AERMINUTE

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Purpose of AERMINUTE

- Calculate hourly average winds from 2-minute ASOS winds (rolling 2-minute averages reported every minute) from TD-6405 files
- AERMET replaces standard hourly observation with AERMINUTE hourly averaged wind
  - If AERMINUTE output is calm or missing, no substitution
- Reduce number of calm and variable winds output from AERMET due to METAR coding
  - Reclaim data that was “lost” due to coding, making station more representative
- Purpose is not to introduce conservatism into model

Calms/Variable winds reporting in METAR code

- Calm: Wind speed less than 3 knots
- Variable: Wind speeds up to 6 knots and wind direction varies by more than 60 degrees in 2-minute average.
  - Wind direction is missing in AERMET output
- AERMOD cannot calculate hourly concentration for hours with calm or variable winds
  - Light wind conditions those of most concern for new 1-hour NAAQS

Release history

- Initial version released February 2011 (version 11059)
- Version 11325 released December 20, 2011
  - Modifications to QA routines to account for newly discovered file formatting issues

Issues

- Data file formats
  - Do not fit regular format
  - Varies from station to station and year to year
- Winds reported in whole knots

Date & time

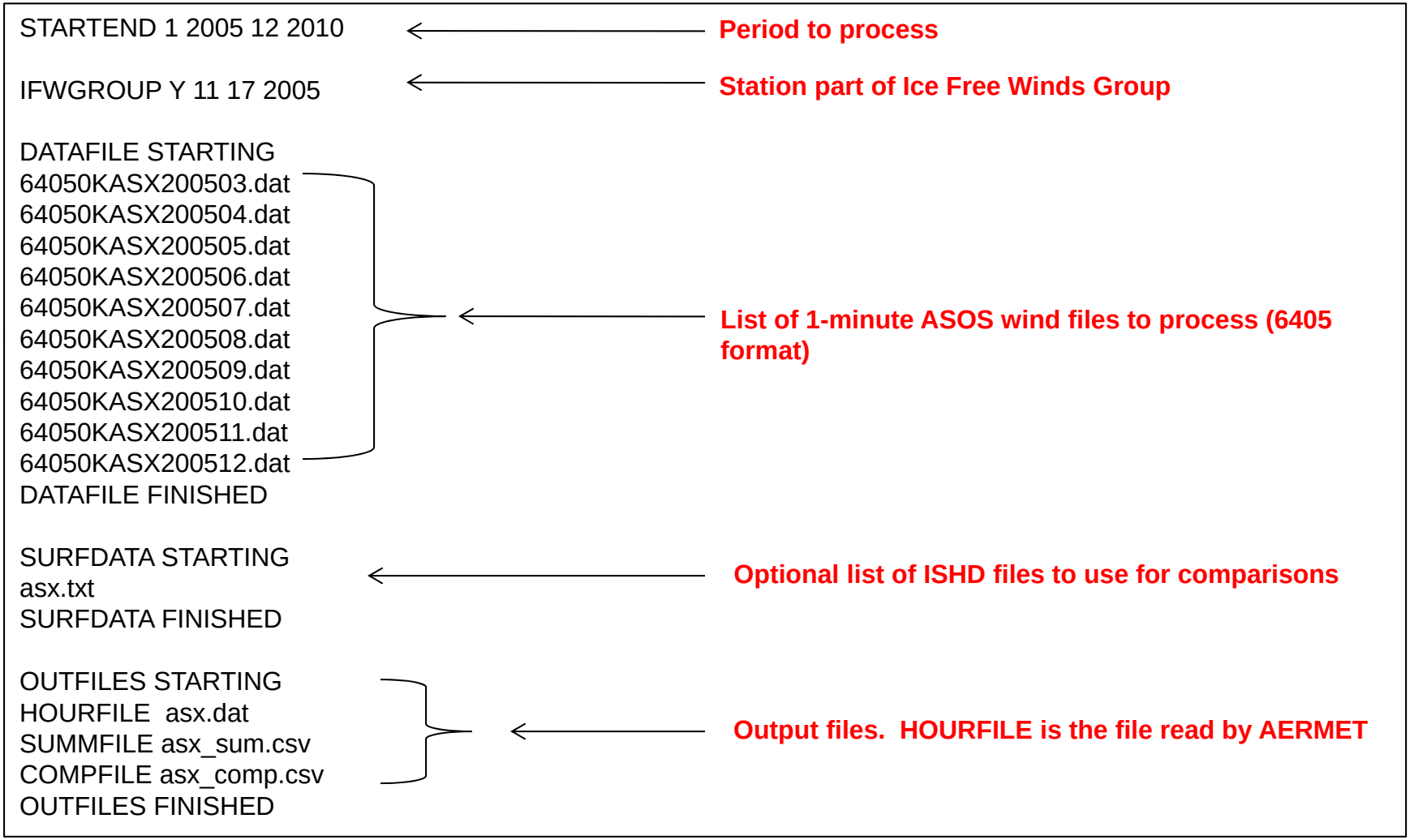
Wind direction

Wind speed (kts)

```
13722KRDU RDU2003110801410641  0.153 N  0.126 N      32  5  30  5
13722KRDU RDU2003110801420642  0.154 N  0.126 N      26  5  21  5
13722KRDU RDU2003110801430643  0.154 N  0.128 N      35  4  55  5
13722KRDU RDU2003110801440644  0.158 N  0.130 N      42  4  24  4
13722KRDU RDU2003110801450645  0.160 N  0.129 N      36  4  31  5
13722KRDU RDU2003110801460646  0.160 N  0.129 N      30  5  30  6
13722KRDU RDU2003110801470647  0.161 N  0.131 N      2  0648  0.166 N  0.133 N
13722KRDU RDU2003110801490649  0.170 N  0.132 N      30  5  33  7
13722KRDU RDU2003110801500650  0.173 N  0.133 N      28  6  19  8
13722KRDU RDU2003110801510651.138 N       32  7  32  7
13722KRDU RDU2003110801530653  0.171 N  0.139 N      32  6  35  7
13722KRDU RDU2003110801540654  0.171 N  0.136 N      20  5  11  6
13722KRDU RDU2003110801550655  0.170 N  0.137 N  0656  0.172 N  0.141 N  1
```

Format is not clean

AERMINUTE inputs/outputs



Ice Free Winds Group (IFWGROUP)

- Beginning in 2003, NWS began replacing cup & vane anemometers with sonic anemometers at NWS and FAA sites
  - No moving parts – ice free
- Commission date of sonic anemometer at a station important input for AERMINUTE
  - Determines treatment of winds < 2 knots
- If a station has become part of the Ice Free Winds Group before or during the data period being processed, enter a “Y” and the commission date on the IFWGROUP line.
- If a station is not part of the Ice Free Winds Group during the data period being processed, enter an “N”
  - If the commission date is after the data period and the user enters a “Y” and the date, AERMINUTE will change the status to “N”.

AERMINUTE treatment of winds < 2 knots

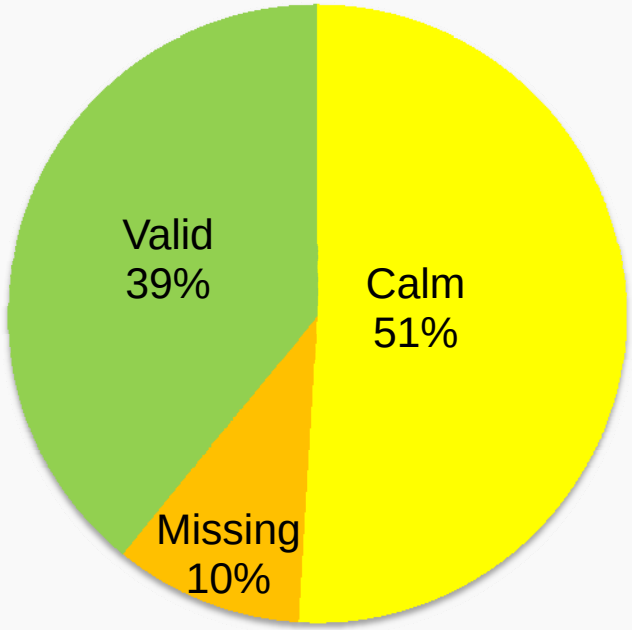
- For observations before a station's IFW commission date or station is not part of the IFW group
  - Reset wind to 1 knot
    - Wind speed is used in the hourly average wind speed but wind direction is not used in hourly wind direction
  - Observation is flagged as calm
- For observations after a station's IFW commission date
  - All wind speeds are considered valid, no resetting of winds below 2 knots
  - After a station's IFW commission date, there should be no calm hours in AERMINUTE output

AERMINUTE treatment of winds

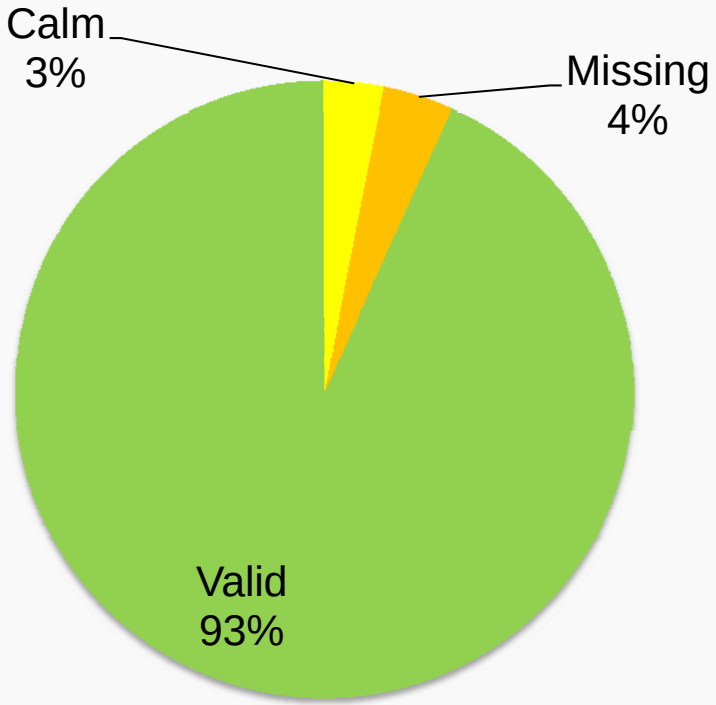
- Hourly winds are calculated from valid/calm even minutes and any non-overlapping odd minutes
- A hour is considered valid if:
  - At least two non-calm observations in the first half of the hour or at least one non-calm observation in the last half of the hour
  - If the hour has more than 50% non-calm observations, an hourly wind will be calculated, otherwise the hour is flagged as calm.
- If an hour does not meet the requirements above it is considered invalid and no hourly winds are calculated

Springfield, VT (2006-2010)

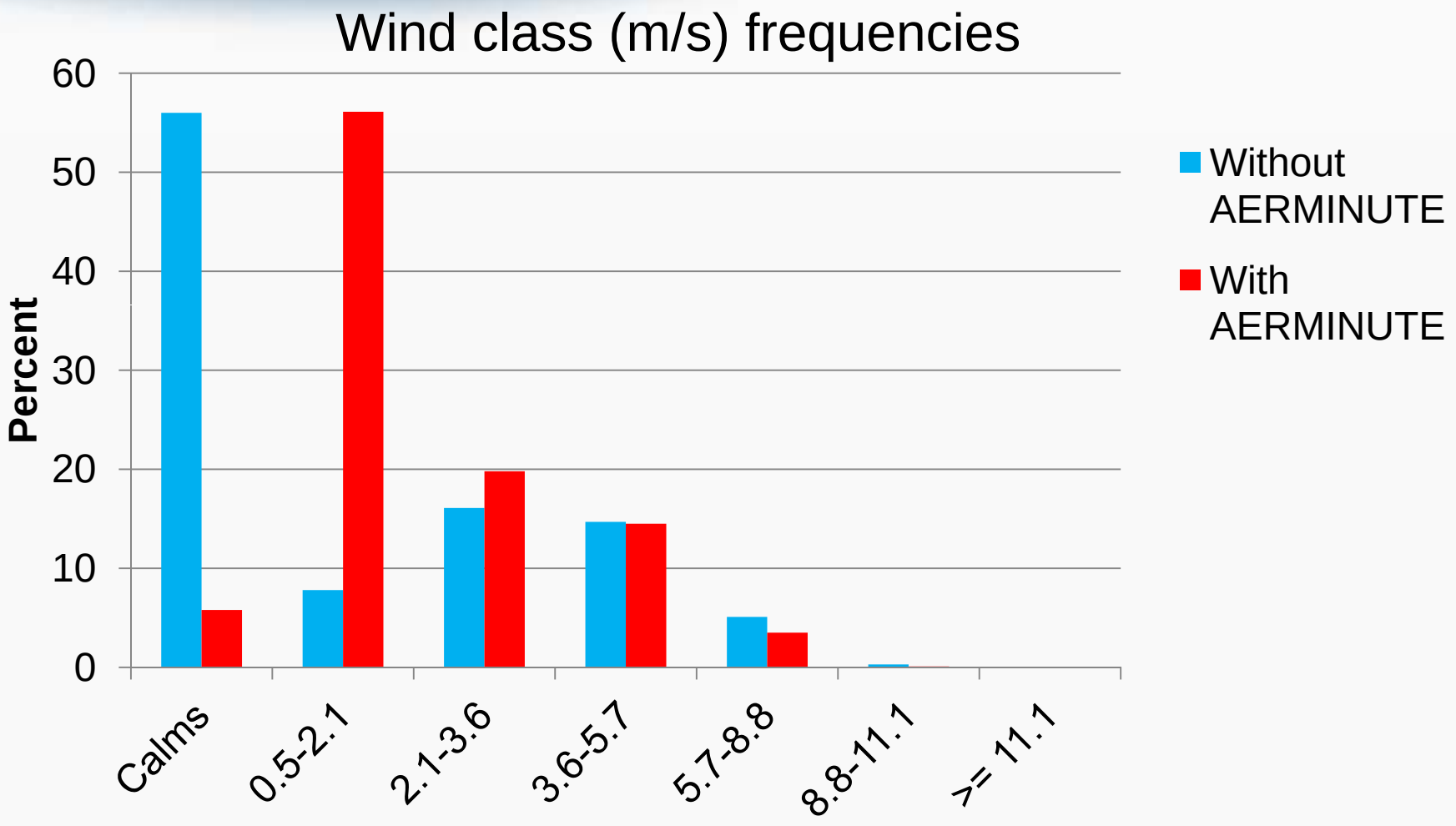
No AERMINUTE

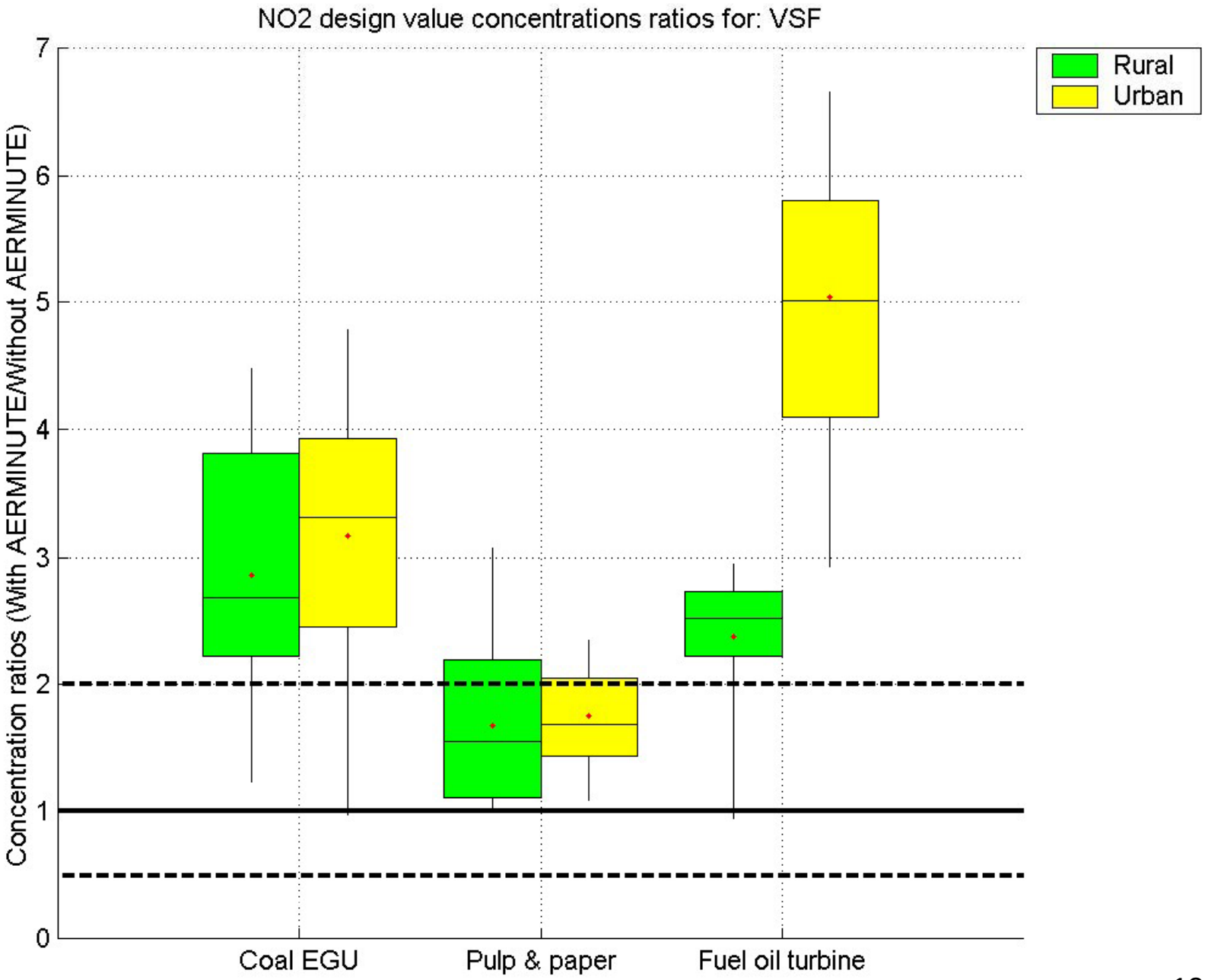


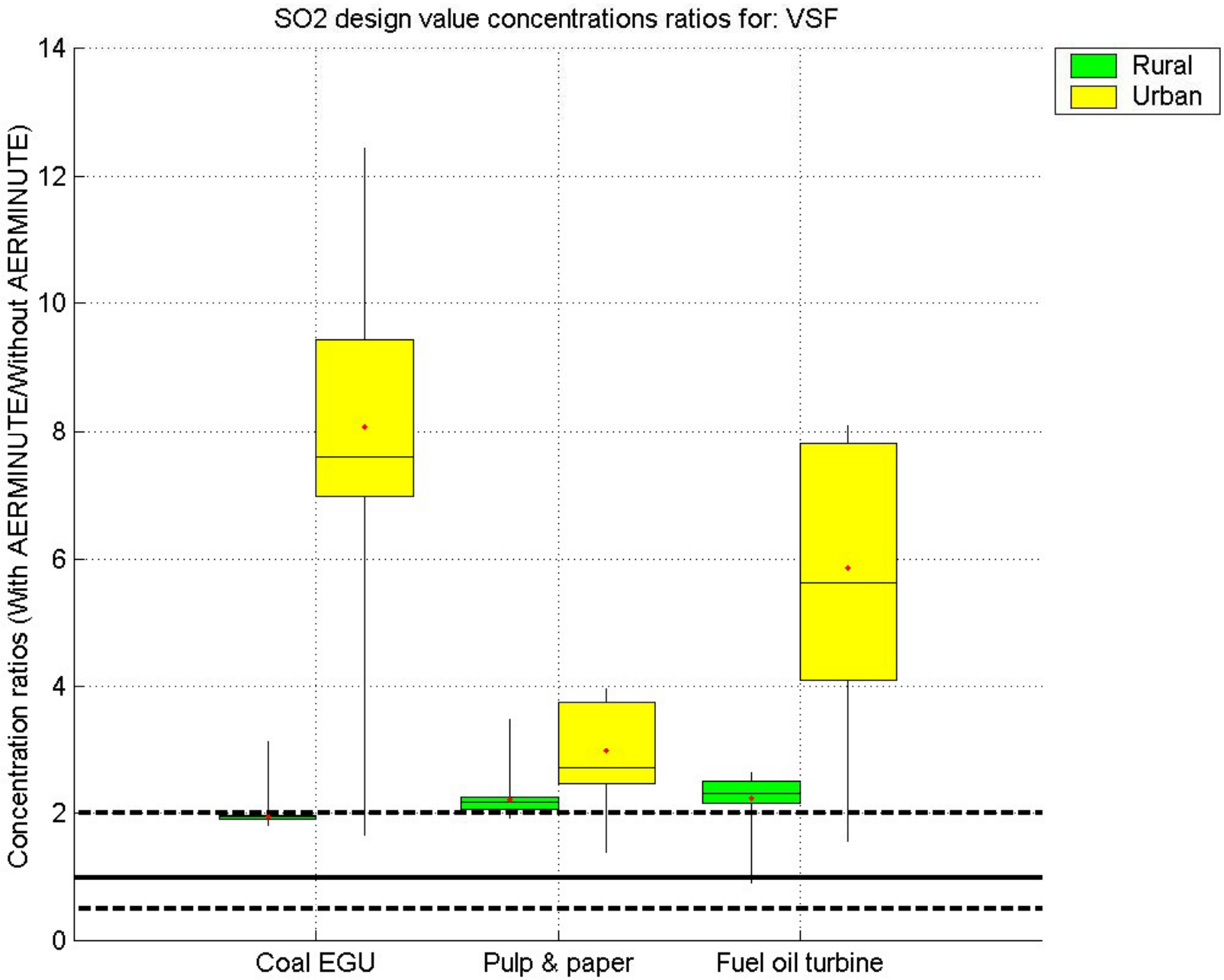
With AERMINUTE



IFW date Nov. 7, 2005


Wind class (m/s) frequencies
Percent
60
50
40
30
20
10
0
Calms
0.5-2.1
2.1-3.6
3.6-5.7
5.7-8.8
8.8-11.1
>= 11.1
Without AERMINUTE
With AERMINUTE


NO2 design value concentrations ratios for: VSF
Concentration ratios (With AERMINUTE/Without AERMINUTE)
0
1
2
3
4
5
6
7
Coal EGU
Pulp & paper
Fuel oil turbine
Rural
Urban


SO2 design value concentrations ratios for: VSF
Concentration ratios (With AERMINUTE/Without AERMINUTE)
0
2
4
6
8
10
12
14
Rural
Urban
Coal EGU
Pulp & paper
Fuel oil turbine

Links of interest

- AERMINUTE executable, source code, and user's guide:
- http://www.epa.gov/ttn/scram/metobsdata_procaccprogs.htm#aermet
- Link to monthly 6405 files
- ftp://ftp.ncdc.noaa.gov/pub/data/asos-onemin/
- Files are arranged by year and named by station call sign
- Link to Ice Free Wind commission dates: http://www.nws.noaa.gov/ops2/Surface/documents/IFW_stat.pdf

Questions?