

Foreword: A note to MET+ users

This user's guide is provided as an aid to users of the Model Evaluation Tools (MET). MET is a set of verification tools developed by the Developmental Testbed Center (DTC) for use by the numerical weather prediction community - and especially users and developers of the Weather Research and Forecasting (WRF) model - to help them assess and evaluate the performance of numerical weather predictions.

It is important to note here that MET is an evolving software package. Previous releases of MET have occurred each year since 2008. This documentation describes the 7.0 release from March 2018. Intermediate releases may include bug fixes. MET is also be able to accept new modules contributed by the community. If you have code you would like to contribute, we will gladly consider your contribution. Please send email to: met_help@ucar.edu. We will then determine the maturity of new verification method and coordinate the inclusion of the new module in a future version.

This User's Guide was prepared by the developers of the MET, including Tressa Fowler, John Halley Gotway, Randy Bullock, Kathryn Newman, Julie Prestopnik, Lisa Goodrich, Tara Jensen, Barbara Brown, Howard Soh, Tatiana Burek, Minna Win-Gildenmeister, George McCabe, Paul Prestopnik, Eric Gilleland, Nancy Rehak, Paul Oldenburg, Anne Holmes, Lacey Holland, David Ahijevych and Bonny Strong.

New for MET+ v1.0

METv7.0 includes some major enhancements, including the addition of vector statistics for winds, finer control of configuration options, message type groups, and WMO mean summary statistics.

Enhancements to Existing Tools:

- Distribute the latest set of bugfixes, details not listed here.
- Vector statistics for winds
 - Add vector wind speeds to the existing VL1L2 line type (F_SPEED_BAR and O_SPEED_BAR)
 - Add a new VCNT line type containing statistics for wind vectors.

- Enhance STAT-Analysis to parse the updated VL1L2 line type, parse the new VCNT line type, and derive VCNT statistics from input VL1L2 lines.
- Enhance STAT-Analysis to read U/V matched pair (MPR) lines and derive VL1L2 or VCNT output lines.
- Config file options
 - Refactor config file logic for Point-Stat, Grid-Stat, and Ensemble-Stat.
 - Whenever possible, parse config file options separately for each verification task rather than parsing from the top level.
 - See default config files for the list of options which may be specified separately for each "obs.field" entry.
 - Parse the "regrid" option separately for each field so that regridding logic can be customized for each field (e.g. use BUDGET for precipitation and BILIN for temperature).
 - Add "message_type_group" config file option to define message types that should be processed together as a group. Enhance PB2NC, Point-Stat, and Ensemble-Stat to parse and process groups of message types.
- PB2NC
 - Add specialized processing for AIRNOW message types to use the TPHR value as the accumulation interval and the QCIND value as the quality control value.
- STAT-Analysis
 - Enhance the existing summary job type.
 - Print debug messages and warnings when summary includes multiple values for each header column.
 - Add three new output columns for WMO-approved means of daily scores (WMO_TYPE, WMO_MEAN, and WMO_WEIGHTED_MEAN).
 - Process columns of data from multiple input line types when the following format is used “-column LINE_TYPE: COLUMN”.
 - Add -derive job command option to automatically compute statistics on the fly from input partial sums (SL1L2/SAL1L2 -> CNT, VL1L2 -> VCNT, and CTC -> CTS).
- Point-Stat
 - Append the shape to the INTERP_MTHD column but omit it for NEAREST, BILIN, and BUDGET methods.
- Grid-Stat
 - Add "nbrhd.field" config file option to control the computation of fractional coverage fields.
- Ensemble-Stat
 - Add "nc_var_str" config file option to customize NetCDF variable names.

- Add "ensemble_flag.latlon" config file option.
- MTD
 - Rename output files using a more explicit naming convention:
 - * Rename *_3d_ss.txt to *_3d_simple_single.txt.
 - * Rename *_3d_sc.txt to *_3d_simple_cluster.txt.
 - * Rename *_3d_ps.txt to *_3d_pair_single.txt.
 - * Rename *_3d_pc.txt to *_3d_pair_cluser.txt.
 - Update output file conventions to match the logic of MODE:
 - * Rename the "OBJ_ID" column to "OBJECT_ID".
 - * Rename the "CLUSTER_ID" column to "OBJECT_CAT".
 - Change object naming conventions for "OBJECT_ID" and "OBJECT_CAT":
 - * FROM: F_#, O_#, F_#_O_#, CF_#, CO_#, and CF_#_CF_#
 - * TO: F####, O####, F####_O####, CF####, CO####, and CF####_CO####
 - * Where ### is a 3-digit object number with leading 0's.
 - * Indicate unmatched objects with a 3-digit "000" object number.
 - Only write pair information to *_pair_cluster.txt for matches.

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