METplus QPF (Accumulated Precipitation) Use Case Overview

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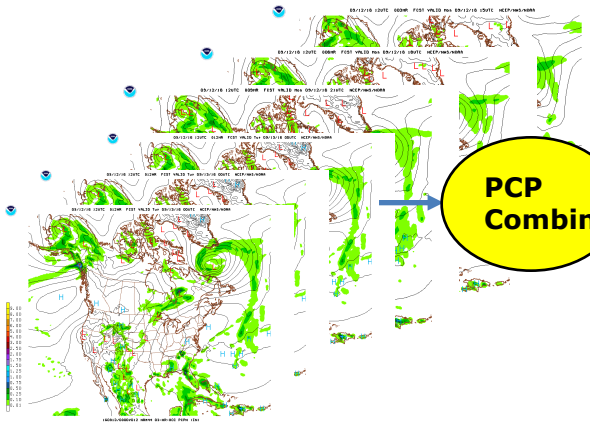
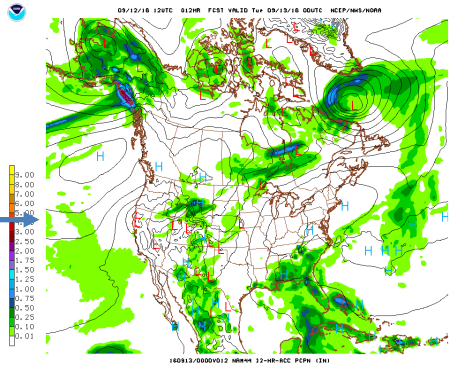
Background – Example Use-Case

1-h accumulation QPE

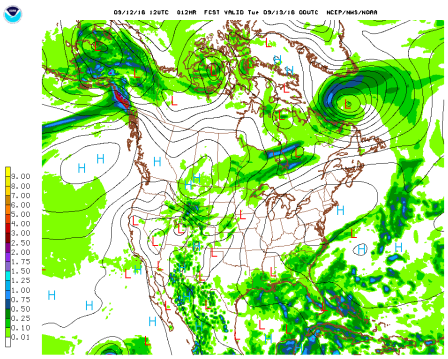


PCP Combine

6-h accumulation QPE



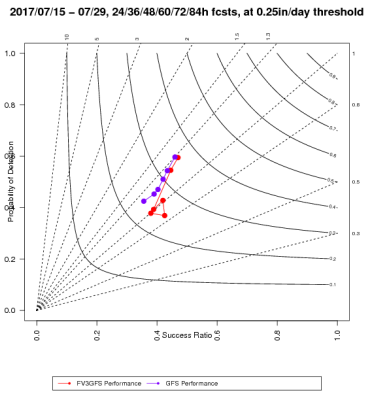
6-h accumulation QPF



- MODE
- MODE-TD
- Wavelet Stat
- Grid Stat
- Series Analysis
- Ensemble Stat
- Point Stat

METViewer Database and Display

Multiple runs over time



Background

QPF Use Case # 1*: "ruc vs. s2 grib"

- Comparing quantitative precipitation forecasts from the RUC NWP model with stage 2 precipitation analyses in GRIB format.
- [OBS] → Stage 2 = gage + WSR-88D accumulated precipitation analysis (hourly/6-hourly)
- [FCST] → RUC = Rapid Update Cycle accumulated precipitation forecasts

QPF Use Case # 2*: "phpt vs. s4 grib"

- Comparing quantitative precipitation forecasts from the PHPT NWP forecast with stage 4 precipitation analyses in GRIB format.
- [OBS] → Stage 4 = regional mosaic multi-sensor analyses with manual RFC quality control of accumulated precipitation (hourly,6-hourly)
- [FCST] → PHPT = Probabilistic Hazard Prediction Tool, ensemble HRRR-based accumulated precipitation forecasts

** There are additional QPF use cases available in METplus 2.0.*

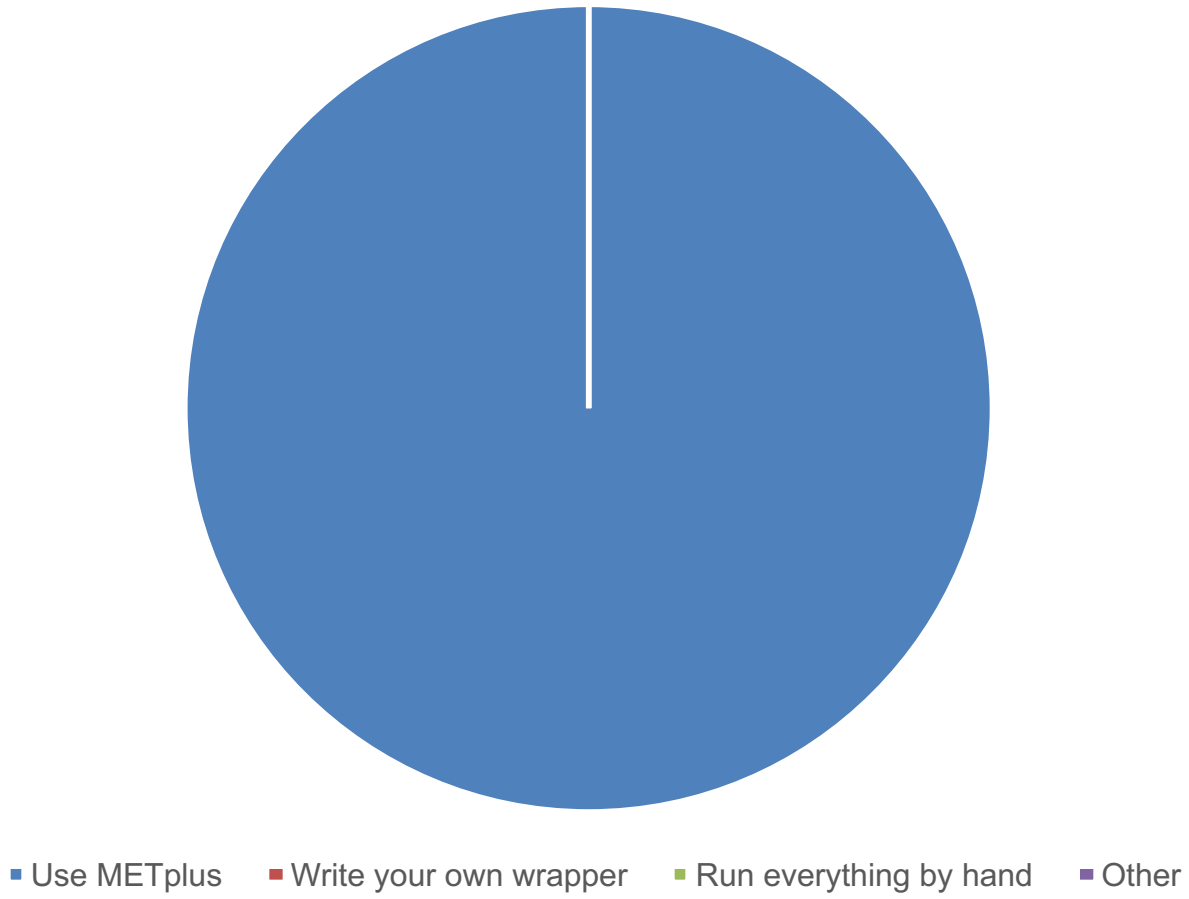
Tools

- Gridded Data 
- Compare gridded precipitation forecast with gridded precipitation analysis 
- Use Grid Stat in MET to compute verification statistics 

… Not so fast … 

1. Determine the accumulation interval to verify
2. Use the MET PCP Combine tool to collect hourly accumulations into the correct accumulation interval to match forecast
3. Use the MET Regrid Data Plane tool to regrid the output from PCP Combine to the forecast (e.g. RUC, HRRR, NCEP grid #) grid
4. Run the MET Grid Stat tool to compute verification statistics

Tools



* Not actual results, but what we recommend!

Configuring METplus for Use Case (Barebones)

1. Change **PROJ_DIR** in metplus_data.conf to point to use case data

2. Change **OUTPUT_BASE** in metplus_system.conf to point to where the output will go

3. Change **METPLUS_BASE** in metplus_system.conf to point to the METPLUS install

4. Change **MET_INSTALL_DIR** in metplus_system.conf to /d1/CODE/MET/MET_releases/met-8.0_beta8

Possibly needed?:
Update cshrc LD_LIBRARY_PATH environment variable to LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/d1/CODE/MET/MET_releases/external_libs/lib:/usr/local/netcdf/lib

Configuring METplus for Use Case (Theia)

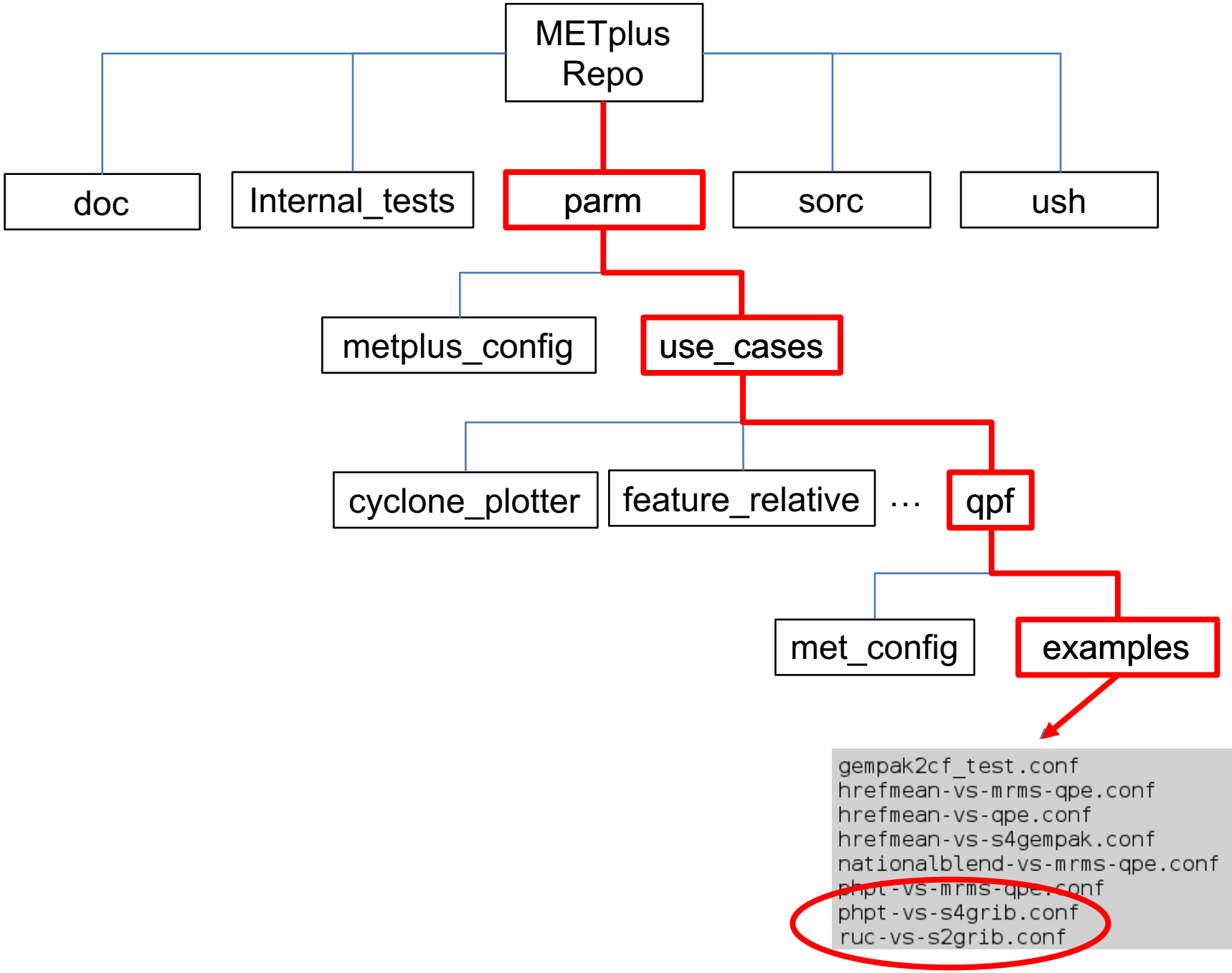
Create your own configuration file: my_phpt-vs-s4grib_qpf_conf.theia:

```
[dir]
PROJ_DIR=/scratch4/BMC/dtc/Julie.Prestopnik/METplus/METplus-2.0_sample_data

OUTPUT_BASE=/somewhere/you/have/write/access/on/theia

METPLUS_BASE=/contrib/METplus/METplus-2.0

MET_INSTALL_DIR=/contrib/MET/8.0
```


METplus Repo
doc
Internal_tests
parm
sorc
ush
metplus_config
use_cases
cyclone_plotter
feature_relative
…
qpf
met_config
examples
gempak2cf_test.conf
hrefmean-vs-mrms-qpe.conf
hrefmean-vs-qpe.conf
hrefmean-vs-s4gempak.conf
nationalblend-vs-mrms-qpe.conf
phpt-vs-mrms-qpe.conf
phpt-vs-s4grib.conf
ruc-vs-s2grib.conf

Running the use case with METplus

QPF Use Case # 1*: "ruc vs. s2 grib"
master_metplus.py –c parm/use_cases/qpf/examples/ruc-vs-s2grib.conf

QPF Use Case # 2*: "phpt vs. s4 grib"
master_metplus.py –c parm/use_cases/qpf/examples/phpt-vs-s4grib.conf

Summary:
1. Download & unpack sample data
2. Make 4 changes to configuration files
3. Run METplus!

It's really that easy to run these two use cases out of the box!

Running the use case with METplus (Theia)

QPF Use Case # 2*: “phpt vs. s4 grib”

```
/contrib/METplus/METplus-2.0/ush/master_metplus.py \
–c my_phpt-vs-s4grib_qpf_conf.theia \
–c /contrib/METplus/METplus-
2.0/parm/use_cases/qpf/examples/phpt-vs-s4grib.conf
```

Post-run overview: logging

Step 1: Review METplus final configuration file → **(THE ANSWER KEY)**

OUTPUT_BASE/metplus_final.conf

OUTPUT_BASE defined in metplus_system.conf

```
[config]
LOOP_METHOD = times
PROCESS_LIST = PcpCombine, RegridDataPlane, GridStat
INIT_TIME_FMT = %Y%m%d%H
INIT_BEG = 2016090412
INIT_END = 2016090412
INIT_INCREMENT = 60
METPLUS_CONF = {OUTPUT_BASE}/metplus_final.conf
LOG_METPLUS = /home/dadriaan/projects/tutorialOct2018/output/logs/master_metplus.log.20180927
LOG_TIMESTAMP_TEMPLATE = %Y%m%d
LOG_MET_OUTPUT_TO_METPLUS = yes
LOG_MET_VERBOSITY = 2
LOG_LEVEL = DEBUG
LOOP_BY_INIT = true
LEAD_SEQ = 6, 7
OBS_PCP_COMBINE_RUN = True
OBS_REGRID_DATA_PLANE_RUN = True
FCST_VAR1_NAME = APCP
FCST_VAR1_LEVELS = A06
FCST_VAR1_THRESH = 12.7, 25.4, 50.8, 76.2, 152.4
OBS_LEVEL = 06
MODEL_TYPE = PHPT
OB_TYPE = STAGE4_GRIB
VERIFICATION_GRID = {CONFIG_DIR}/mask/CONUS_HRRRTLE.nc
GRID_STAT_CONFIG = {CONFIG_DIR}/GridStatConfig_PROB
FCST_MAX_FORECAST = 12
FCST_INIT_INTERVAL = 1
FCST_IS_PROB = true
FCST_IS_DAILY_FILE = false
FCST_LEVEL = 1
OBS_VAR = APCP
OBS_NATIVE_DATA_TYPE = GRIB
OBS_IS_DAILY_FILE = false
OBS_DATA_INTERVAL = 1
OBS_6_FIELD_NAME = A_PCP_GDS5_SFC_acc6h
LOG_TIMESTAMP = 20180927
```

```
[exe]
WGRIB2 = /path/to
RM_EXE = /path/to
CUT_EXE = /path/to
TR_EXE = /path/to
NCAP2_EXE = /path/to
CONVERT_EXE = /path/to
NCDUMP_EXE = /path/to
EGREP_EXE = /path/to

[filename_templates]
FCST_GRID_STAT_INPUT_TEMPLATE = {init?fmt=%Y%m%d}/{init?fmt=%Y%m%d}_i{init?fmt=%H}_f{lead?fmt=%HHH}_HRRRTLE_PHPT.grb2
OBS_PCP_COMBINE_INPUT_TEMPLATE = {valid?fmt=%Y%m%d}/ST4.{valid?fmt=%Y%m%d%H}.{level?fmt=%HH}h
OBS_PCP_COMBINE_OUTPUT_TEMPLATE = {valid?fmt=%Y%m%d}/ST4.{valid?fmt=%Y%m%d%H}_A{level?fmt=%HH}h
OBS_GRID_STAT_INPUT_TEMPLATE = {valid?fmt=%Y%m%d}/ST4.{valid?fmt=%Y%m%d%H}_A{level?fmt=%HH}h
OBS_REGRID_DATA_PLANE_TEMPLATE = {valid?fmt=%Y%m%d}/ST4.{valid?fmt=%Y%m%d%H}_A{level?fmt=%HH}h
```

```
[dir]
METPLUS_BASE = /home/dadriaan/projects/tutorialOct2018/METplus
PARM_BASE = {METPLUS_BASE}/parm
OUTPUT_BASE = /home/dadriaan/projects/tutorialOct2018/output
MET_INSTALL_DIR = /d1/CODE/MET/MET_releases/met-8.0_beta8
MET_BASE = {MET_INSTALL_DIR}/share/met
LOG_DIR = {OUTPUT_BASE}/logs
TMP_DIR = /path/to
PROJ_DIR = /home/dadriaan/projects/tutorialOct2018/data
INPUT_BASE = {PROJ_DIR}
MODEL_DATA_DIR = {PROJ_DIR}/model_data
CONFIG_DIR = {PARM_BASE}/use_cases/qpf/met_config
FCST_GRID_STAT_INPUT_DIR = {INPUT_BASE}/PHPT
OBS_GEMPAK_INPUT_DIR = {INPUT_BASE}/uswrp/StageIV
OBS_PCP_COMBINE_INPUT_DIR = {INPUT_BASE}/uswrp/StageIV
OBS_PCP_COMBINE_OUTPUT_DIR = {OUTPUT_BASE}/uswrp/StageIV_grib/bucket
OBS_REGRID_DATA_PLANE_INPUT_DIR = {OUTPUT_BASE}/uswrp/StageIV_grib/bucket
OBS_REGRID_DATA_PLANE_OUTPUT_DIR = {OUTPUT_BASE}/uswrp/StageIV_grib/regrid
OBS_GRID_STAT_INPUT_DIR = {OUTPUT_BASE}/uswrp/StageIV_grib/regrid
GRID_STAT_OUT_DIR = {OUTPUT_BASE}/uswrp/met_out/{MODEL_TYPE}
```

Post-run overview: logging

Step 2: What did MET commands look like?

OUTPUT_BASE/logs/master_metplus.log.YYYYMMDD

OUTPUT_BASE defined in metplus_system.conf

PCP Combine Tool:

/d1/CODE/MET/MET_releases/met-8.0_beta8/bin/pcp_combine -add -name APCP_03 -add
/home/dadriaan/projects/tutorialOct2018/data/sample_obs/ST2ml/20050807/ST2ml2005080712.Grb_G212 1
/home/dadriaan/projects/tutorialOct2018/data/sample_obs/ST2ml/20050807/ST2ml2005080711.Grb_G212 1
/home/dadriaan/projects/tutorialOct2018/output/qpe_grib/bucket/20050807/ST2ml2005080712_A03h -v 2 >>
/home/dadriaan/projects/tutorialOct2018/output/logs/master_metplus.log.20180927 2>&1

Regrid Data Plane Tool:

/d1/CODE/MET/MET_releases/met-8.0_beta8/bin/regrid_data_plane -v 2 -field "name=\"APCP_03\"; level=\"(*,*)\";" -method BUDGET -width 2 -name APCP_03
/home/dadriaan/projects/tutorialOct2018/output/qpe_grib/bucket/20050807/ST2ml2005080703_A03h
/home/dadriaan/projects/tutorialOct2018/data/sample_fcst/2005080700/wrfprs_ruc13_12.tm00_G212
/home/dadriaan/projects/tutorialOct2018/output/qpe_grib/regrid/20050807/ST2ml2005080703_A03h >>
/home/dadriaan/projects/tutorialOct2018/output/logs/master_metplus.log.20180927 2>&1

Grid Stat Tool:

/d1/CODE/MET/MET_releases/met-8.0_beta8/bin/grid_stat
/home/dadriaan/projects/tutorialOct2018/data/sample_fcst/2005080700/wrfprs_ruc13_03.tm00_G212
/home/dadriaan/projects/tutorialOct2018/output/qpe_grib/regrid/20050807/ST2ml2005080703_A03h
/home/dadriaan/projects/tutorialOct2018/METplus/parm/use_cases/qpf/met_config/GridStatConfig_MEAN -outdir
/home/dadriaan/projects/tutorialOct2018/output/uswrp/met_out/QPF/200508070000/grid_stat >>
/home/dadriaan/projects/tutorialOct2018/output/logs/master_metplus.log.20180927 2>&1

Post-run overview: output

OUTPUT_BASE/logs/master_metplus.log.YYYYMMDD

```
[dir]
METPLUS_BASE = /home/dadriaan/projects/tutorialOct2018/METplus
PARM_BASE = {METPLUS_BASE}/parm
OUTPUT_BASE = /home/dadriaan/projects/tutorialOct2018/output
MET_INSTALL_DIR = /d1/CODE/MET/MET_releases/met-8.0_beta8
MET_BASE = {MET_INSTALL_DIR}/share/met
LOG_DIR = {OUTPUT_BASE}/logs
TMP_DIR = /path/to
PROJ_DIR = /home/dadriaan/projects/tutorialOct2018/data
INPUT_BASE = {PROJ_DIR}
MODEL_DATA_DIR = {PROJ_DIR}/model_data
CONFIG_DIR = {PARM_BASE}/use_cases/qpf/met_config
FCST_GRID_STAT_INPUT_DIR = {INPUT_BASE}/PHPT
OBS_GEMPAK_INPUT_DIR = {INPUT_BASE}/uswrp/StageIV
OBS_PCP_COMBINE_INPUT_DIR = {INPUT_BASE}/uswrp/StageIV
OBS_PCP_COMBINE_OUTPUT_DIR = {OUTPUT_BASE}/uswrp/StageIV_grib/bucket
OBS_REGRID_DATA_PLANE_INPUT_DIR = {OUTPUT_BASE}/uswrp/StageIV_grib/bucket
OBS_REGRID_DATA_PLANE_OUTPUT_DIR = {OUTPUT_BASE}/uswrp/StageIV_grib/regrid
OBS_GRID_STAT_INPUT_DIR = {OUTPUT_BASE}/uswrp/StageIV_grib/regrid
GRID_STAT_OUT_DIR = {OUTPUT_BASE}/uswrp/met_out/{MODEL_TYPE}
```