Integration of Multiple OGC Standards for Delivery of Earth Science Information - Presentation of Time-Enabled WMS Through KML as Implemented by the PHAiRS Project

William Hudspeth (bhudspeth@edac.unm.edu), Karl Benedict (kbene@edac.unm.edu)

Earth Data Analysis Center, University of New Mexico

MSC01 1110, 1 University of New Mexico, Albuquerque, NM 87131

Project Background

Thie Public Health Applications in Remote Sensing (PHAiRS) project has been a five-year project in which Earth Data Analysis Center at the University of New Mexico, the Department of Atmospheric Sciences at the University of Arizona have collaborated (with funding from NASA's Applied Sciences Division) in the development of a core set of standards-based services and demonstration interfaces for the delivery of dust forecast model outputs and related data to public health decision support systems and epidemiological researchers. For the last year of the project these services were expanded through an interoperability demonstration project (funded by NASA's Geosciences Interoperability Office) in which George Mason University joined the collaboration in the development of enhanced high-performance computing modeling capabilities and new interoperable services.

The standards-based services developed for the PHAiRS project fall into three classes
- Open Geospatial Consortium (OGC) services
  - Standard and Time-enabled Web Map Services (WMS)
  - Web Coverage Services
  - KML
- World Wide Web Consortium (W3C) SOAP services
- HTTP GET-based data processing and delivery services

Embedding WMS Service Calls in KML

The KML specification defines an XML schema that is designed for the definition of both geographic data and representation information. KML supports the direct embedding of data, and reference to external imagery through the `GroundOverlay` element. The KML specification also provides for the parameterization of the remote address to accommodate the insertion of bounding box information that would be necessary to use an OGC WMS request as the source for the remote image. KML's implementation of time support allows for the definition of multiple ground overlay elements, each of which represent a specific point or duration in time.

The PHAiRS project developed a core set of time-enabled WMS services for the three-year historic collection of hourly PM_{10} and $PM_{2.5}$ model outputs that have been generated by the project. A basic web-based form was then developed that provides a user interface to a simple HTTP-based service that automatically generates a KML file that encapsulates the collection of time-enabled WMS requests in a set of `GroundOverlay` elements that may be rendered in Google Earth and other KML enabled virtual globe clients.

Time-enabled WMS

HTTP-GET KML Generation

PHAiRS KML Generator and Download Page

Data Management

PostGIS Database

GRASS Raster Database

References

de la Beaujardiere, J. (Ed.). (2006). OpenGIS Web Map Server Implementation Specification, Version 1.3.0 (Vol. OGC® 06-042): Open Geospatial Consortium.

Whiteside, A., & Evans, J. D. (Eds.). (2006). Web Coverage Service (WCS) Implementation Specification, Version 1.1.0 (Vol. 06-083r8): Open Geospatial Consortium.

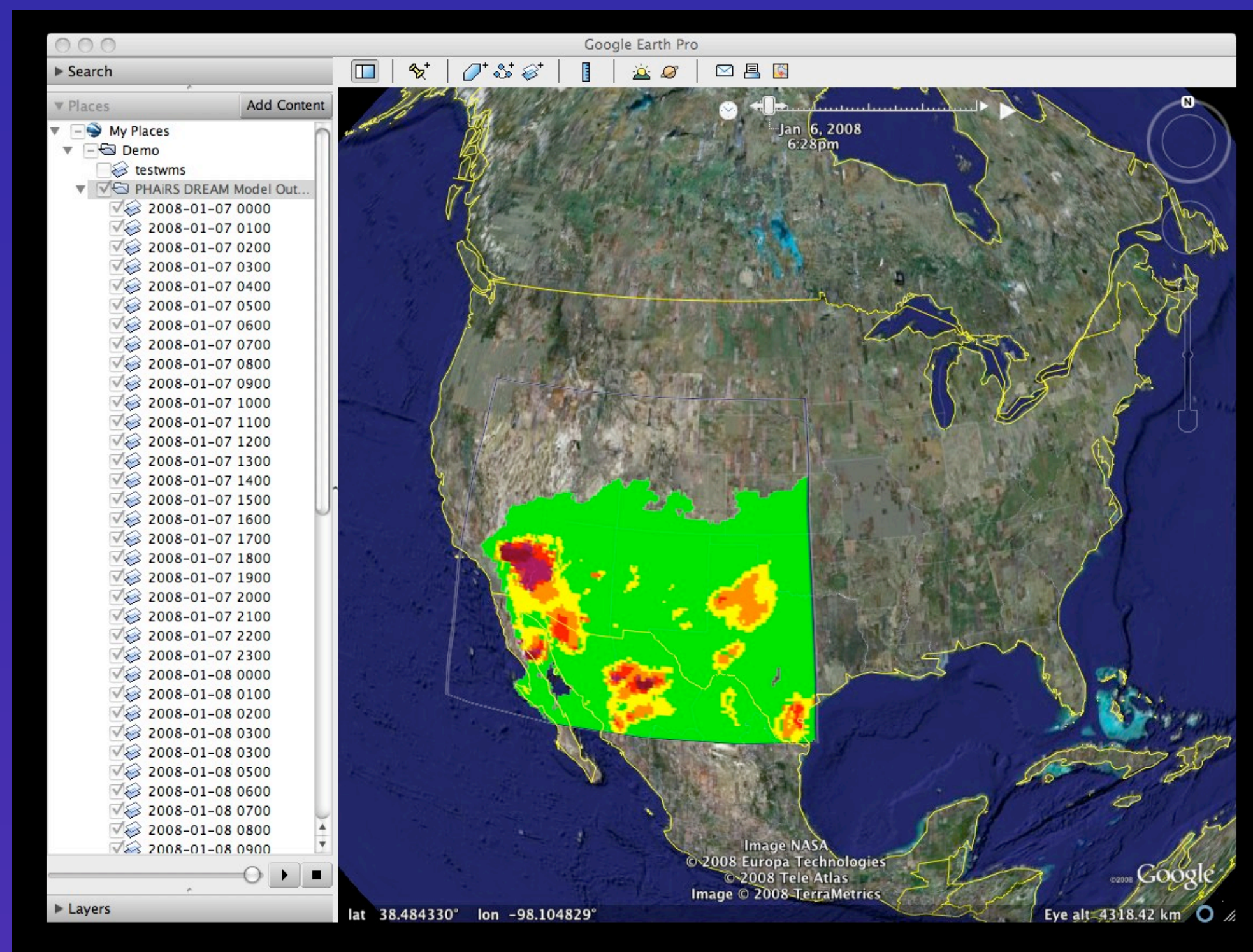Wilson, T. (Ed.). (2008). OGC® KML, Version 2.2.0 (Vol. OGC 07-147r2): Open Geospatial Consortium.

World Wide Web Consortium (W3C). (2006). Extensible Markup Language (XML) 1.1 (Second Edition). Retrieved 2008-06-27, 2008, from http://www.w3.org/TR/2006/REC-xml11-20060816/

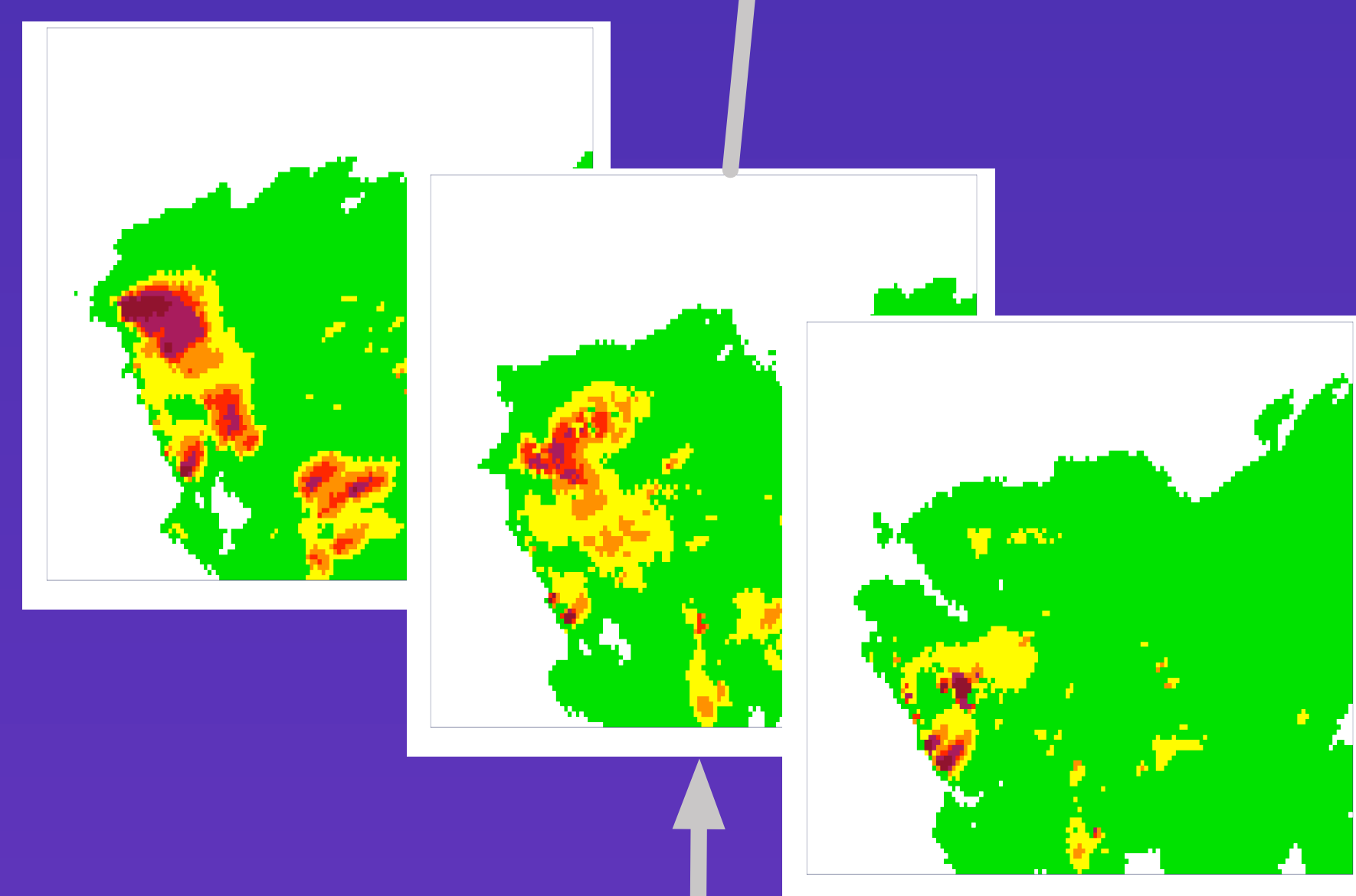World Wide Web Consortium (W3C). (2007). SOAP Version 1.2 Part 1: Messaging Framework (Second Edition). Retrieved 2008-06-27, 2008, from http://www.w3.org/TR/soap12-part1/

Web Resources

PHAiRS Project Website:
http://phairs.unm.edu/

KML Generation Page:
http://phairs-devel.unm.edu:8080/cgi-bin/kml_access.py