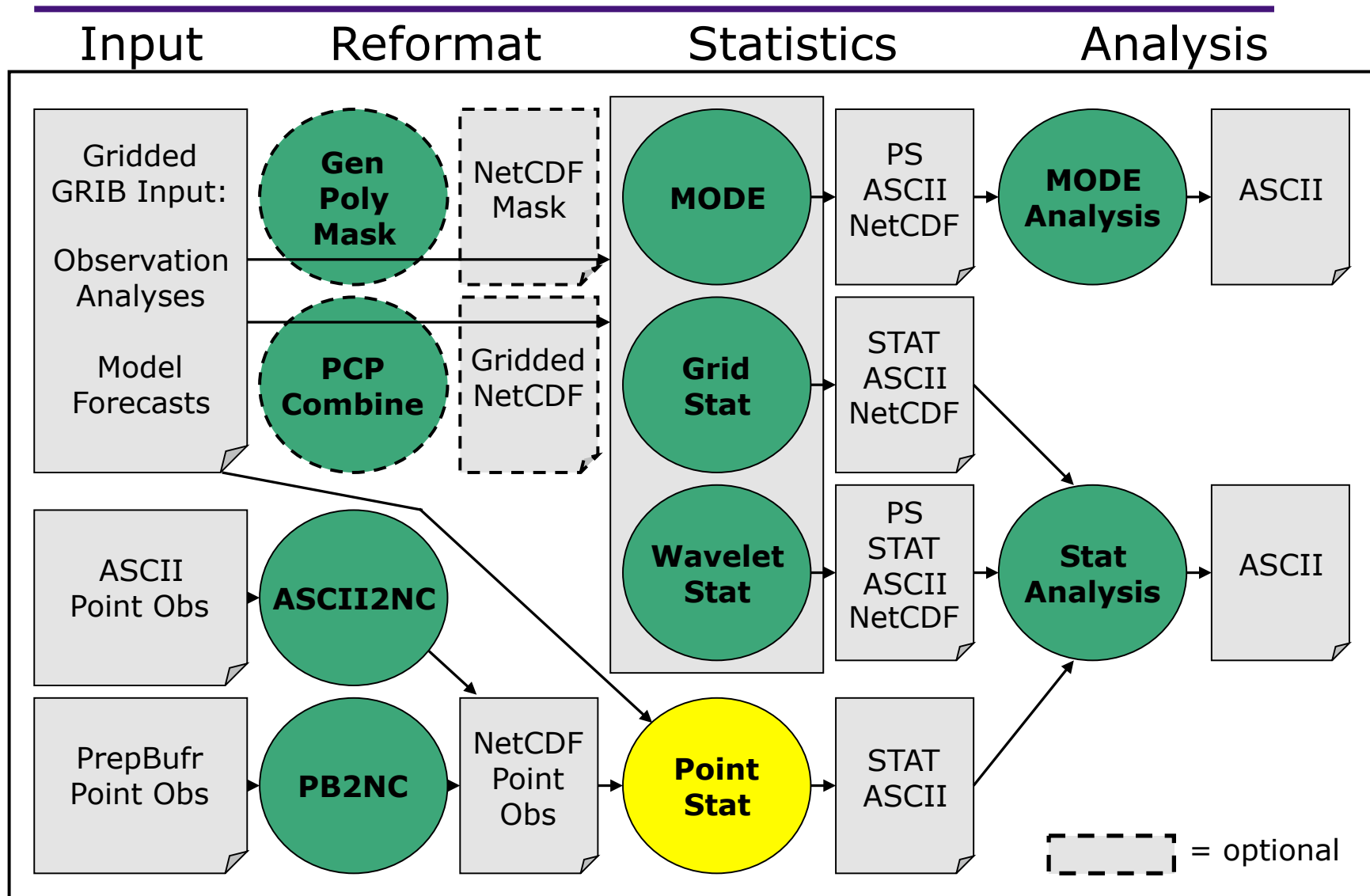
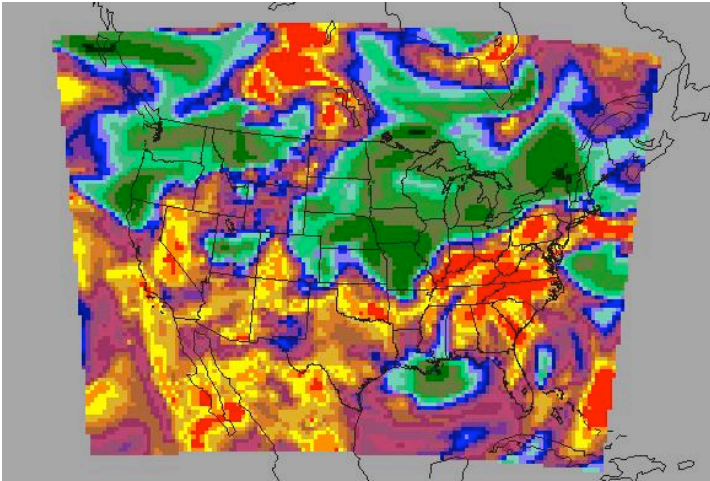


Point-Stat Tool



Point-Stat: Overview



- Compare **gridded forecasts** to **point observations**.
- Accumulate matched pairs over a defined area at a **single point** in time.
- Verify one or more variables/levels.
- Analysis tool provided to aggregate through time.

- Verification methods:
 - **Continuous** statistics for raw fields.
 - **Categorical** counts and statistics for thresholded fields.
 - Parametric and non-parametric **confidence intervals** for statistics.
 - Compute **partial sums** for raw fields and/or the raw matched pair values.
 - Methods for **probabilistic** forecasts.



Point-Stat: Input/Output

- Input Files
 - Gridded forecast file
 - GRIB output of WRF Post-Processor (or other)
 - NetCDF output of PCP-Combine
 - Point observation file
 - NetCDF output of PB2NC
 - NetCDF output of ASCII2NC
 - ASCII configuration file
- Output Files
 - ASCII statistics file with all output lines (end with “.stat”)
 - Optional ASCII files sorted by line type with a header row (ends with “_TYPE.txt”)

Point-Stat: Usage

Usage: point_stat

fcst_file

obs_file

config_file

[-climo climo_file]

[-ncfile netcdf_file]

[-valid_beg time]

[-valid_end time]

[-outdir path]

[-v level]

fcst_file	Forecast file in GRIB or NetCDF
obs_file	Point observation file in NetCDF (PB2NC or ASCII2NC)
config_file	ASCII configuration file
-climo	Climatological file for computing anomaly partial sums
-ncfile	Additional point observation files in NetCDF
-valid_beg	Beginning of valid time window for matching
-valid_end	End of valid time window for matching
-outdir	Output directory to be used
-v	Level of logging

Point-Stat: Configuration

- 28 configurable parameters – only set a few:
 - Temperature at the surface (2-meter).
 - `fcst_field[] = ["TMP/Z2"];`
 - Temperature below freezing.
 - `fcst_thresh[] = ["le273"];`
 - Match to observations at the surface.
 - `message_type[] = ["ADPSFC"];`
 - Look at all the points in my domain.
 - `mask_grid[] = ["FULL"];`
 - Match observation to the nearest forecast value.
 - `interp_wdth[] = [1];`
 - Generate all possible statistic types, except probabilistic.
 - `output_flag[] = [2, 2, 2, 2, 2, 2, 2, 2, 0, 0, 0, 0, 2];`

Point-Stat: Run

- METv2.0/bin/point_stat \
sample_fcst.grb sample_pb.nc \
PointStatConfig_TMPZ2 -outdir out -v 2

```
Forecast File: sample_fcst.grb
Climatology File: none
Configuration File: PointStatConfig_TMPZ2
Observation File: sample_pb.nc
-----
Reading records for TMP/Z2.
For TMP/Z2 found 1 forecast levels and 0 climatology levels.
-----
Searching 179772 observations from 44076 PrepBufr messages.
-----
Processing TMP/Z2 versus TMP/Z2, for observation type ADPSFC, over region FULL, for interpolation method
UW_MEAN(1), using 11370 pairs.
Computing Categorical Statistics.
Computing Continuous Statistics.
Computing Scalar Partial Sums.
-----
Output file: out/point_stat_360000L_20070331_120000V.stat
Output file: out/point_stat_360000L_20070331_120000V_fho.txt
Output file: out/point_stat_360000L_20070331_120000V_ctc.txt
Output file: out/point_stat_360000L_20070331_120000V_cts.txt
Output file: out/point_stat_360000L_20070331_120000V_cnt.txt
Output file: out/point_stat_360000L_20070331_120000V_sl112.txt
Output file: out/point_stat_360000L_20070331_120000V_sal112.txt
Output file: out/point_stat_360000L_20070331_120000V_vl112.txt
Output file: out/point_stat_360000L_20070331_120000V_val112.txt
Output file: out/point_stat_360000L_20070331_120000V_mpr.txt
```

Point-Stat: ASCII Output Types

- Statistics line types: 13 possible
 - Categorical - apply threshold
 - Contingency table counts and stats (FHO, CTC, CTS)
 - Continuous - raw fields
 - Continuous statistics (CNT)
 - Partial Sums (SL1L2, SAL1L2, VL1L2, VAL1L2)
 - Probabilistic
 - Contingency table counts and stats (PCT, PSTD)
 - Continuous statistics and ROC curve (PJC, PRC)
 - Matched pairs
 - Raw matched pairs – a lot of data! (MPR)
- 21 header columns common to all line types
- Remaining columns specific to each line type

Point-Stat: Sample Output

1. **STAT** file output for sample run:
 - 1 line each for **FHO**, **CTC**, **CTS**, **CNT**, **SL1L2**
 - 11,370 lines for **MPR**!
2. Additional **TXT** files for each line type

```
Output file: out/point_stat_360000L_20070331_120000V.stat
Output file: out/point_stat_360000L_20070331_120000V_fho.txt
Output file: out/point_stat_360000L_20070331_120000V_ctc.txt
Output file: out/point_stat_360000L_20070331_120000V_cts.txt
Output file: out/point_stat_360000L_20070331_120000V_cnt.txt
Output file: out/point_stat_360000L_20070331_120000V_sl1l2.txt
Output file: out/point_stat_360000L_20070331_120000V_sal1l2.txt
Output file: out/point_stat_360000L_20070331_120000V_vl1l2.txt
Output file: out/point_stat_360000L_20070331_120000V_val1l2.txt
Output file: out/point_stat_360000L_20070331_120000V_mpr.txt
```

Point-Stat: CTC Output Line

VERSION	V2.0
MODEL	WRF
FCST_LEAD	360000
FCST_VALID_BEG	20070331_120000
FCST_VALID_END	20070331_120000
OBS_LEAD	000000
OBS_VALID_BEG	20070331_103000
OBS_VALID_END	20070331_133000
FCST_VAR	TMP
FCST_LEV	Z2
OBS_VAR	TMP
OBS_LEV	Z2
OBTYPE	ADPSFC

VX_MASK	FULL
INTERP_MTHD	UW_MEAN
INTERP_PNTS	1
FCST_THRESH	<273.000
OBS_THRESH	<273.000
COV_THRESH	NA
ALPHA	NA
LINE_TYPE	CTC
TOTAL	11370
FY_OY	1635
FY_ON	380
FN_OY	438
FN_ON	8917

Point-Stat: Matched Pairs

- Matched Pair (MPR) line type contains 1 line for each matched pair.
- Data overload!

TOTAL	INDEX	OBS_LAT	OBS_LON	OBS_LVL	OBS_ELV	FCST	OBS	CLIMO
11370	1	43.93000	-60.01000	1010.79999	4.01053	271.87788	271.54999	NA
11370	2	46.43000	-71.93000	1016.09998	102.04903	268.50255	269.45001	NA
11370	3	44.23000	-78.36000	1004.50000	191.44466	272.94013	272.35001	NA
11370	4	51.67000	-124.40000	916.50000	872.82202	263.69020	264.95001	NA
11370	5	58.61000	-117.16000	973.90002	337.50449	272.37757	270.95001	NA
11370	6	52.18000	-122.04000	906.50000	938.08594	271.37738	264.35001	NA
11370	7	50.68000	-127.36000	1020.20001	22.03931	275.44020	275.04999	NA
11370	8	50.45000	-100.59000	949.09998	562.38477	272.18978	271.75000	NA
11370	9	57.13000	-61.47000	899.70001	834.87476	258.06464	254.64999	NA
11370	10	47.56000	-59.16000	1000.90002	40.06803	272.06486	269.54999	NA
11370	11	47.41000	-72.79000	1006.90002	169.37592	266.37724	265.95001	NA
11370	12	45.76000	-62.68000	1014.00000	1.99518	268.94018	268.64999	NA
11370	13	49.24000	-65.33000	1014.90002	28.96468	264.25276	267.25000	NA
11370	14	43.29000	-79.79000	1017.79999	77.03765	273.56474	275.85001	NA
11370	15	48.78000	-123.04000	1015.70001	23.93772	278.12724	280.25000	NA