Use of Rapidly Updating and Global Meteorological Datasets in ArcGIS

By Paul Kamis, David Vandenheuvel and Matt Gaffner
• 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

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

Houston, TX

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
Size does matter.

- Global models
  - (Dozen products with millions of points)
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- Rapid updates (seconds to minutes)
  - Caching not realistic
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• Global models
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• 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
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• 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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• 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 stGeometry, and arcpy.da
- Display/visual mapping still issue
Questions