Model Evaluation Tools

MODEL EVALUATION TOOLS *Recent Additions and Enhancements*





NATIONAL CENTER FOR ATMOSPHERIC RESEARCH (NCAR) **DEVELOPMENTAL TESTBED CENTER (DTC)**



OVERVIEW

The Model Evaluation Tools (MET) is a comprehensive numerical weather prediction (NWP) verification package supported to the community by the Developmental

NEW FEATURES



Testbed Center (DTC). It provides traditional verification statistics (e.g. RMSE, bias, skill scores), advanced spatial verification methods, and methods for ensemble and probabilistic forecasts. MET also includes pre-processing and aggregation tools, interpolation methods, and confidence intervals. MET-TC verifies tropical cyclone track, intensity etc. using ATCF A-, B- and E-decks. MET-TC creates consensus forecasts and identifies rapid intensification and rapid weakening.

MET: A VERIFICATION TOOLKIT DESIGNED FOR FLEXIBLE YET SYSTEMATIC EVALUATION



• Over 85 traditional stats for point and gridded datasets • Automated regridding and multiple interpolation methods • Computation of confidence intervals • Object-based, neighborhood and scale decomposition • Able to read in GRIB1, GRIB2 and CF-compliant NetCDF • Applied to many spatial (1km - global) and temporal scales (minutes to decades)

OUTPUT SUPPORTS GEOGRAPHICAL REPRESENTATION OF ERRORS



NWS CWA ON HRRR DOMAIN

VERSION 7.0

• Add vector wind statistics (VCNT) line type • Overhaul config files to increase flexibility of options • Add WMO summary statistics to STAT-Analysis • Refactor and simplify MTD naming conventions

VERSION 7.1

 Process AIRNOW and ANOWPM obs for optical depth • Add Ensemble Continuous Statistics (ECNT) line type • Add flexible obs error handling into Ensemble-Stat

MET+ UNIFIED PACKAGE

• Python wrappers to automate calls • Simple to set-up and run • Automated plotting of 2D fields and statistics • Copy existing use case and modify for your needs





MODE: METHOD FOR OBJECT-BASED DIAGNOSTICS IDENTIFIES FEATURES AND COMPARE ATTRIBUTES





90TH PERCENTILE 6-HR ACCUMULATED PRECIP BIAS

MET-TC FOR TROPICAL CYCLONES



• Overhaul NetCDF point obs format to reduce size by 2/3 • Define masking regions and map data using GIS shapefiles • Add utilities to dump GIS metadata

• Ingest GOES-16 AOD for HYSPLIT and CMAQ PM verification • Communication between Python and MET

METVIEWER DATABASE AND DISPLAY

• Database and Display system for statistical output of MET • Built using Java, Apache/Tomcat, MySQL, R statistics • Interactive GUI and batch mode for routine processing • Supports many plot types and summary scorecards



GITHUB REPOSITORY HTTPS://GITHUB.COM/NCAR/METPLUS **PYTHON PLOTTING**

DOCKER CONTAINERS

• End-to-End NWP Modeling with Docker Containers • Low overhead, get up and running quickly • Online tutorial with Sandy and Derecho examples • Stand-alone containers for MET and METViewer https://dtcenter.org/met/container-nwp-tutorial

Container – WPS GEOG	
Container – End-to-end NWP	
Image – WPS GEOG	
Image – Case Data	
Image – WRF-WPS-UPP	
Image – NCL	
Image – MET	
Image – METViewer	
Image – MySQL	



docker



MTD DROUGHT INDEX

DISPLACEMENT ERROR



• Identifies Rapid Intensification/Weakening events • Evaluate probability of RI/RW E-Decks



INTERACTIVE WEB GUI



CONTOUR PLOTS







John Halley Gotway, Tara L. Jensen, Randy Bullock, Tatiana Burek, Howard Soh, and Julie Prestopnik NCAR: Tressa Fowler, Minna Win-Gildenmeister, George McCabe, Dan Adriannsen, Christina Kalb | NOAA: Bonny Strong, James Frimel, Jason Levit, Mallory Row, Fanglin Yang, Binbin Zhuo

