



AERMOD Implementation Workgroup (AIWG)

ASOS and Met Data Processing Subgroup

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1. Impact of ASOS data versus pre-ASOS data on AERMOD predicted concentrations
2. Guidance and tools for filling data gaps in ASOS data and improving quality assessment and reporting in AERMOD
3. Impact of light winds in AERMOD
4. Use of average hourly winds in AERMOD

The Problem:

- Beginning in 1992, NWS began converting from observer-based observations to automated observations (ASOS).
- In 1996, NWS adopted the international METAR code for surface observations (significant changes in reporting variable winds and clouds).
- ASOS-related changes in anemometer instruments and heights have led, in some cases, to a significant increase in number of “calms” reported.
- What are the impacts of these changes on AERMOD predicted concentrations?

Actions:

Action #1 - Understand differences in equipment, measurement and reporting of met parameters in the two observing systems.

Action #2 - Compare AERMOD model predictions using pre-ASOS and ASOS met data from same NWS stations and times.

- An EPA study was done in 1997 on a limited, pre-METAR, NWS data set using ISCST3
- Repeat the study using AERMOD
- Search for additional concurrent data and design an AERMOD experiment using different stations and longer time periods, if available

Actions (cont'd):

Action #3 - Compare AERMOD model predictions using pre-ASOS and ASOS met data from same NWS stations but different times periods.

- Select stations from different geographical areas (East, South, Midwest, West)
- Select stations with at least 5 years pre-ASOS and 5 years (post 1996) ASOS data
- Run AERMOD and develop set of statistical measures to characterize the results
- Compare variability of 3 scenarios:
 - Variability between Pre-ASOS and ASOS results
 - Inter-year variability in pre-ASOS results
 - Inter-year variability in ASOS results

Hopefully this will allow us to assess the extent that the predicted concentration differences between the two observation periods are due to the weather and not to the introduction of ASOS

Actions (cont'd):

Action # 4 - Investigate why the number of calms and missing data reported by ASOS stations appears to be significantly higher than for pre-ASOS data

- For as many NWS stations as feasible, compare number of calm, variable wind directions and missing winds in ASOS data to same parameters for the same stations pre-ASOS. Include stations used in Action #3 above.
- Examine the results to see if any patterns appear that might help explain the differences in AERMOD concentrations found in Actions #2 & #3 above.

Actions (cont'd):

Action #5 - Recommend modifications to AERMOD in response to findings in Actions #2, #3 and #4 above.



Issue #2 - Missing Data Replacement Guidance and QA Reporting

The problem:

- Duration and frequency of data gaps at ASOS stations appear to be more significant than at observer-based stations
- Current EPA guidance on filling data gaps is based on a pre-ASOS and pre-AERMOD environment. Is it still valid?
- Tools for assessing quality/availability of met data in the AERMOD/AERMET process was considered inadequate by several members of the original AERMOD Implementation Workgroup.

Actions:

Action #1 - Missing data and data replacement

- Compare AERMOD concentrations using ASOS data with varying percentages of missing data (artificially created) to the concentrations using the same stations and time periods with no missing data
- Compare AERMOD concentrations using data sets similar to above, but using a missing data replacement algorithm such as the “AERFILL” program developed at Iowa DNR
- Evaluate the feasibility of using NWS analyses as a part of a missing data replacement procedure

Actions (cont'd):

Action #2 - QA Reporting

- Review existing QA screening and reporting capability in AERMET/AERMOD
- Develop a questionnaire to survey users and get opinions/suggestions for improving the capability

Action #3 - Follow-up

- Recommend guidance language for handling missing data, based on results of Action #1
- Pursue data-filling software options as appropriate
- Recommend QA steps modelers can take as they confront met data problems
- Recommend modifications to AERMET if survey supports changes

The Problem:

- AERMOD is designed to handle winds less than 1m/s
- Some users have reported that light winds in AERMOD can result in unrealistically high concentrations
- Problem limited to on-site and gridded met data (NWS treats winds 2kts and less as calms)
- How significant is the problem and how can we fix it?

Actions:

Action #1 - Develop a questionnaire to survey users to better define the extent and severity of the problem

Action #2 - If necessary, conduct study evaluating AERMOD performance using a variety of wind conditions (would require creation of artificial wind regimes)

Action #3 - Develop guidance, as necessary, to address light wind problem

Action #4 - Recommend modifications to AERMET/AERMOD as appropriate

The Problem:

- ASOS wind currently reported as the 2-minute average taken approximately 10 minutes before the hour
- The 2-minute winds are recorded every minute and are available on an NCDC ftp site for all first order NWS stations (beginning with 2000 data)
- The capability exists to calculate hourly average winds (and other parameters) from these data
- Use of average hourly winds may dramatically reduce the number of “calms” reports and eliminate the number of hours when winds are reported less than 6kts with a variable direction
- What would be the impact on AERMOD concentrations of using hourly averaged NWS winds?

Actions:

Action #1 - Find out more about accessibility, formats and NWS stations and years available

Action #2 - Create hourly wind averages for a subset of stations and run AERMET/AERMOD

Action #3 - Compare concentrations to AERMOD runs with same stations and years using traditional ASOS observations

Action #4 - Pending results of Action #3, create data sets for all available stations and post on SCRAM

Action #5 - Develop language for AERMOD Users Guide, AERMOD Implementation Guide, etc on use of hourly averaged data



Questions/Comments?

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