



METplus Tutorial



July 30 – August 1, 2019

NCAR

Monterey, CA

Goals

- Introduce basic verification concepts
- Overview of METplus with MET and METViewer at it's core
- How to set up the tools
- Introduce the tools and the METplus use-cases that use them



METplus Team

NCAR/RAL

Instructors

Engineers: **John Halley Gotway**, Julie Prestopnik, Randy Bullock, Tatiana Burek, Minna Win, Howard Soh, **George McCabe**, Hank Fisher

Statisticians: Tressa Fowler, Barb Brown, Eric Gilleland

Scientists: **Tara Jensen**, Tina Kalb, Dan Adriaansen, Jonathan Vigh, Lindsay Blank

NOAA/ESRL

Engineers: Bonny Strong, Jim Frimel, Randy Pierce, Molly Smith, Venita Hagerty

Scientists: Jeff Hamilton, Jeff Beck, Jeff Duda, Man Zhang, Melinda Marquis

NOAA/EMC

Scientists: Mallory Row, Perry Shafran, Binbin Zhuo, Ying Lin

Getting to know you



Who knows statistics and verification

Who has worked with:

MET

METviewer

METplus

Working on:

DA

Ensembles

S2S

Global

Regional

Marine

Aerosols/AQ

Clouds

Arctic

???

Schedule

Tuesday - July 30th (Intro, Grid-to-Grid)

9:00 am Introductions - **Tara and Liz** (20 min)

9:20 am What is METplus - **Tara** (25 min)

9:45 am Installing and Using METplus - **George**

HandsOn - Setting up METplus

12:00 pm Lunch

1:00 pm Grid-to-Grid Verification

Pre-processing, Python Embedding, Masking, Regridding

HandsOn - Grid-Stat

HandsOn - Grid-to-Grid use-case

5:00 pm Done for the day

Schedule

Wednesday - July 31st (Point, Ensembles, Probabilities)

9:00 Q&A, Point preprocessing

HandsOn - PB2NC and ASCII2NC

Point-Stat

HandsOn - Point-Stat

HandsOn - Grid-to-Obs use-case

12:00 pm Lunch

1:00 pm Q&A, Evaluating Ensemble Characteristics, Stat-Analysis

HandsOn - Running Ensemble-Stat

HandsOn - Stat-Analysis

Evaluating Probabilities

HandsOn - Ensemble and PQPF use-cases

5:00 pm Done for the day

Schedule - Thursday

Thursday - August 1st (Spatial, MET-TC)

9:00 am Object-based Verification - MODE and MTD

HandsOn - Running MODE and MTD tools then use-case

11:00 am Intro to MET-TC

HandsOn - TC-pairs and TC-stat

12:00 pm Lunch

1:00 pm Intro to MET-TC

HandsOn - TC Track and Intensity use-cases

Series Analysis, Feature Relative, METviewer

HandsOn - Series-Analysis

HandsOn - Feature Relative use-cases

3:00 pm What's coming in METplus v3.0

3:30 pm **Q&A**

5:00 pm Tutorial Complete

Tutorial, Help and Downloads

<https://dtcenter.org/community-code/model-evaluation-tools-met>

The screenshot shows the top navigation bar with links for ABOUT, TESTING + EVALUATION, COMMUNITY CODE, VISITOR PROGRAM, NEWS, and EVENTS. Below the navigation is a large banner image of a sunset over clouds with the text "MODEL EVALUATION TOOLS (MET)".

Welcome

Welcome to the users page for the Model Evaluation Tools (MET) verification package. MET was developed by the National Center for Atmospheric Research (NCAR) Developmental Testbed Center (DTC) through the generous support of the U.S. Air Force Weather Agency (AFWA) and the National Oceanic and Atmospheric Administration (NOAA).

Description

MET is designed to be a highly-configurable, state-of-the-art suite of verification tools. It was developed using output from the Weather Research and Forecasting (WRF) modeling system but may be applied to the output of other modeling systems as well.

MET provides a variety of verification techniques, including:

- Standard verification scores comparing gridded model data to point-based observations
- Standard verification scores comparing gridded model data to gridded observations
- Spatial verification methods comparing gridded model data to gridded observations using neighborhood, object-based, and intensity-scale decomposition approaches
- Ensemble and probabilistic verification methods comparing gridded model data to point-based or gridded observations
- Aggregating the output of these verification methods through time and space

MET Sponsors

- National Center for Atmospheric Research (NCAR)
- National Oceanic and Atmospheric Administration (NOAA)
- United States Air Force (USAF)

On the right side of the page, there is a sidebar with a "MODEL EVALUATION TOOLS (MET)" section containing links for Home, System Architecture, Download (+), Documentation (+), and User Support (+). Below that is a "LATEST RELEASE" section for MET Version 8.1.1, released on 2019-07-08.

The screenshot shows the "MODEL EVALUATION TOOLS (MET) | TUTORIAL - IN-PERSON" page. The main content area contains the following text:

The next MET tutorial will be held **February 4 - 6, 2019**, at NCAR in Boulder, Colorado in conjunction with the [2019 Winter WRF/MPAS Tutorial](#).

The **METplus tutorial** is typically offered annually in conjunction with the WRF/MPAS tutorial or other WRF-related tutorials.

WRF/MPAS tutorial classes for new users are generally offered twice a year, typically in the Summer and Winter. The tutorial consists of lectures about and hands-on experience using the following software packages:

- The WRF system, both ARW and NMM dynamical cores
- The WRF Preprocessing System (WPS)
- WRF Postprocessing software and graphical tools
- WRF-Var data assimilation
- WRF-Chemistry
- Model Evaluation Tools (METplus)

Participants may register for *any combination* of these tutorials.

Refer to the [WRF/MPAS Tutorial](#) page for information on upcoming tutorials.

This tutorial makes use of the [METplus Practical Sessions](#).

On the right side, there is a sidebar with a "MODEL EVALUATION TOOLS (MET)" section containing links for Home, System Architecture, Download (+), Documentation (+), User Support, FAQ's, Related Links, Tutorial - Online (+), Tutorial - In-person (highlighted in yellow), METplus Practical Session Guide (Feb 2019), METplus Practical Session Guide (July 2019), and Contact MET Help.

The screenshot shows the "MODEL EVALUATION TOOLS (MET) | DOWNLOAD" page. The main content area contains the following text:

RECOMMENDED

VERSION	DOWNLOAD	DATE
8.1.1	met-8.1.1.tar.gz METplus-2.1.1 METviewer 2.10 MET User's Guide 8.1.1 Existing Builds Online Tutorial Release Notes	2019-07-08

OTHER

VERSION	DOWNLOAD	DATE
8.1	met-8.1.tar.gz METplus-2.1 METviewer 2.10 MET User's Guide 8.1 Docker Container Existing Builds Online Tutorial Release Notes Known Issues	2019-05-03
8.0	met-8.0.tar.gz met-8.0_bugfix.tar.gz METplus-2.0.4 MET User's Guide 8.0 Docker Container Existing Builds Online Tutorial Release Notes Known Issues	2018-09-27

On the right side, there is a sidebar with a "MODEL EVALUATION TOOLS (MET)" section containing links for Home, System Architecture, Download (highlighted in yellow), Terms Of Use, Sign Up For Updates, Sample Analysis Scripts, Input Data, Documentation (+), and User Support (+).