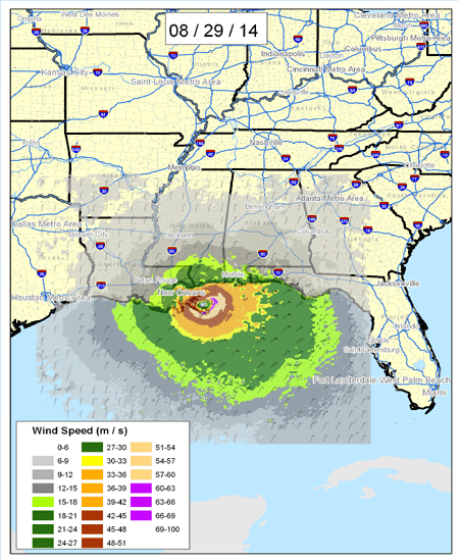
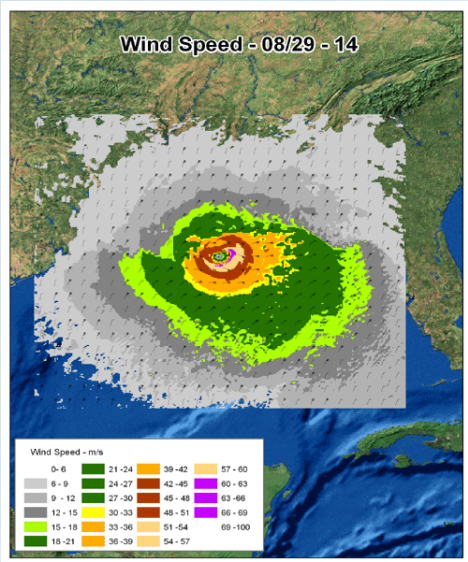




NCAR

WRF netCDF Output in GIS

Jennifer Boehnert (RAL/ISSE)

WRF Workshop
June 19, 2006

Presentations outline

- **Introduction of GIS**
- **Overview of the GIS Initiative at NCAR**
- **Progress to-date of WRF in GIS**
- **Potential applications of using WRF in GIS**

The “G” in GIS = Geographic

Weather

Atmospheric Conditions

Topography

Demography

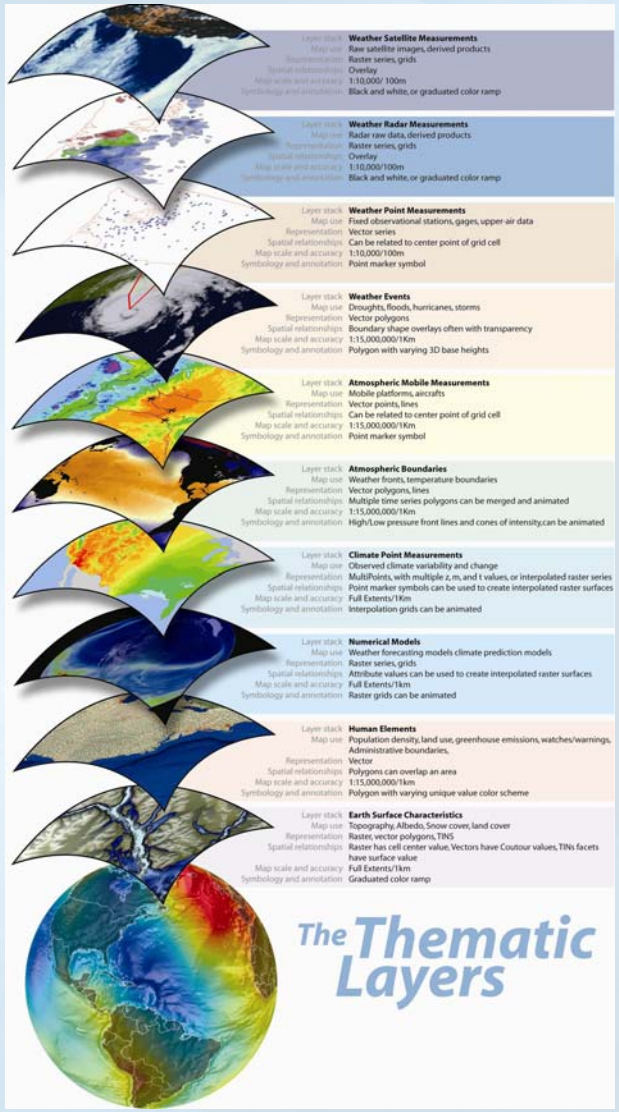
Hydrology

Geology

REFERENCE SYSTEM

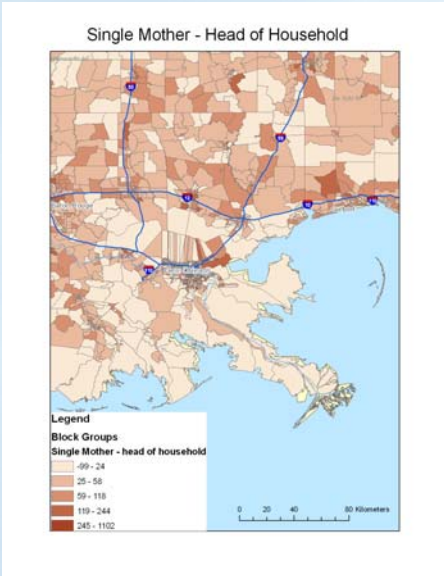
What is GIS?

- **A system of computer hardware, software used for data capturing, storing, integrating, analysing and displaying of data.**
- **Analysis that combine data with spatial interpretation**



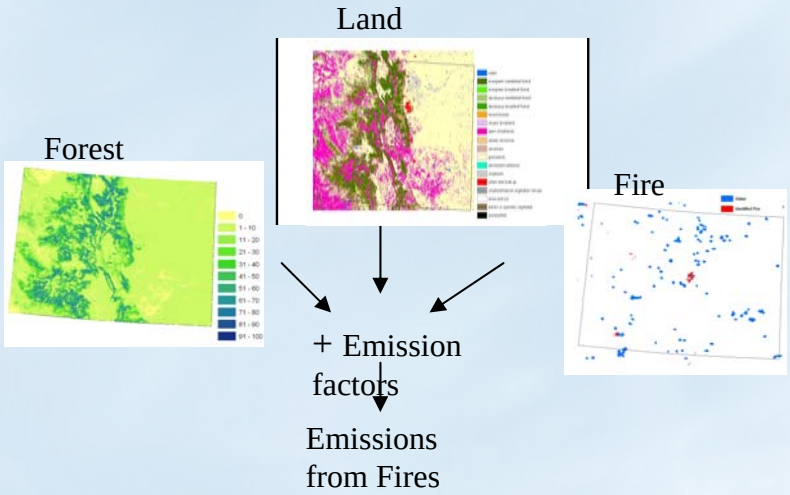
GIS Functions

- **Capture – paper maps, digital, coordinates, GPS**
- **Display – paper map, image, chart**
- **Modeling – combining analysis tools**
- **Store – Gridded, vector, database, flat file**
- **Analyse – proximity, overlay**
- **Query – select based on a criteria (attribute or spatial)**



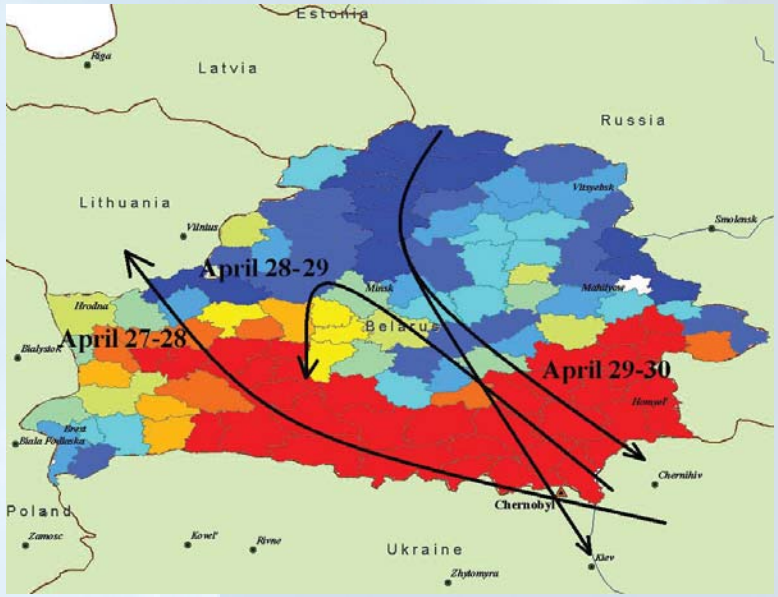
GIS Applications

Emissions Modeling



An example of the emissions modeling that is currently being carried out in ACD includes a North American daily biomass burning emission inventory created for the U.S.EPA. These emission estimates will be used as input to regional atmospheric chemistry transport models used by federal and state agencies and by scientific researchers. (Wiedinmyer)

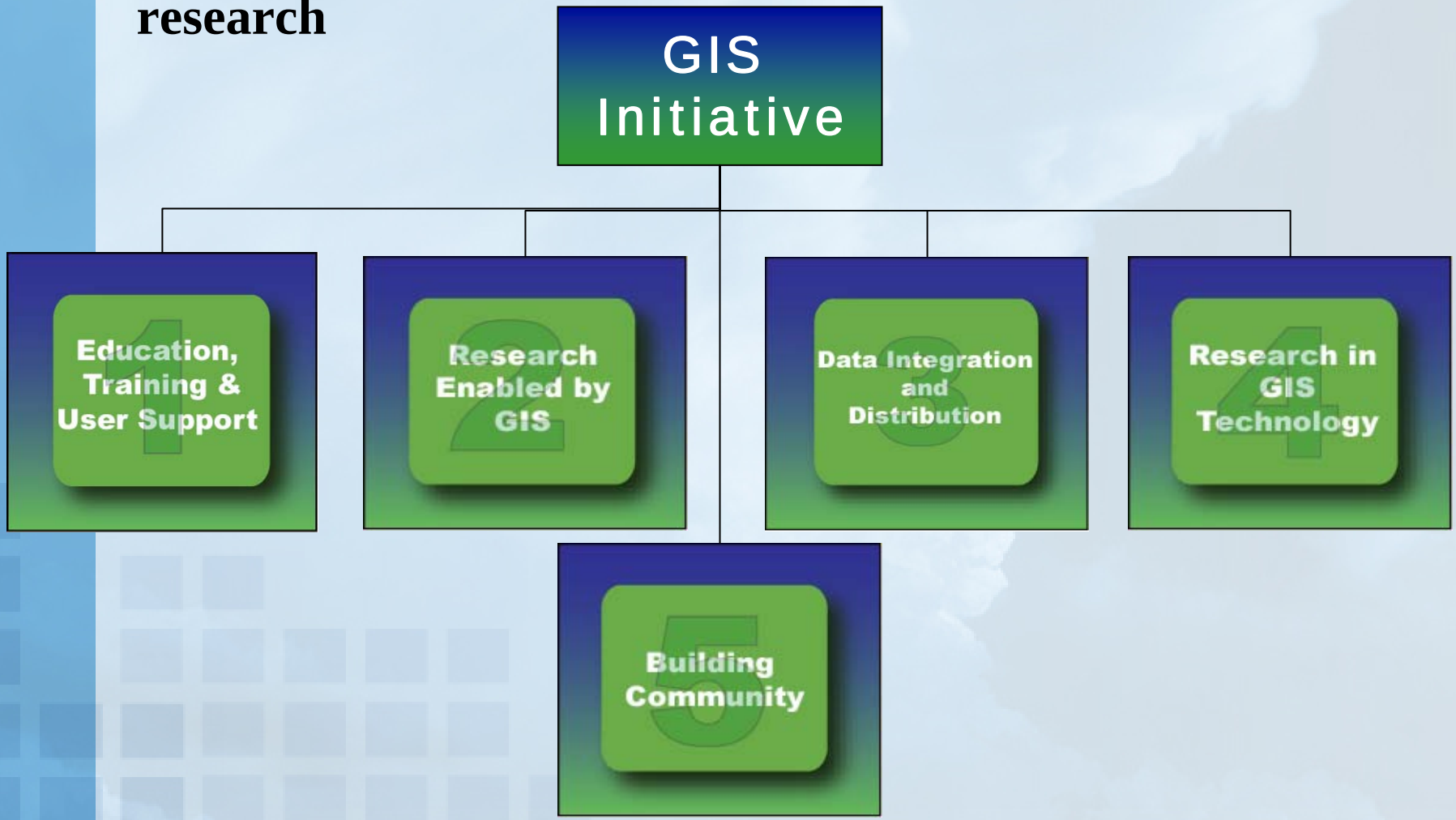
Assessing the probability of thyroid cancer in children



Wind direction over the Belarus territory in April 1986. Using filtered kriging, Byelorussian districts are colored according to the probability that thyroid cancer rates in children exceeded one case per 10,000. Red represents the highest probability and cycles through the spectrum to blue, the lowest probability. (Data: the Sakharov Institute of Radioecology, Minsk, Belarus)

GIS UCAR

To promote and support the use of GIS as both an analysis and an infrastructure tool in atmospheric research



GIS in the Atmospheric Community

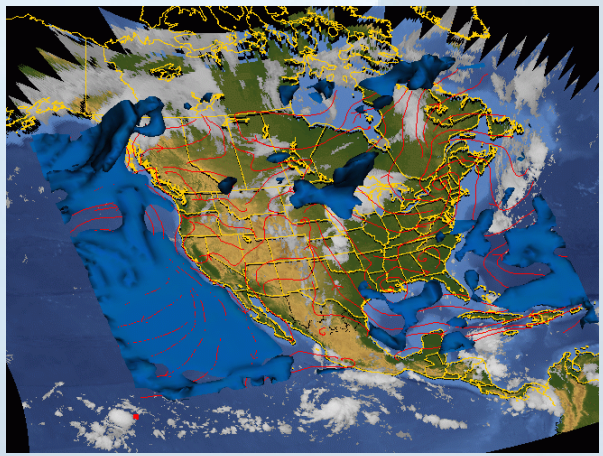
NCAR

Atmospheric Information Systems (AIS)

- **Domain-specific information system**
- **Highly efficient for atmospheric applications**
- **Built to address visualization needs of atmospheric data**
- **Minimal integration of non-atmospheric data**

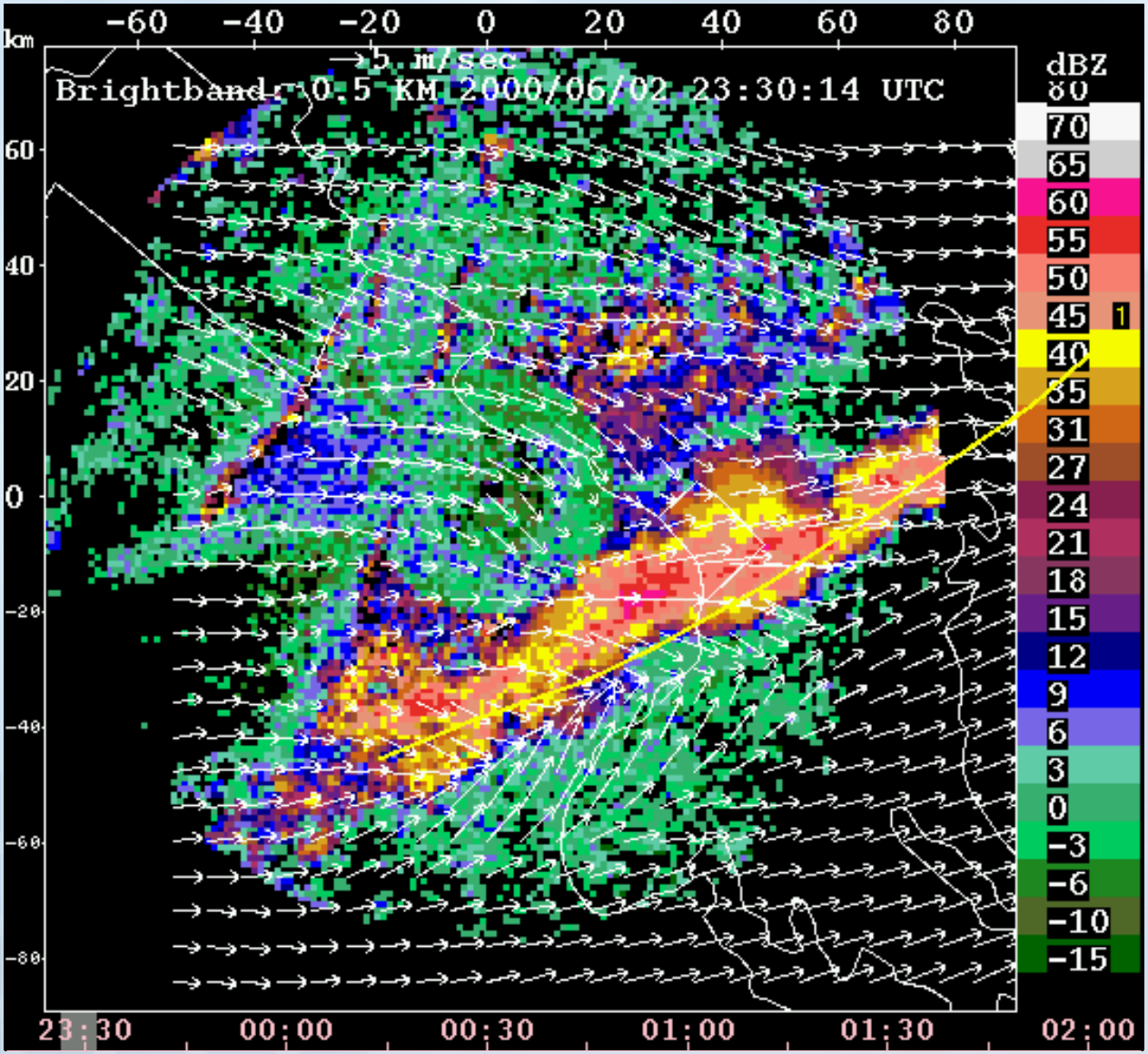
Geographic Information Systems (GIS)

- **General purpose information system**
- **Highly developed cartographic tools**
- **Limited range of spatial and temporal representation**
- **Minimal integration of atmospheric data**



Building the Bridge

Can your GIS do this?



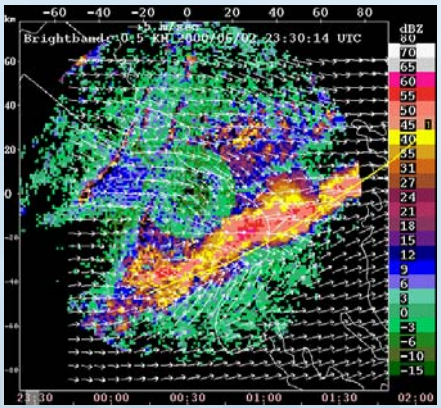
Two-Track Approach

AIS
Client

GIS
Client

Track 1

Track 2



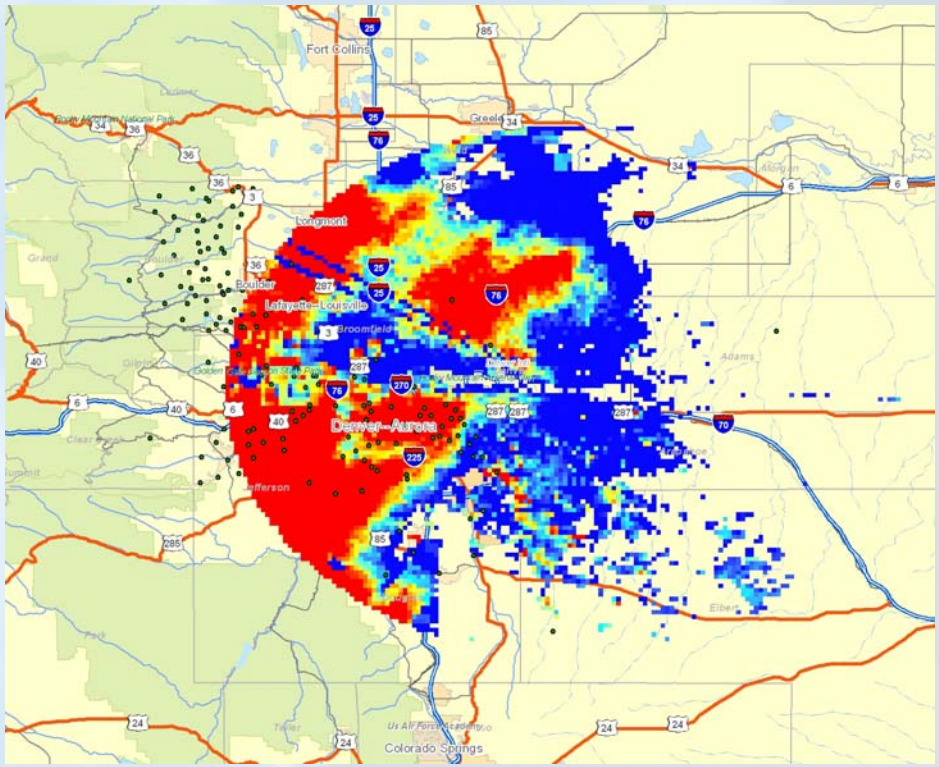
Research in GIS Technology

- **Background to getting netCDF into ArcGIS**
  - NCAR GIS Initiative leading the Atmospheric GIS Special Interest Group (SIG)
  - 2004 – 1st Data Modeling workshop with SIG and ESRI
  - Continued talks between ESRI, UNIDATA, and GIS Initiative
  - 2005 - ESRI support for netCDF that is COARDS and CF convention

1st Data Modeling Workshop
Seattle, WA 2004

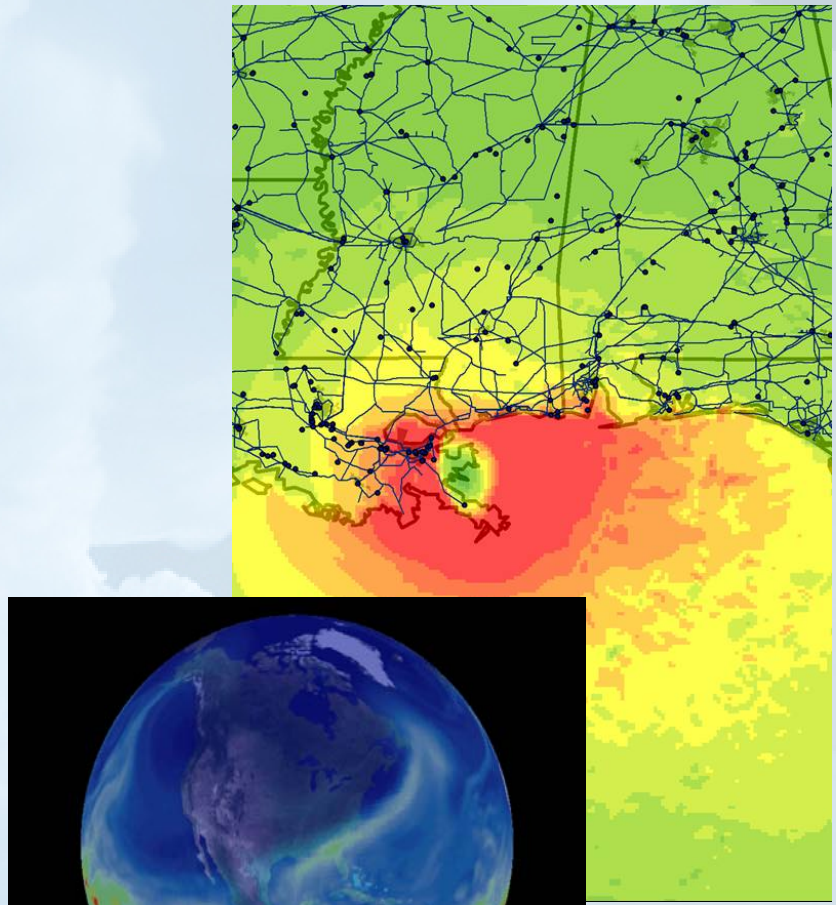
Potential Applications for WRF netCDF in GIS

- **Impacts on extreme weather events**
- **Verification of model outputs**
- **Decision support and management**
- **Integration of weather forecast with socio-economic data**



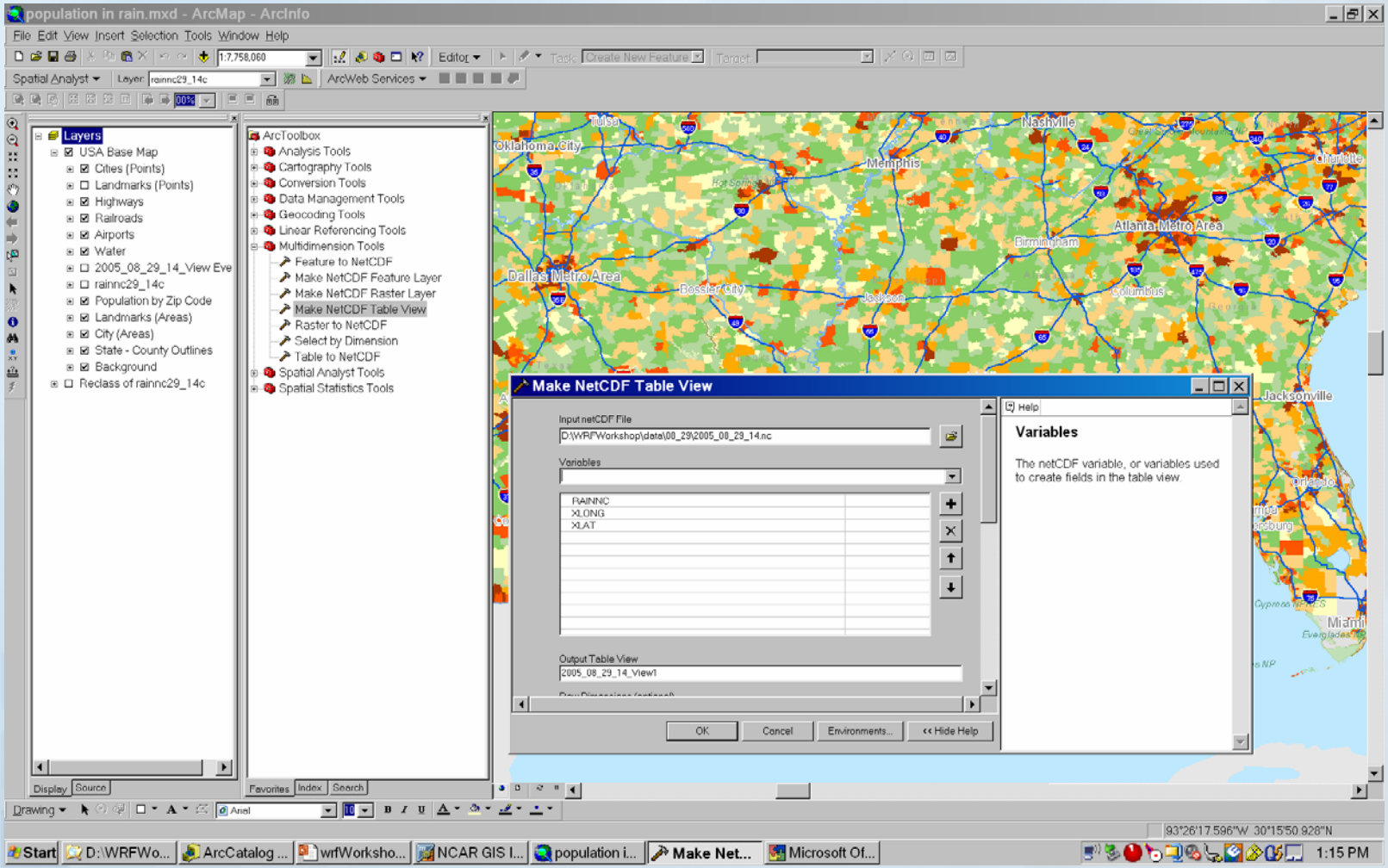
Workaround for WRF output

- **Bring netCDF into GIS :**
  - Grid
  - Point
  - Table
- **Bring WRF into GIS :**
  - Table – display as a point
- **Store coordinates in CF convention**



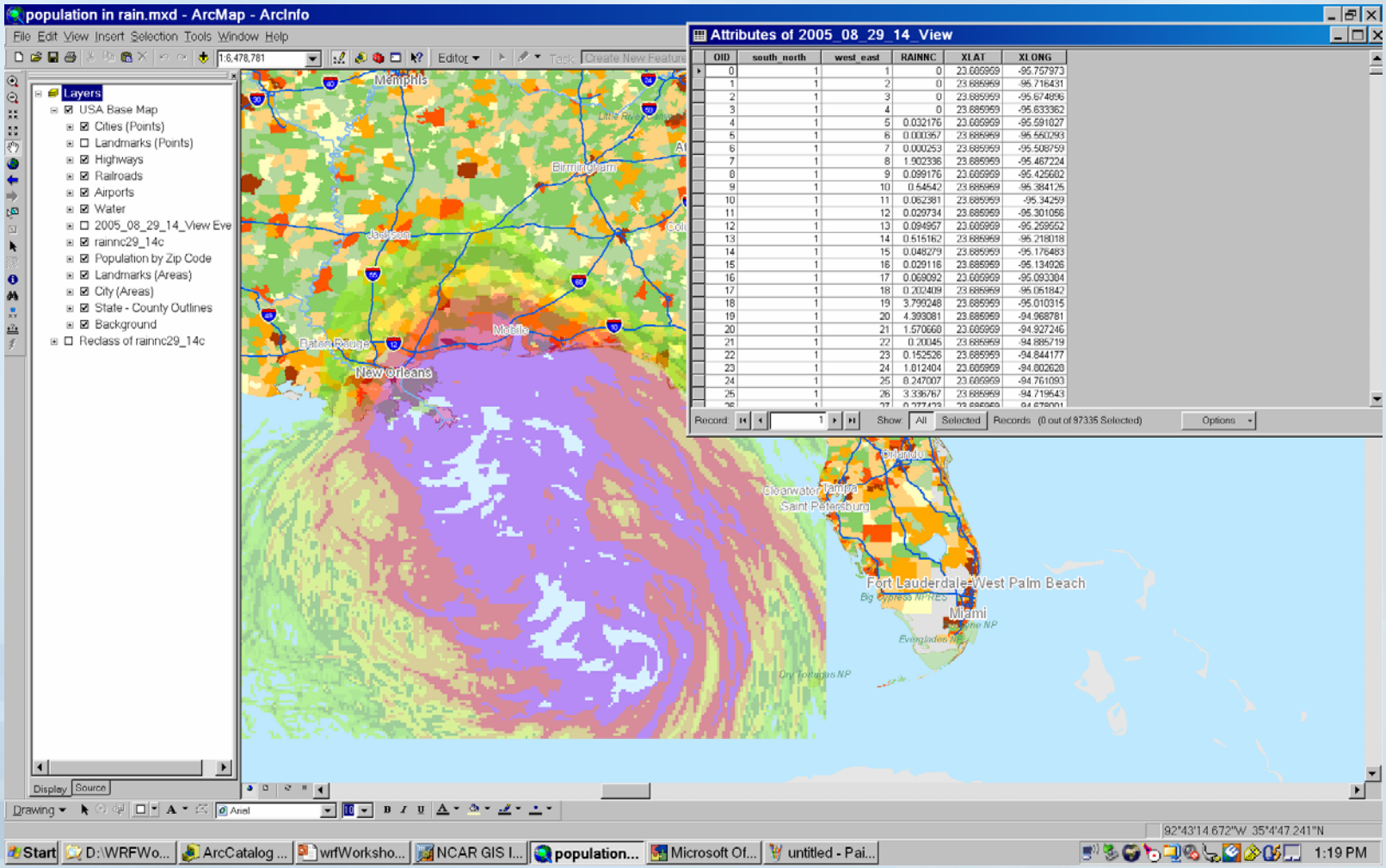
Bringing WRF into GIS

Step 1 – bring WRF in as table view



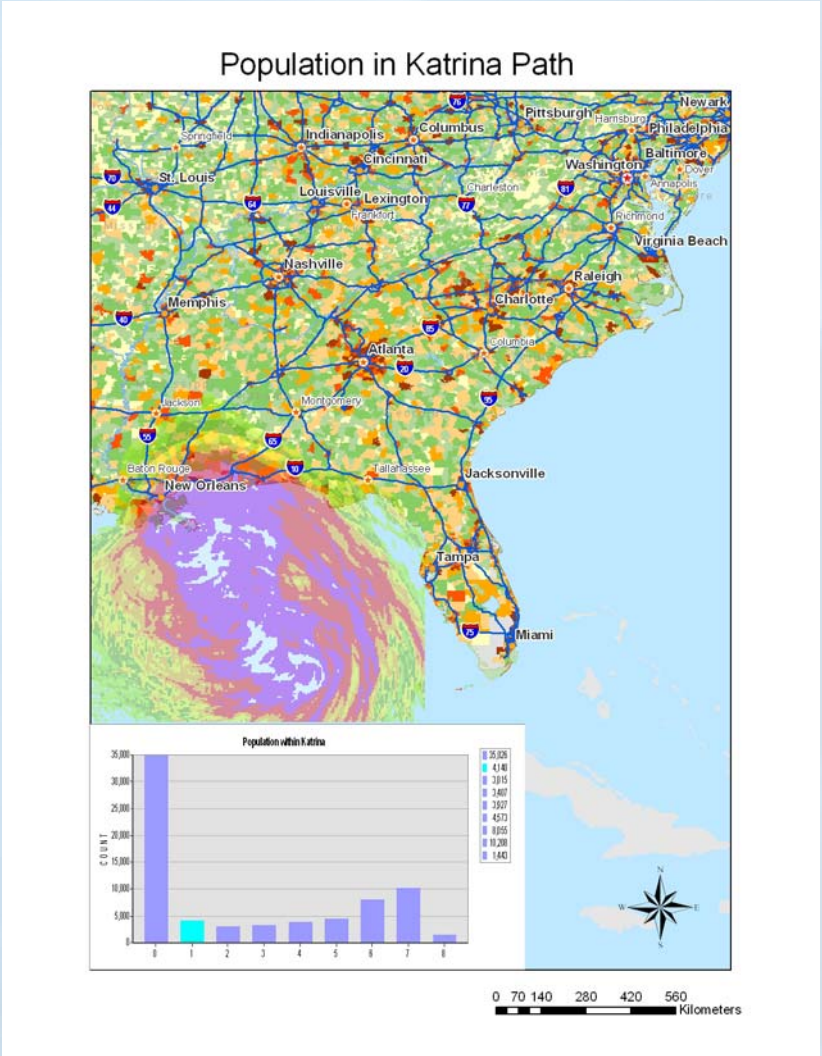
Bringing WRF into GIS

Step 2 – display based on XLONG and XLAT



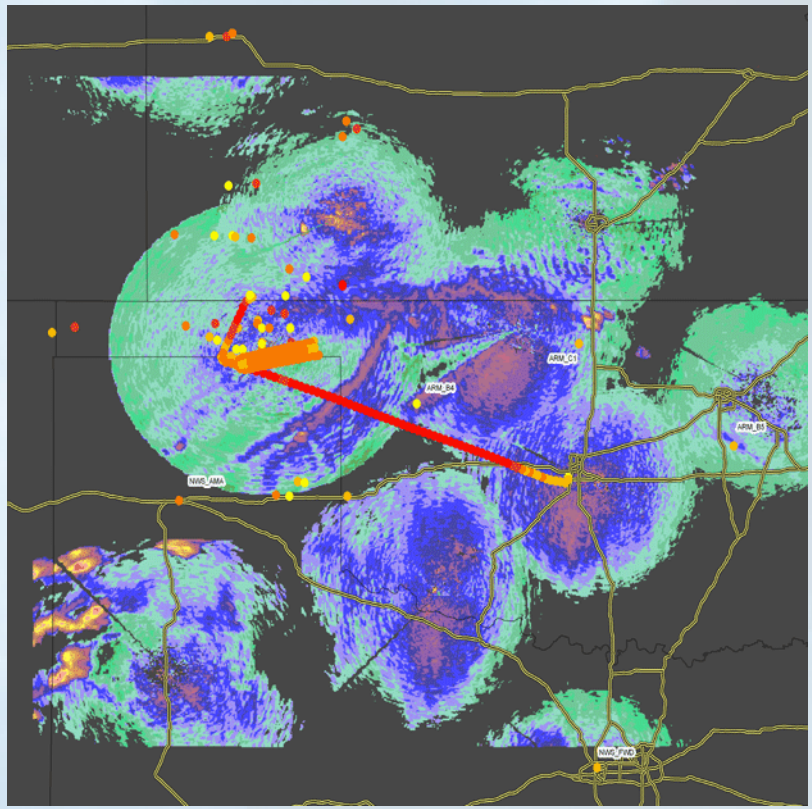
Bringing WRF into GIS

Step 3 – make map, create animation, do analysis with base data



Conclusion

- **GIS provides a new visualization tool for WRF output**
- **A suite of new analysis tools to integrate WRF output with socio-economic data**
- **Opening up WRF output to new users in the :**
  - Resource management
  - Impacts
  - Assessment
  - Educational



Click here for animation