

METplus Tutorial

Tara Jensen

Oct 1-5, 2018

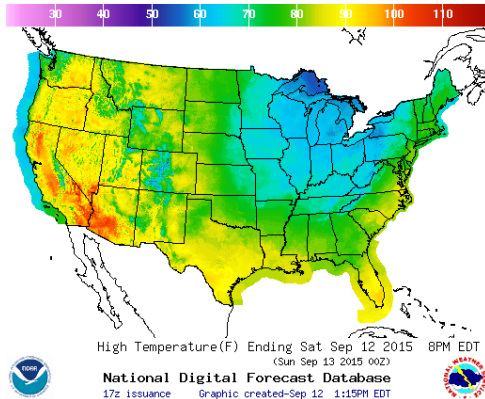
National Center for Weather and Climate

Prediction

College Park, MD

Unifying Through Blending: Contributions from Multiple Projects

Forecasters



Operational Centers



Researchers



DTC Community Support

Long-term Projects

DTC
T&E

NGGPS

HFIP

USWRP

JTTI

Hurricane
Supplemental

Projects of Opportunity

DTC
Visitor

NOAA,
NASA, DOE

Other
NCAR Labs

International
Capacity
Building

Community
Contributio



Continuing to Enhance: Upcoming MET Additions

- **Code clean-up to pass cyber-security software scans (Fortify) and improve memory handling and speed**
 - Fortify testing integrated into nightly build testing
 - Hope it will go quickly
 - Hope to use this opportunity to profile the code and identify areas for improvement. All areas may not be addressed but at least we will have something to work toward
- METviewer Fortified and transitions to AF 557th WW

MET 8.1 will be released when this work is complete

Continuing to Enhance: Upcoming METplus Additions

- **CAM Specific Evaluation**
- Compute surrogate severe-like fields using Gaussian smoothing after regridding
 - Use percentile thresholding
 - Develop hail specific use-case, including evaluating hail swaths using MODE and MTD
 - Interface with HWT SFE and WOF python scripts

Continuing to Enhance: Upcoming MET Additions

- **Process Oriented Diagnostics**

Prof. Zhou Wang and WeiWei Li, U of Ill Urbana-Champaign

- Moisture-Convection Coupling
- MJO, NAO, and Teleconnection
- TC Genesis
- Extreme Weather related to Blocking
- Cloud Property and Structure

Prof. Dan Halperin, Embry Riddle University

- TC Genesis

Continuing to Enhance: Upcoming MET Additions

- **Process Oriented Diagnostics**
- Juliana Dias and George Kiladis
 - Space-time spectral diagnostics of tropical rainfall and large-scale flow. (*Transfer to [MET](#)*)
 - Object-based diagnostics of organized tropical convection. (*Expand MODE in [MET](#)*)
 - Improved MJO forecast metrics. (*Expand on [CPC MJO diagnostics](#)*)
 - Scatter plots and Q-Q plots supported in METviewer

Continuing to Enhance: Upcoming METplus Additions

- **Feature Relative Diagnostics**

- Extending the METplus Feature Relative use-case to include multi-variate fields and fluxes
 - Thermodynamics and moisture budgets;
 - Potential vorticity budget will also be computed at low-levels (average of a few isentropic levels in the lowest 100 hPa) and upper levels (dynamic tropopause) to determine the role of non-conservative processes (latent heating from precipitation and surface fluxes);
 - Strength of upper-level forcing (PV advection) and the spatial and temporal distribution;
 - Potential vorticity advection;
 - Vertical motion and moisture profiles
 - Various quasi-geostrophic diagnostics, such as the Q-Vector and the horizontal frontogenesis

Continuing to Enhance: Upcoming METplus Additions

- **Space Weather Evaluation (NOAA and NASA)**
- Support for SWPC to evaluate the Commercial Data Weather Program for feasibility
- Support for PANDAs in embedded Python for MET
- Next lowest hanging fruit from a data perspective with guidance from Community Coordinated Modeling Center at NASA working toward supporting a 3-D data cube rather than a 2-D plane tied to lat/lon
- METplus use-cases to support these capabilities

Continuing to Enhance: Upcoming METplus Additions

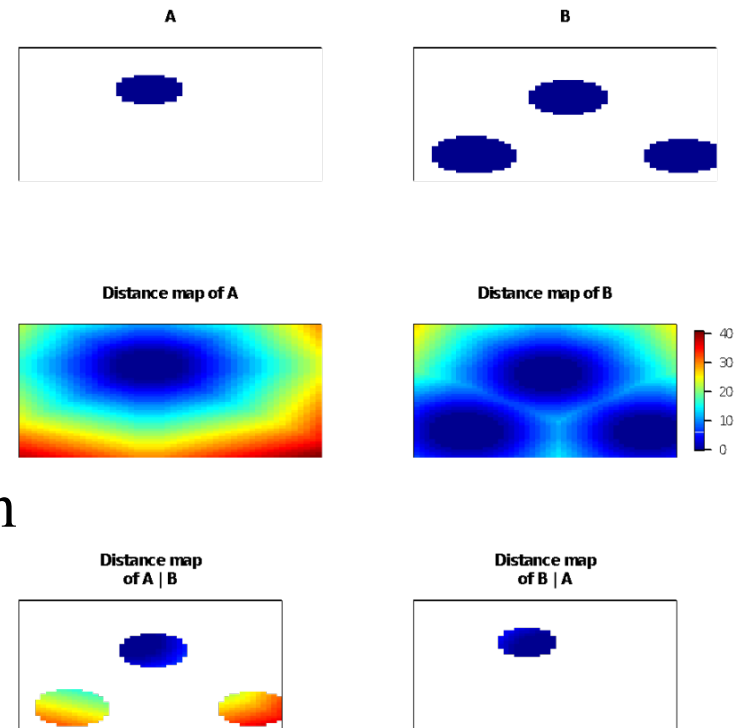
- **Regional Deterministic and Ensemble, and Atmospheric Composition/Air Quality Use-Cases**
 - EMC Mesoscale point-to-obs use-case developed. Will need augmentation
 - EMC Ozone and PM-2.5 point-to-obs use-cases under development
 - EMC Aeronet point-to-obs use-case in the queue
- Ensemble-Stat being wrapped for use with Obs Uncertainty use-case

Continuing to Enhance: Upcoming METplus Additions

- **Tropical Cyclone Evaluation**
 - Evaluation in spherical coordinates centered on the eye and used to evaluate from the perspective of the radius of maximum wind
 - Support for additional cyclone specific observation data sources (e.g. drop-sondes and hopefully tail-borne radar)
 - Support for additional ensemble-based and probabilistic products
 - TC-Stat output supported in METviewer

DTC Visitor Program

- **DTC Visitor** Eric Gilleland – include as much of Spatial Vx package as possible
 - Distance Maps
 - Baddeley's delta metric
 - Hausdorff distance
 - Pratt's Figure of Merit
 - Mean square error distance
 - Image Warping??
 - Spatial Prediction Comparison Test



Other Enhancements of Opportunity

- **CPC** – read their post-processed data;
- Add RPS and RPSS
- Develop CPC use-case

What else should we consider?