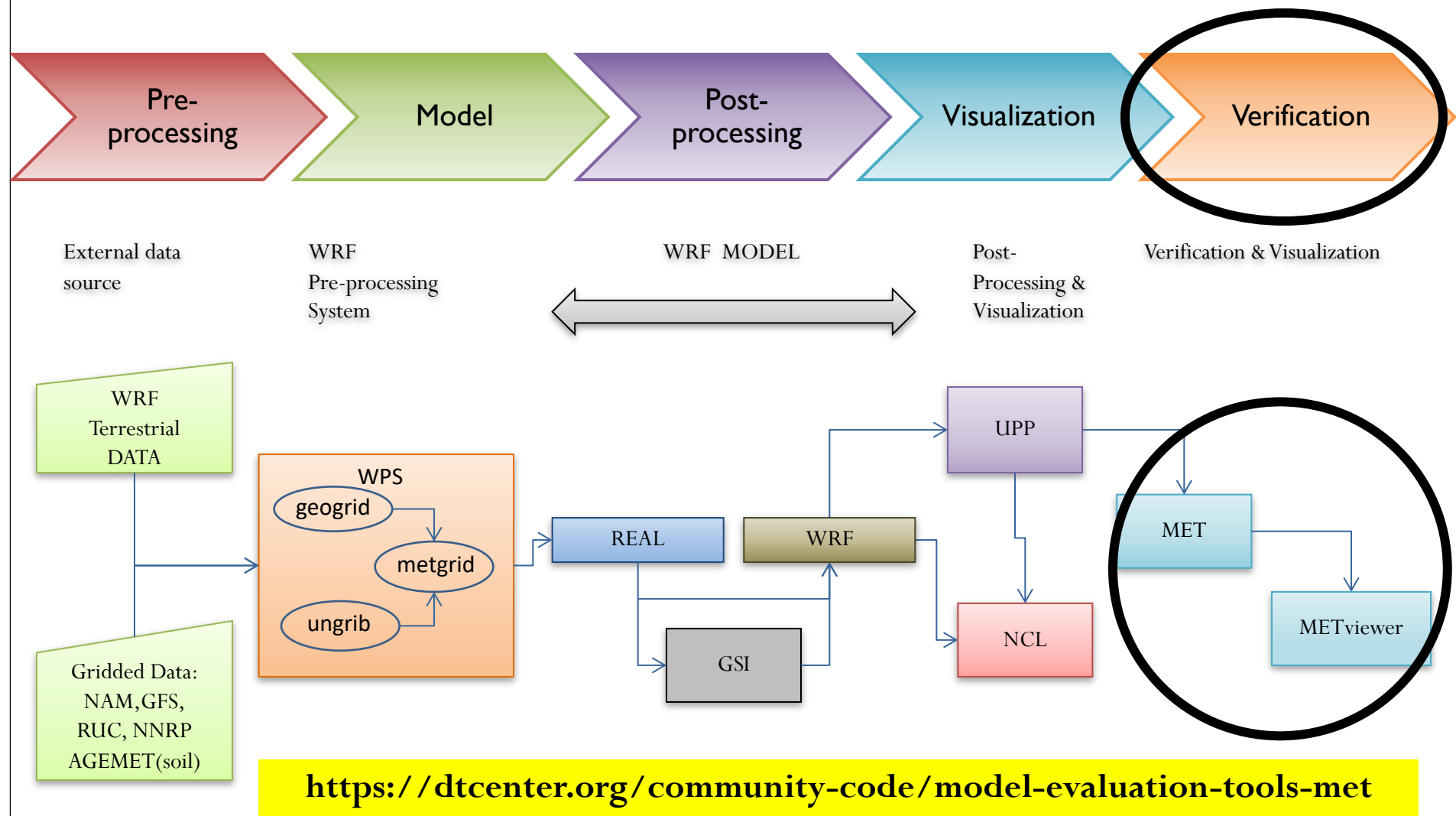


Hands-on Exercise:
Run Verification Containers

Verification Containers: MET and METviewer



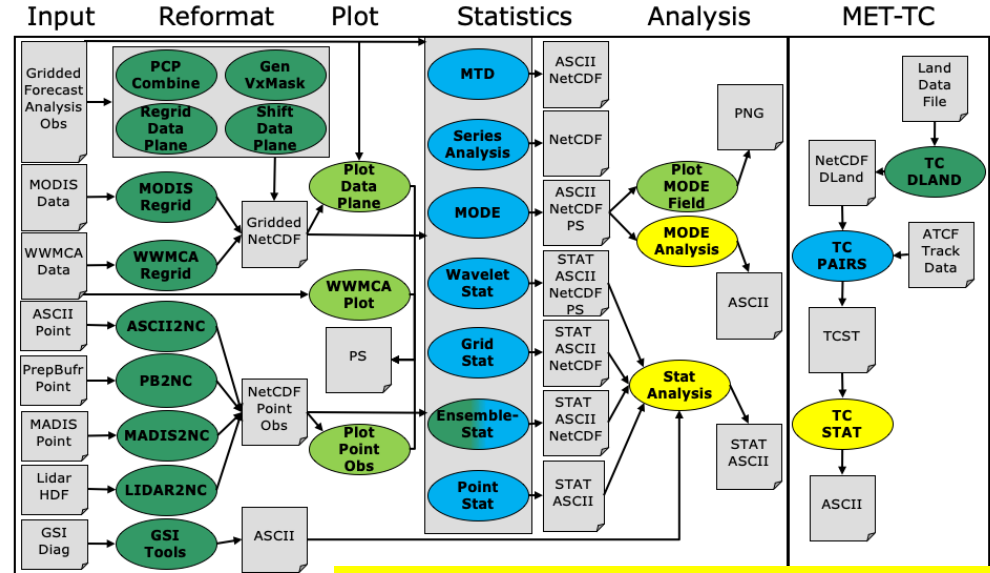
MET

A Verification Toolkit Designed for Flexible Yet Systematic Evaluation
(supported to the community via the DTC)

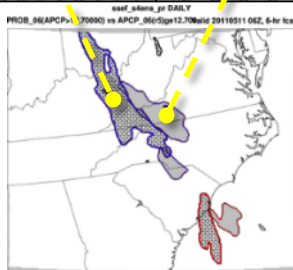
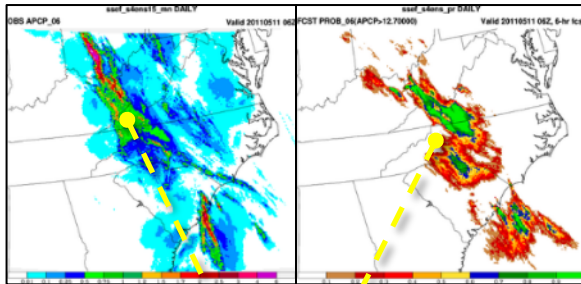
Model Evaluation Tools

- Originally developed to replicate the EMC mesoscale verification system
- Over 85 traditional statistics using both point and gridded datasets
- Many interpolation and smoothing methods
- Computation of confidence intervals
- Able to read in GRIB1, GRIB2 and CF-NetCDF
- Applied to many spatial and temporal scales
- 3500+ users, both US & Int'l

MET version 8.1.2

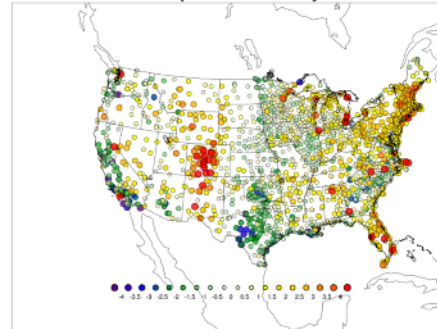


Object Based and Spatial Methods



Bad forecast or
Good forecast
with displacement
error?

Dew Point Temperature Bias by Station ID

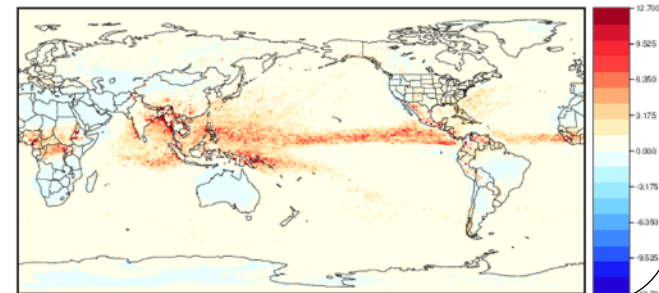


Config=APWAOC_WRFv3.5 Season=WINTER Inlt=00UTC Foot Hr=42h

www.github.com/NCAR/MET

Geographical Representation of Errors

90th Percentile of difference between two models



METplus

Python Wrappers for the Verification Components

Python wrappers around:

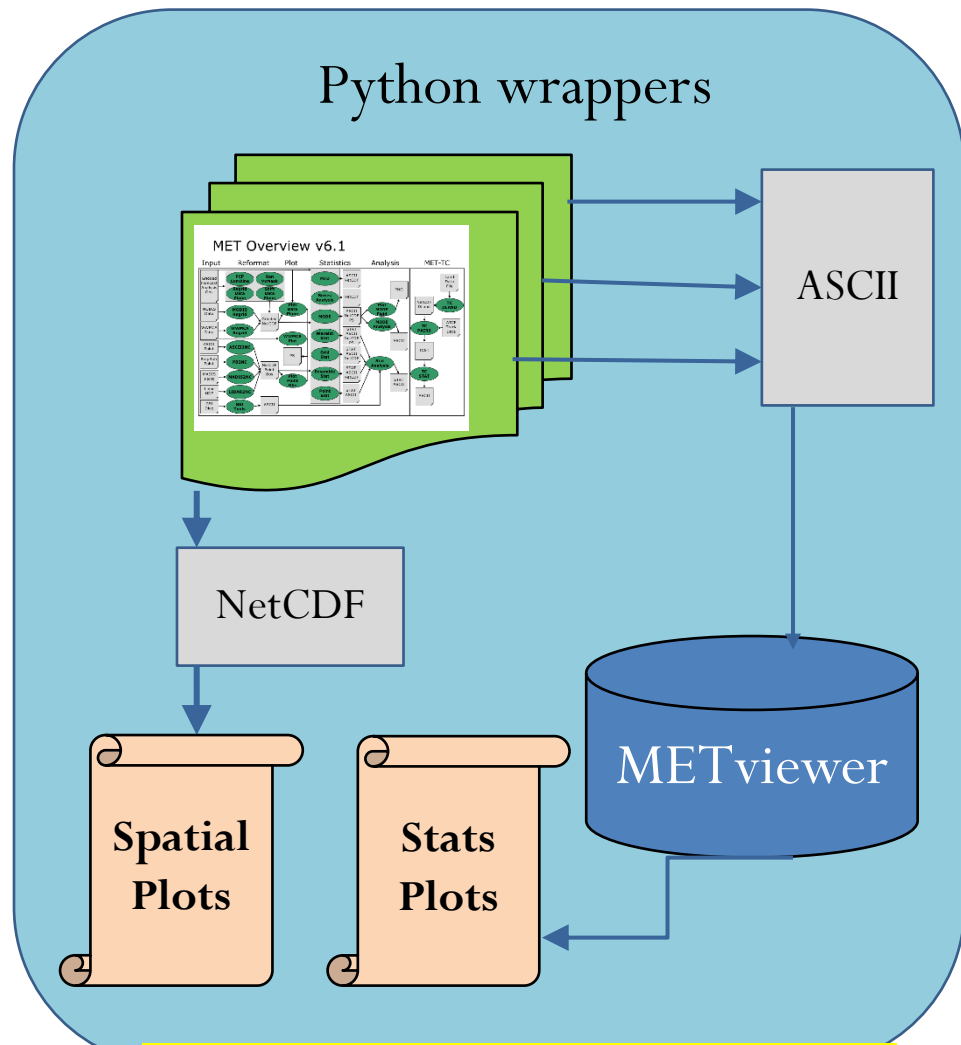
- MET
- METdb *
 - Verification database loader
- METviewer
 - GUI and batch engine
- METexpress *
 - Simplified plotting interface
- METplotpy *
- METcalcpy *
- Communication between MET & python algorithms

* New development underway

***Near Term:** After Global - CAM,
Ensembles and Aerosols / Air Qual*

***Longer Term:** Earth System
“Components”*

*** Not included in container-dtc-nwp ***



www.github.com/NCAR/METplus

Run the MET container

- <https://dtcenter.org/community-code/numerical-weather-prediction-nwp-containers/tutorial-version-3>
- First, run the **dtc-met** container:

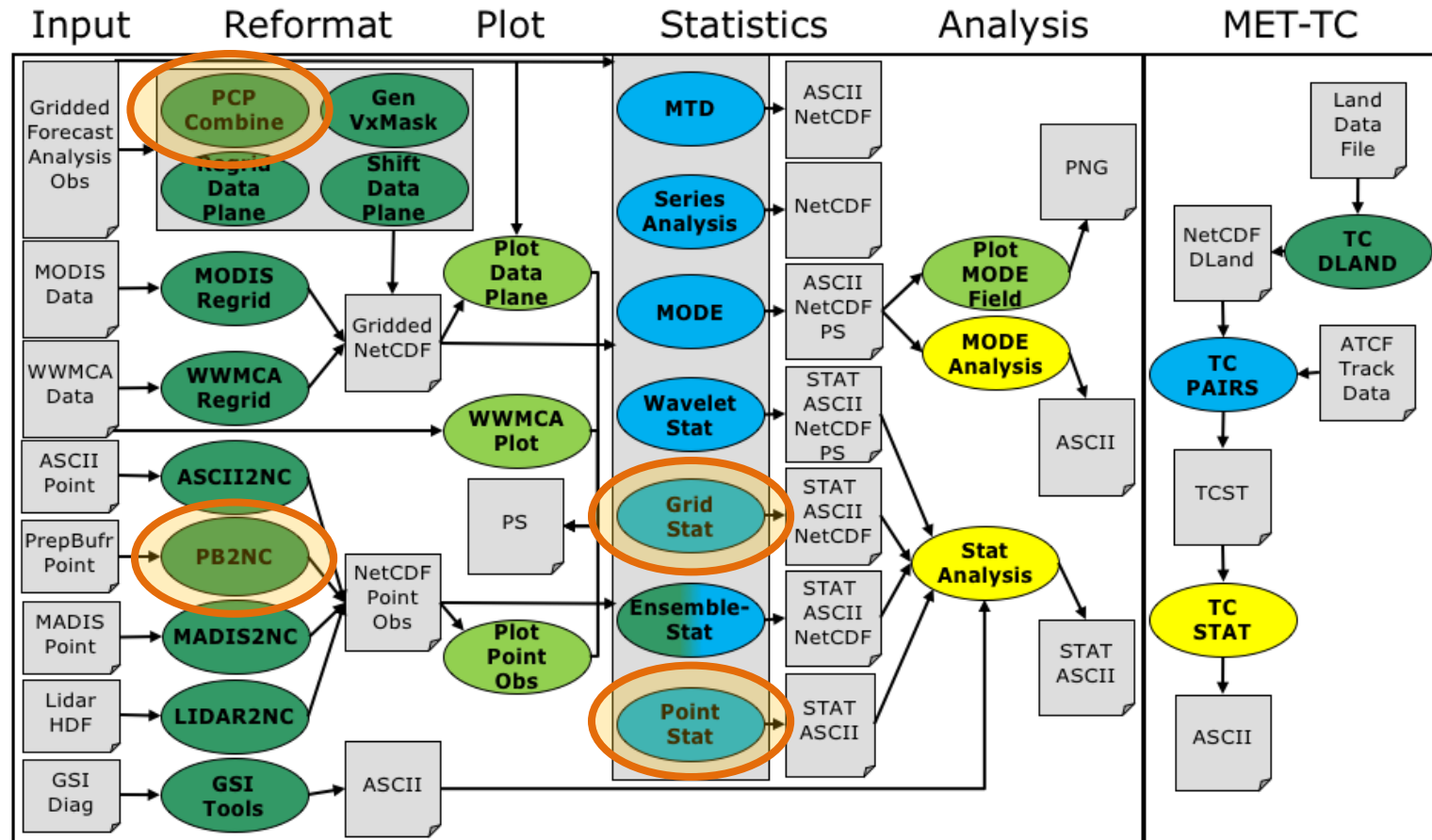
```
➤ docker run --rm -it -e LOCAL_USER_ID=`id -u $USER` \
  --volumes-from sandy \
  -v ${PROJ_DIR}/container-dtc-
nwp/components/scripts/common:/home/scripts/common \
  -v ${PROJ_DIR}/container-dtc-
nwp/components/scripts/sandy_20121027:/home/scripts/case \
  -v ${CASE_DIR}/postprd:/home/postprd \
  -v ${CASE_DIR}/metprd:/home/metprd \
  --name run-sandy-met dtc-met \
  /home/scripts/common/run_met.ksh
```

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Postprocess NWP Data With UPP	
Create Graphics	
Run MET Verification Software	
Visualize Verification Results	
Snow Case (23 Jan 2016)	+
Derecho Case (29 Jun 2012)	+
Customization	+

Run the MET container

- `run_met.ksh` loops over forecast lead times and runs...
 - `met_point_verf_all.ksh` ... runs PB2NC and Point-Stat
 - `met_qpf_verf_all.ksh` ... runs PCP-Combine and Grid-Stat



Run the MET container

- Inspect the output

```
➤ ls -l ${CASE_DIR}/metprd ### MET output directory
load_mv_sandy.xml
met_point_verf_all.ksh      ### Point Verification
pb2nc
point_stat
met_qpf_verf_all.ksh       ### QPF Grid Verification
pcp_combine
grid_stat
run_met.log                 ### Output Log
```


Launch METviewer container

- <https://dtcenter.org/community-code/numerical-weather-prediction-nwp-containers/tutorial-version-3>
- Run docker-compose to...
 - Pull **mysql:5.7** image from DockerHub
 - Setup environment and start METviewer

```
➤ cd ${PROJ_DIR}/container-dtc-nwp/components/metviewer  
➤ docker-compose -f docker-compose-AWS.yml up -d
```

- Load MET output for Sandy into a METviewer database named `mv_sandy`

```
➤ docker exec -it metviewer /scripts/common/metv_load_all.ksh  
mv_sandy
```

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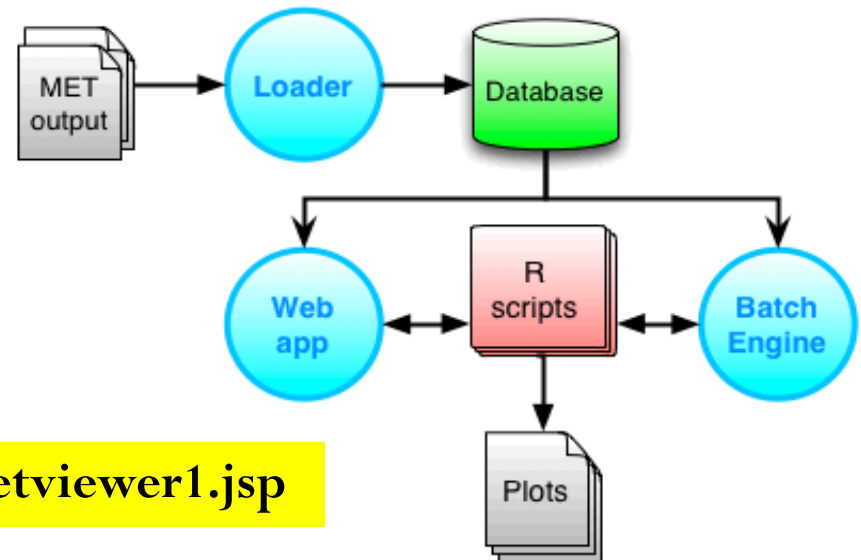
Reconfigure METviewer for AWS

- Reconfigure Tomcat to use the current AWS IPV4 address
- Necessary when AWS instance is restarted and IPV4 changes

```
➤ docker ps -a
➤ docker exec -it metviewer /bin/bash
➤ /scripts/common/reset_metv_url.ksh
➤ exit
```

- Use **docker exec** to run commands in a container that is already running!

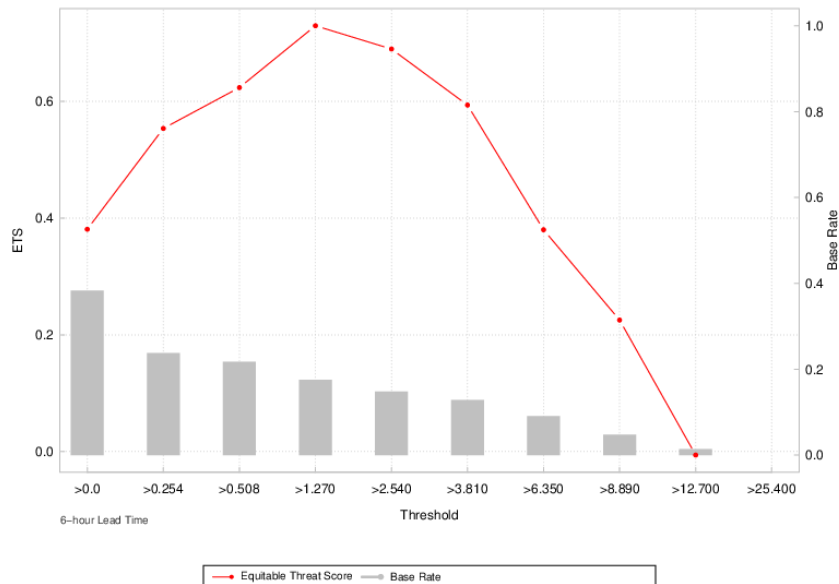
http://IPV4_public_IP/metviewer/metviewer1.jsp



METviewer Plotting

- For each XML in tutorial, right-click on the link, and save to your local machine.
- On Mac, CNTRL-Click and select “Save Link As...”
- Follow instructions to use the XML Upload feature.

Sandy 3-hourly APCP ETS by Threshold



Sandy 10-meter Wind by Lead Time

