

Minnesota Air, Water, and Waste Environmental Conf.

Air Modeling – Training (8am-noon)
Sheraton Bloomington Hotel, Atrium 7

February 14, 2006
Chris Nelson & Dennis Becker
Minnesota Pollution Control Agency

X:\Old_P_Fox\AQPRJ\TOXTEAM\ModelTraining\

Air Modeling (98 Slides)

- AERMOD Status and MPCA “Draft” Data
- AERMOD Urban Modeling Developments
 - Metropolitan Statistical Areas and Micropolitan Statistical Areas
- New MPCA NAAQS/MAAQs Feature: FAR Data
- Break - slide 40
- Rochester and Olmsted County SIP Work
 - RPU-Silver Lake Plant Sensitivity Analyses
- Break - slide 75
- AERA/RASS with supplemental Post-RASS Option
- Fugitive PM₁₀ emissions: roads, cooling towers, etc.
- VISCREEN (Nearby areas v. Class I areas)
- Future Possibilities

AERMOD

- AERMOD promulgated Nov. 9, 2005
 - AERMOD/AERMAP/AERMET (04300)
 - AERSCREEN (early 2006?)
 - AERSURFACE (mid 2006?)
- First PSD Project: RPU (March 2003)
- MPCA “Trial” Data (September 2004)
- MPCA “Draft” Data (October 2005)
 - <http://www.pca.state.mn.us/air/modeling-data2.html>
 - See next 15 slides

MPCA "Draft" Data for AERMOD

The screenshot shows a Microsoft Internet Explorer browser window displaying the Minnesota Pollution Control Agency (MPCA) website. The address bar shows the URL: <http://www.pca.state.mn.us/air/modeling-data2.html>. The page title is "Draft Data for AERMOD Applications -- Minnesota Pollution Control Agency - Microsoft Internet Explorer". The MPCA logo is visible at the top left of the page content. A navigation bar includes links: Home, Site Index, Glossary, What's New, Ask MPCA, and Visitor Center. A search box is located on the right side of the navigation bar. The main content area is titled "Draft Data for AERMOD Applications (October 2005)". A red dashed box contains a warning: "Please note that the files available from this Web page are for skilled AERMOD users only! Potential users of the Draft data should carefully read the AMODDATA.DOC file and all applicable README files below before downloading and using the draft AERMOD data!". Below this, a paragraph states: "MPCA is providing ready-to-run 'draft' data suitable for AERMOD (version 04300) for conditional regulatory applications – see restrictions in the README files." Another paragraph states: "All data and documents are works-in-progress and are subject to change:". A bulleted list of links is provided: [AMODDATA1.doc](#) (discusses "draft" AERMOD data, restrictions, etc.); [ABZoINFO1.XLS](#) (draft "ABZo" tables, wind roses, DRG/DOQ/LULC maps, etc.); and [SITECHAR1.XLS](#) (draft AERMET "SITE_CHAR" for Zo). Below this, a section titled "Draft AERMAP 1-DEGREE DIGITAL ELEVATION MODEL (DEM) DATA" contains two links: [READ ME .TXT](#) and [DEM1DATA.ZIP](#) (32MB zipped; 473MB unzipped). A final section titled "Draft AERMET STAGE 0 (RAW DATA)" is partially visible at the bottom, with a link to [READ ME0.TXT](#). The browser's status bar at the bottom shows "Done" and "Internet".

Draft Data for AERMOD Applications -- Minnesota Pollution Control Agency - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print Mail Print Preview

Address <http://www.pca.state.mn.us/air/modeling-data2.html> Go Links

Minnesota Pollution Control Agency

Home | Site Index | Glossary | What's New | Ask MPCA | Visitor Center

[Air Modeling](#)

[Air](#)

This Web site contains [PDF documents](#) that require Adobe Acrobat for viewing.

MPCA Home > [Air](#) > [Air Modeling](#) > Draft Data for AERMOD Applications

Draft Data for AERMOD Applications (October 2005)

Please note that the files available from this Web page are for skilled AERMOD users only!

Potential users of the Draft data should carefully read the AMODDATA.DOC file and all applicable README files below before downloading and using the draft AERMOD data!

MPCA is providing ready-to-run "draft" data suitable for AERMOD (version 04300) for conditional regulatory applications – see restrictions in the README files.

All data and documents are works-in-progress and are subject to change:

- [AMODDATA1.doc](#) (discusses "draft" AERMOD data, restrictions, etc.);
- [ABZoINFO1.XLS](#) (draft "ABZo" tables, wind roses, DRG/DOQ/LULC maps, etc.);
- [SITECHAR1.XLS](#) (draft AERMET "SITE_CHAR" for Zo)

Draft AERMAP 1-DEGREE DIGITAL ELEVATION MODEL (DEM) DATA

- [READ ME .TXT](#)
- [DEM1DATA.ZIP](#) (32MB zipped; 473MB unzipped)

Draft AERMET STAGE 0 (RAW DATA)

[READ ME0.TXT](#)

Done Internet

MPCA “Draft” Data for AERMOD

The screenshot shows a Microsoft Internet Explorer browser window with the title bar "Draft Data for AERMOD Applications -- Minnesota Pollution Control Agency - Microsoft Internet Explorer". The address bar displays the URL "http://www.pca.state.mn.us/air/modeling-data2.html". The main content area lists draft data for AERMOD applications, organized into five sections:

- Draft AERMAP 1-DEGREE DIGITAL ELEVATION MODEL (DEM) DATA**
 - [READ ME.TXT](#)
 - [DEM1DATA.ZIP](#) (32MB zipped; 473MB unzipped)
- Draft AERMET STAGE 0 (RAW DATA)**
 - [READ ME0.TXT](#)
 - [MET0DATA.ZIP](#) (19MB zipped; 110MB unzipped)
- Draft AERMET STAGE 1 (DATA EXTRACTION)**
 - [READ ME1.TXT](#)
 - [MET1DATA.ZIP](#) (11MB zipped; 111MB unzipped)
- Draft AERMET STAGE 2 (DATA MERGING)**
 - [READ ME2.TXT](#)
 - [MET2DATA.ZIP](#) (42MB zipped; 357MB unzipped)
- Draft AERMET STAGE 3 (DATA PROCESSING)**
 - [READ ME3.TXT](#)
 - [Over 3,000 ZIP files](#) Note: this link will take you to a ftp site with many files. The file naming convention is explained in the AMODDATA.DOC above and the above README files. This ftp area is intended for skilled air dispersion modelers only. Each file is approximately 1.5MB zipped and 10MB unzipped that reflects:
 - 1986-1990 National Weather Service (NWS) data;
 - preliminary National Land Cover Data (NLCD);
 - draft monthly values of albedo (A), Bowen ratio (B), and roughness height (zo);

The browser window includes standard navigation buttons (Back, Forward, Stop, Reload, Home, Search, Favorites, Go, Links) and a status bar at the bottom showing "Done" and "Internet".

AERMAP “Draft” Data

- AERMAP (04300) released Dec. 2005
- USGS 7.5 minute DEM files (Refined)
 - “Close-in” receptors (within ~10 km)
 - “Distant” receptors too, if easy to do
- USGS 1-degree DEM files (Screening)
 - Maybe “Distant” receptors (beyond ~10 km)
- Beware of AERMAP 03107 bugs
- Verify! Compare with DRG TOPO maps!

AERMET “Draft” Data

[National Weather Service (NWS)]

- Standard Meteorological Parameters
 - Wind speed, wind direction, temperature, etc.
- Additional Land Use Land Cover Parameters
 - Albedo (solar reflection)
 - Dark soil~0.1; snow cover~0.5
 - Bowen Ratio (moisture term)
 - Lower values for wet conditions
 - Higher values for dry conditions
 - Roughness Height (surface roughness)
 - Grass<0.1m; cropland~0.2m; dense forest~1m; big city~1m

AERMET “Draft” Data [National Weather Service (NWS)]

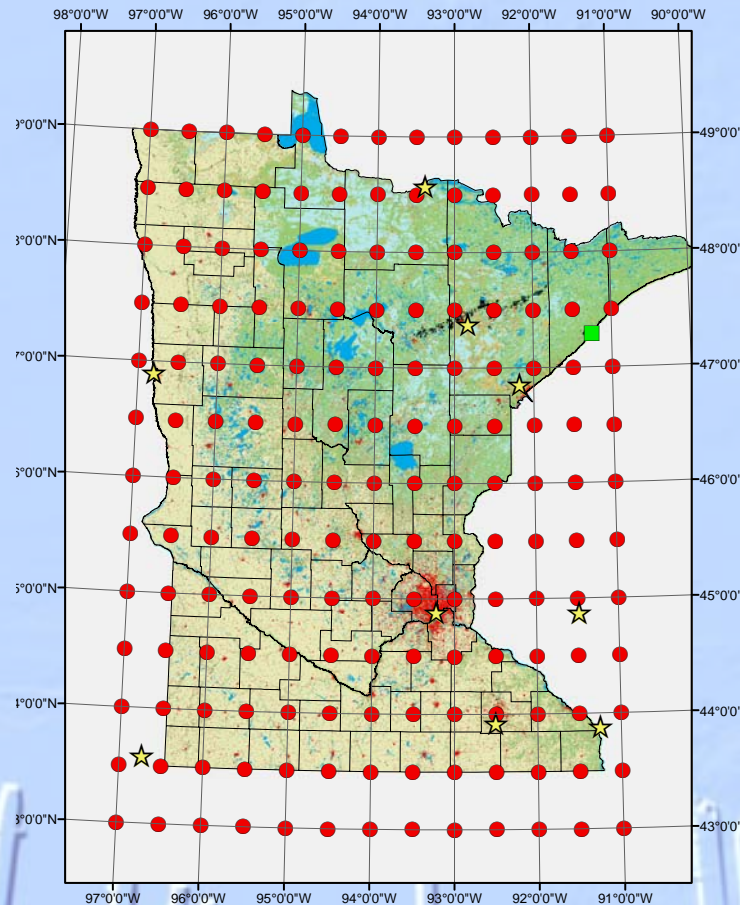
■ Nine Surface Stations

- Minnesota Sites: INL, HIB, DLH, MSP, RST
- Adjacent States: FAR, SXF, EAU, LAC
- Mostly 1986-1990 (Hibbing: 1972-1976)
- National Land Cover Data (NLCD)
- Draft Values (Albedo, Bowen Ratio, Zo)

■ Two Upper Air Stations (INL, STC)

■ Processed each 0.5 degrees lat./long.

NWS Sites (Yellow Stars) & Processed Sites (Red Dots)



AERMET “Draft” Surface Data

- Compare project site vs. NWS sites:
 - Prevailing winds (annual, season, month?)
 - Land Use Land Cover (LULC)
 - Monthly and annual values
 - Twelve 30 degree sectors
 - 3 kilometer radius
 - Roughness Height (Z_o) very important
 - Albedo and Bowen Ratio less important
- Select most representative NWS site

AERMET “Draft” Surface Data

[illegible]

AERMET "Draft" Surface Data

Microsoft Excel - ABZoINFO1.XLS

File Edit View Insert Format Tools Data Window Help

Type a question for help

Arial 10 B I U

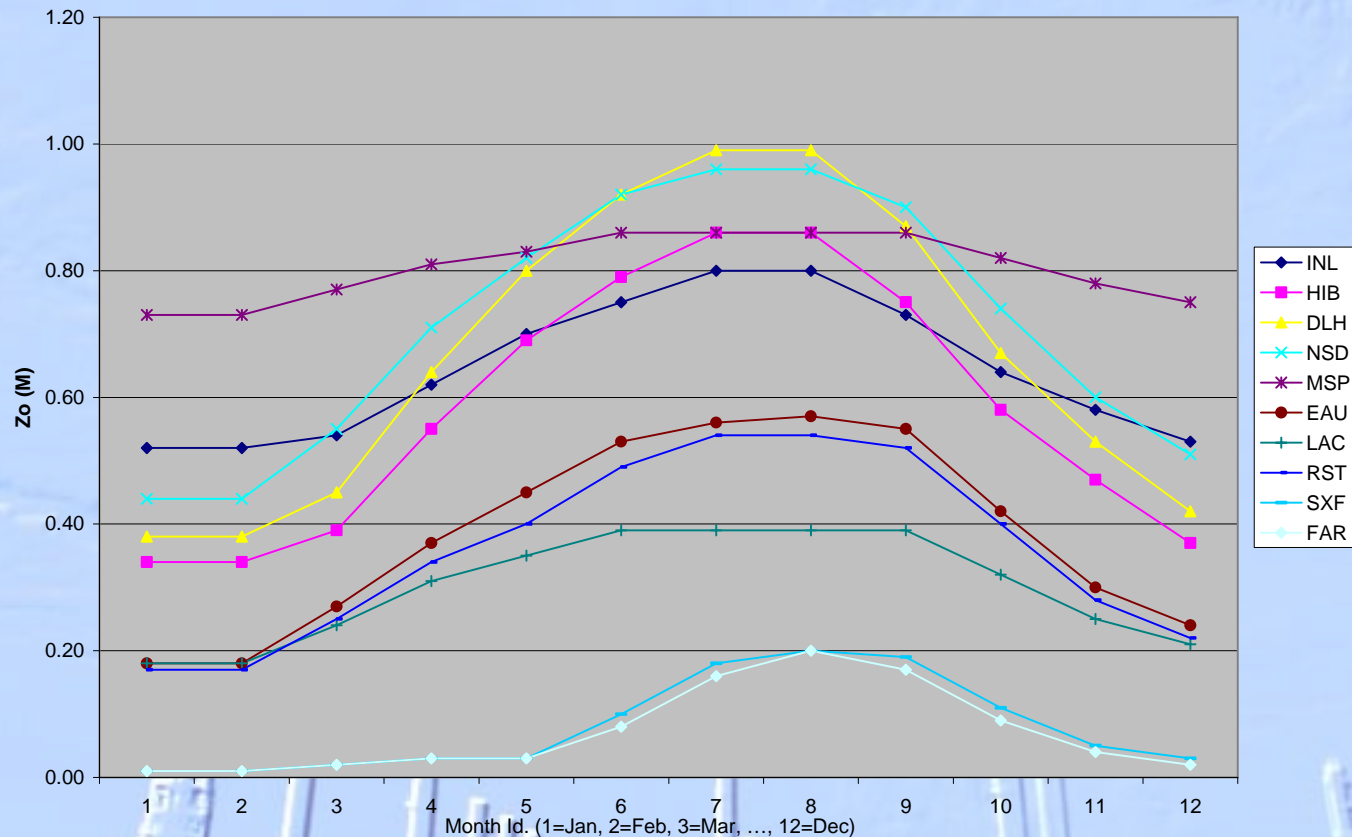
A1

		Minnesota "AERMET NLCD Seasons" by Month, Latitude, and Terrain (Interpolate by Latitude with Terrain Adjustment [43N < LATadj. < 50N])																																			
		Approximately 43N Latitude (N. Iowa)												Approximately 50N Latitude (S. Canada)																							
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
5	State of Minnesota																																				
6	National Land Cover Data																																				
7	ID Category																																				
8	% of Area																																				
9	11 Open water	5.8																								Some Considerations: Mean Ice In & Ice Out Dates Terrain Elevation Fall Foliage Dates Mean Monthly Temperatures Chance of White Christmas											
10	12 Perennial ice/snow	0.0																																			
11	21 Low intensity residential	0.7																																			
12	# High intensity residential	0.3																								First & Last Frost Dates Corn knee high by 4th of July Median Snow Cover Dates Mean Duration of Snow Cover											
13	# Comm./Industrial/Trans.	0.6																																			
14	31 Bare rock/sand/clay	0.0																																			
15	# Quarries/mines/gravel pits	0.2																																			
16	# Transitional	0.4																																			
17	41 Deciduous forest	15.8																																			
18	# Evergreen forest	3.0																																			
19	# Mixed forest	3.4																																			
20	51 Shrubland	0.5																																			
21	61 Orchards/vineyards/etc.	0.0																																			
22	71 Grassland/herbaceous	0.0																																			
23	81 Pasture/hay	11.9																																			
24	# Row crops: corn/soybeans	35.8																																			
25	# Small grains: wheat/oats	2.3																																			
26	# Fallow	0.0																																			
27	# Urban/recreational grass	0.3																																			
28	91 W/woody W/wetlands	13.1																																			
29	# Emergent Herb. W/wetlands	5.8																																			
MN AERMET "Seasons"																																					
Winter (Snow Cover > 3")		Latitude Adjustments for Terrain Elevations (above sea level):																																			
Spring, T=Transition Month		LAT(adjusted)=LAT(actual) + (Z-366m)/100m. Note: mean elevation in Minnesota is approximately 1200 feet (366m) a.s.l.																																			
Summer																																					
Autumn, T=transition month		Value=Value43 + (Value50 - Value43)*[(LATadj.-43) / (50-43)]																																			

NUM

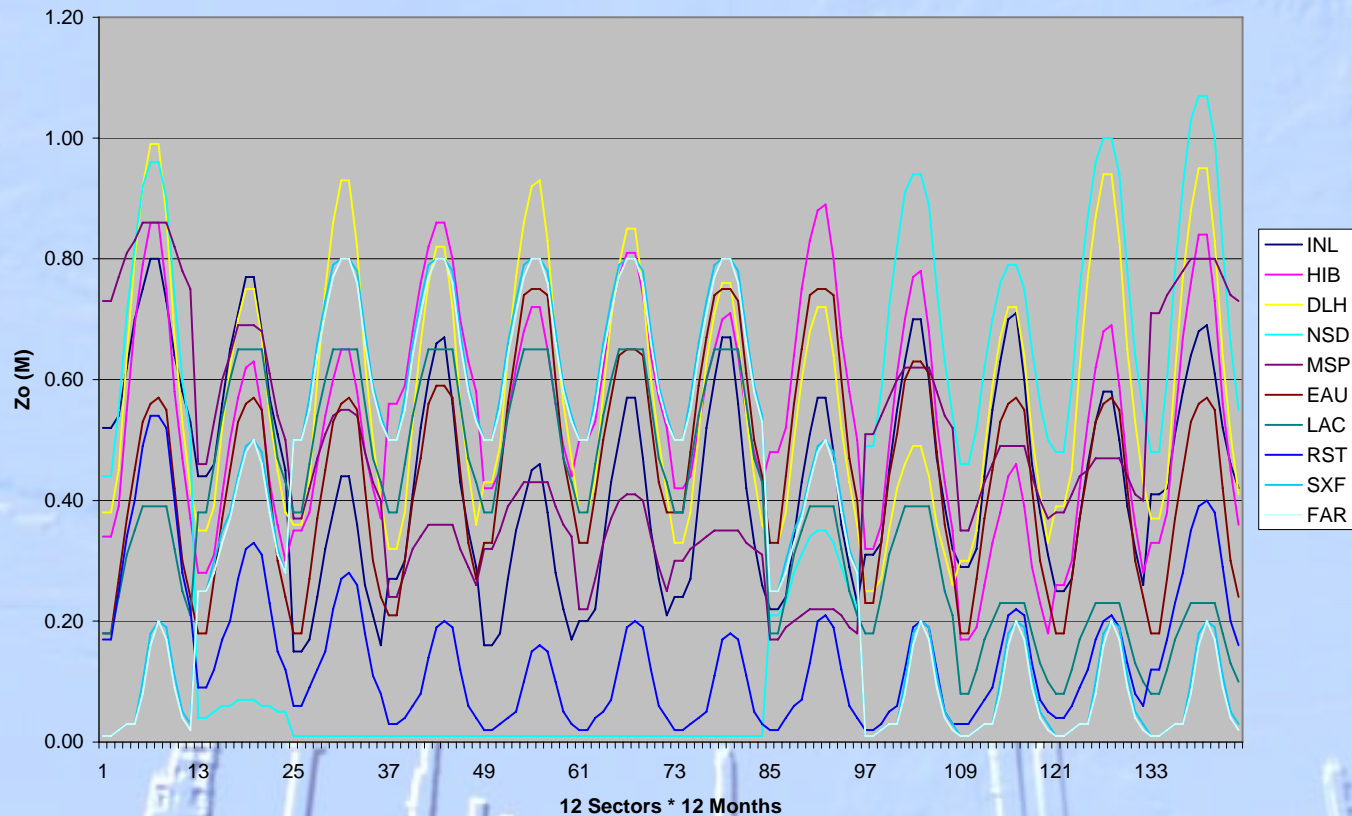
AERMET – Roughness Heights (NNE Sector – Monthly Values)

Draft AERMET "SITE_CHAR": Zo(M) for Sector 1 (by Site and Month)



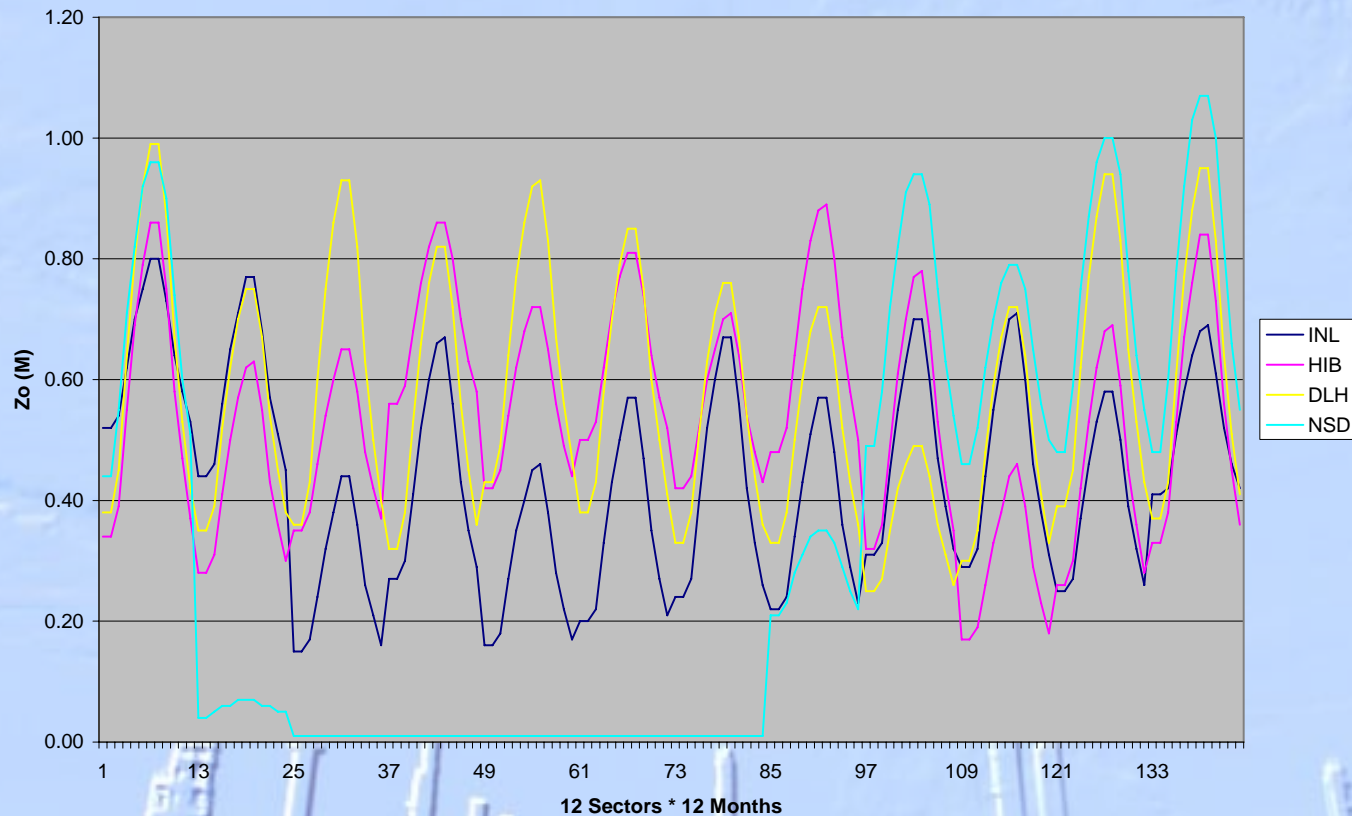
AERMET – Roughness Heights (ALL 12 Sectors – Monthly Values)

Draft AERMET "SITE_CHAR": Zo(M) (12 Sectors & 12 Months [144 Values])



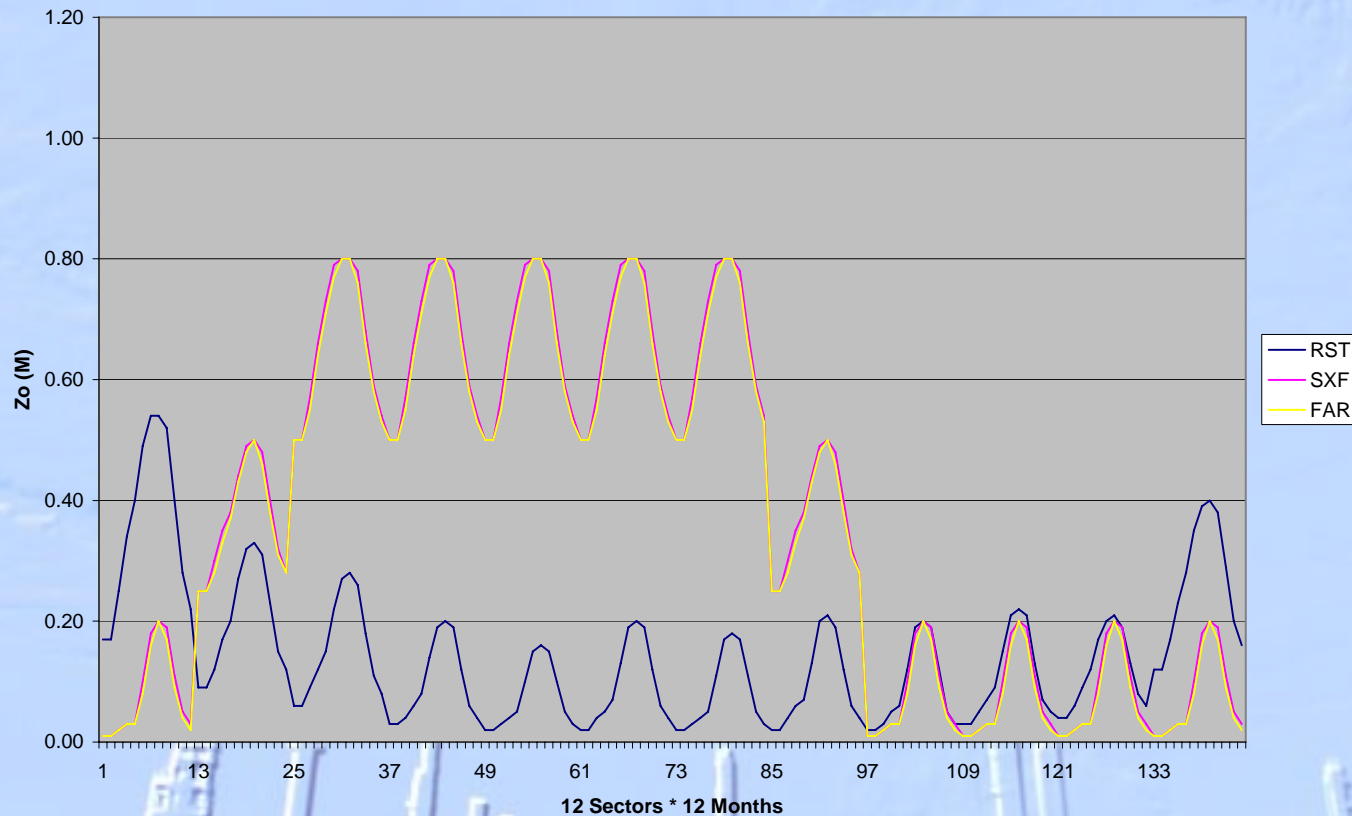
AERMET – Roughness Heights (Northern MN – All 12 Sectors)

Draft AERMET "SITE_CHAR": Zo(M) (12 Sectors & 12 Months [144 Values])



AERMET – Roughness Heights (Southern MN – All 12 Sectors)

Draft AERMET "SITE_CHAR": Zo(M) (12 Sectors & 12 Months [144 Values])



AERMET “Draft” Upper Air Data

- Generally use INL in northern MN
- Generally use STC in southern MN
- Less important than selecting surface site

AERMOD Summary

- MPCA expects AERMOD (04300):
 - State Air Emission Risk Analyses (AERA)
 - Federal PSD and SIP modeling

- Possible Exceptions:
 - Screening
 - Residual Title V modeling (state requirement)
 - Miscellaneous non-regulatory applications

- Questions?