

Use of Rapidly Updating and Global Meteorological Datasets in ArcGIS

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WEATHER. DECISION. TECHNOLOGIES.

- Who is WDT?
- Why does weather matter?
- Does GIS work with meteorology?
- Long title, short explanation.
- Python, where open source meets ESRI.
- Big data is big!
- Round peg in a less round hole.

ABOUT US.

WHY WE ARE WHERE WE ARE



Over 1200 people employed in the Norman weather community

Norman, Oklahoma

Houston, TX




 Research Campus...
NSSL, School of Meteorology
PC, ROC



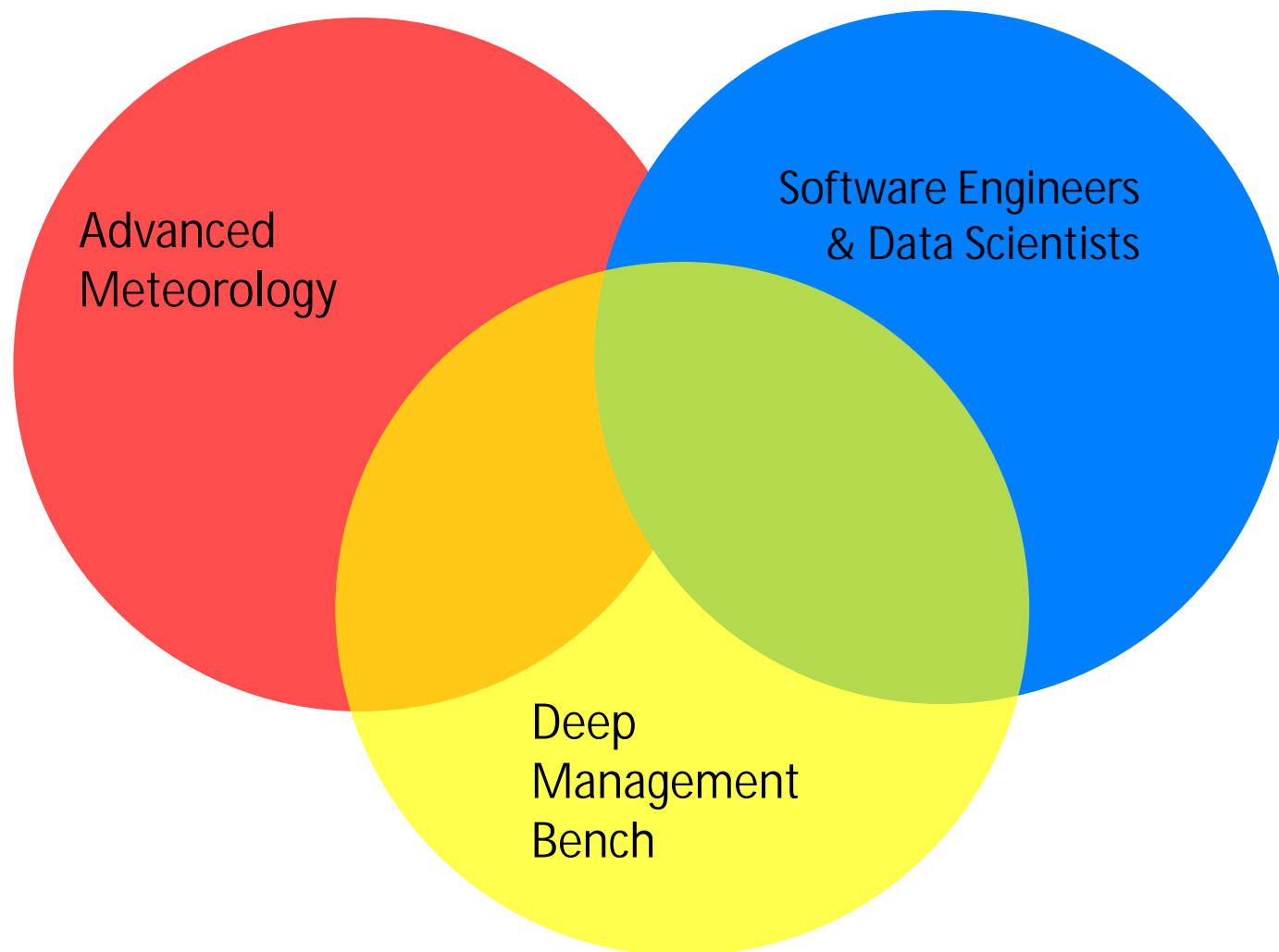
 Private Industry



 Houston
Energy Capital of the World

ABOUT US.

WHO IS WDT?



- ▶ 85+ Employees
- ▶ 40+ PhD, Masters
- ▶ 58 Meteorology degrees
- ▶ 31 Computer Science degrees
- ▶ 4 Certified Consulting Mets
- ▶ AMS Fellow
- ▶ Leaders in Weather Tech

Mostly Sunny with a Chance of EF-5

- Weather affects everyone

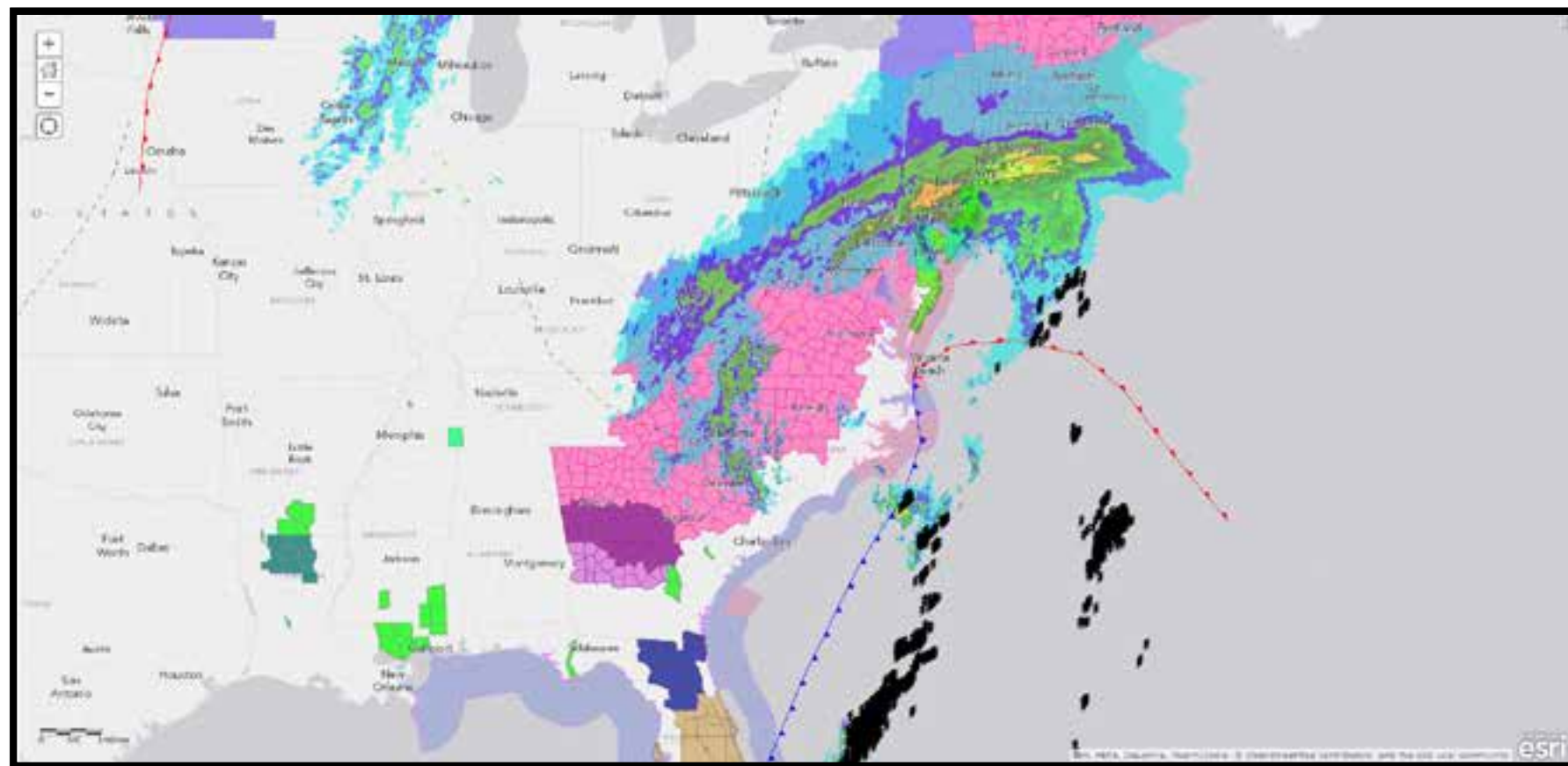


Mostly Sunny with a Chance of EF-5

- Weather affects everyone
- Critical decision making
 - Life and property
 - Business continuity
- Multiple industries/parties
 - Agriculture
 - Utilities/Oil & Gas
 - Aviation
 - Transportation
- How best to disseminate information?

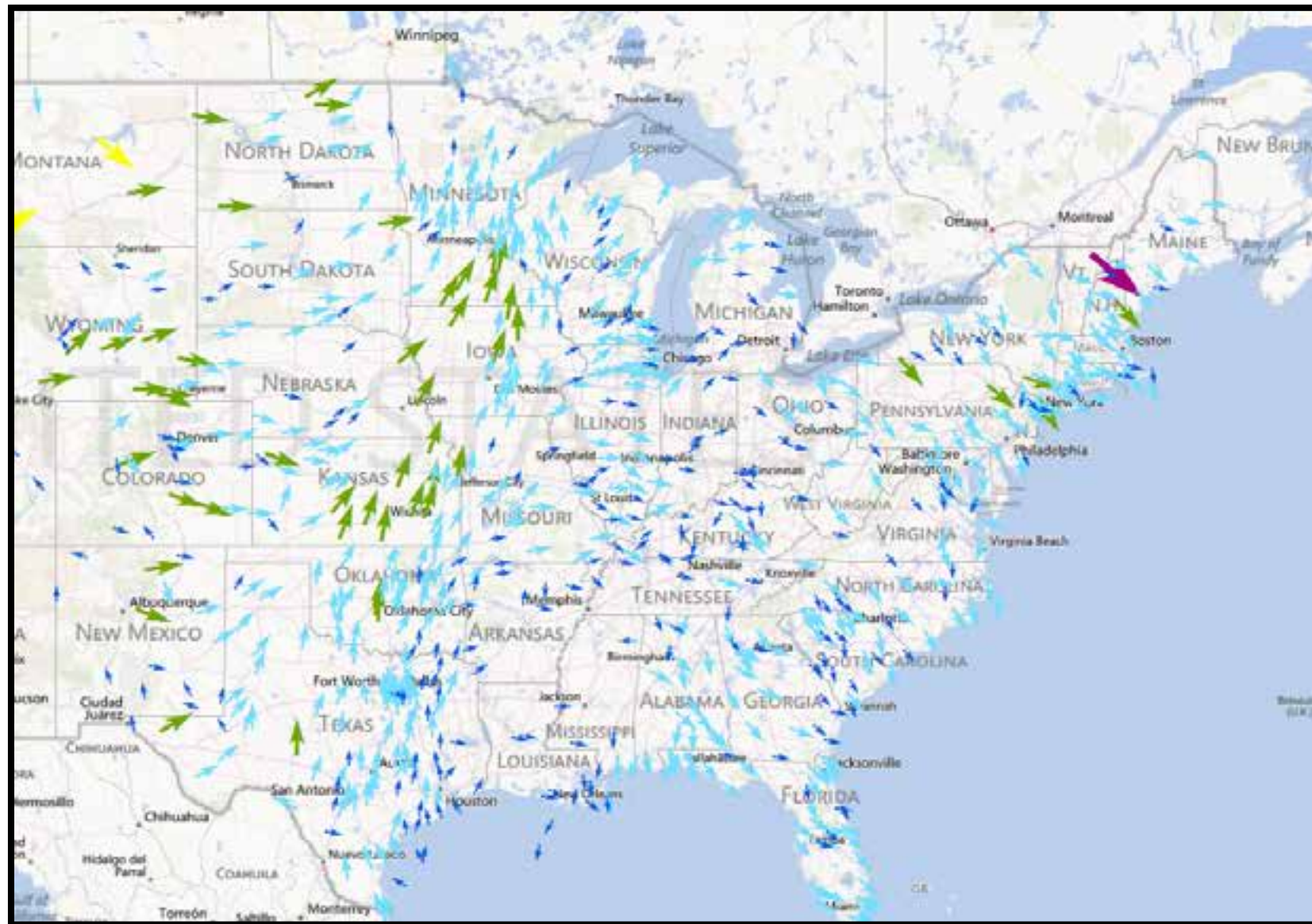
Meteorology and GIS?

- Meteorology inherently linked to Geography
- GIS is everywhere
- Asset mapping
- Planning



Ajar-source

- Model output in meteorological gridded formats (Grib, NetCDF)
- QA/QC, contour (In house software C/C++)



Ajar-source

- Model output in meteorological gridded formats (Grib, NetCDF)
- QA/QC, contour (In house software C/C++)
- Open source (GDAL/OGR, Shapely)
- In house spatial data (Postgresql/PostGIS)
- All lead to ESRI customer facing products

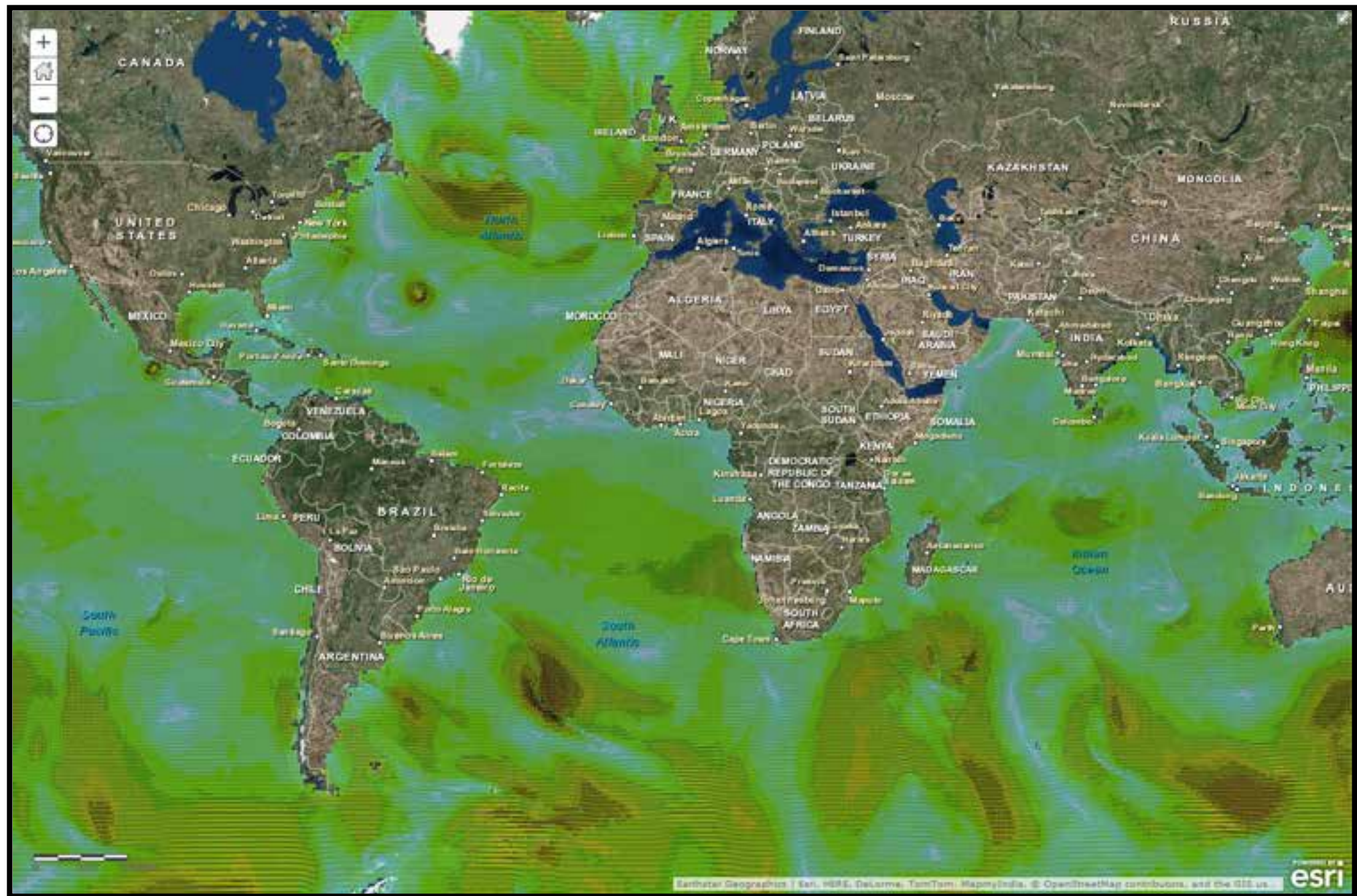
Python is man's best friend.

- Arcpy, Postgresql and spatial data are friends
- Arcpy.da, direct database connections
- Flexible scripting/OOP language
- Easy to maintain
- Cross-Platform support

```
def update_feature(new_fc, current_fc):  
    """ """  
    print "Trying to update Feature"  
    # Truncate data to delete features and reset OID  
    try:  
        arcpy.TruncateTable_management(current_fc)  
    except Exception, e:  
        print e  
  
    with arcpy.da.SearchCursor(new_fc, "*") as cursor:  
        with arcpy.da.InsertCursor(current_fc, "*") as cursor_insert:  
            for row in cursor:  
                try:  
                    cursor_insert.insertRow(row)  
                except RuntimeError as e:  
                    print e
```

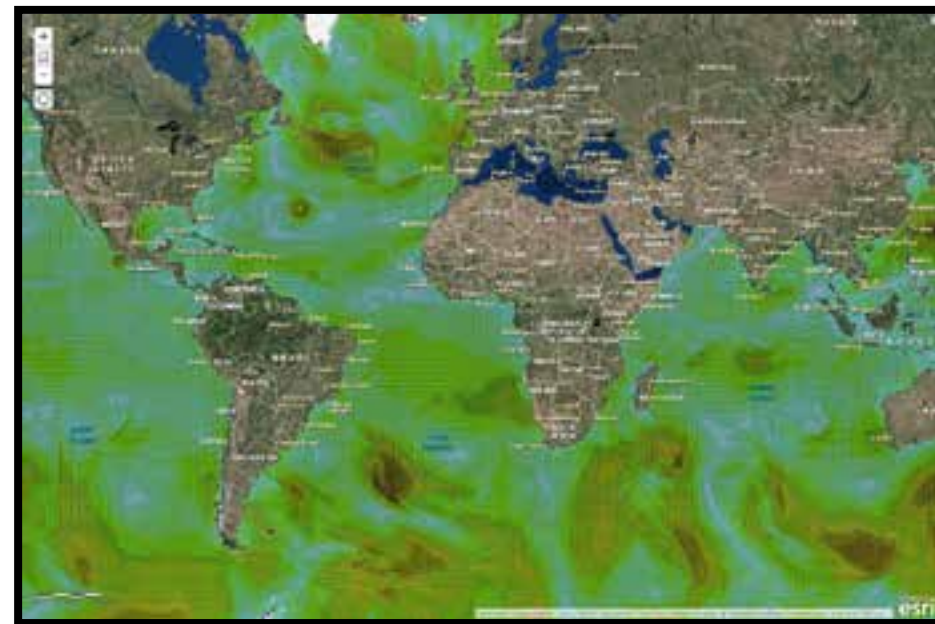
Size does matter.

- Global models
 - (Dozen products with millions of points)



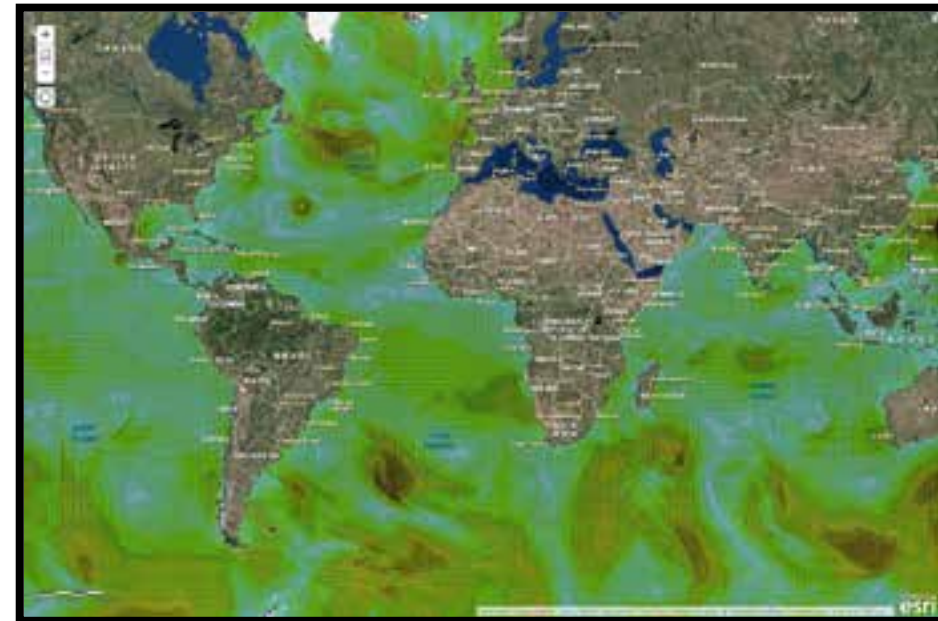
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Size does matter.

- Global models
 - (Dozen products with millions of points)
- Rapid updates (seconds to minutes)
 - Caching not realistic
- Time = Money
 - Introducing latency degrades data value
 - Large draw times decrease productivity

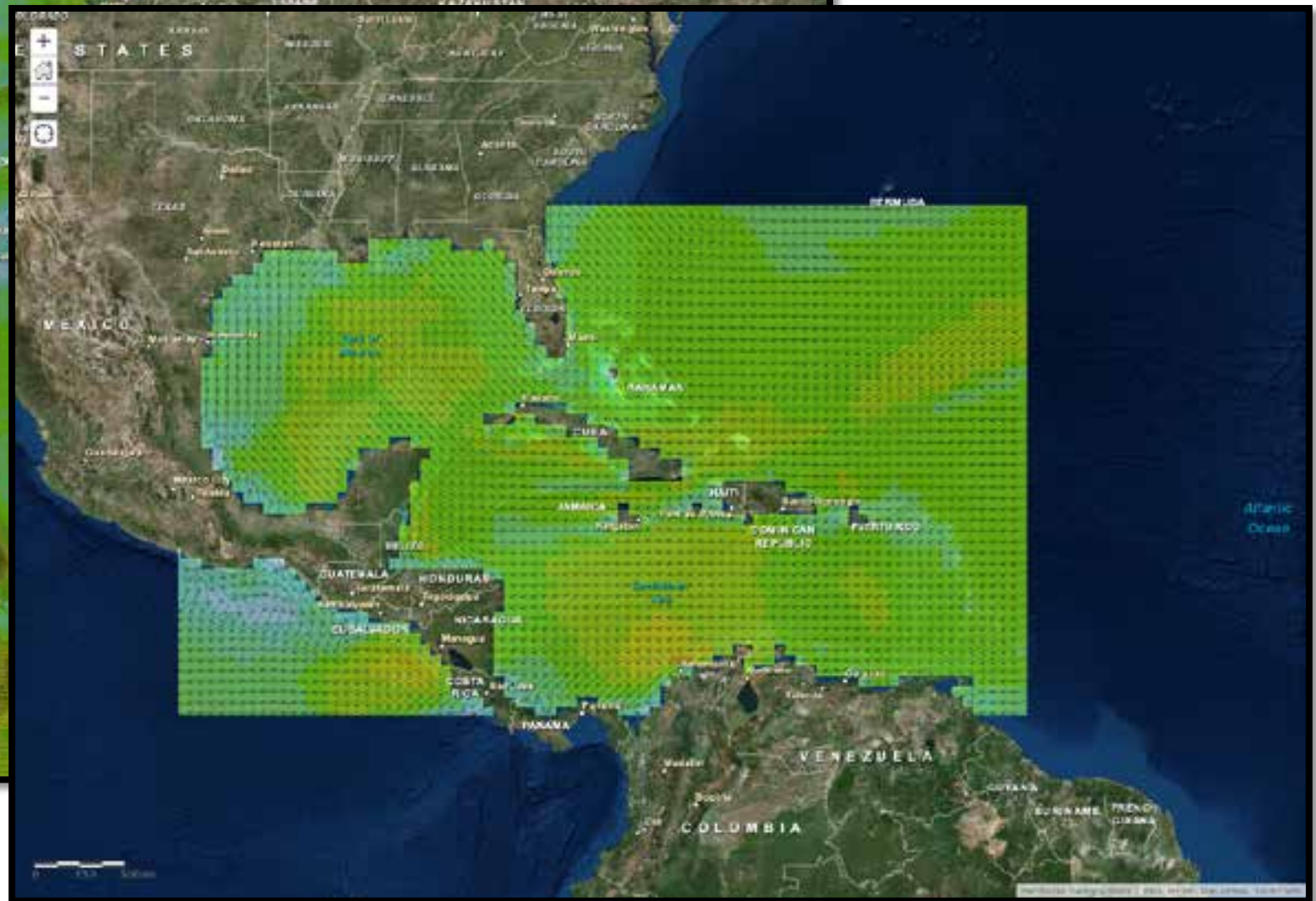
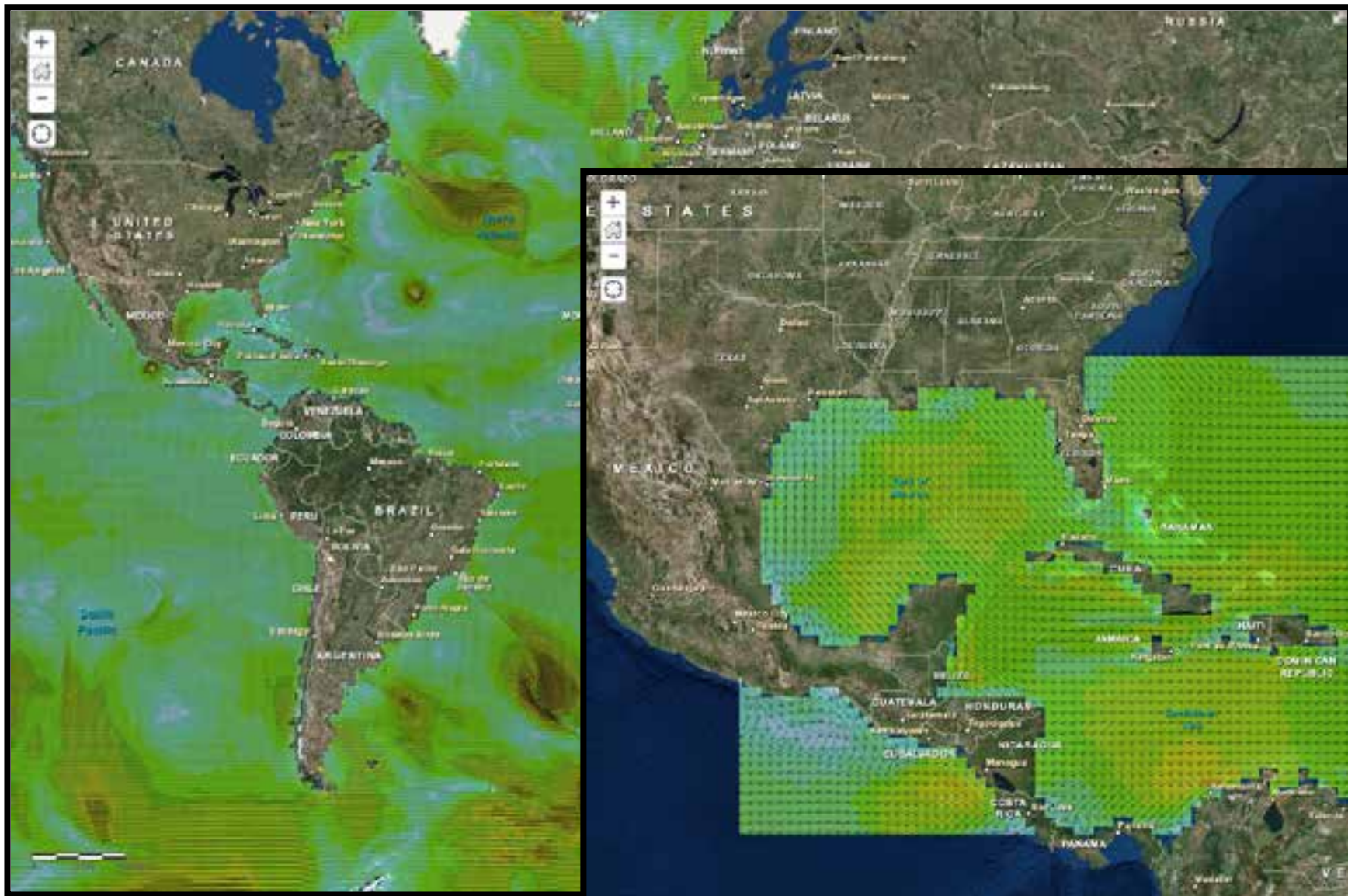


Why ArcGIS?

- Wildly flexible restful endpoints
- Spatial data in all flavours
- Mapping and geospatial analysis in one place
- Multi-industry accepted mapping/geospatial software

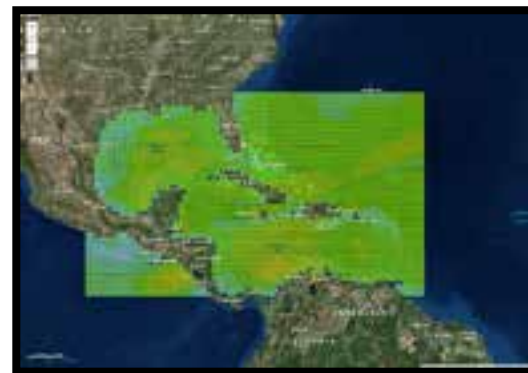
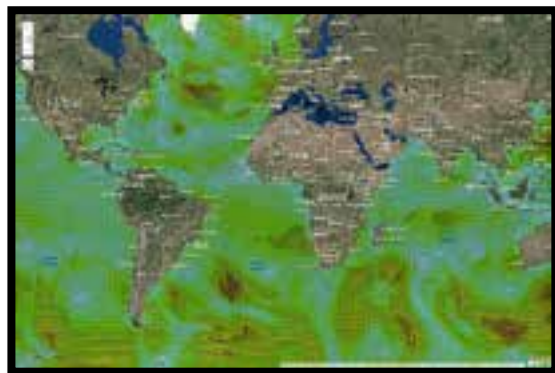
It doesn't work perfect every time?

- Shear size
- Split into regional subsets



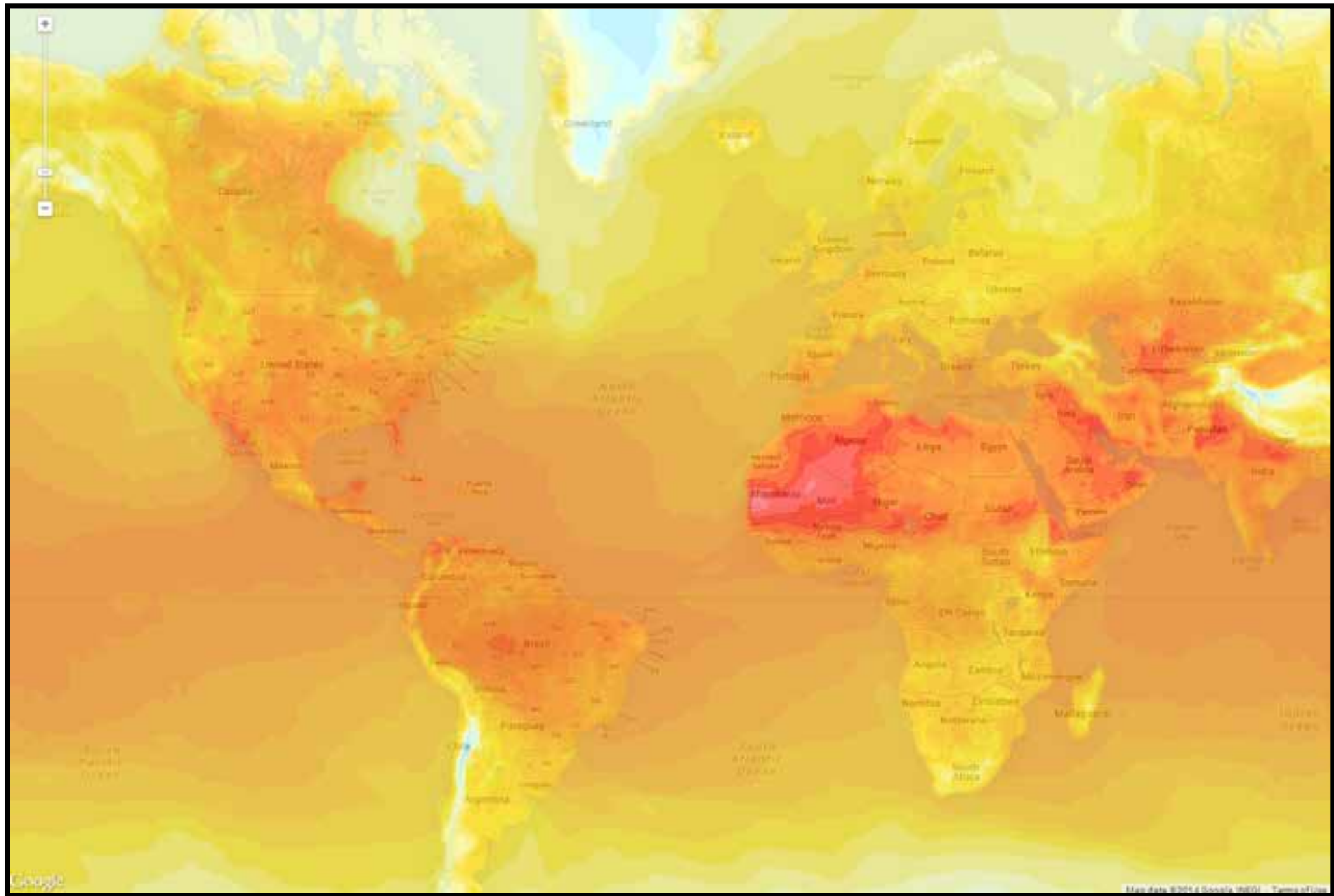
It doesn't work perfect every time?

- Shear size
- Split into regional subsets
- Simplify data (smooth and simplify contours, unstack)
- Reduce grid density
- Loss of precision and accuracy vs increased usability



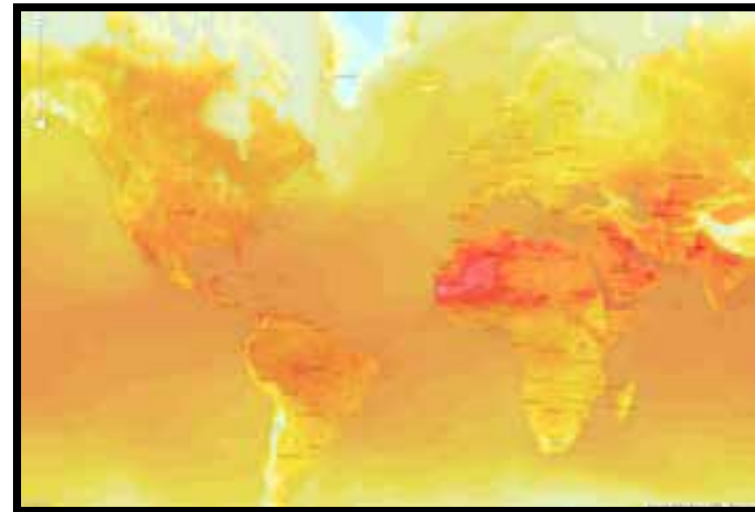
WDT Alternatives to ArcGIS

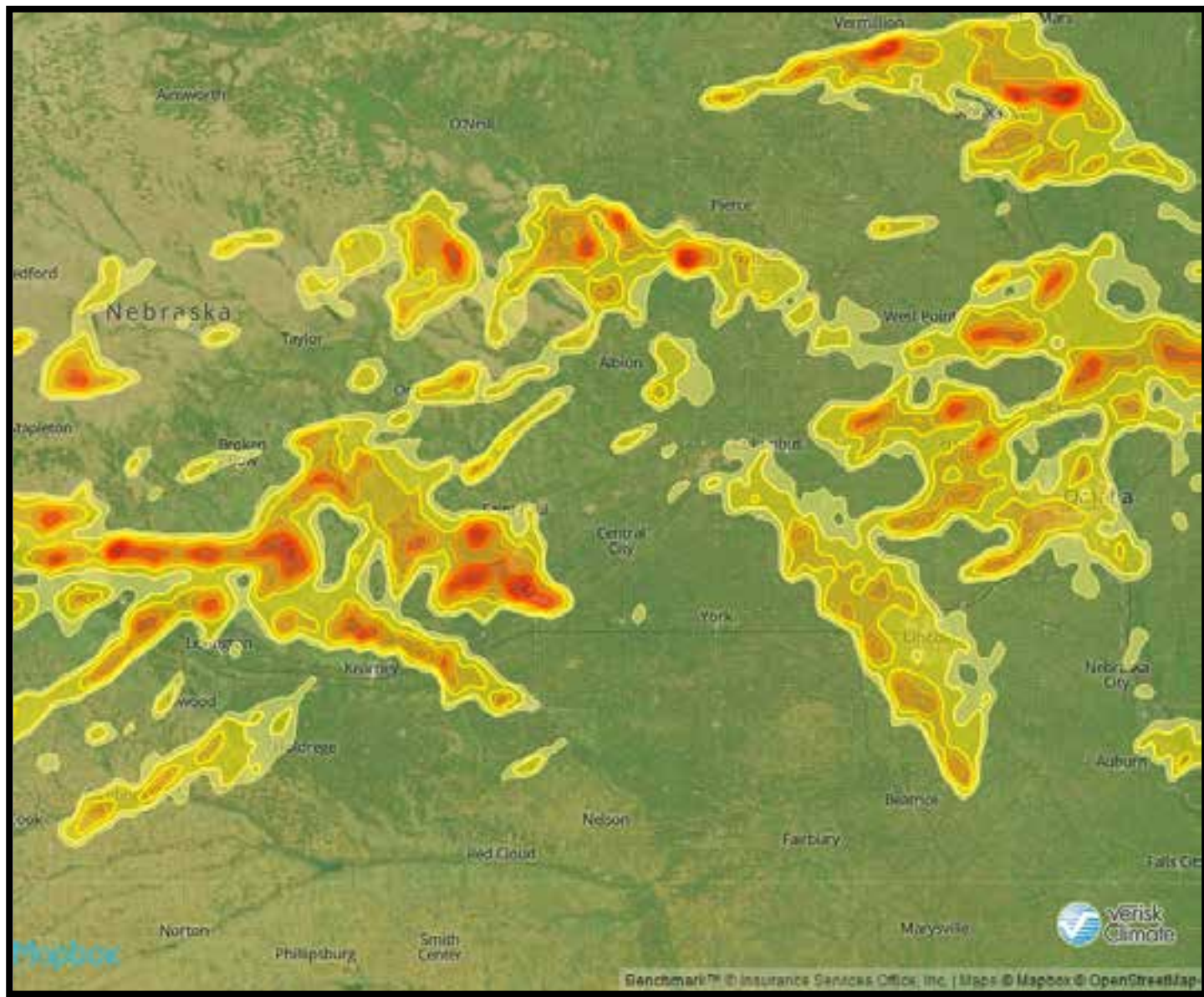
- SWARM – WDT's proprietary tiling engine



WDT Alternatives to ArcGIS

- SWARM – WDT's proprietary tiling engine
 - Fast pre-cached tiled data, conforms loosely to WMS
 - Massive scalability
 - Numerous datasets
 - Fixed symbology
 - No geospatial analysis
- Home grown GIS API's





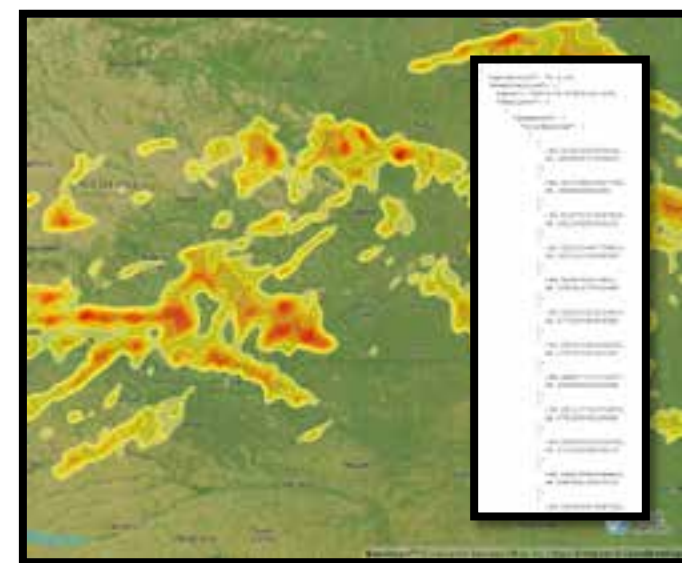
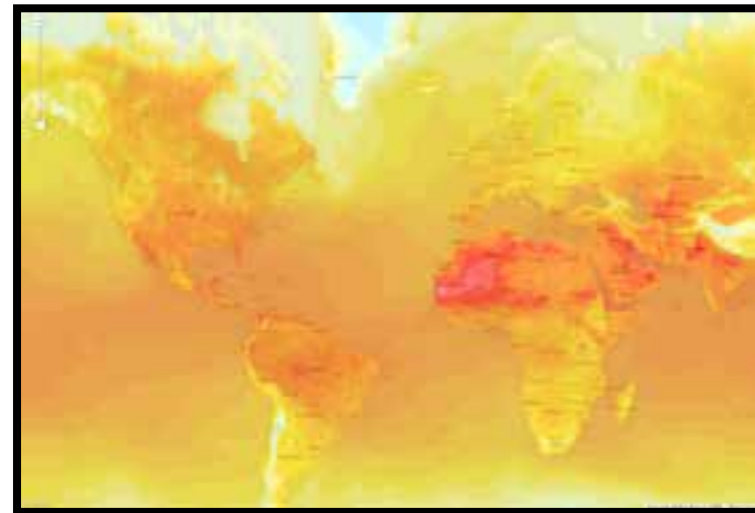
```

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            [
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            ]
          ]
        }
      }
    ]
  }
}

```


WDT Alternatives to ArcGIS

- SWARM – WDT’s proprietary tiling engine
 - Fast pre-cached tiled data, conforms loosely to WMS
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 - Numerous datasets
 - Fixed symbology
 - No geospatial analysis
- Home grown GIS API’s
 - Fast open source formatted data (GeoJSON/XML)
 - Allows for client side geospatial analysis and rendering
 - Significant development overhead compared to ESRI
 - Does not penetrate ESRI user market



So wait, what do you do?

- Weather information is critical in decision making
- Adding premium weather data to GIS systems is a natural fit
- Open source Python to format data
- Leverage fast spatial queries from `st_geometry`, and `arcpy.da`
- Display/visual mapping still issue

Questions