

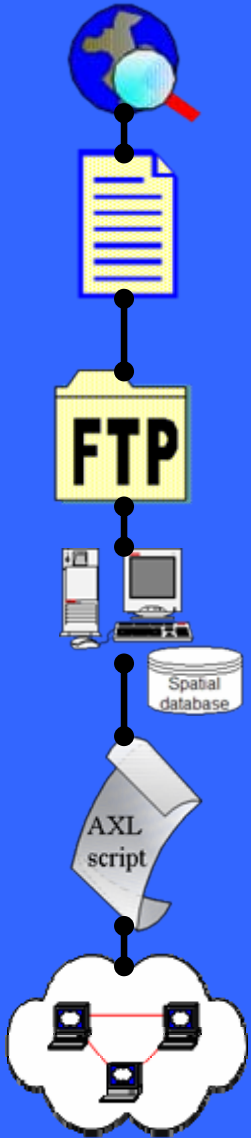
## Bringing NOAA's Weather Data to your Desktop: Penn State's Internet Map Services

- **Bernd J. Haupt**, *Earth & Environmental Systems Institute*

*In collaboration with*

- Maurie Caitlin Kelly, *PS Institutes of Energy & the Environment*
  - Ryan E. Baxter, *PS Institutes of Energy & the Environment*
  - James F. Spayd, *PS Institutes of Energy & the Environment*
    - Jack Settelmaier, *NOAA/NWS*
    - Ken Waters, *NOAA/NWS*

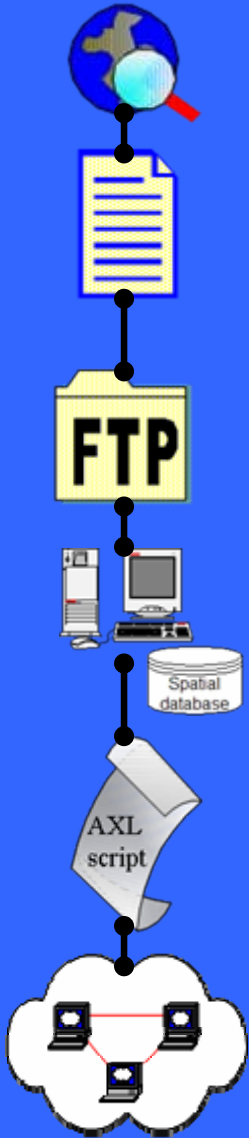
*ESSC – Meteo 597E seminar, October 24, 2007*



## Introduction

I will talk about ...

- who we are,
- why we need it #1 (*background information*)
- the element in-between,
- why we need it #2 (*framework for pilot project*),
- what NOAA/NWS says,
- *6 process steps* (an example showing how our service works and how it is accessible),
- conclusions,
- what other data can be fed into our system,
- what is coming in the near future



## ... who we are ...

- PSIEE & EESI faculty collaborate on several GIS related projects.
- Project team works with Federal agencies such as the US Geological Survey (USGS); state agencies such as the PA Office of Information Technology, and non profit organizations such as the American Fisheries Society.
- Currently, project team members manage spatial databases that house approximately 8 terabytes of data and imagery.
- Project team members manage the *Pennsylvania Geospatial Data Clearinghouse, PASDA*, <http://www.pasda.psu.edu>, the geospatial component of the *Mid-Atlantic Information Node, MAIN* of the *National Biological Information Infrastructure, NBII*, <http://main.nbii.org>, *Fisheries and Aquatic Resources (FAR) Node* of the *NBII*, and *NoiseQuest*, a noise modeling and mitigation site for the *Federal Aviation Administration*.
- Initial funding was provided from the *Penn State University GIS Council* to develop proof of concept for climate and weather data.

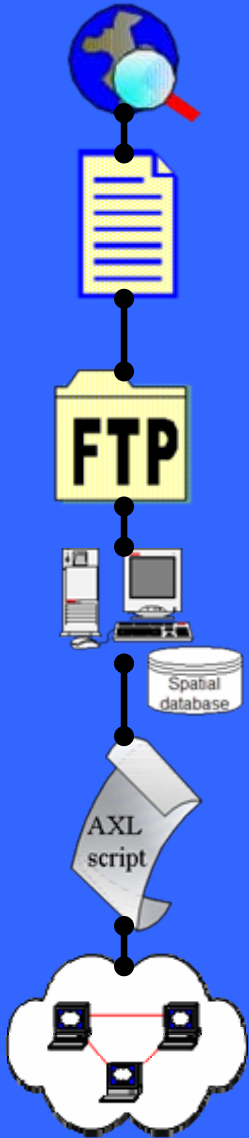
## ... why we need #1 (*background information*) ...

Looking at the list of extreme situations that are influenced by extreme weather events and conclusions of the Intergovernmental Panel on Climate Change (IPCC; 4th IPCC report) saying that:

- “Global climate change is very likely to have been human-induced”
- “It is very likely that human activities are causing global warming”
- “Probable temperature rise by the end of the century will be between 1.8 and 4°C (3.2-7.2°F)”
- “Sea levels are likely to rise by 28-43 cm”
- “It is very likely that parts of the world will see an increase in the number of heat waves”
- “Climate change is likely to lead to increased intensity of tropical storms”

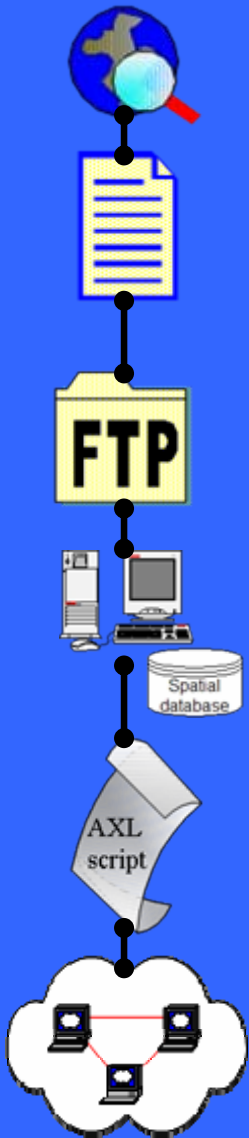
The IPCC is very confident about their conclusions as the IPCC report definitions of probability of occurrence are defined as follows: ‘very likely’ – more than 90 percent and ‘likely’ – more than 60%.

*It seems only natural that extreme weather events of all kinds will strongly influence our future way of life, positively as well as negatively.*

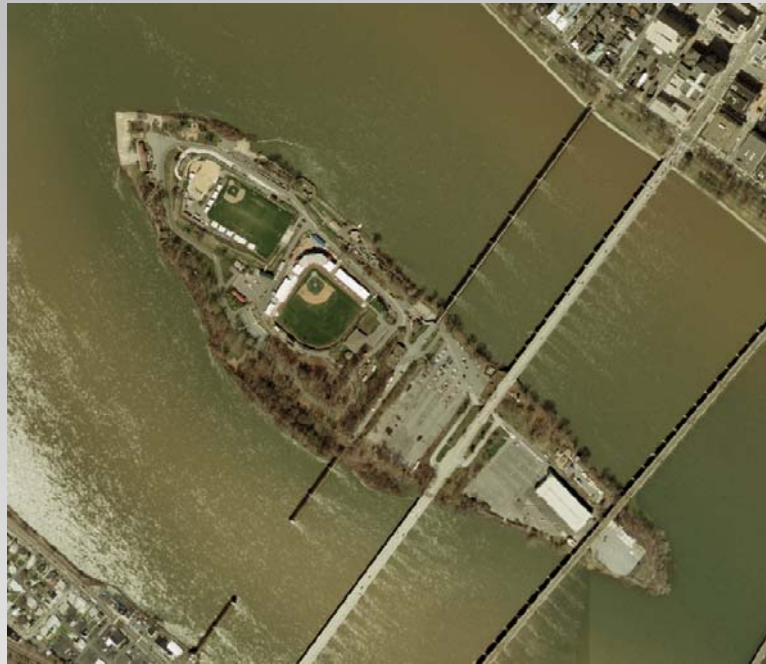




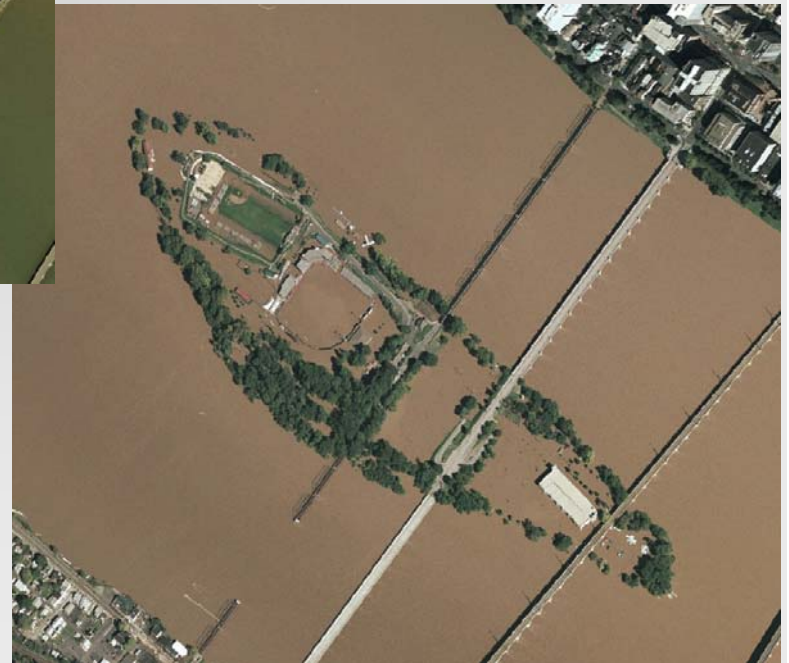
... why we need it #1 (*background information*) ...



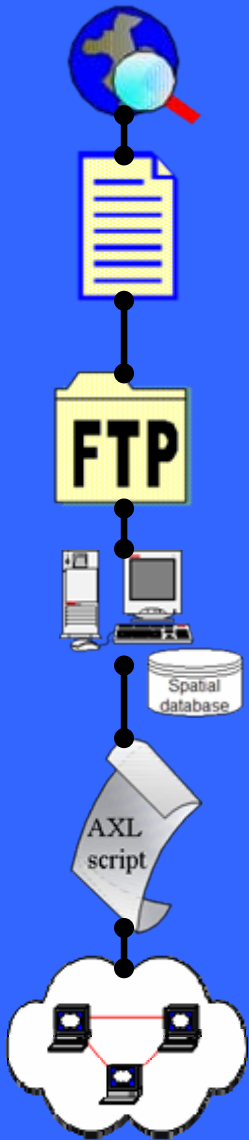
## ... why we need it #1 (*background information*) ...



The aerial photographs show City Island, a park located within the Susquehanna River near Harrisburg, Pennsylvania. Both images were captured from a traditional WEB GIS application.



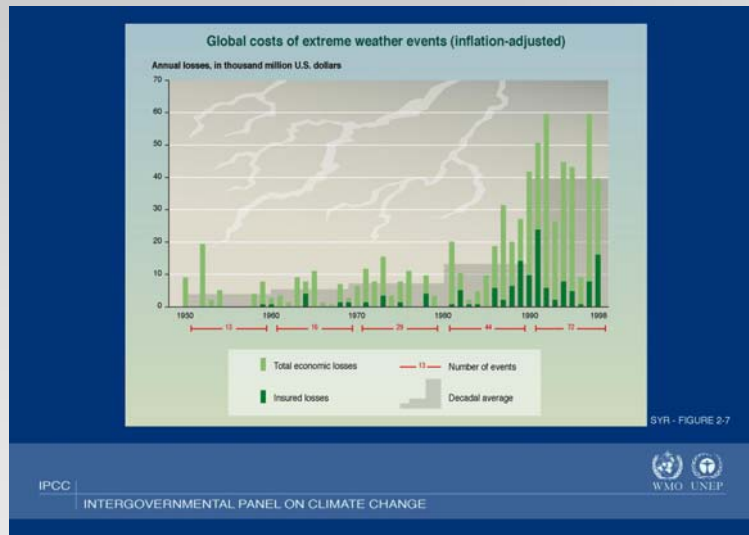
The upper left image was captured in 2003, and the other one was captured in September, 2004 during the flood caused by Tropical Depression Ivan.





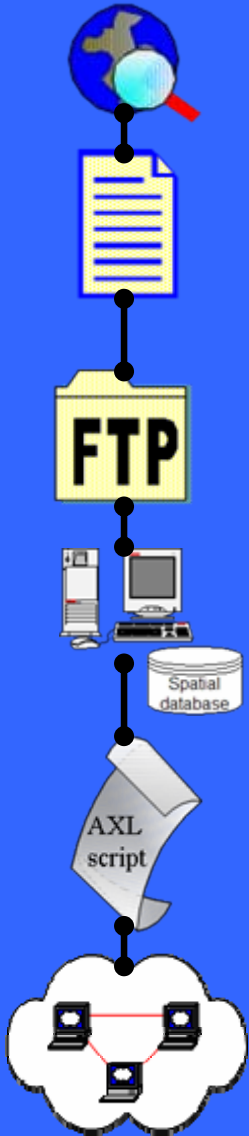
## ... why we need #1 (*background information*) ...

- The list of natural and man-made disasters can be continued indefinitely.
- There is a whole variety of disasters that range from environmental threats and problems to health issues to local, national and international crises.
- **It is important to note that disasters strike our society with increasing frequency.**



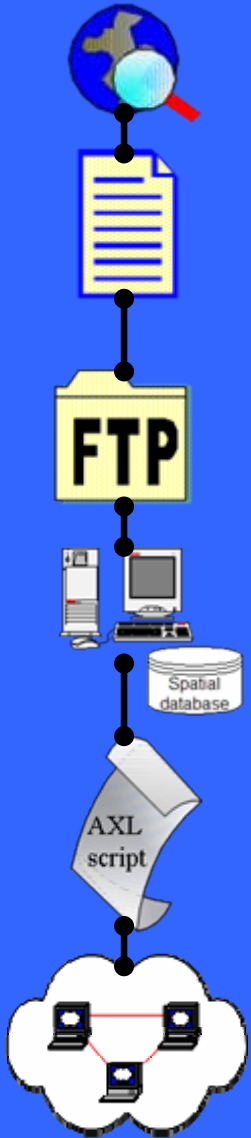
IPCC: Global cost of extreme weather events from 1950-1998.

- **All disasters and crises have one common element: They need to be managed and mastered; in other words, they require *Emergency Management Planning (EMP)*.**

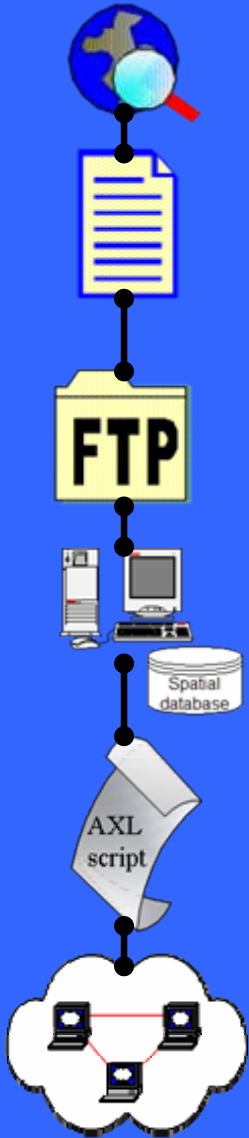


... the element in-between ...

# Weather







## ... why we need it #2 (framework for pilot project) ...

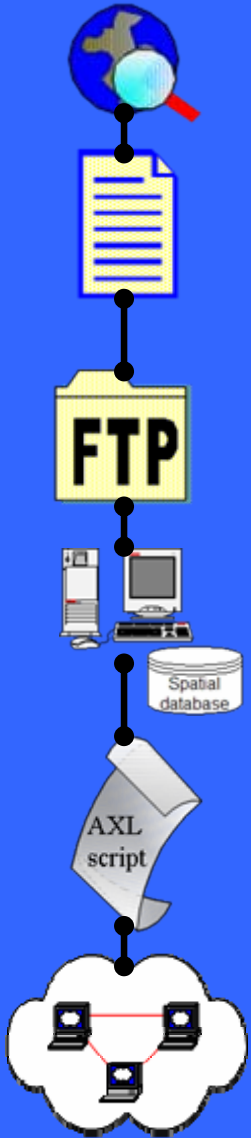
The NDFD (National Digital Forecast Database) Pilot project was developed by PSIEE and EESI faculty for the following reasons:

- Most users are unfamiliar with the NDFD, NDGD (GMOS), MOS, RTMA data or the types of data formats (e.g., NetCDF, Grib2) that climate and weather data come in.
- Most users do not have the processing capabilities or knowledge to acquire and convert and store this data for their own use.
- *We have developed a way for users to incorporate this data into their desktop GIS with a click of a button. This eliminates the need for them to process this data themselves.*
- Emergency managers and response support agencies need this vital information to cope with potential emergency situations. *They are heavy GIS users* but are often unfamiliar with technical details.

- NDGD = Natl. Digital Guidance Database
- MOS = Model Output Statistics
- GMOS = Gridded Model Output Statistics

- NetCDF = Network Common Data Format
- Grib2 = 2nd vers. of gridded WMO data output
- RTMA = Real Time Mesoscale Analysis

... what NOAA/NWS says ...



What Can't the NWS do with GIS?

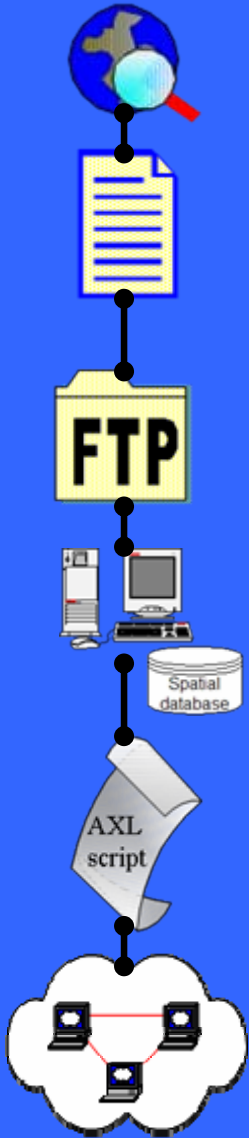
**SERVE IT!**

# What can PSU (and others?) do with weather data in GIS?

Segue to PSU portion on  
Serving NDFD via IMS

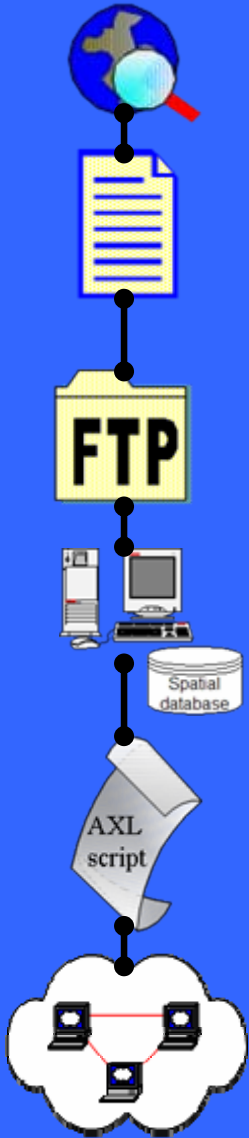
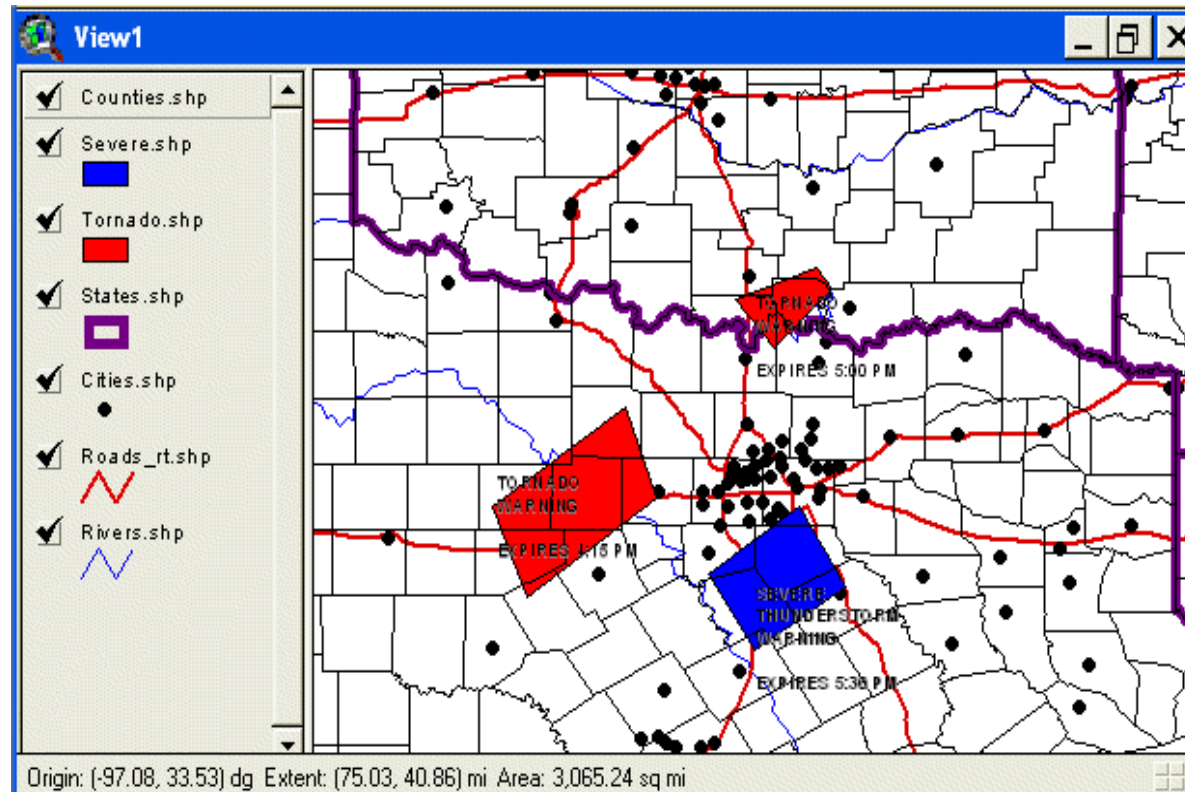


- Old and new radar imagery from the NWS offered in a viewer



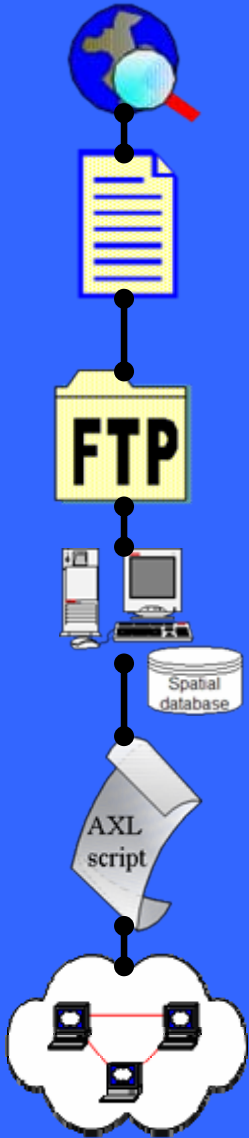
Two screenshots of Microsoft Internet Explorer showing radar imagery from the National Weather Service. The left screenshot shows a radar image from KFTG at 14:17 UTC on 09/13/2005, with a color scale on the left ranging from -28 to +28. The right screenshot shows a WSR-88D image from the same station and time, with a color scale on the right ranging from 0 to 32 dBZ. Both screenshots include navigation controls and a menu on the left side of the browser window.

- Regional live IMS offered from the NWS for severe weather season 2004 (geared towards emergency managers)



## Process Steps... (6 in total) Overview

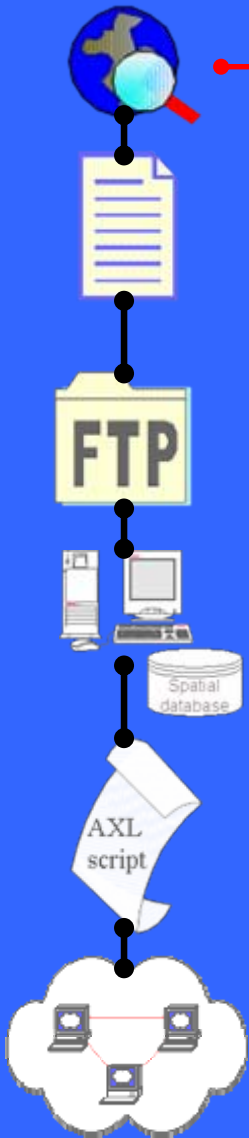
- Identify sources of spatial and temporal data from agencies, organizations, or academic institutions.
- Develop partnership with data provider.
- Acquire data from provider or from public access site such as an FTP site (Automate this process where possible).
- QA/QC data for completeness; convert to GIS format; create metadata; load into ArcSDE (spatial data engine).
- Create ArcIMS Image and Feature Services which are updated when data is updated in database (new AXL files with new datasets).
- Users can bring Image and Feature services directly into their desktop GIS software.



## Process Steps... (step 1)

Identify sources of spatial and temporal data from agencies, organizations, or academic institutions.

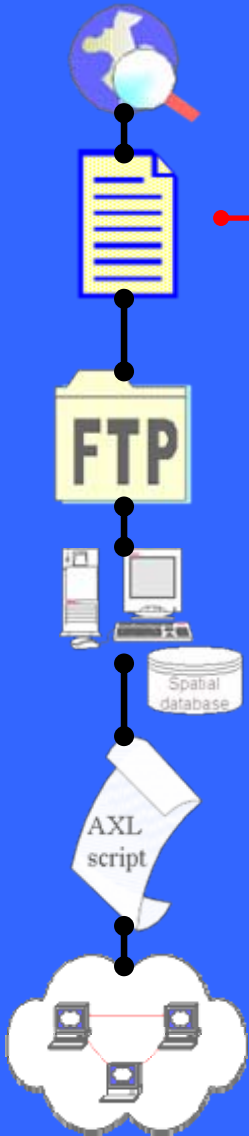
- Develop partnership with data provider.
- Acquire data from provider or from public access site such as an FTP site (Automate this process where possible).
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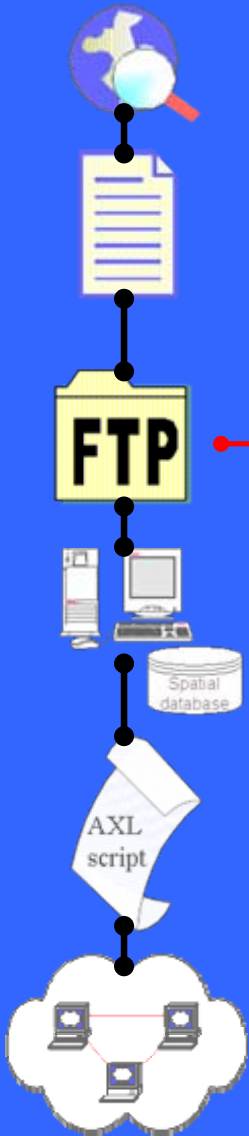
## Process Steps... (step 2)

- Identify sources of spatial and temporal data from agencies, organizations, or academic institutions.
- **Develop partnership with data provider.**
- Acquire data from provider or from public access site such as an FTP site (Automate this process where possible).
- QA/QC data for completeness; convert to GIS format; create metadata; load into ArcSDE (spatial data engine).
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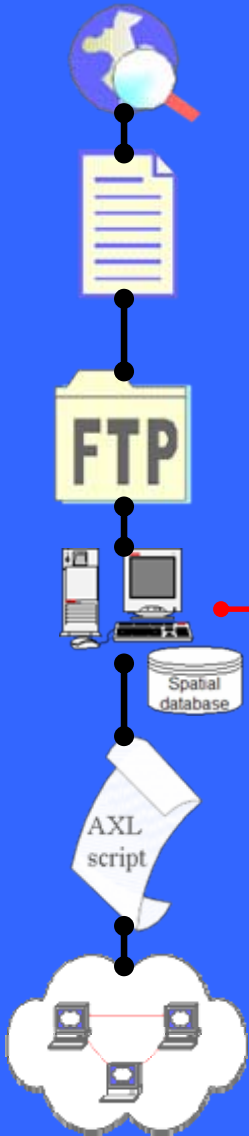
## Process Steps... (step 3)

- Identify sources of spatial and temporal data from agencies, organizations, or academic institutions.
- Develop partnership with data provider.
- Acquire data from provider or from public access site such as an FTP site (Automate this process where possible).
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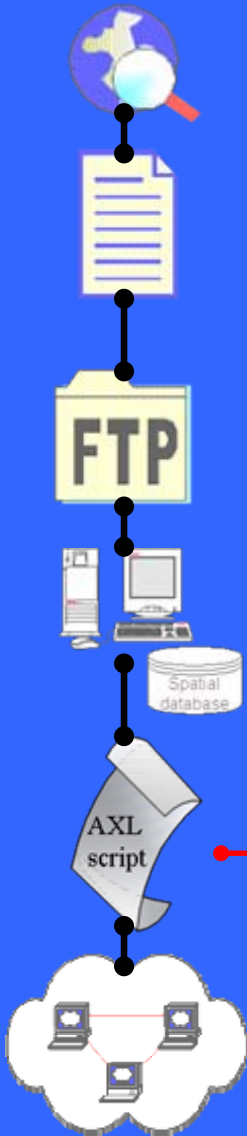
## Process Steps... (step 4)

- Identify sources of spatial and temporal data from agencies, organizations, or academic institutions.
- Develop partnership with data provider.
- Acquire data from provider or from public access site such as an FTP site (Automate this process where possible).
- QA/QC data for completeness; convert to GIS format; create metadata; load into ArcSDE (spatial data engine).
- Create ArcIMS Image and Feature Services which are updated when data is updated in database (new AXL files with new datasets).
- Users can bring Image and Feature services directly into their desktop GIS software.



## Process Steps... (step 5)

- Identify sources of spatial and temporal data from agencies, organizations, or academic institutions.
- Develop partnership with data provider.
- Acquire data from provider or from public access site such as an FTP site (Automate this process where possible).
- QA/QC data for completeness; convert to GIS format; create metadata; load into ArcSDE (spatial data engine).
- **Create ArcIMS Image and Feature Services which are updated when data is updated in database (new AXL files with new datasets).**
- Users can bring Image and Feature services directly into their desktop GIS software.

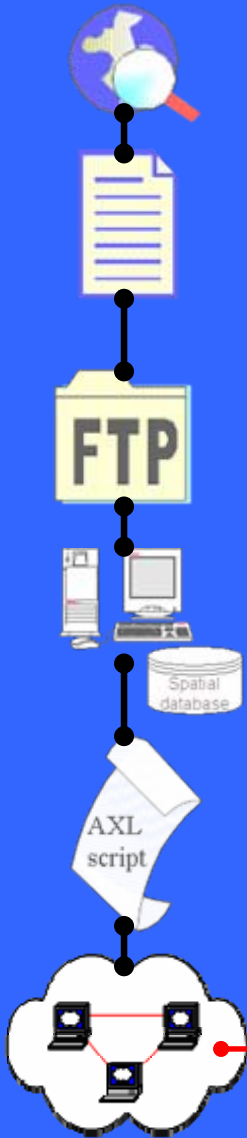




## Process Steps... (step 6)

- Identify sources of spatial and temporal data from agencies, organizations, or academic institutions.
- Develop partnership with data provider.
- Acquire data from provider or from public access site such as an FTP site (Automate this process where possible).
- QA/QC data for completeness; convert to GIS format; create metadata; load into ArcSDE (spatial data engine).
- Create ArcIMS Image and Feature Services which are updated when data is updated in database (new AXL files with new datasets).

Users can bring Image and Feature services directly into their desktop GIS software.

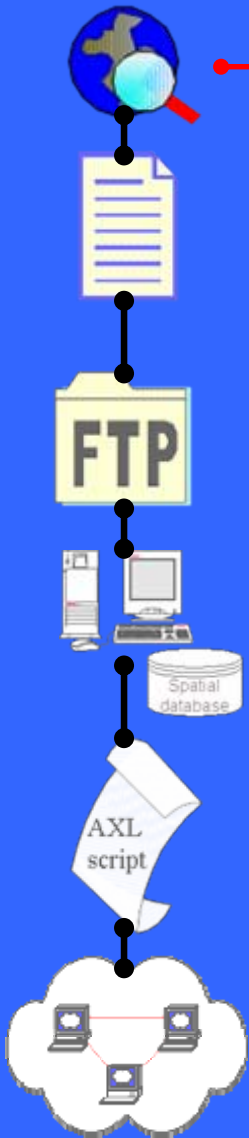


## Process Steps... (step 1a)

Identify sources of spatial and temporal data from agencies, organizations, or academic institutions.

There many sources of temporal data such as:

- National Oceanic & Atmospheric Administration (NOAA)
  - National Weather Service (NOAA/NWS) ⇔ *today's example*
- US Geological Survey (USGS)
- National Biological Information Infrastructure (NBII)
- Multi-State Aquatic Resources Information System (MARIS)
- Universities
- Government
- ...
  
- Today, we'll use NOAA/NWS NDFD/NDGD data as one possible example.
  - NDFD = National Digital Forecast Database; <http://www.weather.gov/ndfd>
  - NDGD = National Digital Guidance Database



## Process Steps... (step 1b)

Identify sources of spatial and temporal data from agencies, organizations, or academic institutions.

- The National Digital Forecast Database (NDFD) broke the CONUS (Continental United States) into sixteen geographic sub-sectors.

National Weather Service  
National Digital Forecast Database

Home News Organization

Home  
Status of NDFD Elements as of November 1, 2006  
Access Data  
Development Status  
Customer Support  
Feedback/Survey  
FAQ  
Background Information  
Presentations Archive  
Contact Us  
Other Links

Access Data

**NDFD**  
NWS National Digital Forecast Database

Coverage Map of NDFD Data Sectors  
Move Cursor over map to view the 16 predefined NDFD Data Sectors

**Coverage Map of NDFD Data Sectors**

Eastern Great Lakes Sector

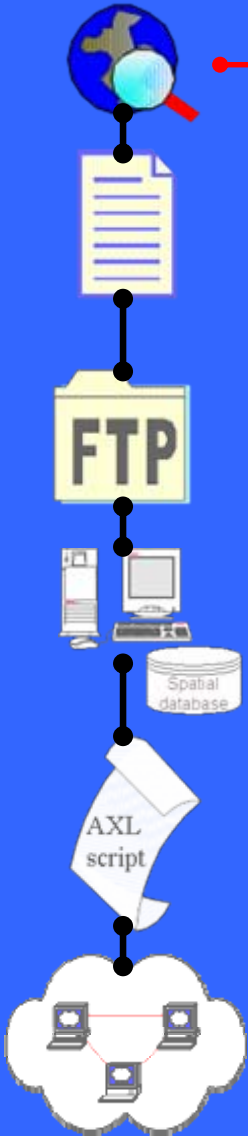
FIRSTGOV

Home, Access Data, Development Status, Customer Support, Feedback, FAQ, Background, Presentations, Contact Us, Other Links

Available variables we are currently serving to the GIS community are:

min. & max. temp., 12-hour probability of precipitation, temp., dew point, quantitative precipitation forecast (QPF), snow amount, wind direction & speed, significant wave height, sky cover, apparent temp., rel. humidity, wind gust, ozone, smoke

*More variables provided by NOAA/NWS and others are hopefully coming soon (depends on interest and time available -- non-funded enterprise)*



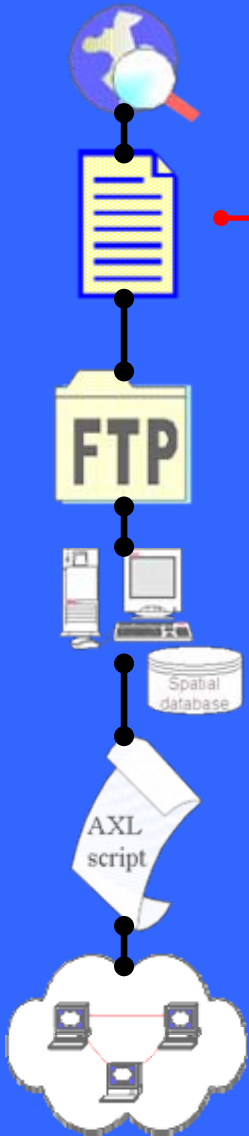
## Process Steps... (step 2)

### Develop partnership with data provider.

Developing a relationship with a data provider gives the project a more sustainable base, allows data to be updated more readily, and encourages further cooperation should additional data become available.

The following step should be made once a dataset has been identified:

- The data provider should be contacted to ensure that he/she agrees to the distribution of his/her data by another institution.
- Appropriate credit should be given in the metadata to the data provider.
- Disclaimer and use constraints can also be included in the metadata where applicable.



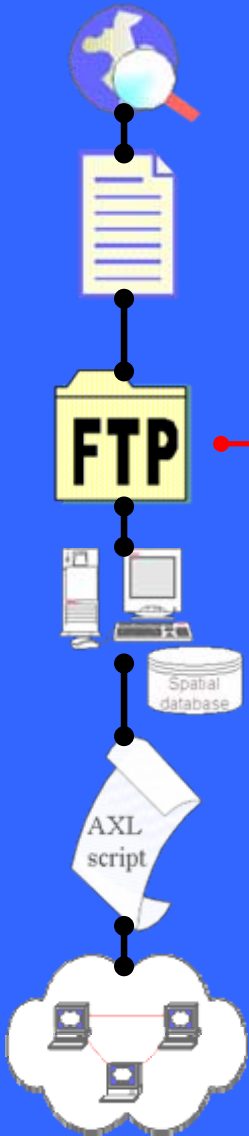


## Process Steps... (step 3)

Acquire data from provider or from public access site such as an FTP site (Automate this process where possible).

Some details that the normal user will not get to see and does not have to worry about:

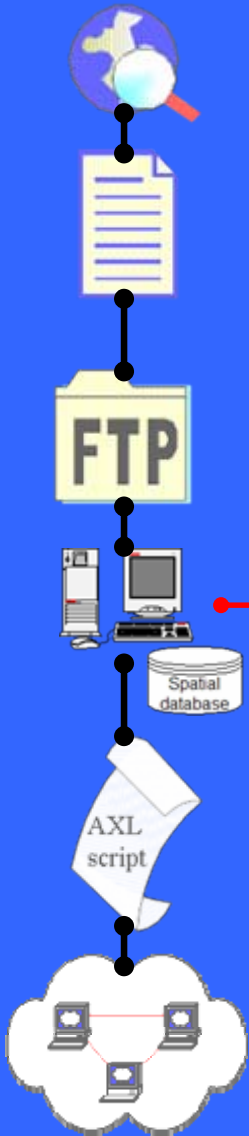
- Data (e.g., NDFD/NDGD; ~100 MB -- compressed) will be downloaded from the data provider at *predetermined time intervals* (e.g., *every 1-3 hours*) via either anonymous FTP or HTTP (Unix, Linux, Cygwin).
- Parallel downloads immensely speed up data transfer (frequently datasets are split into chunks, which is preferable; note: datasets need to be concatenated to become usable).
- Avoid sequential data downloads if possible.
- If downloads require a username and password other than an anonymous login, *make sure that files are read and write protected, especially on multi-user systems.*



## Process Steps... (step 4)

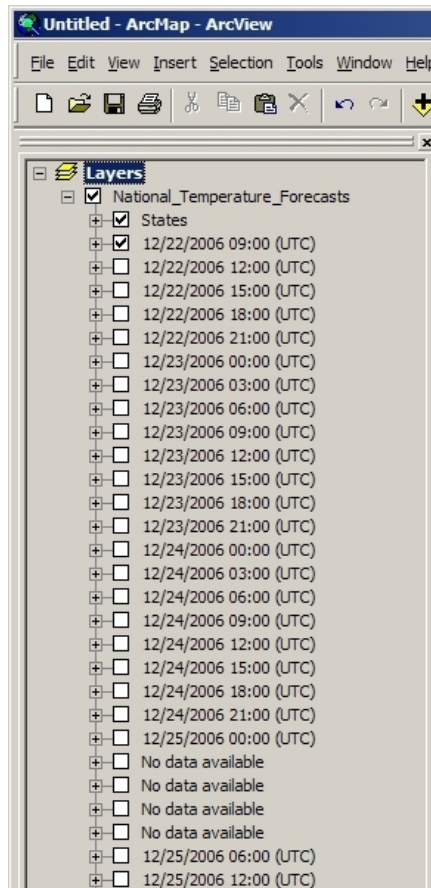
QA/QC data for completeness; convert to GIS format; create metadata; load into ArcSDE (spatial data engine).

- Check data for completeness
- Data come in compressed format => “Degrib” (uncompress) data and convert to ESRI shape files (GRIB2 is the second version of the World Meteorological Organization’s (WMO) standard for distributing gridded data; initial 100 MB become several Gigabyte).
- Upload ESRI shape files/layers into “Spatial Database”, e.g., 40 forecast layers for “temperature” (26 x every 3h = 78h; then 14 x 6h = 84h; forecast for about 1 week)
- Repeat for all other variables (total of over 500 layers)

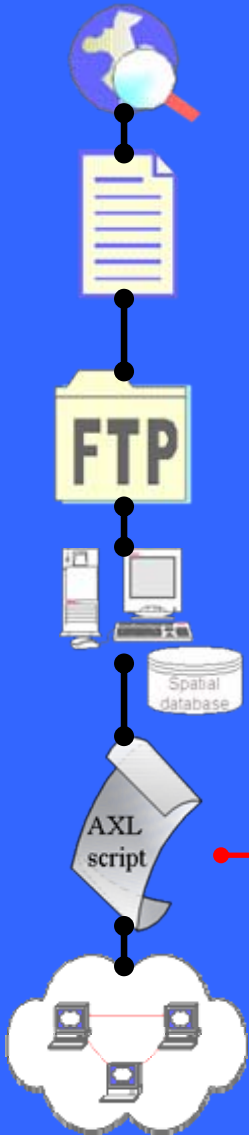


## Process Steps... (step 5a)

Create ArcIMS Image and Feature Services which are updated when data is updated in database (new AXL files with new datasets).



- Update time stamp (*BONUS; tricky; wait for next slide*).
- Usually timestamps say, e.g. 3, 6, 9, ... , 150 hours from now; **ours do show real times**.
- Problem: A users saves a map and reopens it without remembering the time he saved the map → *ideally the timestamp should show the forecast time*.



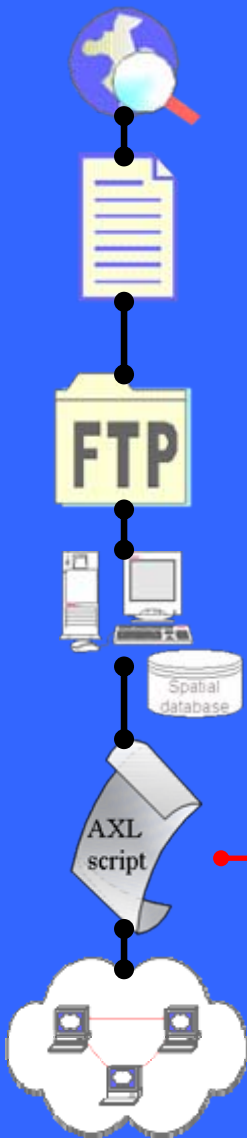
## Process Steps... (step 5b)

Create ArcIMS Image and Feature Services which are updated when data is updated in database (new AXL files with new datasets).

```
cygdrive/d/ NOAA.CONUS/data-archive/2007010301/CONUS
$ degrib vp004-007/ds.temp.bin -I
MsgNum, Byte, GRIB-Version, elem, level, reference(UTC), valid(UTC), Proj(hr)
1.0, 0, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/06/2007 06:00, 72.00
2.0, 255958, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/06/2007 12:00, 78.00
3.0, 511415, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/06/2007 18:00, 84.00
4.0, 767703, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/07/2007 00:00, 90.00
5.0, 1027690, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/07/2007 06:00, 96.00
6.0, 1285997, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/07/2007 12:00, 102.00
7.0, 1544605, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/07/2007 18:00, 108.00
8.0, 1800934, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/08/2007 00:00, 114.00
9.0, 2061530, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/08/2007 06:00, 120.00
10.0, 2323549, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/08/2007 12:00, 126.00
11.0, 2586626, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/08/2007 18:00, 132.00
12.0, 2845848, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/09/2007 00:00, 138.00
13.0, 3108526, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/09/2007 06:00, 144.00
14.0, 3371488, 2, T="Temperature [K]", 0-SFC, 01/03/2007 06:00, 01/09/2007 12:00, 150.00
```

Example of metadata  
• degrib ds.temp.bin -I

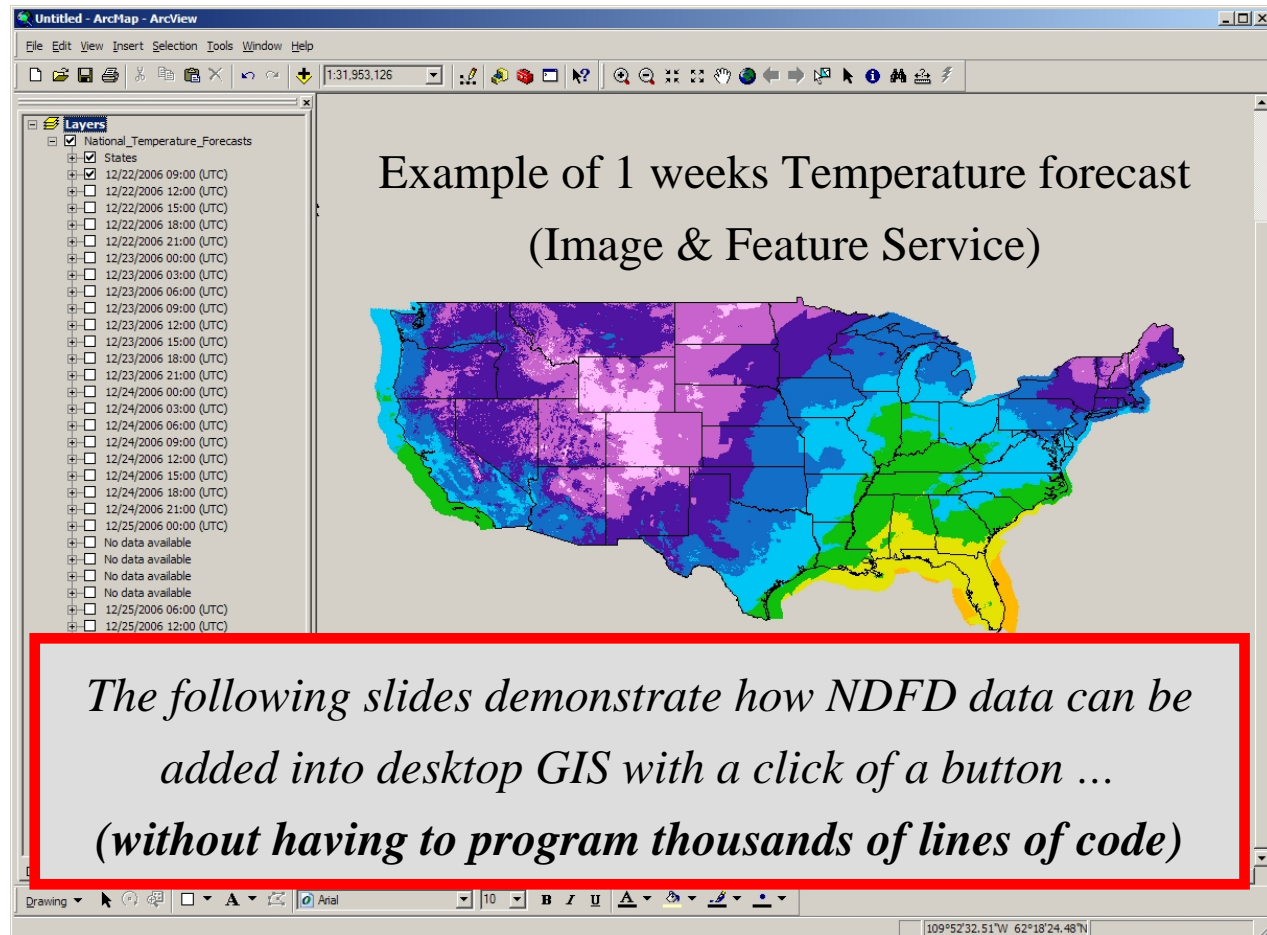
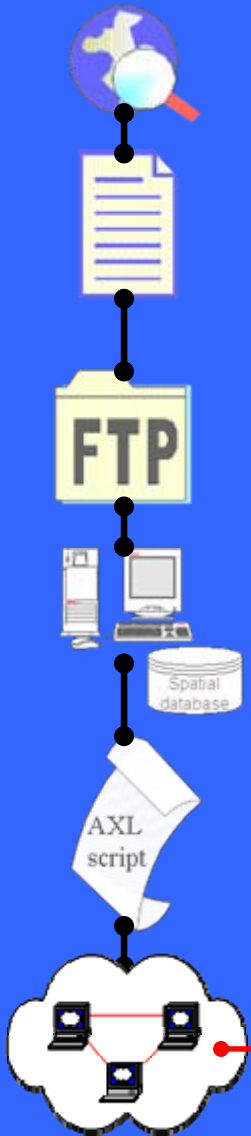
- Here is how we *update the time stamp* ...
  1. Extract timestamp from data archive/metadata
  2. Update AXL file with the “real” time information
  3. Stop Feature and Image Service
  4. Replace old AXL file with new updated file
  5. Restart Feature and Image Service
  6. Repeat for all other variables
  7. DONE





## Process Steps... (step 6a)

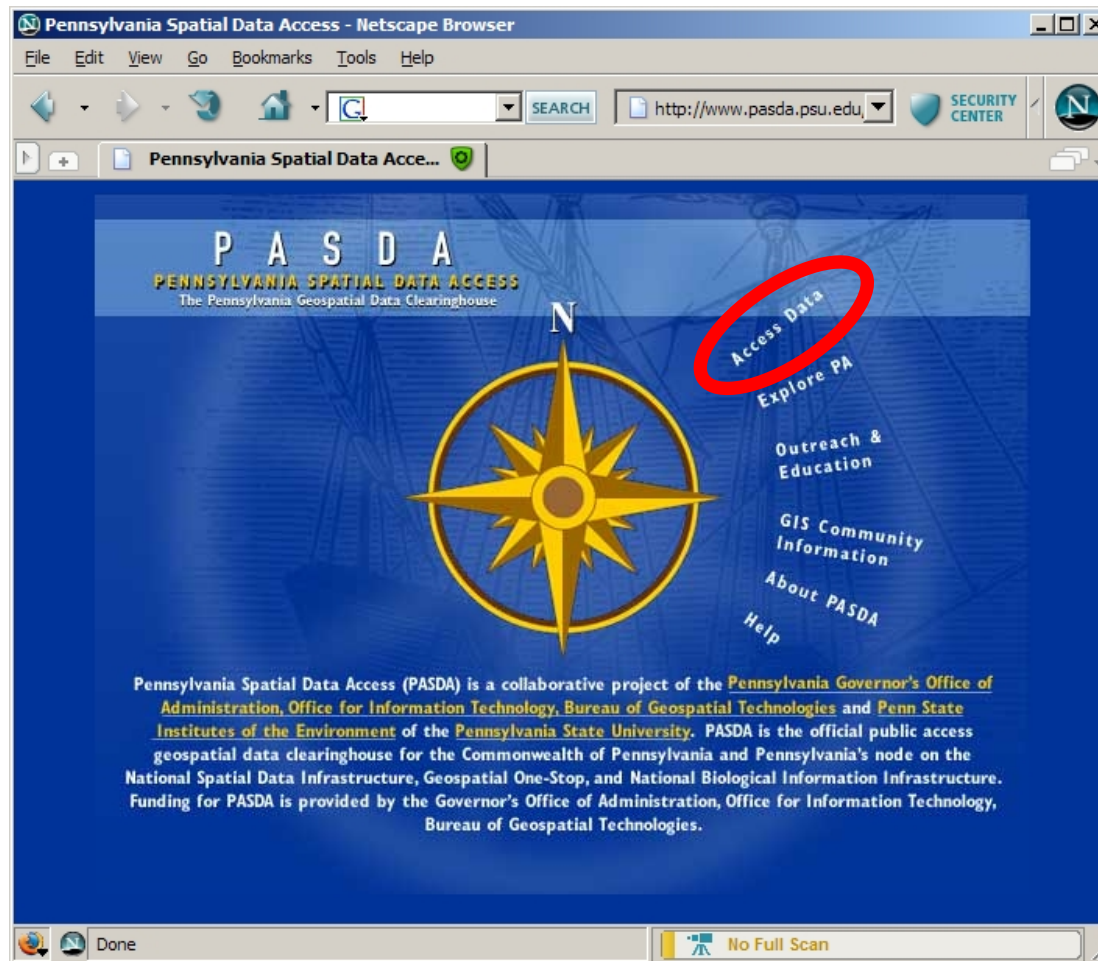
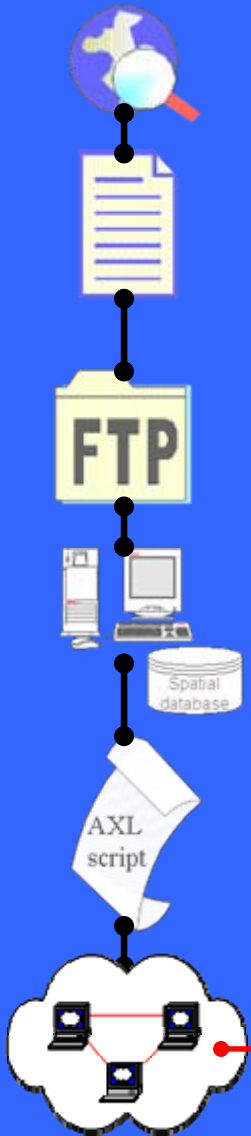
Users can bring Image and Feature services directly into their desktop GIS software.





## Process Steps... (step 6b)

Users can bring Image and Feature services directly into their desktop GIS software.



*GIS weather data with a click of a button!*

PASDA is funded by the Geospatial Technologies Office of the PA Office for Information Technology

## Process Steps... (step 6c)

Users can bring Image and Feature services directly into their desktop GIS software.

PASDA - Access Data - Netscape Browser

File Edit View Go Bookmarks Tools Help

http://www.pasda.psu.edu/access/index...

PASDA - Access Data

**PASDA**  
PENNSYLVANIA SPATIAL  
DATA ACCESS

Access Data  
Explore PA  
Outreach

GIS Community  
About PASDA  
Help

### Access Data

**NEW!** **NEW!**

#### Data Access Wizard

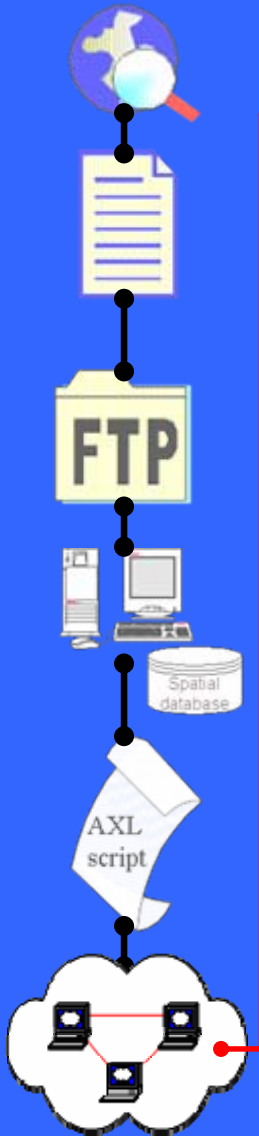
- Simplified interface -  
- Add datasets to your *Data Cart* -  
- Clip, reproject and download multiple datasets at the same time -

**NEW!** **NEW!**

#### FTP Site & Search Options

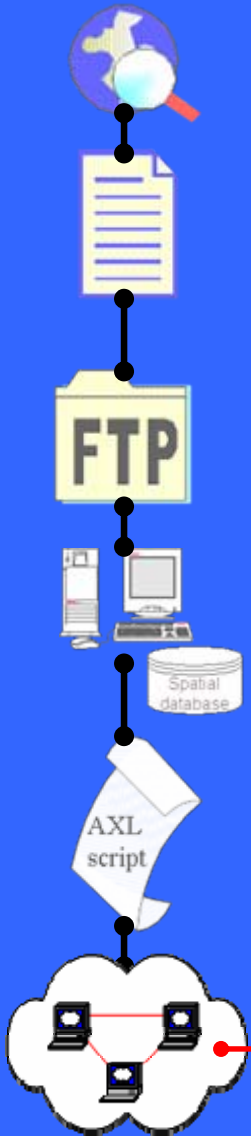
- ◆ [Direct to FTP Site](#)---NOTE: Our FTP site has been streamlined and updated. If you are unable to find the data you need, use the Data Wizard.
- ◆ [Keyword Search](#)
- ◆ [Search by County](#)
- ◆ [Search by Quadrangle](#)
- ◆ [Search by Watershed](#)

Transferring data from www.pasda.psu.edu... No Full Scan



## Process Steps... (step 6d)

Users can bring Image and Feature services directly into their desktop GIS software.



**Find Data**

Search using one of the following options:

**Search by Keyword(s):**  AND  OR

**Search by Theme:**

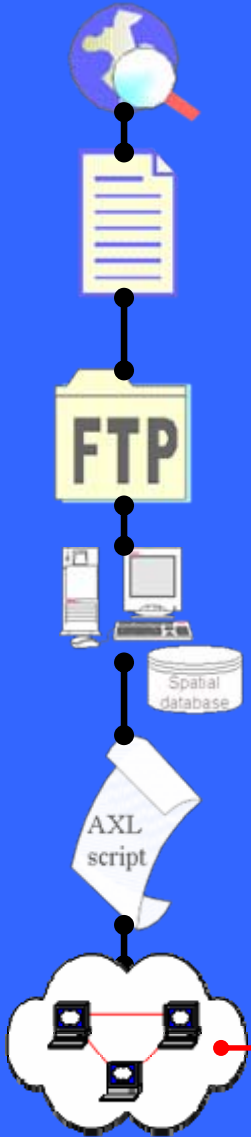
**Search by Data Provider:**

- Alliance for Aquatic Resource Monitoring
- American Forests
- Chesapeake Bay Program
- Chester County
- City of Philadelphia
- Delaware River Basin Commission (DRBC)
- Heritage Conservancy
- Juniata County
- Lancaster County
- Mifflin County
- Municipality of Murrysville
- National Aeronautics and Space Administration (NASA)
- National Weather Service (NOAA/NWS)**
- Natural Heritage Inventory
- Natural Lands Trust
- PAMAP Program
- Partnership for the Delaware Estuary
- Pennsylvania Department of Conservation and Natural Resources
- Pennsylvania Department of Environmental Protection
- Pennsylvania Department of Health

**Today's example:**  
**NOAA/NWS**

## Process Steps... (step 6e)

Users can bring Image and Feature services directly into their desktop GIS software.



**PASDA** Data Access Wizard  
The Pennsylvania Geospatial Data Clearinghouse

Shortcuts → Aerial Photography Topographic Maps State-wide Data Browse FTP

Online Maps & Services  
Help  
Home

**Find Data** [View Your Data Cart](#)

Search using one of the following options:

**Search by Keyword(s):**  AND  OR

**Search by Theme:**

**Search by Data Provider:**  
National Weather Service

**Search by County:**

**Browse MapServices:**

**Browse All Data:**

Done Popup Blocking Disabled



## Process Steps... (step 6f)

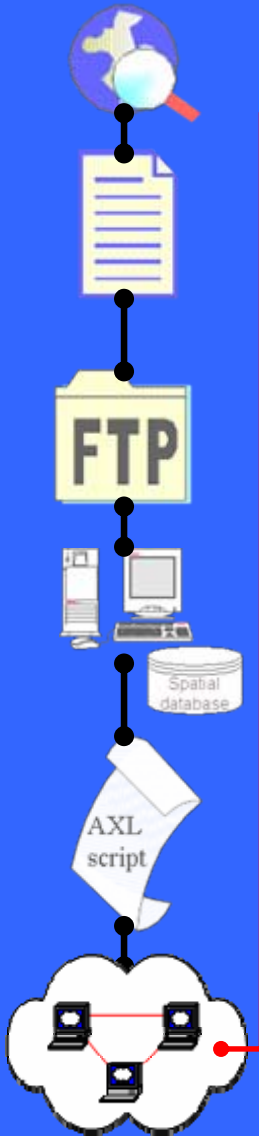
Users can bring Image and Feature services directly into their desktop GIS software.

The screenshot shows the 'PASDA Data Access Wizard' interface in a Netscape browser window. The search results are as follows:

Title	Originator	Year	Download Icon
<a href="#">Latest National Infrared Satellite Image</a>	National Weather Service	2006	🔗
<a href="#">Latest National Radar Image</a>	National Weather Service	2006	🔗
<a href="#">Latest National Visible Satellite Image</a>	National Weather Service	2006	🔗
<a href="#">National Apparent Temperature Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Dew Point Temperature Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Maximum Temperature Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Minimum Temperature Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Precipitation Amount Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Probability of Precipitation Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Relative Humidity Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Sky Cover Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Snow Amount Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Temperature Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Wave Height Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Wind Direction Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Wind Gust Forecasts</a>	National Weather Service	2006	🔗
<a href="#">National Wind Speed Forecasts</a>	National Weather Service	2006	🔗

18 + 3 = 21 variables

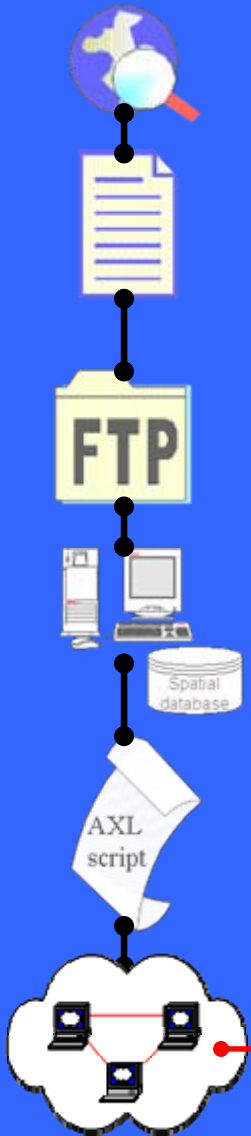
- 3 temporal images
- 18 NDFD datasets





## Process Steps... (step 6g)

Users can bring Image and Feature services directly into their desktop GIS software.



MetadataDisplay - Netscape Browser

File Edit View Go Bookmarks Tools Help

SEARCH http://cegis2.cas.psu.edu/ SECURITY CENTER

MetadataDisplay

**PASDA** Data Access Wizard  
Pennsylvania Spatial Data Access  
The Pennsylvania Geospatial Data Clearinghouse Help

Online Maps & Services  
Help  
Home

### Metadata Summary

#### National Weather Service - National Temperature Forecasts

Title:National Weather Service - National Temperature Forecasts  
Originator:National Weather Service  
Publication Date:2006

**Abstract:**  
This datasets contains 40 maps representing temperature forecasts for times occurring every three hours during the next seven day period. The model is run every three hours, so these forecast projections are relative to real-time, plus or minus three hours. TEMPERATURE is the expected temperature valid for the indicated hour. The National Digital Forecast Database (NDFD) contains a seamless mosaic of digital forecasts from NWS field offices working in collaboration with the National Centers for Environmental Prediction (NCEP). The database is made available to all customers and partners from the public, private and academic sectors. Those customers and partners may use this data to create a wide range of text, graphic, gridded and image products of their own. Over time, NWS will offer a wider array of gridded forecast elements and a larger set of graphical presentations.

[View Full Metadata Document](#)  
[Download Full XML Metadata Document \(Right-click and save...\)](#)

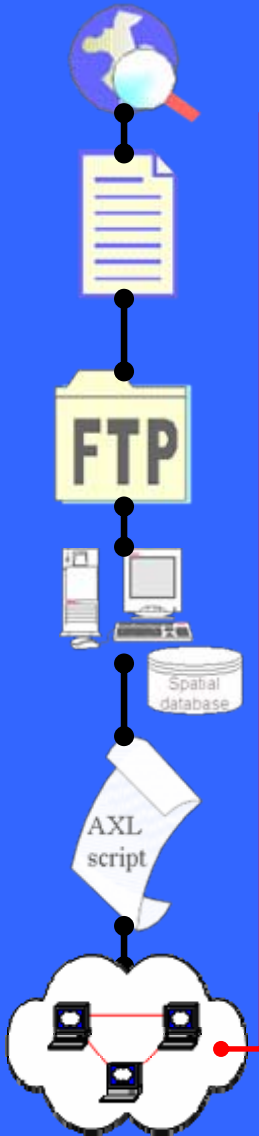
MapServices (ArcMap/GoogleEarth/WMS)

Done No Full Scan

Keep slide in mind,  
we'll return to it.

## Process Steps... (step 6h)

Users can bring Image and Feature services directly into their desktop GIS software.



**National Weather Service - National Temperature Forecasts**

- [Identification Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

*Identification\_Information:*  
*Citation:*  
*Citation\_Information:*  
Originator:National Weather Service  
Publication\_Date:2006  
Title:  
National Weather Service - National Temperature Forecasts  
Geospatial\_Data\_Presentation\_Form:vector digital data  
Publication\_Information:  
Publication\_Place:University Park, Pennsylvania  
Publisher:The Pennsylvania State University  
Online\_Linkage: <http://gis1.pasda.psu.edu>  
Online\_Linkage: <http://www.weather.gov/ndfd/>

*Description:*  
*Abstract:*  
This datasets contains 40 maps representing temperature forecasts for times occurin  
The National Digital Forecast Database (NDFD) contains a seamless mosaic of digite

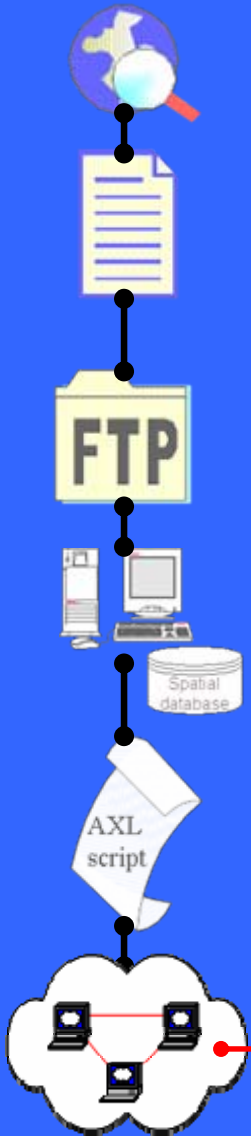
*Purpose:*  
Many technological advances and scientific breakthroughs have allowed NWS weather

*Time\_Period\_of\_Content:*  
*Time\_Period\_Information:*  
Single\_Date/Time:  
Calendar\_Date:2006  
Currentness\_Reference:

← Provide appropriate credit

## Process Steps... (step 6i)

Users can bring Image and Feature services directly into their desktop GIS software.



MetadataDisplay - Netscape Browser  
http://cegis2.cas.psu.edu

**PASDA**  
Pennsylvania Spatial Data Access  
Data Access Wizard  
The Pennsylvania Geospatial Data Clearinghouse

Online Maps & Services  
Help  
Home

### Metadata Summary

#### National Weather Service - National Temperature Forecasts

**Title:**National Weather Service - National Temperature Forecasts  
**Originator:**National Weather Service  
**Publication Date:**2006

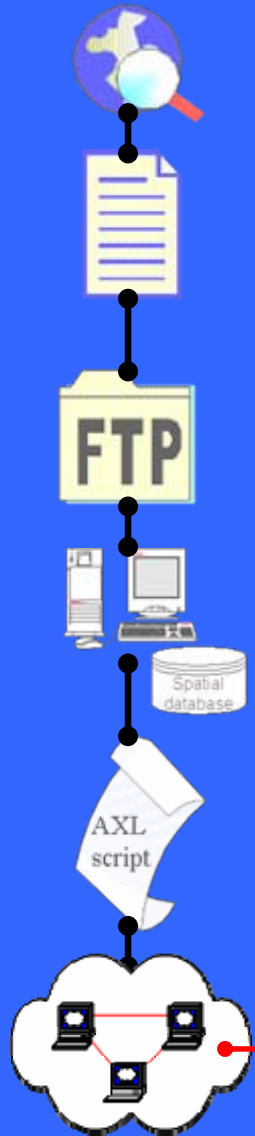
**Abstract:**  
This datasets contains 40 maps representing temperature forecasts for times occurring every three hours during the next seven day period. The model is run every three hours, so these forecast projections are relative to real-time, plus or minus three hours. TEMPERATURE is the expected temperature valid for the indicated hour. The National Digital Forecast Database (NDFD) contains a seamless mosaic of digital forecasts from NWS field offices working in collaboration with the National Centers for Environmental Prediction (NCEP). The database is made available to all customers and partners from the public, private and academic sectors. Those customers and partners may use this data to create a wide range of text, graphic, gridded and image products of their own. Over time, NWS will offer a wider array of gridded forecast elements and a larger set of graphical presentations.

[View Full Metadata Document](#)  
[Download Full XML Metadata Document \(Right-click and save...\)](#)

[MapServices \(ArcMap/GoogleEarth/WMS\)](#)

## Process Steps... (step 6j)


Users can bring Image and Feature services directly into their desktop GIS software.



**PASDA** Data Access Wizard  
The Pennsylvania Geospatial Data Clearinghouse

### MapService Details

**Title:** National Temperature Forecasts  
**Originator:** National Weather Service  
**Date:** 2006



[Preview Data](#)

[View in Google Earth](#)

**ArcIMS Image Service:** [Add to ArcMap](#)  
Server Name: gis1.pasda.psu.edu  
Service Name: National\_Temperature\_Forecasts

**WMS Service:**  
Map Server  
URL: [http://gis1.pasda.psu.edu/servlet/com.esri.ogc.wms.WMSServlet?Servicename=National\\_Temperature\\_Forecasts](http://gis1.pasda.psu.edu/servlet/com.esri.ogc.wms.WMSServlet?Servicename=National_Temperature_Forecasts)

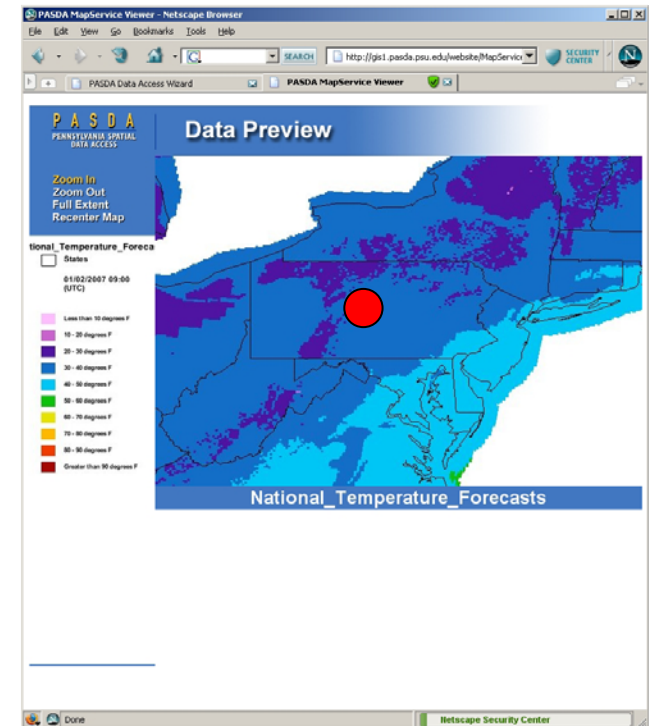
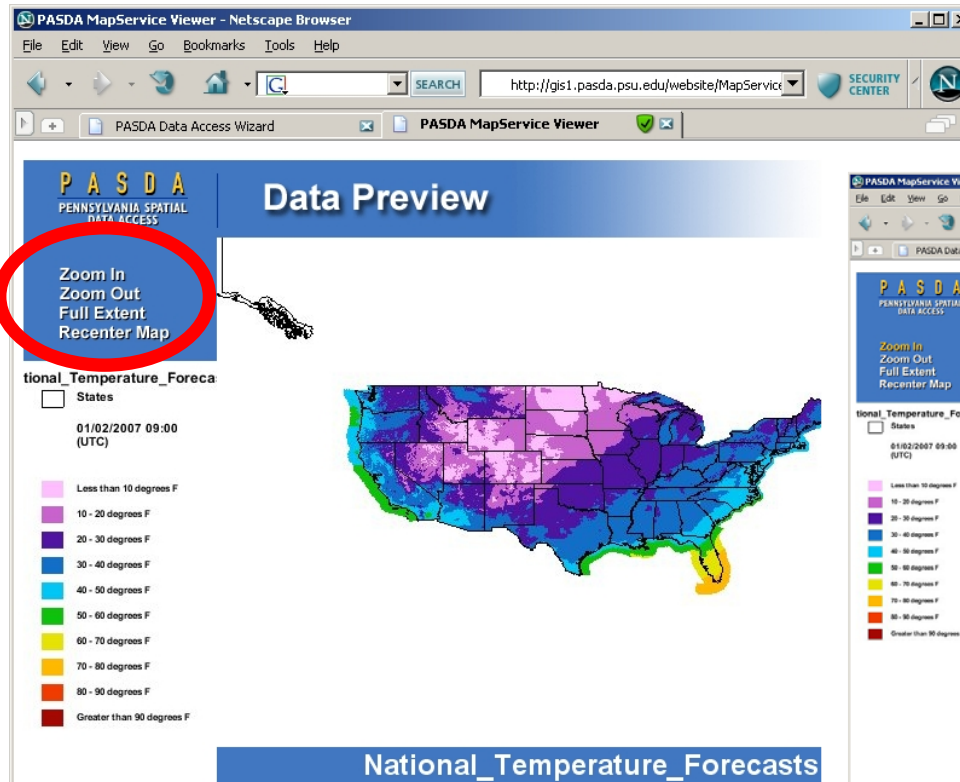
**ArcIMS Feature Service:** [Add to ArcMap](#)  
Server Name: gis1.pasda.psu.edu  
Service Name: National\_Temperature\_Forecasts\_feature

Keep slide in mind,  
we'll return to it.

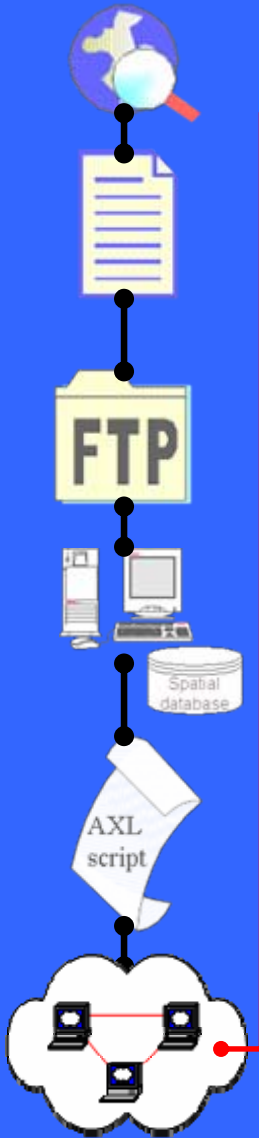


## Process Steps... (step 6k)

Users can bring Image and Feature services directly into their desktop GIS software.



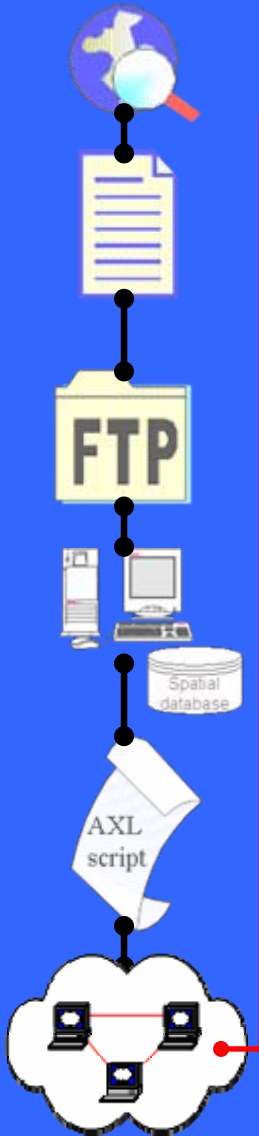
Does not require GIS software!





## Process Steps... (step 6l)

Users can bring Image and Feature services directly into their desktop GIS software.



**PASDA** Data Access Wizard  
The Pennsylvania Geospatial Data Clearinghouse

### MapService Details

**Title:** National Temperature Forecasts  
**Originator:** National Weather Service  
**Date:** 2006

[Preview Data](#)

[View in Google Earth](#)

**ArcIMS Image Service:** [Add to ArcMap](#)  
Server Name: gis1.pasda.psu.edu  
Service Name: National\_Temperature\_Forecasts

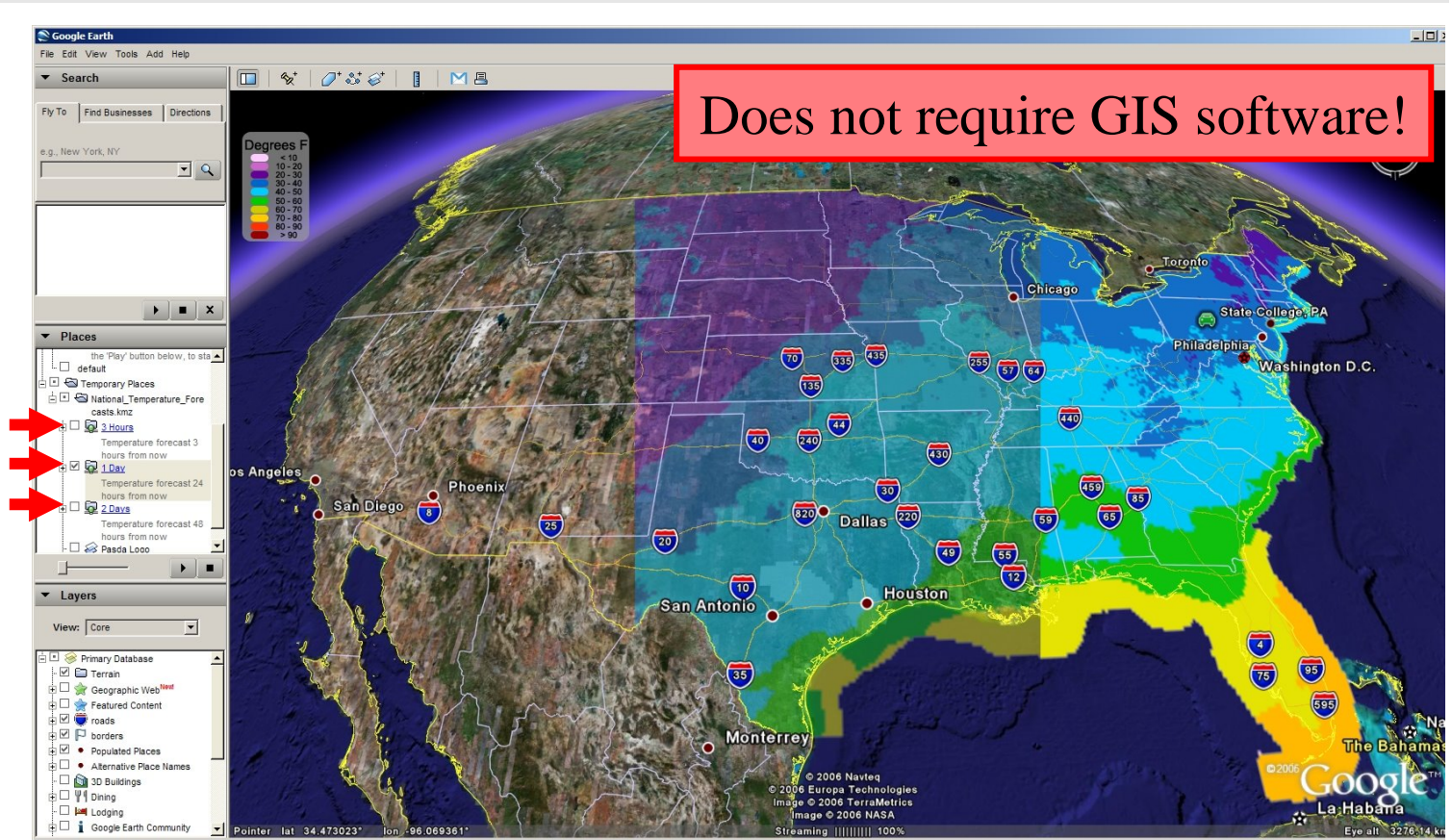
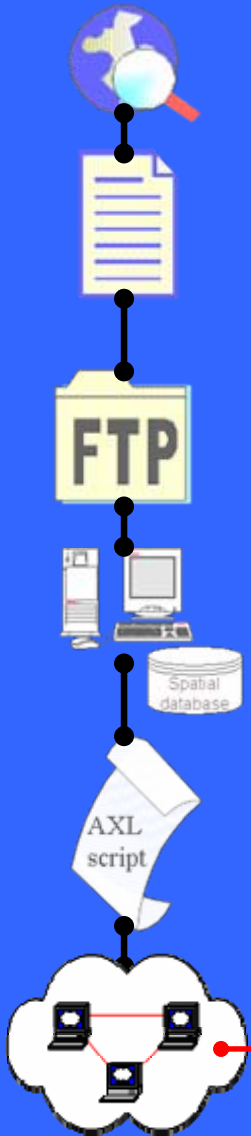
**WMS Service:**  
Map Server  
URL: http://gis1.pasda.psu.edu/servlet/com.esri.ogc.wms.WMSServlet?Servicename=National\_Temperature\_Forecasts

**ArcIMS Feature Service:** [Add to ArcMap](#)  
Server Name: gis1.pasda.psu.edu  
Service Name: National\_Temperature\_Forecasts\_feature

Keep slide in mind,  
we'll return to it.

## Process Steps... (step 6m)

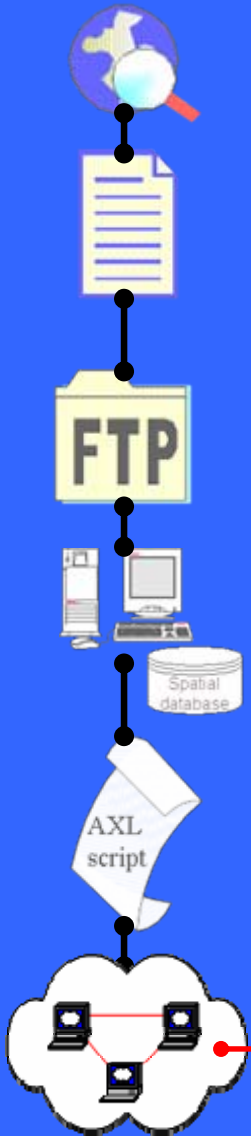
Users can bring Image and Feature services directly into their desktop GIS software.



Three NDFD/NDGD forecast layers are available for each variable at 3h, 1d, & 2d

## Process Steps... (step 6n)

Users can bring Image and Feature services directly into their desktop GIS software.



**PASDA** Data Access Wizard  
The Pennsylvania Geospatial Data Clearinghouse

### MapService Details

**Title:** National Temperature Forecasts  
**Originator:** National Weather Service  
**Date:** 2006

[Preview Data](#)  
[View in Google Earth](#)

**ArcIMS Image Service:** [Add to ArcMap](#)  
Server Name:gis1.pasda.psu.edu  
Service Name:National\_Temperature\_Forecasts

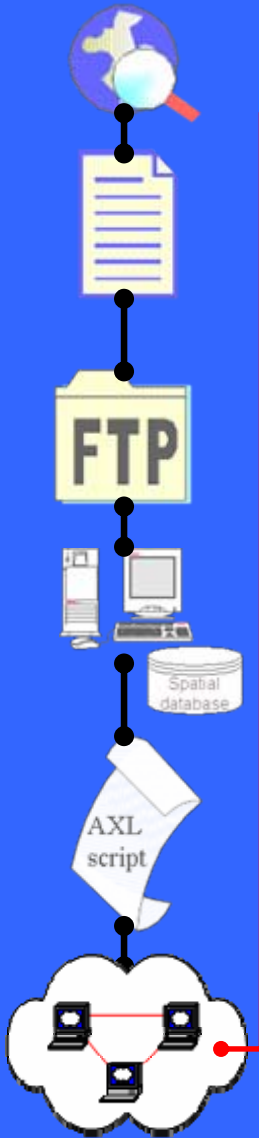
**WMS Service:**  
Map Server  
URL:http://gis1.pasda.psu.edu/servlet/com.esri.ogc.wms.WMSServlet?Servicename=National\_Temperature\_Forecasts

**ArcIMS Feature Service:** [Add to ArcMap](#)  
Server Name:gis1.pasda.psu.edu  
Service Name:National\_Temperature\_Forecasts\_feature



## Process Steps... (step 60)

Users can bring Image and Feature services directly into their desktop GIS software.



Example of 1 weeks Temperature forecast  
(Image & Feature Service)

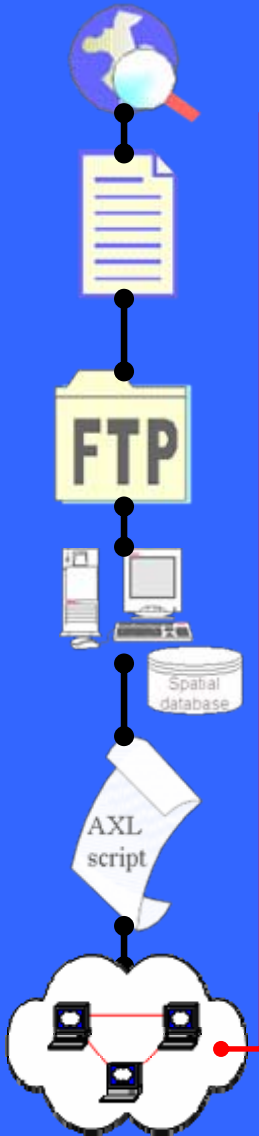
*Data are available with  
a click of a mouse!*

Layers

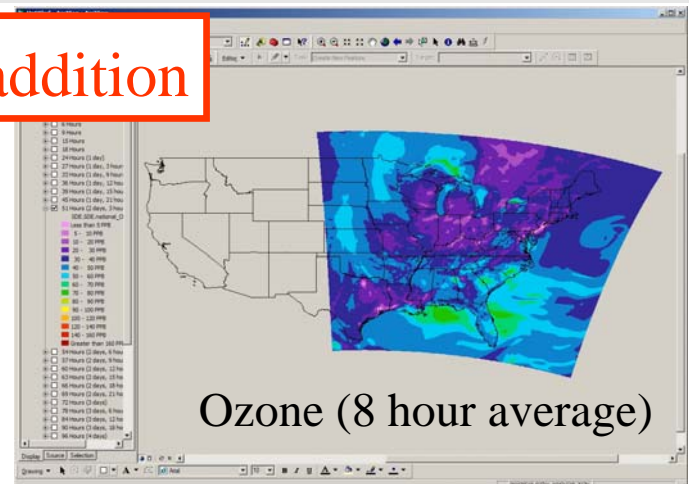
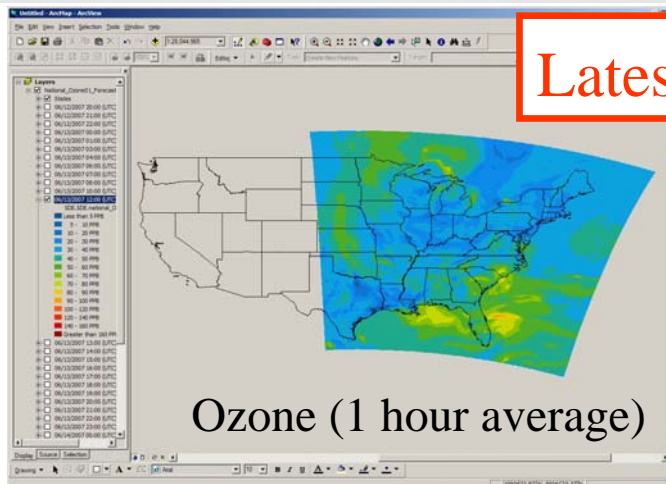
- National\_Temperature\_Forecasts
  - States
    - 12/22/2006 09:00 (UTC)
    - 12/22/2006 12:00 (UTC)
    - 12/22/2006 15:00 (UTC)
    - 12/22/2006 18:00 (UTC)
    - 12/22/2006 21:00 (UTC)
    - 12/23/2006 00:00 (UTC)
    - 12/23/2006 03:00 (UTC)
    - 12/23/2006 06:00 (UTC)
    - 12/23/2006 09:00 (UTC)
    - 12/23/2006 12:00 (UTC)
    - 12/23/2006 15:00 (UTC)
    - 12/23/2006 18:00 (UTC)
    - 12/23/2006 21:00 (UTC)
    - 12/24/2006 00:00 (UTC)
    - 12/24/2006 03:00 (UTC)
    - 12/24/2006 06:00 (UTC)
    - 12/24/2006 09:00 (UTC)
    - 12/24/2006 12:00 (UTC)
    - 12/24/2006 15:00 (UTC)
    - 12/24/2006 18:00 (UTC)
    - 12/24/2006 21:00 (UTC)
    - 12/25/2006 00:00 (UTC)
    - No data available
    - No data available
    - No data available
    - No data available
    - 12/25/2006 06:00 (UTC)
    - 12/25/2006 12:00 (UTC)
    - 12/25/2006 18:00 (UTC)
    - 12/26/2006 00:00 (UTC)
    - 12/26/2006 06:00 (UTC)
    - 12/26/2006 12:00 (UTC)
    - 12/26/2006 18:00 (UTC)
    - 12/27/2006 00:00 (UTC)
    - 12/27/2006 06:00 (UTC)
    - 12/27/2006 12:00 (UTC)
    - 12/27/2006 18:00 (UTC)
    - 12/28/2006 00:00 (UTC)
    - 12/28/2006 06:00 (UTC)
    - 12/28/2006 12:00 (UTC)

## Process Steps... (step 6p)

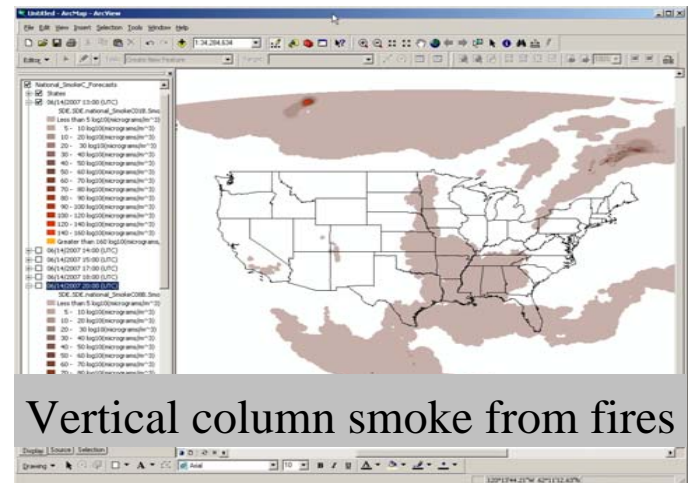
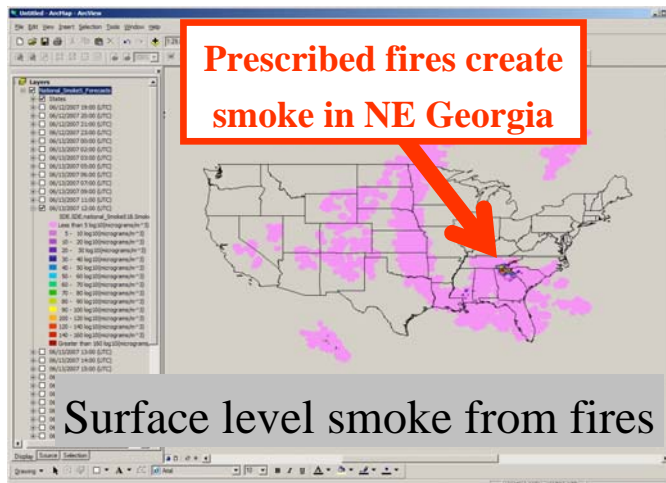
Users can bring Image and Feature services directly into their desktop GIS software.



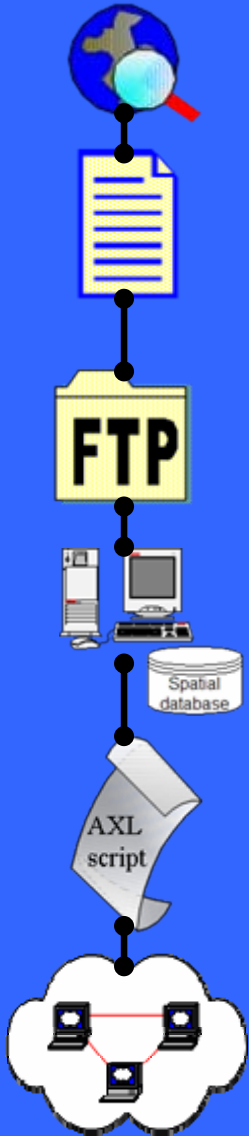
Latest addition



Prescribed fires create smoke in NE Georgia

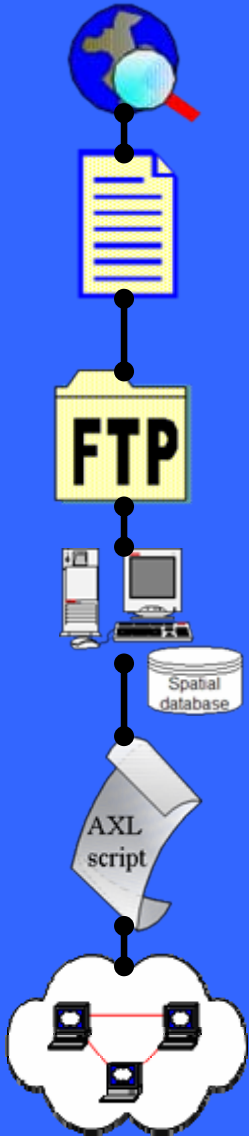






## Conclusions

- PSIEE & EESI (PSU) team communicates and collaborates with NOAA/NWS on GIS projects.
- Together, we, PSIEE, EESI, and NOAA/NWS can grow together for a greater benefit to anyone tapping in →
- We provide continuously updated NOAA/NWS weather data *in GIS format* to emergency managers and response support agencies as well as the general public (includes scientists, farmers, utility companies, and other).
- *With a click of a mouse users can bring our Image and Feature services directly into their desktop GIS software.*



## Conclusions II

(this slide was added by NOAA/NWS collaborators)

- **Collaboration works!!**

(according to NOAA/NWS collaborators)

- **Further exploration/resources needed**

- <http://www.weather.gov/gis>
- <http://www.pasda.psu.edu>
- <http://www.nbii.gov>

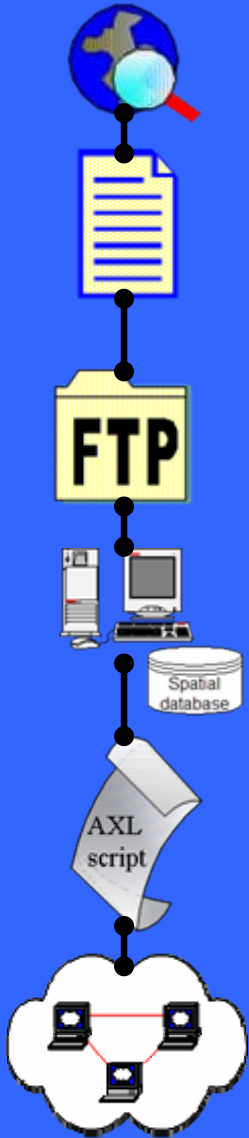
## ... what other data can be fed into our system ...

Any kind of temporal gridded data starting from:

- observed data (e.g., satellite data, climate data, soil data, biological data, power grid data, health data, etc.)

to

- data from numerical models (e.g., climate models, hydrological models)



## ... what is coming in the near future ...

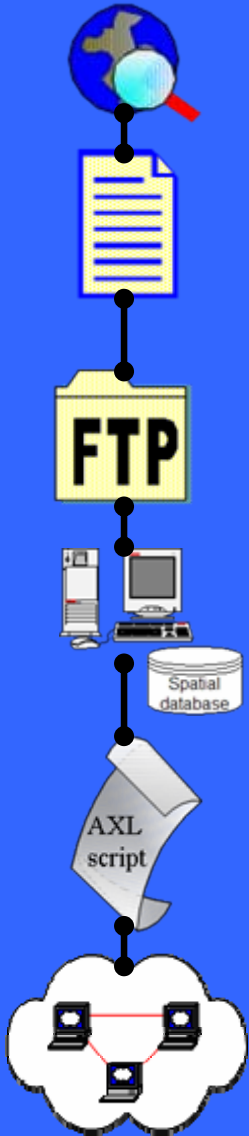
More data from:

- NWS/NOAA
  - NDFD (National Digital Forecast Database) – new fields
  - NDGD (National digital Guidance Database), e.g., lightning strikes and wind gusts
- National Hurricane Center (NHC) in Miami:
  - Tropical cyclone wind speed probs, tornado, hail, damaging thunderstorm wind probs
  - Extreme tornado, hail, damaging wind probs, total severe, and extreme severe thunderstorm probs

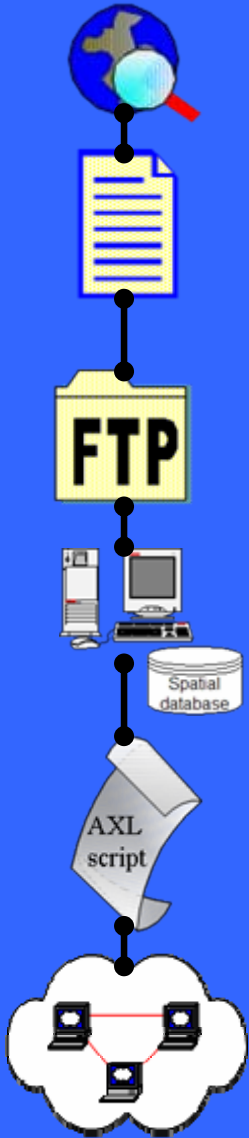
- River gauge data (if made available as one dataset)
- Bedford Institute of Oceanography (BIO) & Dalhousie University
  - Buoy data

And:

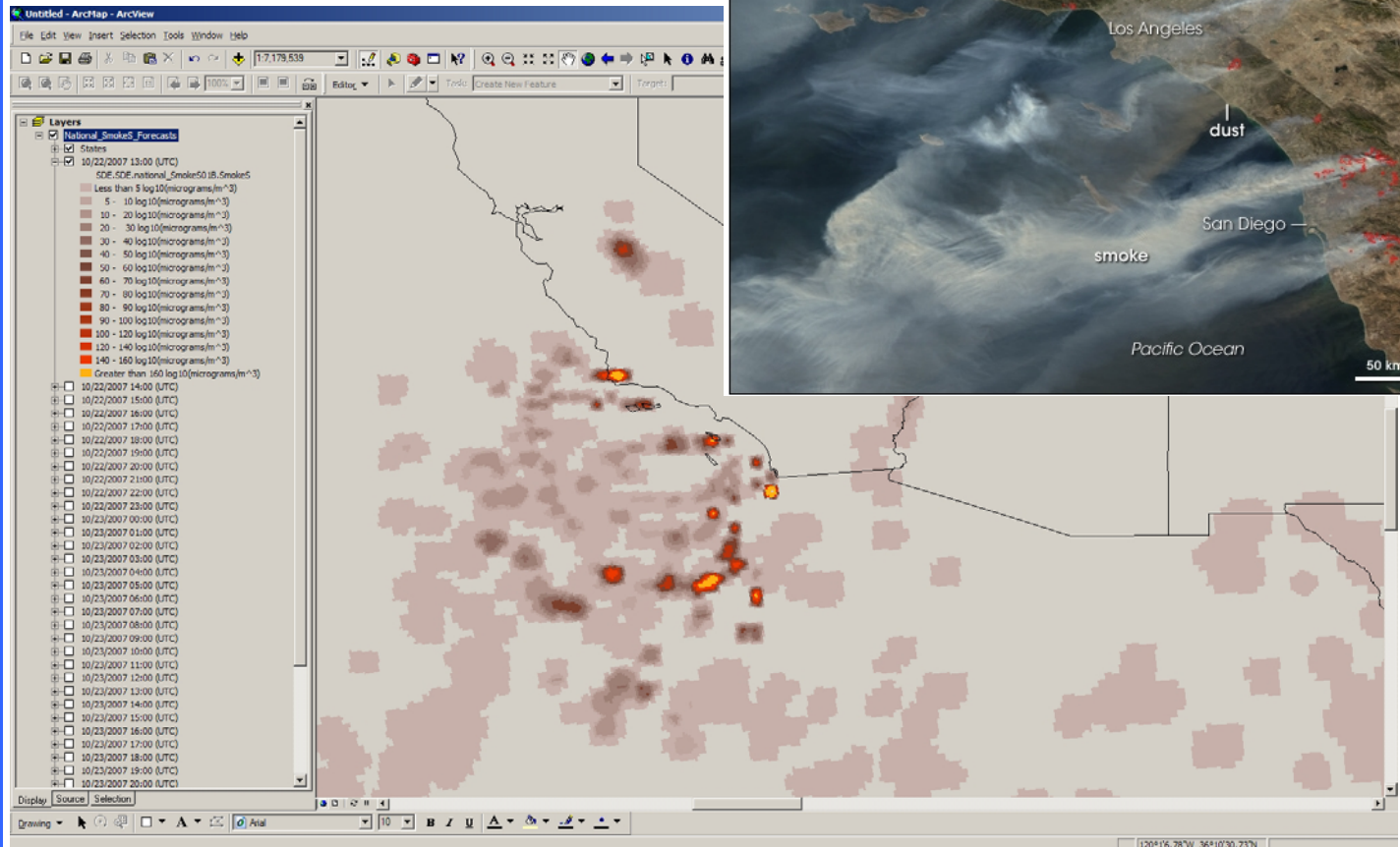
- NOAA/NWS might use us as an official GIS data outlet



... questions and comments ...



Fires in Southern California





... questions and comments ...

