Earth Demonstration II



Where are We?

Overview

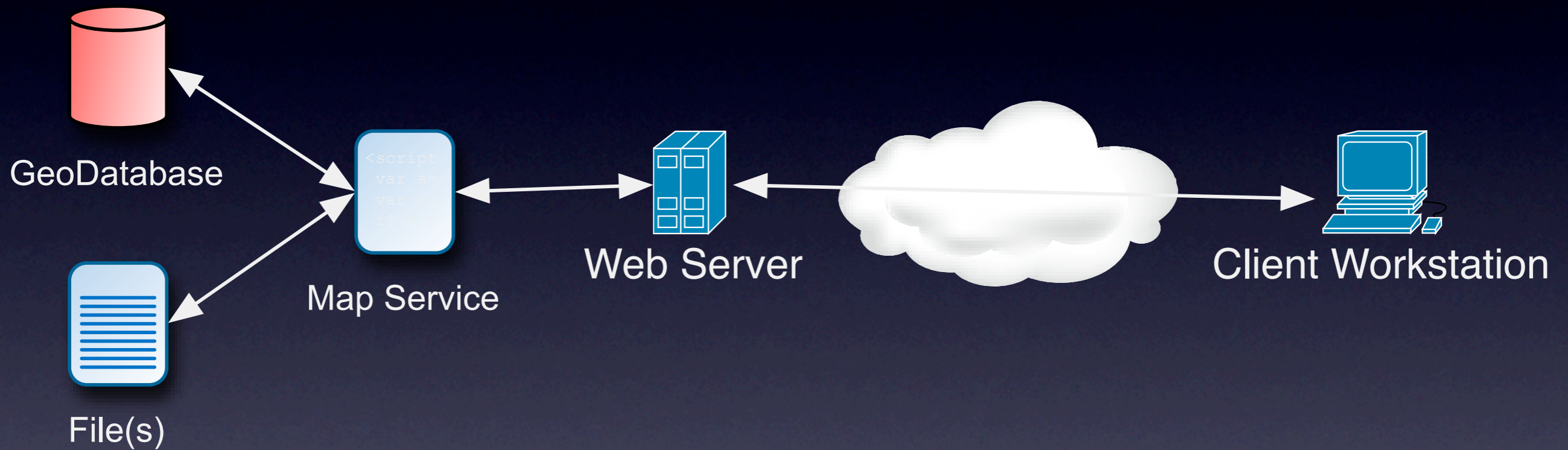
Open Standards & Demonstrations

Architecture

Applications Used in the Implementation

Concluding Remarks

Architectural Components



Where are We?

Overview

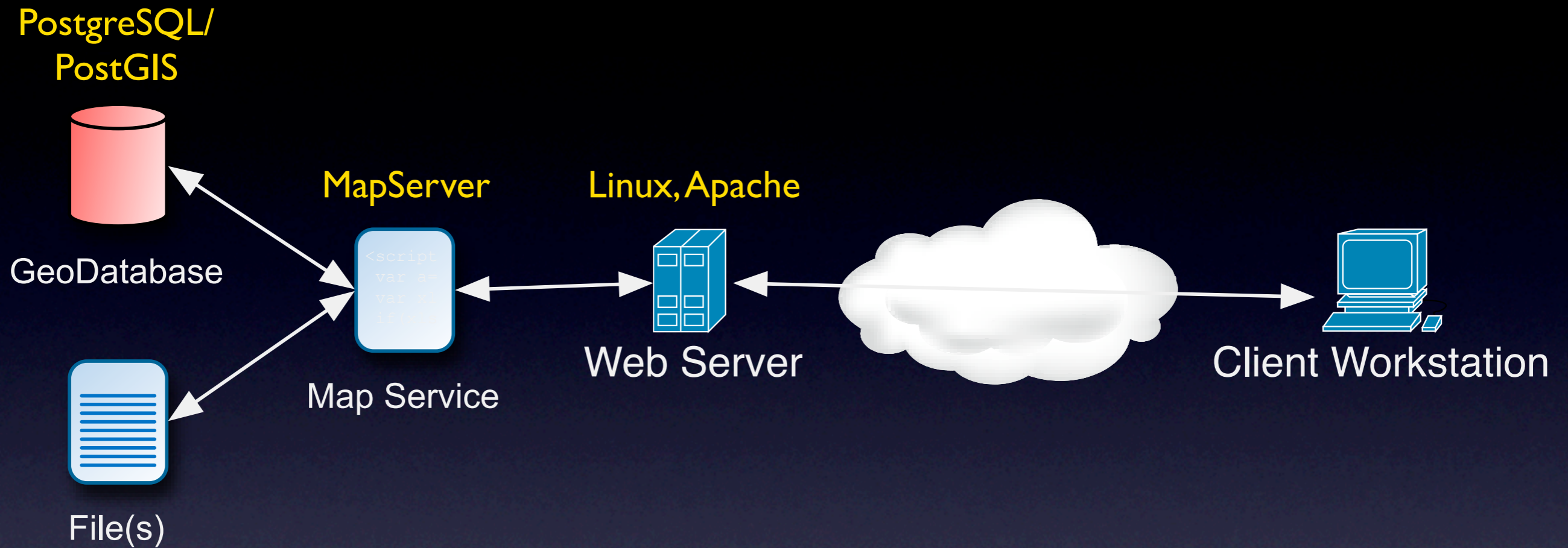
Open Standards & Demonstrations

Architecture

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Open Source Application Stack



Additional Applications

GDAL - Geospatial Data Abstraction Library

Proj4 - Projection Library

Python

Client and Server Applications

WMS 1.0: 124 registered implementations

WMS 1.1: 137 registered implementations

WMS 1.1.1: 194 registered implementations

WMS 1.3.0: 11 registered implementations

KML 2.2: 5 registered implementations

source: OGC Implementations Web Page

<http://www.opengeospatial.org/resource/products/byspec>

Where are We?

Overview

Open Standards & Demonstrations

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Concluding Remarks

Lessons Learned

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The deployment of standards-based services has led to great flexibility in serving diverse communities

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Services Oriented Architectures provide for a high level of component reusability

The available collection of Open Source applications provide a robust platform for deploying interoperable services

The inclusion of temporal support in the OGC standards provides a powerful tool for “drilling down” into large data collections

Resources

PostgreSQL

<http://www.postgresql.org/>

PostGIS

<http://www.postgis.org/>

MapServer

<http://mapserver.gis.umn.edu/>

Google Earth

<http://earth.google.com/>

OGC Standards

<http://www.opengeospatial.org/standards>

Acknowledgements

Acknowledgements

The New Mexico Resource Geographic Information System (RGIS) is funded by the NM State Legislature

The Public Health Applications in Remote Sensing (PHAiRS) project has been supported by NASA's REASoN Program, with additional interoperability support from NASA's Geosciences Interoperability Office.

EDAC's initial work in OGC's WMS was funded by a grant from the FGDC

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