

Technology Products of the PHAiRS REASoN Project – Year 2 Web Services and Demonstration Interfaces Development

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1 Presentation Outline

- Overall Project Goals
- Year 1 Foundation
- Year 2 Accomplishments
 - ❖ Services Oriented Architecture
 - ❖ Demonstration Interface
- Future Developments

Project Goals

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- The information provided by this project includes:

- PM_{2.5} and PM₁₀ particulate forecasts, generated by the DREAM model, and improved through the integration of NASA data into the model

- Ground measurement data from the EPA AIRNOW network

- A real-time, multi-scale, multi-functional, multi-media

Project Goals

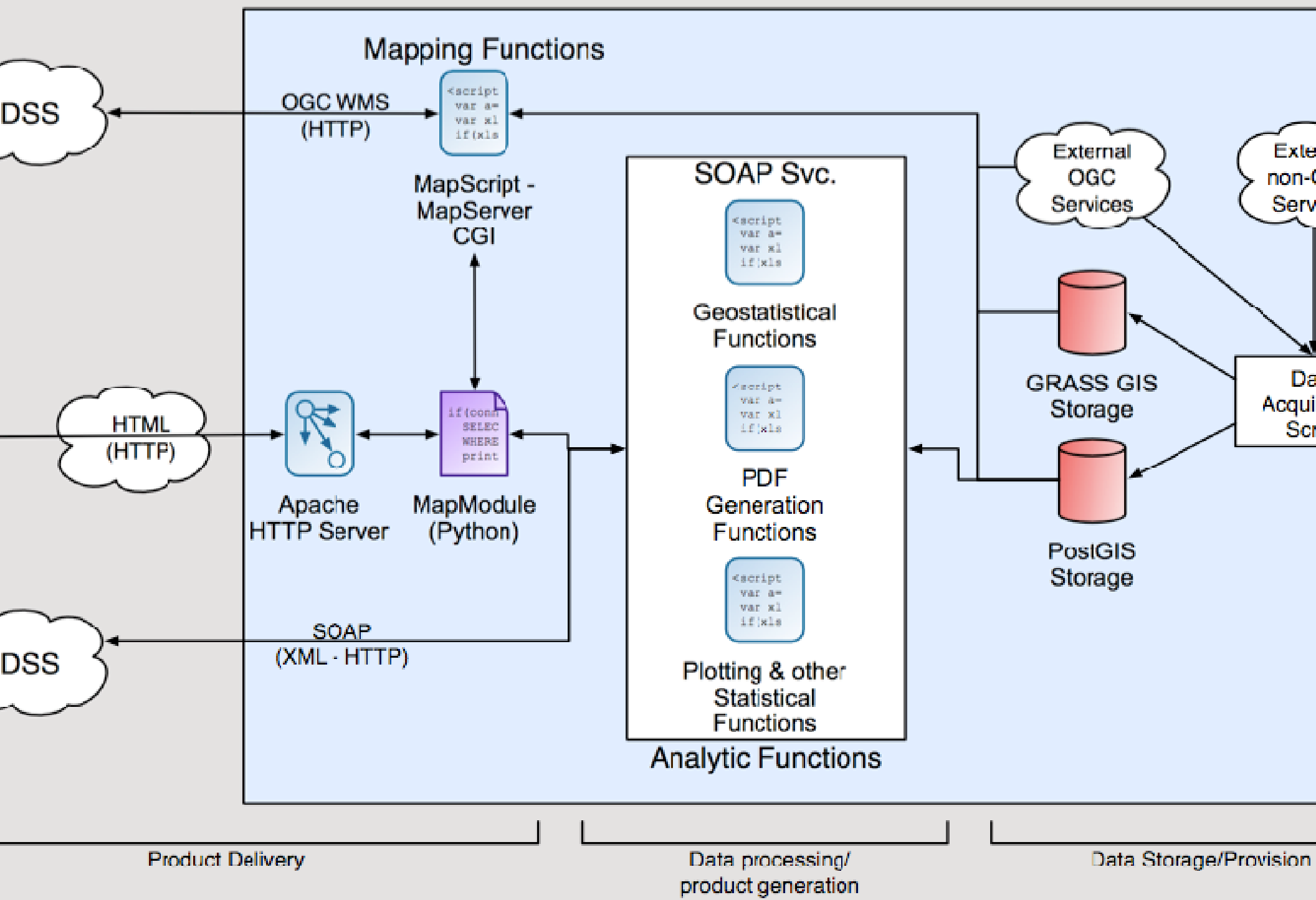
- *Enhance public health decision-making through the delivery of relevant information to public health officials through existing decision support systems.*
- Development of a Services Oriented Architecture that supports the delivery of products that may be embedded into existing decision support systems. For example:
 - Rapid Syndrome Validation Project (RSVP) - Sandia National Laboratories
 - Syndrome Reporting Information System (SYRIS) - ARES Corporation

- The first year of technology development for the PHAiRS project emphasized the following:
 - ❖ Data acquisition and processing
 - ❖ Sample product generation
 - ❖ Basic online analytic tools
 - ❖ Version 1 of the client interface that illustrates the various data and analytic capabilities of the application framework

Year 2 Accomplishments

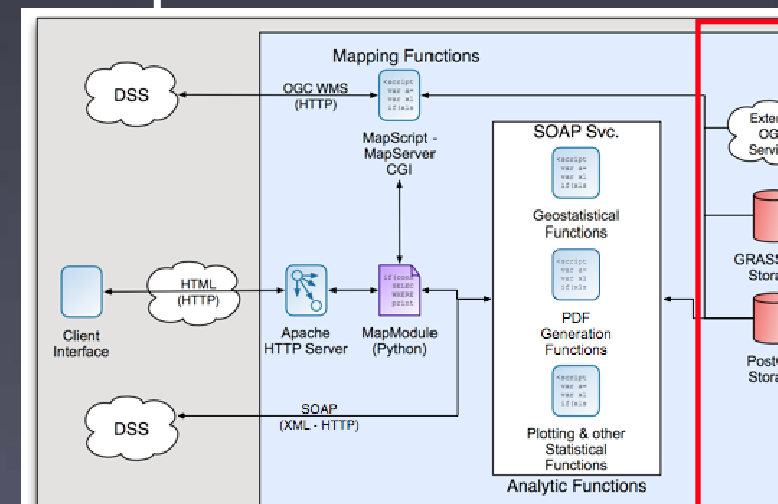
- Year 2 of the PHAiRS project builds on the first project year by producing a Services Oriented Architecture (SOA) that consists of:
 - ❖ Enhanced raster and vector data management capabilities
 - ❖ Integration of sample products of the DREAM model into the visualization and analysis system
 - ❖ Analytic tools as SOAP services that may be called either from the demonstration interface or from other clients (i.e. DSSs)
 - ❖ Time-enabled OGC Web Map Services developed as part of the overall services oriented architecture
 - ❖ A demonstration interface that exemplifies how the developed services may be deployed within a web

OVERVIEW



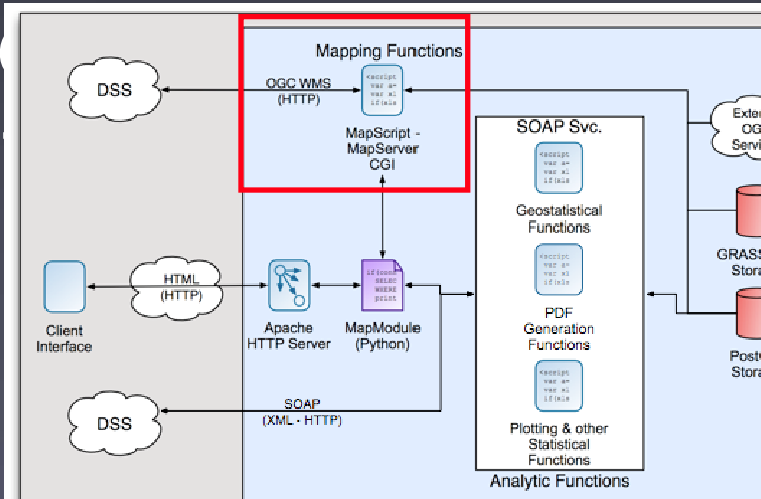
Data Management and Processing

- External Data/Service Providers
 - ❖ OGC Enabled: DataFed
 - ❖ Non-OGC: NOAA/NWS, Land-Process DAAC
- Automated data acquisition through scheduled Python and shell scripts
- Data stored in PostgreSQL/PostGIS (vector data), GRASS GIS (raster data)
 - ❖ Boundaries, cities, land ownership
 - ❖ Transportation networks, Hydrography, other environmental data
 - ❖ EPA AirNow Particulates
 - ❖ DREAM model outputs



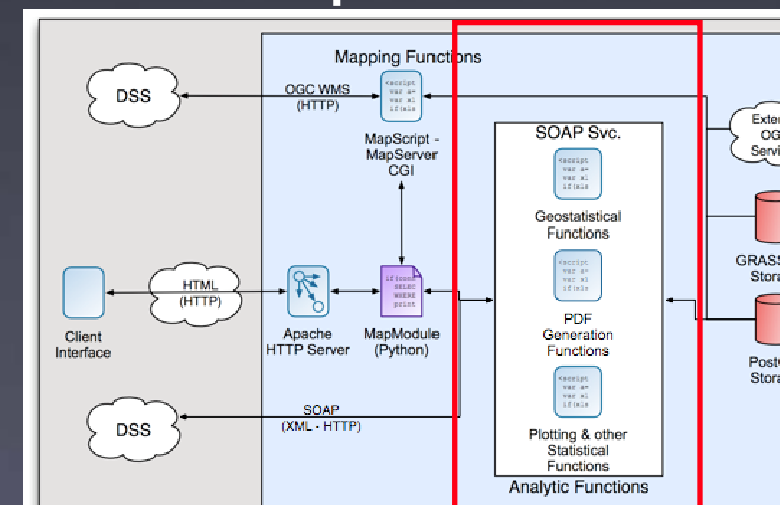
Product Generation

- Two service models are used to generate products:
 - ❖ Open Geospatial Consortium Web Map Services (WMS)
 - ❖ W3C Simple Object Access Protocol (SOAP)
- WMS services provide images of data, including time-sensitive data (e.g. EPA AirNow particulate data), through the simple WMS URL specification
- The WMS services are provided as a customized build of MinnGeo running as a CGI application that accesses data stored in GRASS GIS and



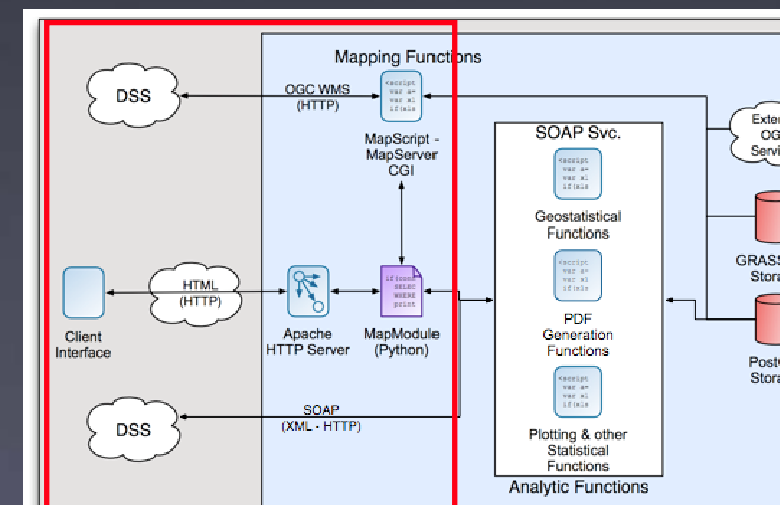
Product Generation

- The current suite of SOAP services provide three capabilities:
 - ❖ Time series components
 - Frame Image URLs (WMS requests)
 - Time series plot (URL for a custom generated PNG file)
 - ❖ Geostatistical analysis functions
 - Summarization over irregular regions, represented as a density plot
 - ❖ High-quality hardcopy map/document production
 - PDF file generation



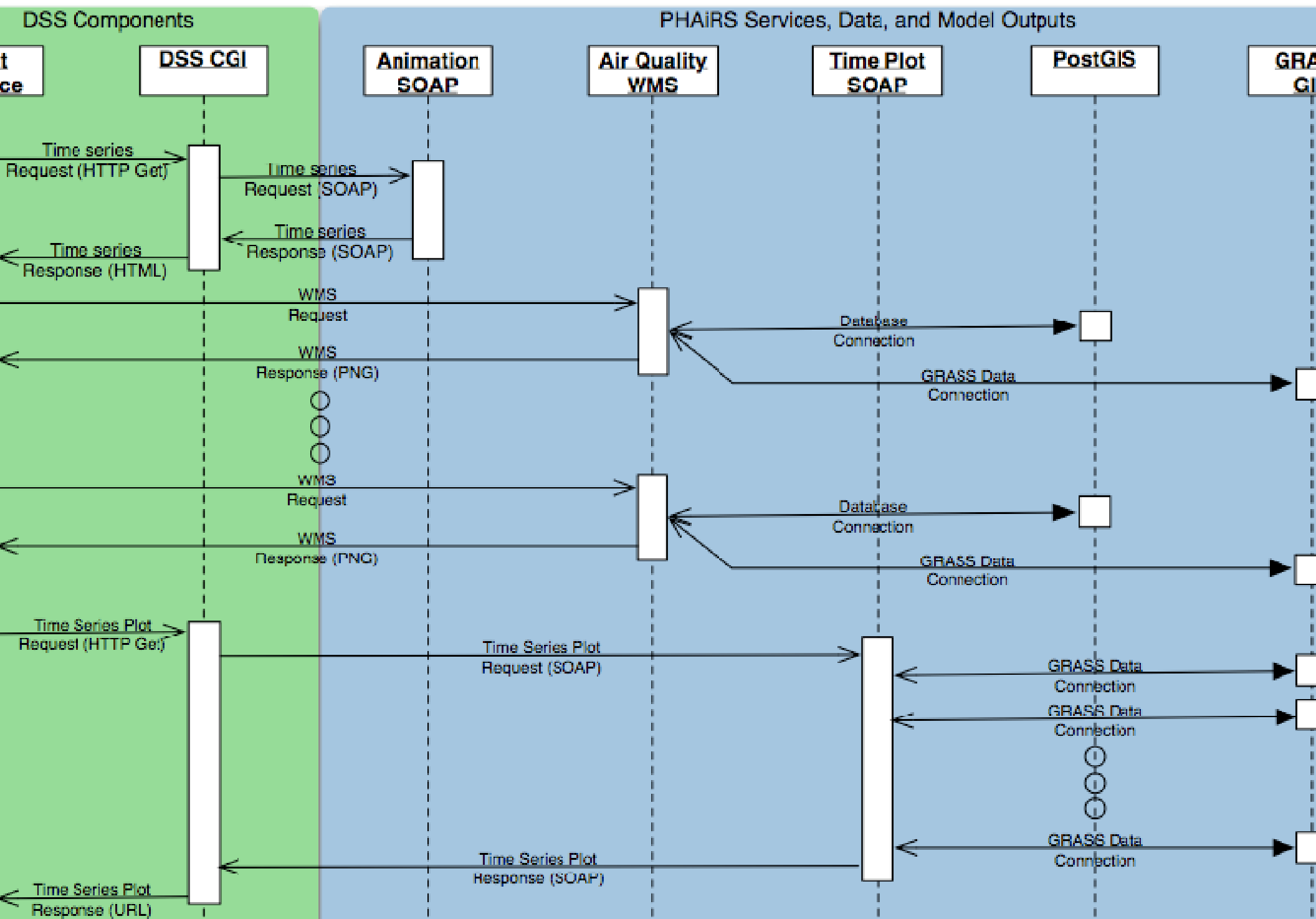
Product Delivery

- Product delivery is provided through the standards-based interfaces described previously, and through the demonstration client web interface
- The WMS and SOAP specifications support simple integration of PHAiRS products into external applications, such as the RSVP and SYRIS decision support systems.

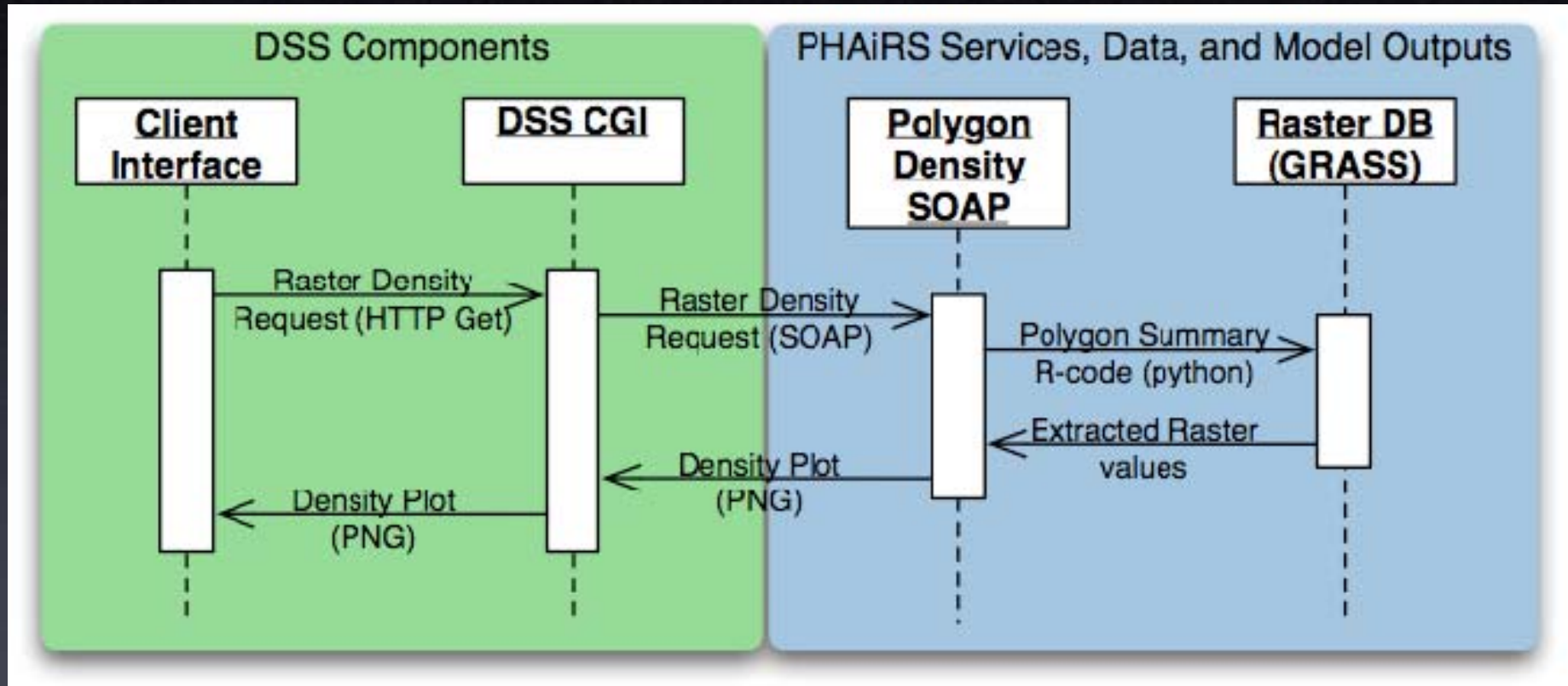


Time Series Client Service

Interaction



Density Plot Client Service Interaction



Demonstration Client Interface

PHAIRS 6.0 Mapping Client - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://phairs-devel.unm.edu/cgi-bin/mapmodule6_client.py?map_size=large

PHAIRS 6.0 Mapping Client

**Public Health Applications
in Remote Sensing**

1

2

3

4

Legend

- Denotes Time-Sensitive Layer
- Wilderness Areas
- Urban Areas
- Waterbodies
- Indian Lands

Background Layers

GTOPO 30 Meter DEM

Settings for Time-Sensitive Layers

2003-01-01 00:00:00
Date and Time

Refresh Map

Powered by
Map Server

Northing 31.41.24N Easting 107.02.59W Map Size Large Scale 1:29923317

Time Series Interface

PHAIRS 6.0 Mapping Client - Mozilla Firefox <2>

File Edit View Go Bookmarks Tools Help

http://phairs-devel.unm.edu/cgi-bin/mapmodule6_client.py?map_

PHAIRS 6.0 Mapping Client

PHAIRS Dust Modeling Client

72 hr Dust Model for Lubbock, TX (PM 2.5)

Dust Animation Key

- ★ Time Series Target
- Green AQI 1 (1-50ug/m3)
- Yellow AQI 2 (51-100ug/m3)
- Orange AQI 3 (101-150ug/m3)
- Red AQI 4 (151-200ug/m3)
- Dark Red AQI 5 (201-300ug/m3)
- Black AQI 6 (>300ug/m3)

Dust Concentration Plot

UTC Hours	Air Quality Index Level
0	1
18	3
24	1
33	0
38	1
72	1

⏸ PLAY ⏪ ⏩ 200

Date	UTC Time	Particle Size Class
12/16/03	09 hrs	PM 2.5

Generate PDF of Current Animation Step

Lubbock, TX (33:39:00N-101:49:11W)

Time Series Interface (movie)

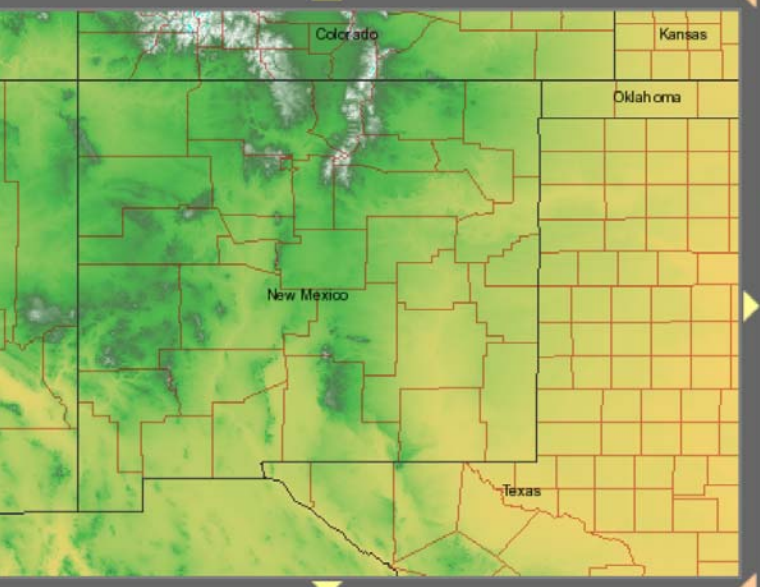
QuickTime™ and a
PNG decompressor
are needed to see this picture.

Sample Density Plot

PHAIRS 6.0 Mapping Client

http://phairs-devel.unm.edu/cgi-bin/mapmodule6_client.py

Health Applications in Remote Sensing



Legend

- Denotes Time-Sensitive Layer
- Wilderness Areas
- Urban Areas
- Waterbodies

Background Layers

GOTOPO 30 Meter DEM

Settings for Time-Sensitive Layers

2003-01-01 00:00:00
Date and Time

Refresh Map

1N Easting 104:51:35W Map Size Small Scale 1:6833698

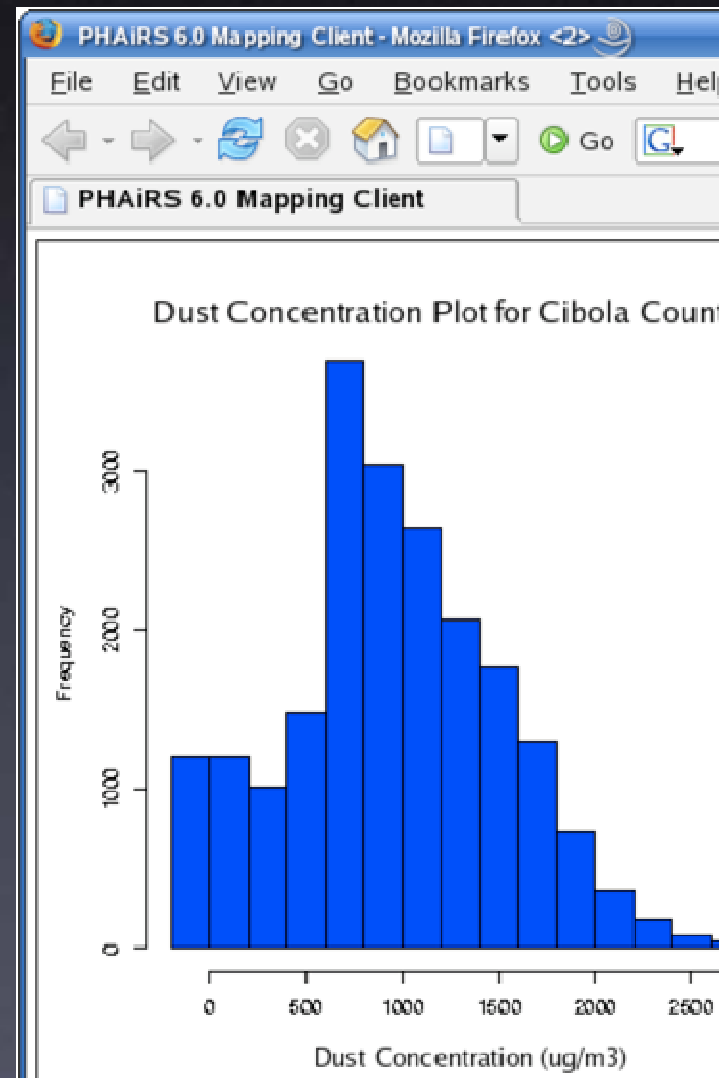
Class DREAM Date and UTC Time Polygon Analysis Layer

PM2.5 2003-01-01 0:00 Counties

Select Point on Map Select a Layer Identifier

Cibola

~~Select Dust Analysis~~



- Validation and Verification of regionalized DREAM model
 - ❖ Historic (2003-2006) particulate measurements already acquired for 84 AirNow stations in the model region
 - ❖ Historic Global Forecast System (GFS) data acquired for 8/05-present
 - ❖ Embarking on sequential model runs for comparison with EPA ground measurements
- Develop routine model run and result presentation capabilities
- Develop service metadata (WSDL)
- Work with DSS developers to deploy products

ACKNOWLEDGMENTS

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