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MDE Summary of EPA tools for Network Assessment

MARAMA Monitoring Committee Training Workshop

23 February 2010

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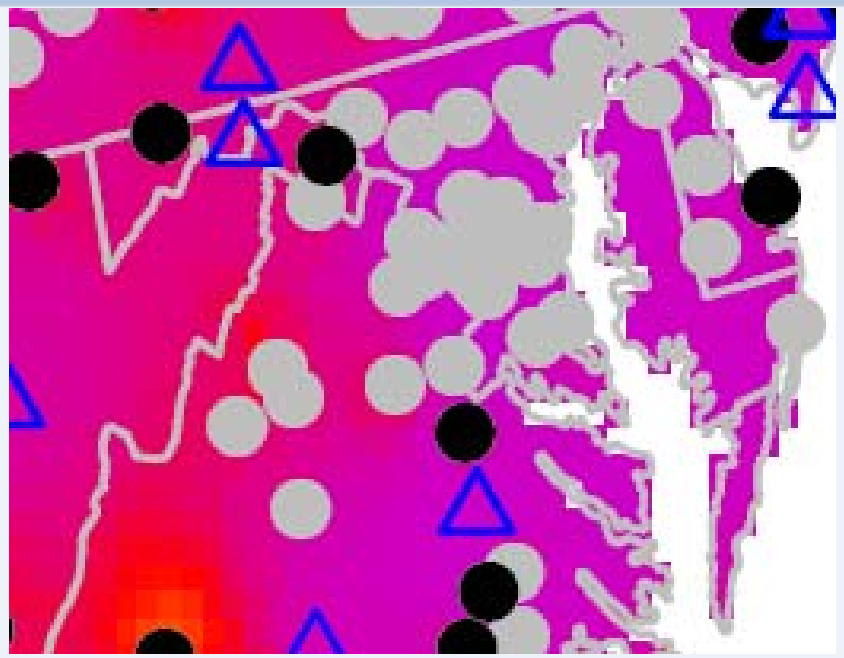
Results

- Remove two PM2.5 sites.
  - Bladensburg, NEPS.
- Keep all ozone sites.
- PM2.5 sites show stronger correlation than ozone sites.

Outline

- Summarize tools
- Summarize results
- Weighting scheme

New sites tool



Existing sites from site pairs meeting criteria

Existing sites from site pairs not meeting criteria

Possible new sites

The tool examines all site pairs

Do they meet criteria for:

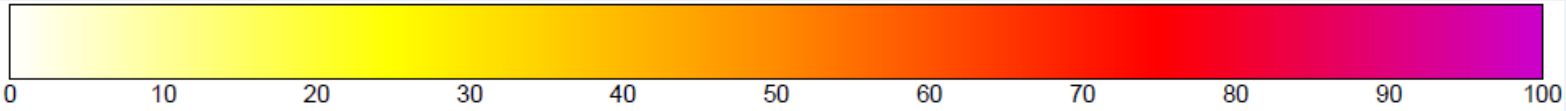
- Correlation?
- Concentration difference?
- Distance?
- Exceeding NAAQS?

- Corridors of new sites created.

– Not all new sites are practical.

- Re-run tool to get convincing solution.

Probability of exceeding 85% of 8 hour **ozone** NAAQS



There is a PM2.5 new sites tool as well.

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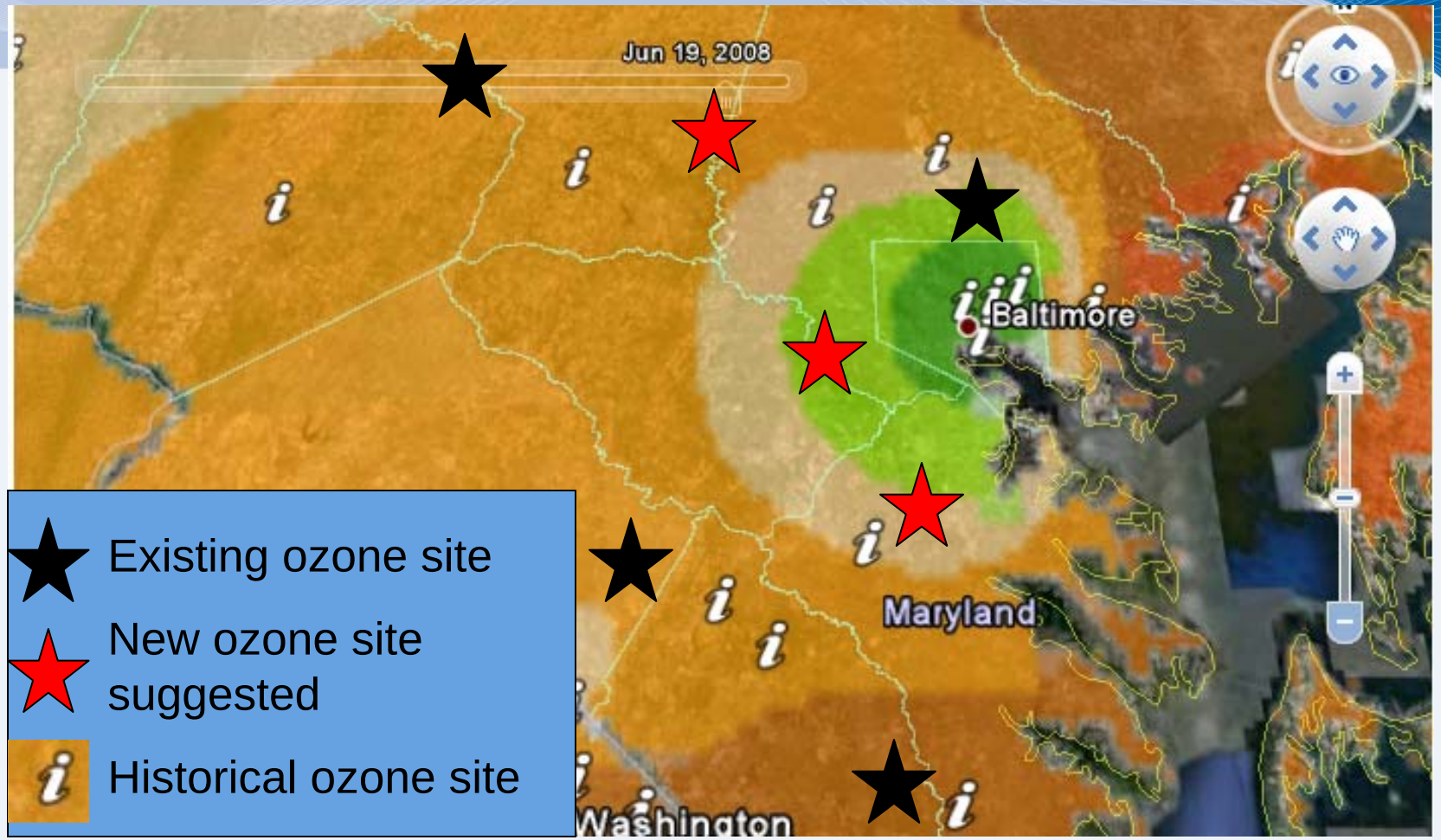

8-Hour Ozone

65 70 76 80 85 90 95 100 105 110+ ppb

Map generated by interpolating annual ozone monitor values.

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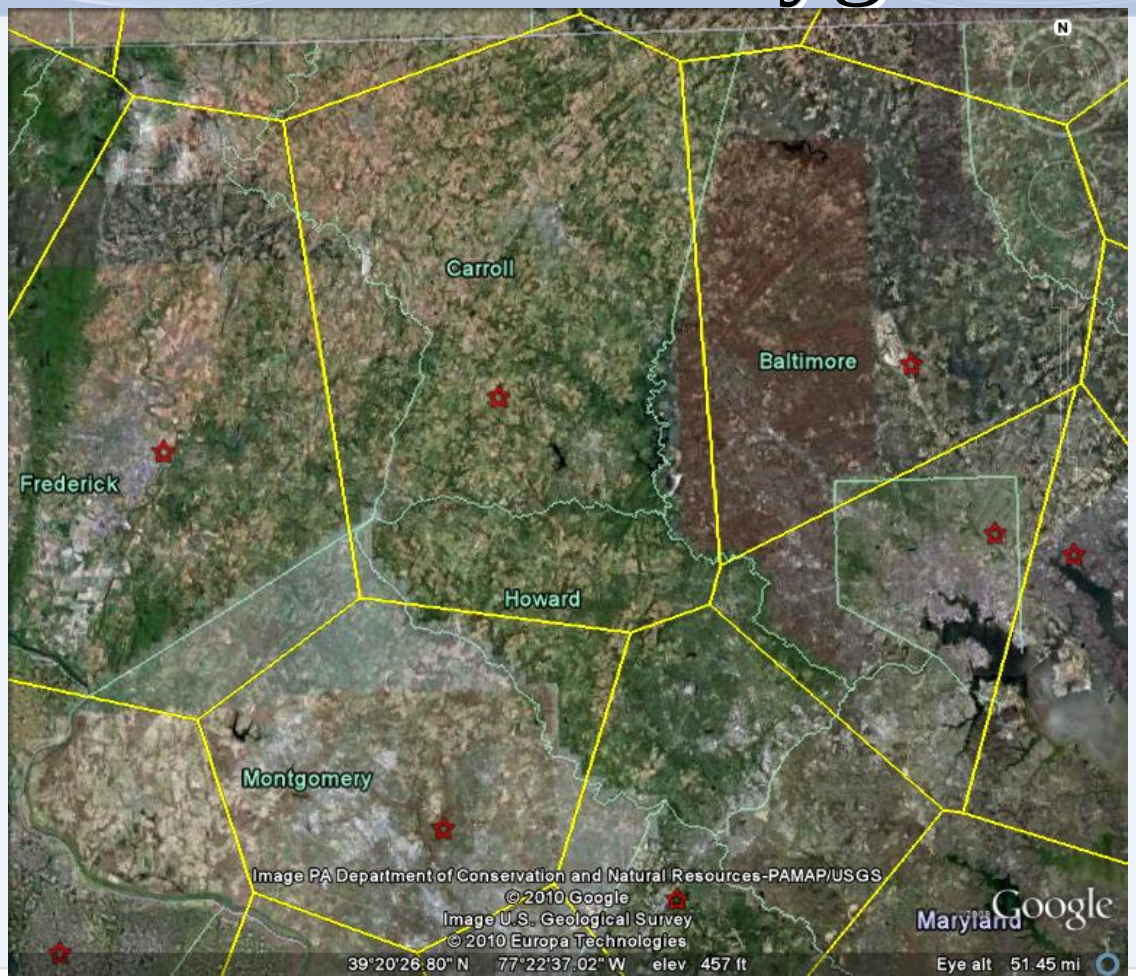
Voronoi Polygons



- Polygon drawn using neighboring sites.
- Population, pop. density and pop. changes (2008-2000) estimated from county level census tracks.

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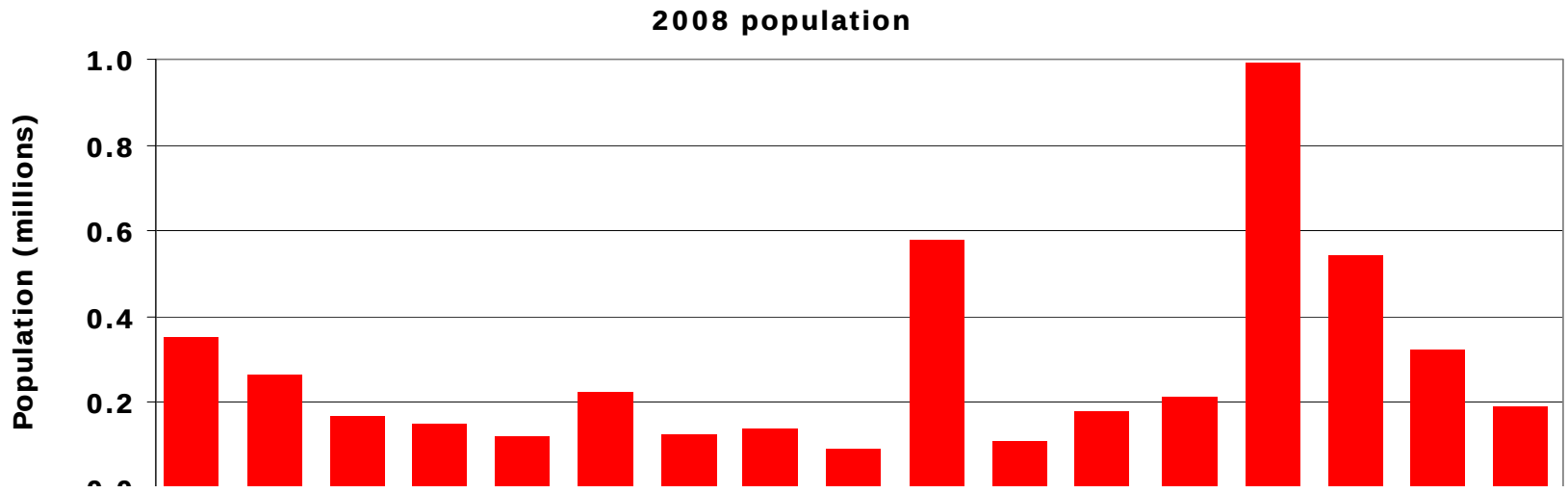

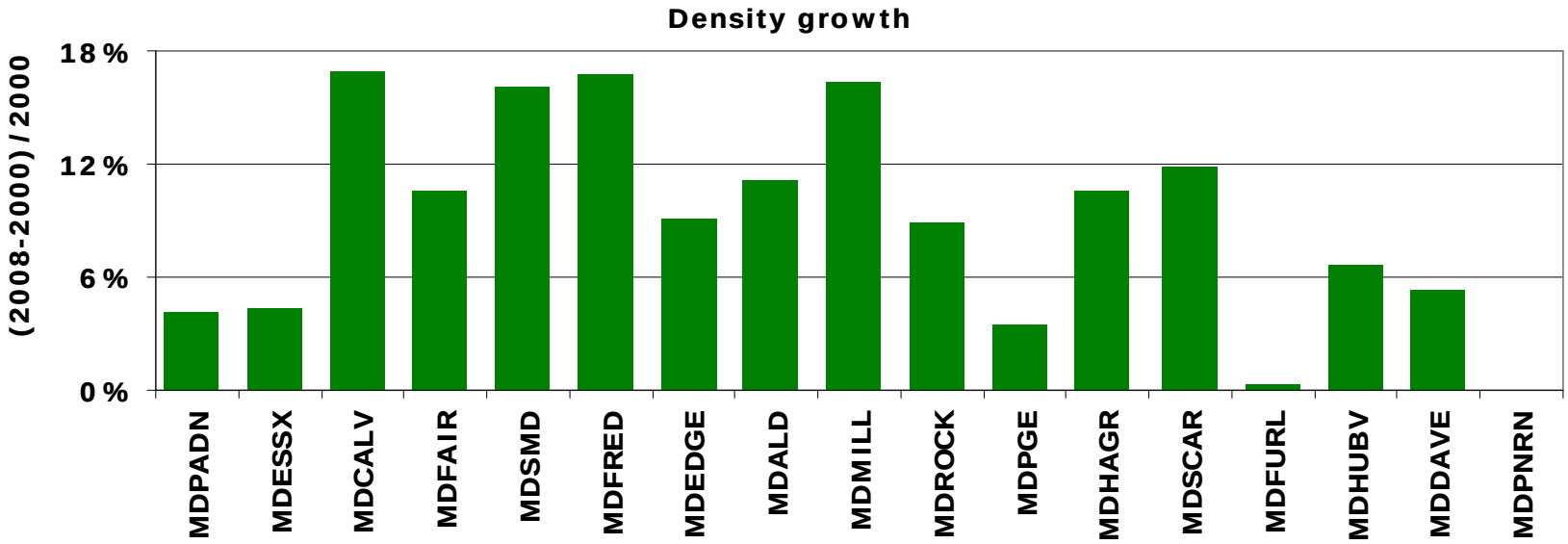

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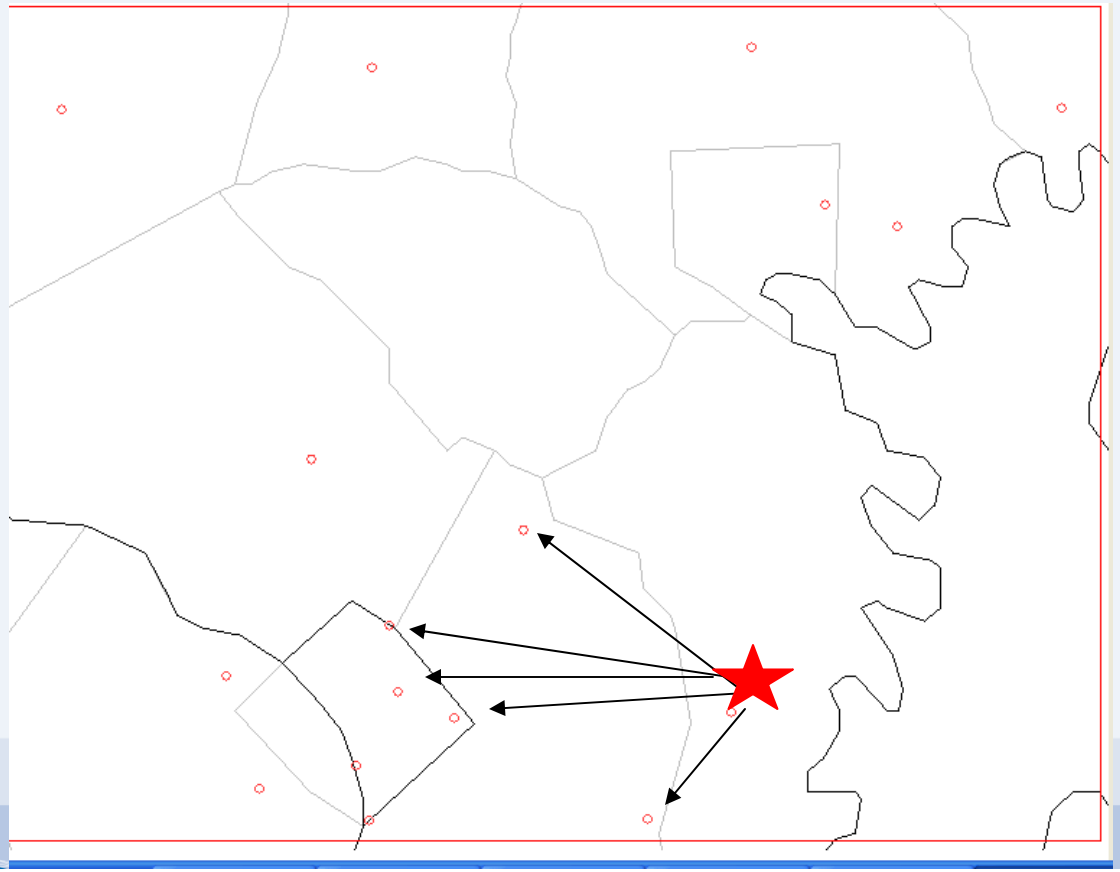
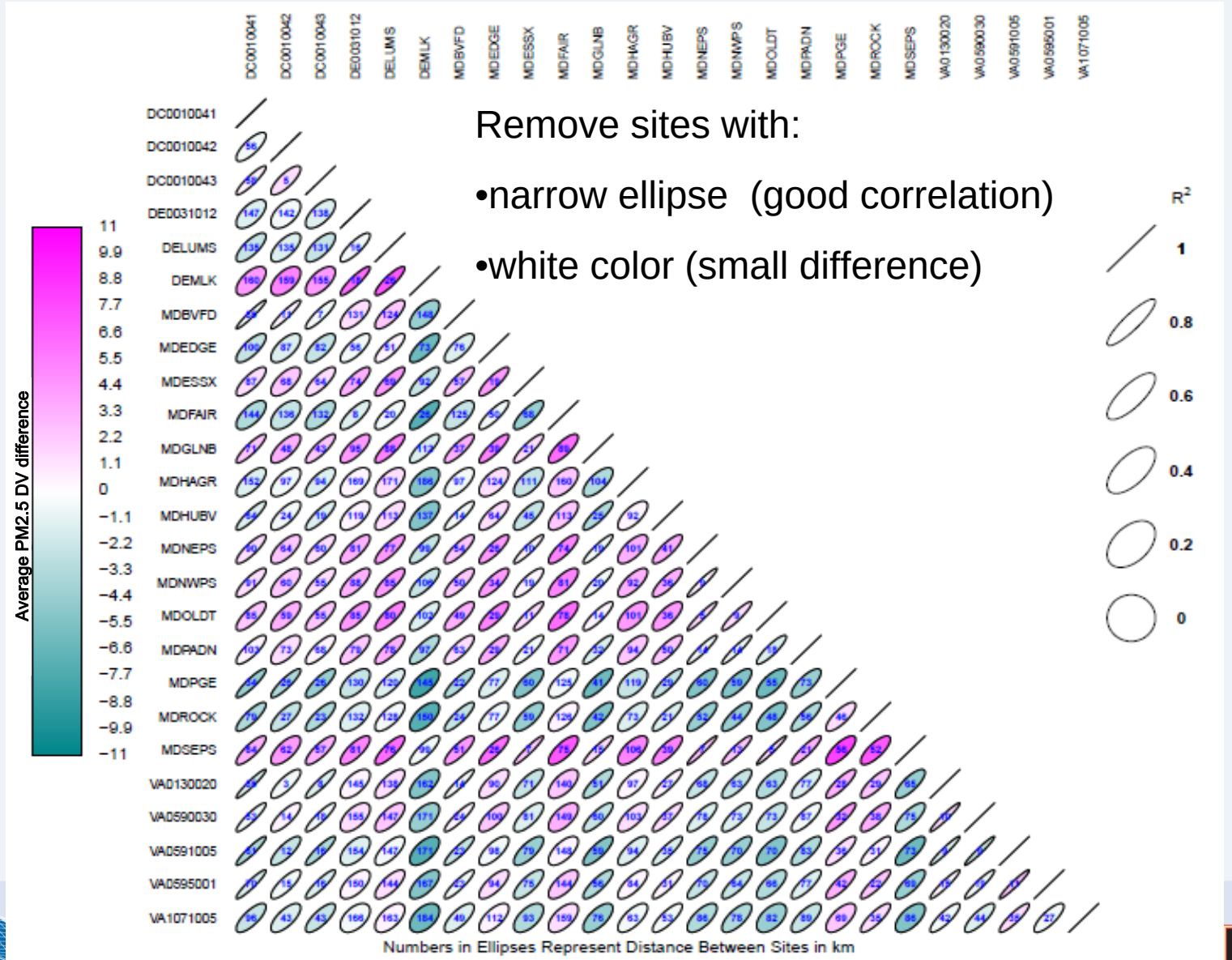
Cormat tool calculates inter-site

- Correlations
- Average relative **differences**
  - In MD and outside.



2007-2008 **PM2.5** data



Remove sites with:

- narrow ellipse (good correlation)
- white color (small difference)

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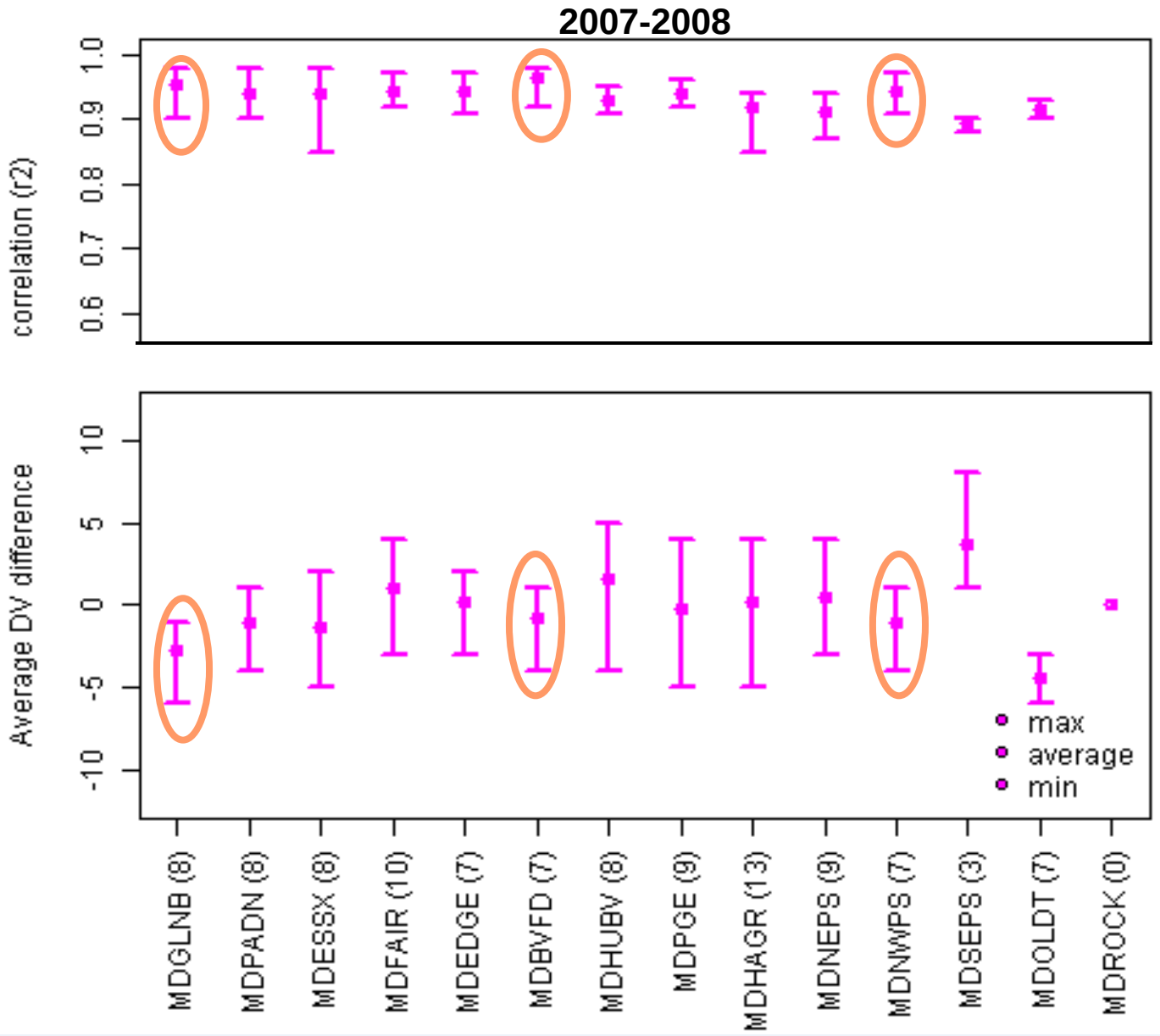
PM2.5-24 hr DV

Averages calculated for sites within 25 mile radius of the site of interest.



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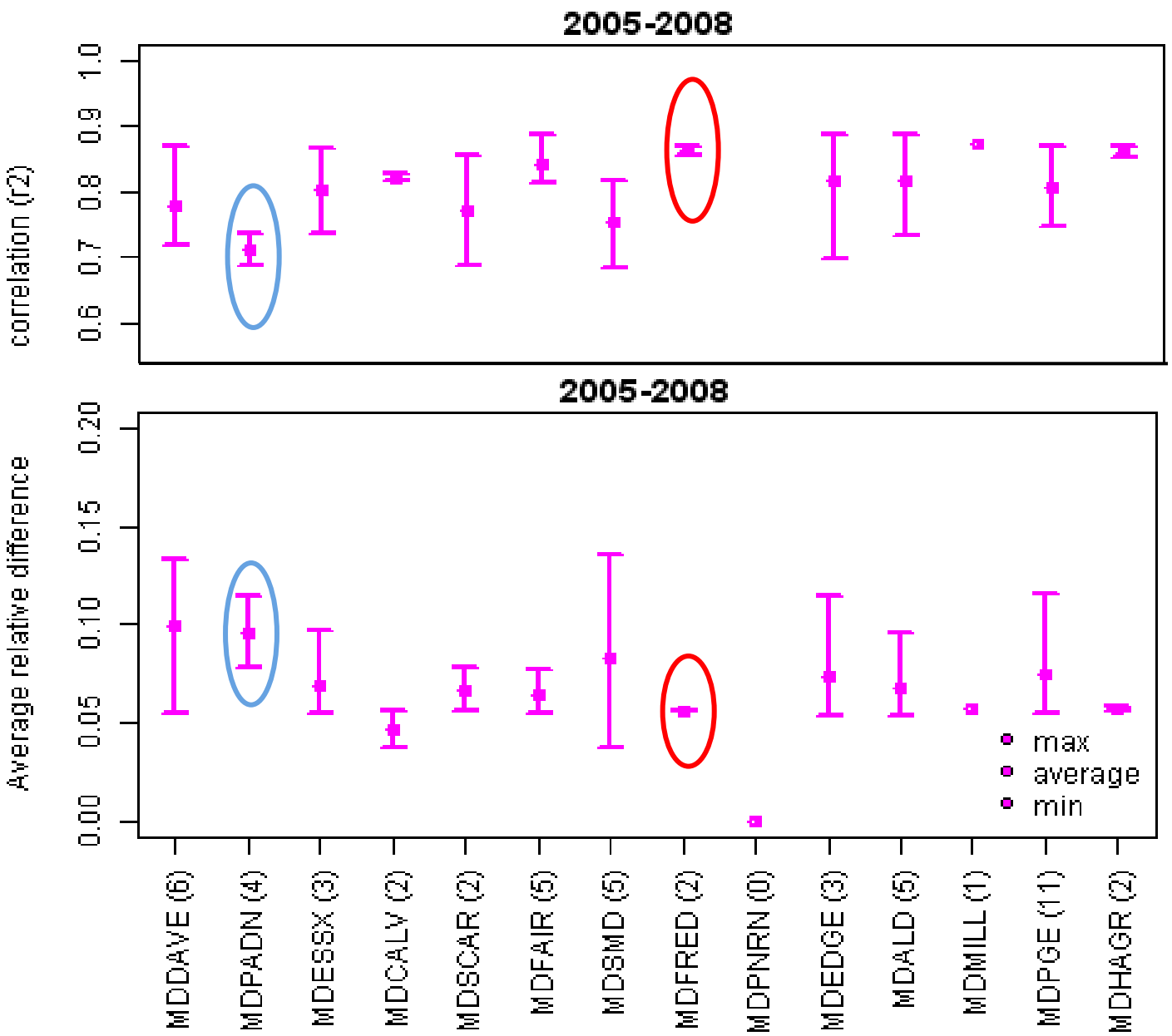
Ozone

Averages calculated for sites within 25 mile radius of the site of interest.



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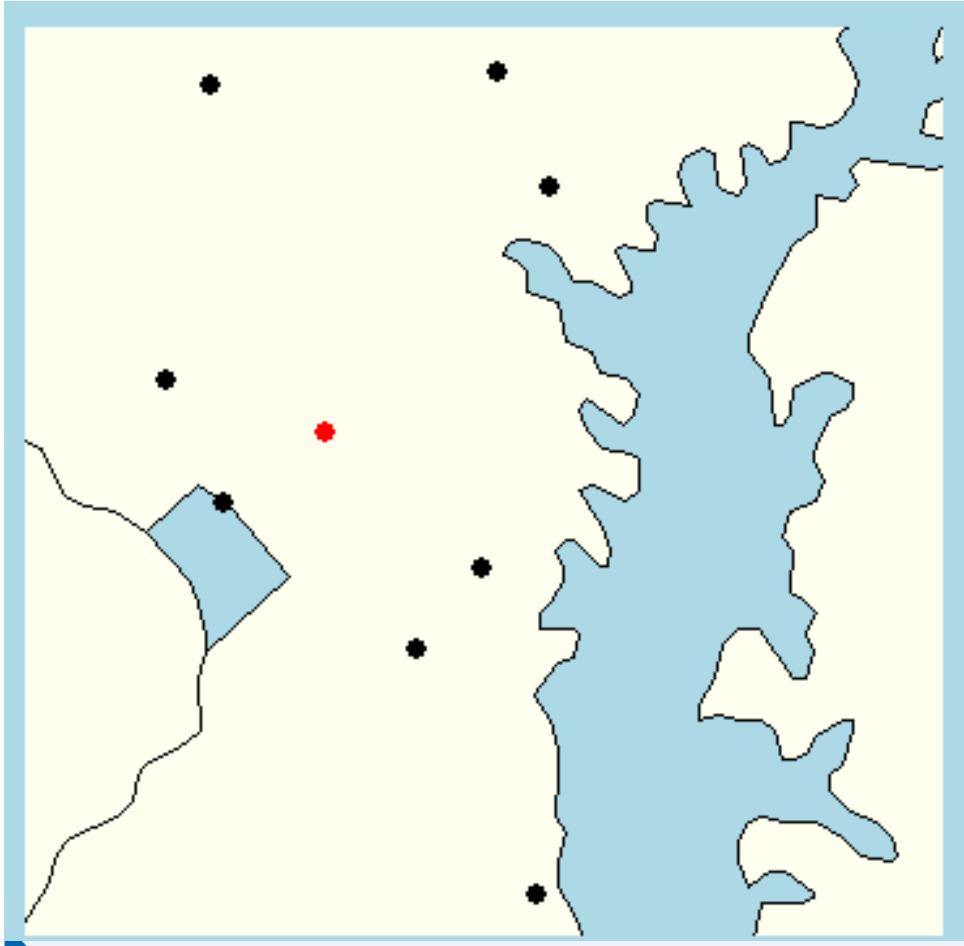
Removal bias tool- Beltsville ex.



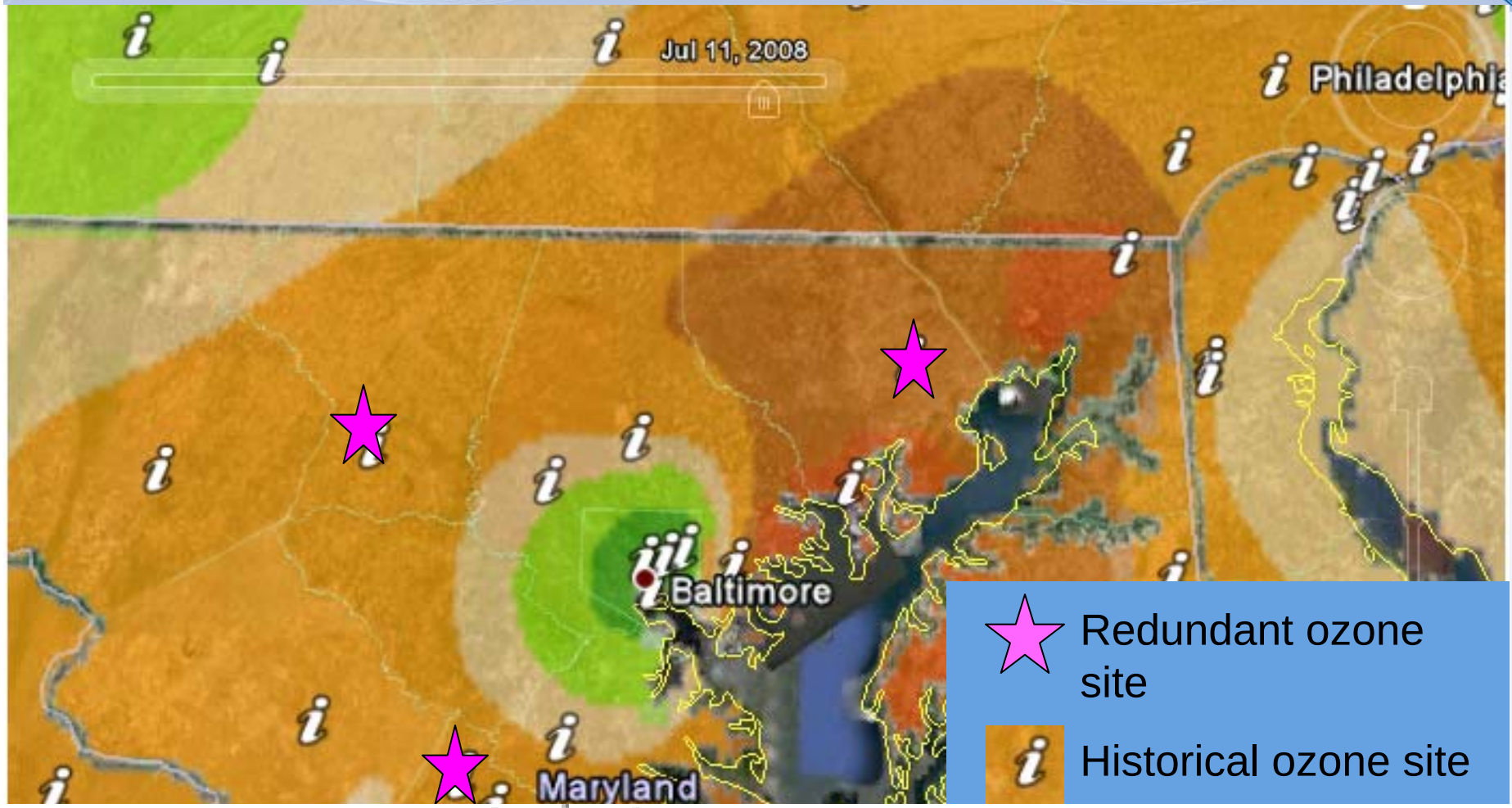
Looks at sites close-by.

Calculates ozone using neighbor sites weighted with distance.

Is Beltsville ozone significantly different from neighbor values?

No → Beltsville can be removed.

Possible redundant ozone sites



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Scoring the PM2.5 network

SITE	Pop2008		# params		Mon Age		PM_{24}Hr DV %NAAQS		SCORE
	weight:	0.33	weight:	0.20	weight:	0.00	weight:	1.00	
	raw	points	raw	points	raw	points	raw	points	
MDBVFD	317660	12	1	0	2	0	89	50	62
MDEDGE	251938	9	2	1	10	0	83	25	35
MDESSX	180367	5	12	14	10	0	94	75	94
MDFAIR	173563	5	3	3	10	0	80	13	20
MDGLNB	500831	21	4	4	10	0	97	88	112
MDHAGR	348577	13	3	3	10	0	86	38	53
MDHUBV	396161	16	17	20	5	0	86	38	73
MDNEPS	282644	10	2	1	10	0	94	75	86
MDNWPS	539562	23	2	1	10	0	94	75	99
MDOLDT	270406	9	9	10	10	0	97	88	107
MDPADN	267195	9	3	3	10	0	91	63	74
MDPGE	453629	19	3	3	7	0	77	0	21
MDROCK	731042	33	2	10	10	0	80	13	56
MDSEPS	84587	0	2	8	8	0	100	100	108
Min	84587		1		2		77		
Max	731042		17		10		100		

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Conclusions

- Cormat helpful for PM2.5, we modified graphics
  - Remove Bladensburg PM2.5 → ok for DC, VA?
    - Let's work together for site removal near state borders.
- New sites tool → Furley ozone anomaly
  - No new sites suggested for PM2.5
- Removal bias tool →Beltsville, Aldino, S.Carroll.
  - Didn't work for PM2.5
- PM2.5 is regional, ozone is more local.
- Suggestions for weighting factors
  - Are we missing anything?
  - Should we leave any factors out?
  - Should we add a forecasting factor?

Contact

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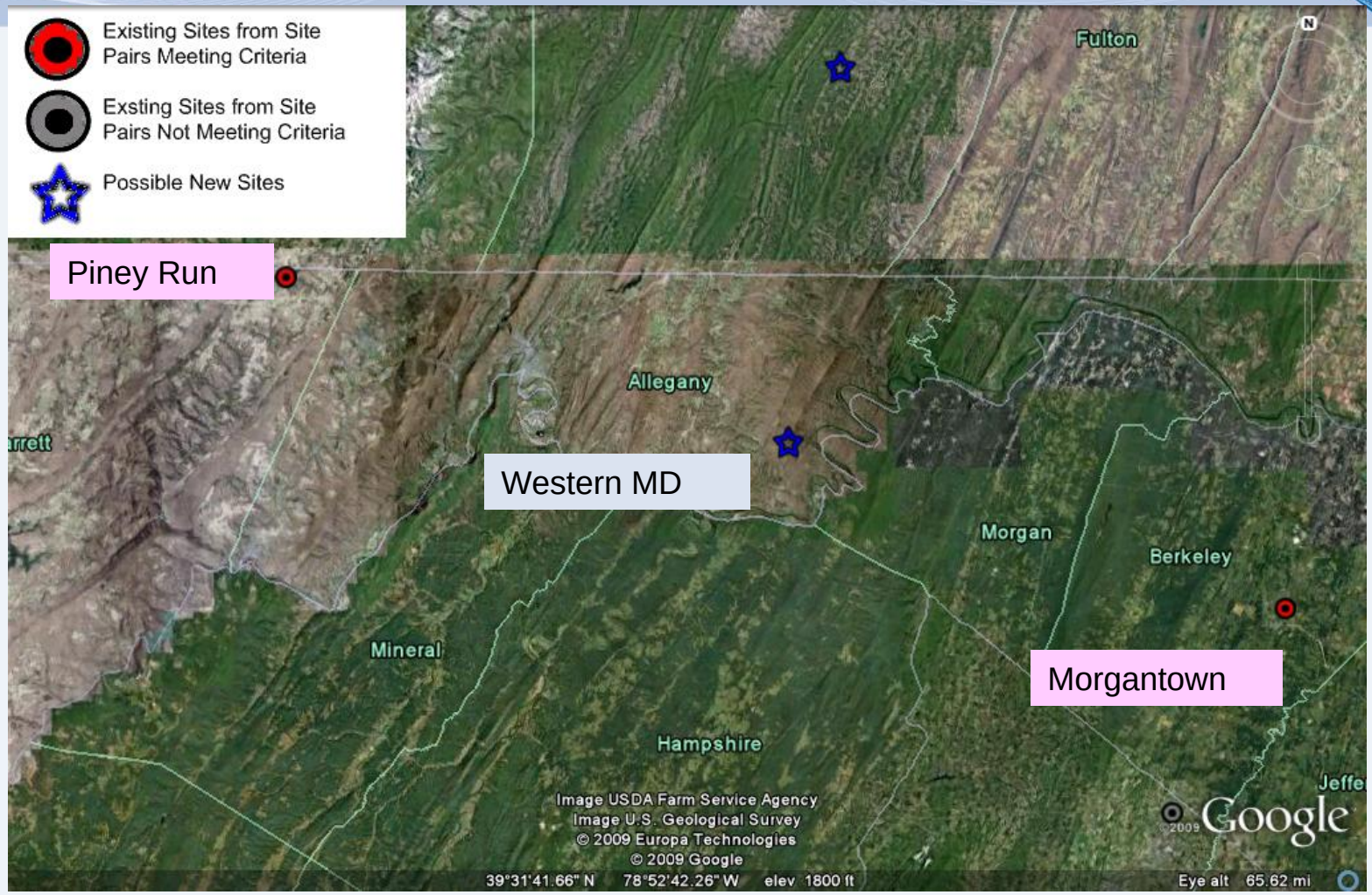
Extra Material

New sites tool results for ozone.

Criteria	Test 1	Test 2	Test 3	Test 4	Test 5
correlation <	0.6	0.6	0.6	0.6	0.75
distance (km) >	0	0	0	100	0
difference (ppm) >	0	0.003	0	0	0.01
probability (%) of exceeding NAAQS > 80	80	80	50	80	80
New Sites	1	0	1	0	3

Poor correlation, small concentration difference.

Good correlation, large concentration difference.



Poor correlation, concentration difference < 3 ppb

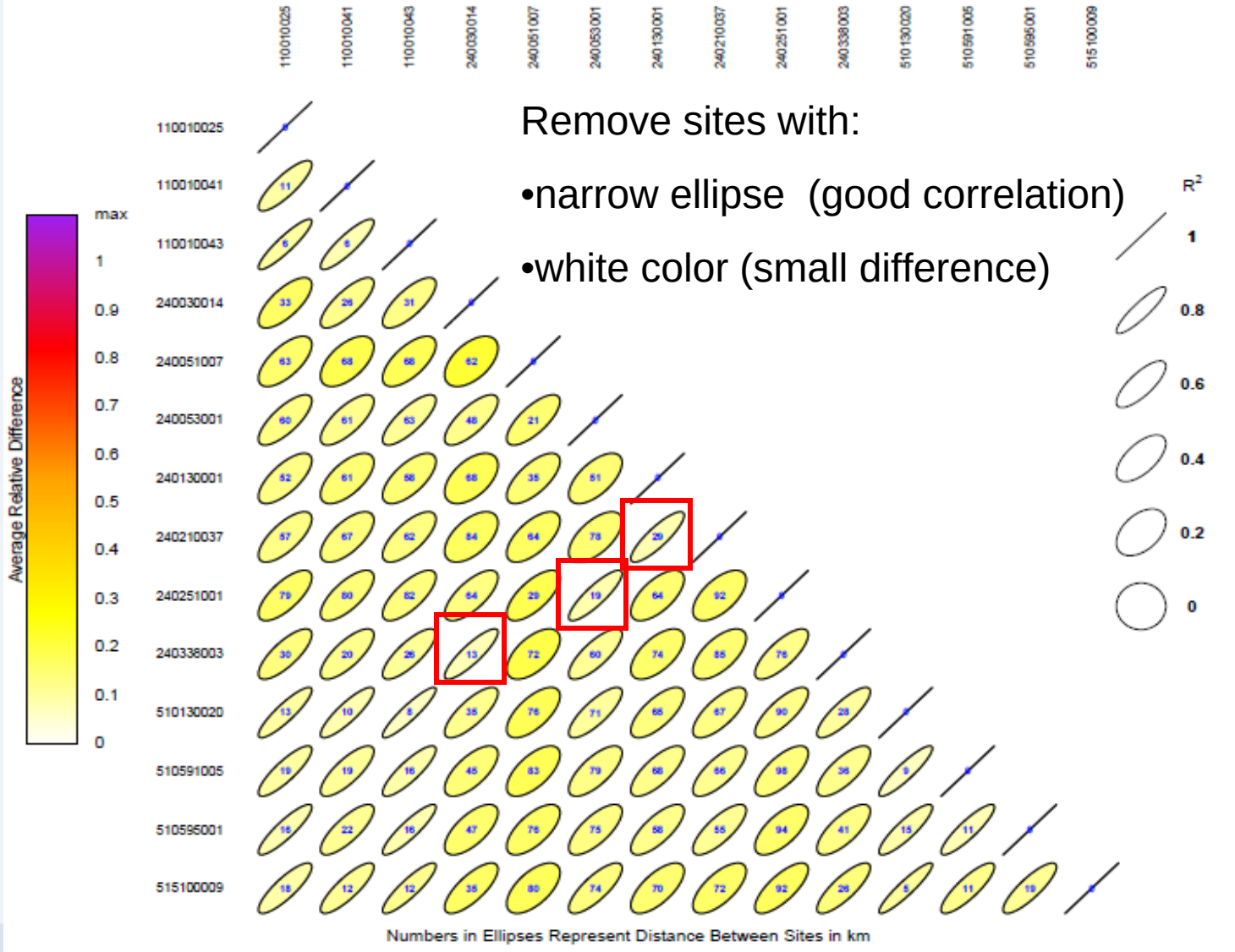
Trials using 'newsite' for PM2.5

Criteria	Trial										
	0	A	B	C	D	E	F	G	H	I	K
r^2<	.7	.5	.9	.95	.99	.95	.7	.8	.95	.95	.7
Dist (km) >	16	0	0	0	0	0	16	16	0	0	16
Diff (µg/m^3) >	2	0	0	0	0	0	5	5	0	0	2
Prob. (%) >	70	99	70	50	1	80	70	80	25	0	0
Number New Sites	0	0	0	14	22	0	0	0	16	17	0

New sites found for

- good correlation (all sites with r^2 < .95)
- small probability of exceeding NAAQS
- Any distances allowed
- These criteria allowed many new sites

Cormat results for ozone



Remove sites with:

- narrow ellipse (good correlation)
- white color (small difference)

Scoring results for ozone

SITE	Pop2008		#params		Age		Ozone DV %NAAQS		Sites within 25 miles		SCORE
	weight:	0.33	weight:	0.20	weight:	0.25	weight:	1.00	weight:	0.50	
	raw	points	raw	points	raw	points	raw	points	raw	points	
DAVE	322819	8	2	1	29.7	19	1.160	83	7	71	183
PADN	358215	10	3	3	31.1	20	1.067	54	5	79	166
ESSX	270208	7	12	16	38.1	25	1.133	75	4	83	206
CALV	166991	3	1	0	4.8	1	1.053	50	2	92	145
SCAR	205345	4	1	0	26.6	17	1.107	67	3	88	175
FRHIL	150178	2	4	4	18.1	11	1.200	96	5	79	192
SOMD	125376	1	1	0	25.3	16	1.093	63	5	79	159
FRED	224018	5	1	0	11.6	6	1.093	63	2	92	165
PNRN	192030	4	13	17	5.8	2	0.973	25	0	100	148
EDGE	125822	1	3	3	29.1	19	1.213	100	4	83	206
ALDN	137441	2	5	6	19.8	12	1.187	92	6	75	186
MILL	92039	0	4	4	20.6	12	1.107	67	1	96	179
ROCK	577350	18	4	4	30.1	19	1.120	71	12	50	162
BELT	541105	17	15	20	4.7	1	1.107	67	12	50	154
PGEQ	108724	1	3	3	7.8	3	1.160	83	12	50	140
HAGR	178897	3	3	3	10.8	5	1.040	46	2	92	149
FURL	988285	33	1	0	3.4	0	0.9	0	4	83	116

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Number of Excess Ozone and PM2.5 Monitors by MSA

(based on Table D-2 of Appendix D to Part 58- SLAMS Minimum O3 Monitoring Requirements and Table D-5 of Appendix D to Part 5 - PM2.5 Minimum Monitoring Requireme

		#Mons By State									# Excess Mons	
Param Code	MSA Name	10	11	24	51	54	Total Mons	Population	# required >= 85% NAAQS	# required < 85% NAAQS	From	To
44201	Baltimore,MD	0	0	8	0	0	8	2552994	2	1	6	7
	Cumberland,MD	0	0	1	0	0	1	102008	1	0	0	1
	Hagerstown, Martinburg,MD	0	0	1	0	0	1	131923	1	0	0	1
	Washington,DC-MD-VA-WV	3	1	5	7	1	17	4923153	3	1	14	16
	Wilmington-Newark,DE-MD	1	0	1	0	0	2	586216	2	1	0	1
88101	Baltimore,MD	0	0	9	0	0	9	2552994	3	2	6	7
	Hagerstown Martinsburg,MD	0	0	1	0	0	1	131923	1	0	0	1
	Washington,DC-MD-VA-WV	3	0	3	4	1	11	4923153	3	2	8	9
	Wilmington-Newark,DE-MD	4	0	1	0	0	5	586216	2	1	3	4

DE, DC, MD, VA corrected and verified
MSA Population from DISCOVERER.

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