Observations of springtime surface O_3 and GEM depletion at Toolik Lake, AK

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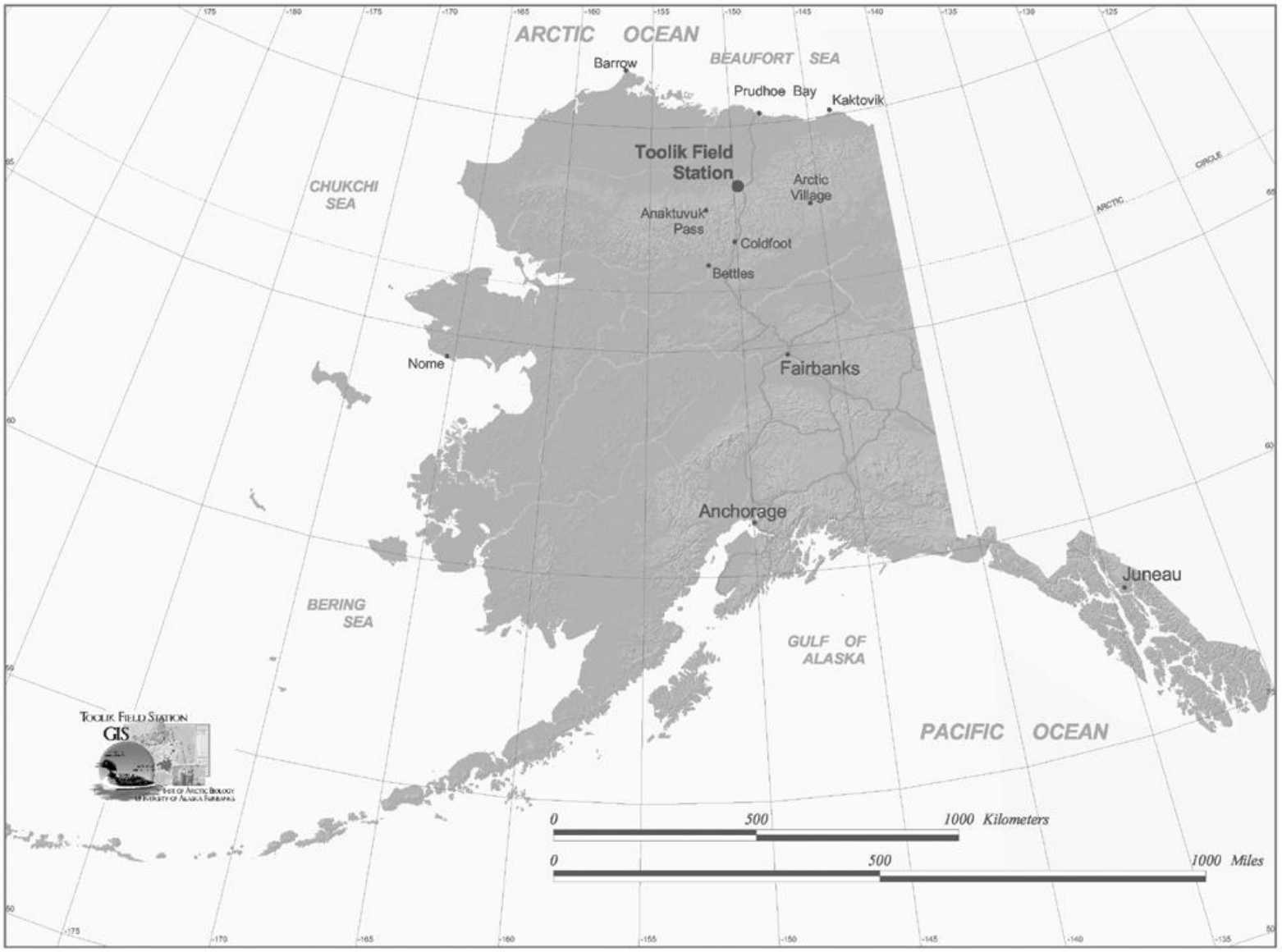
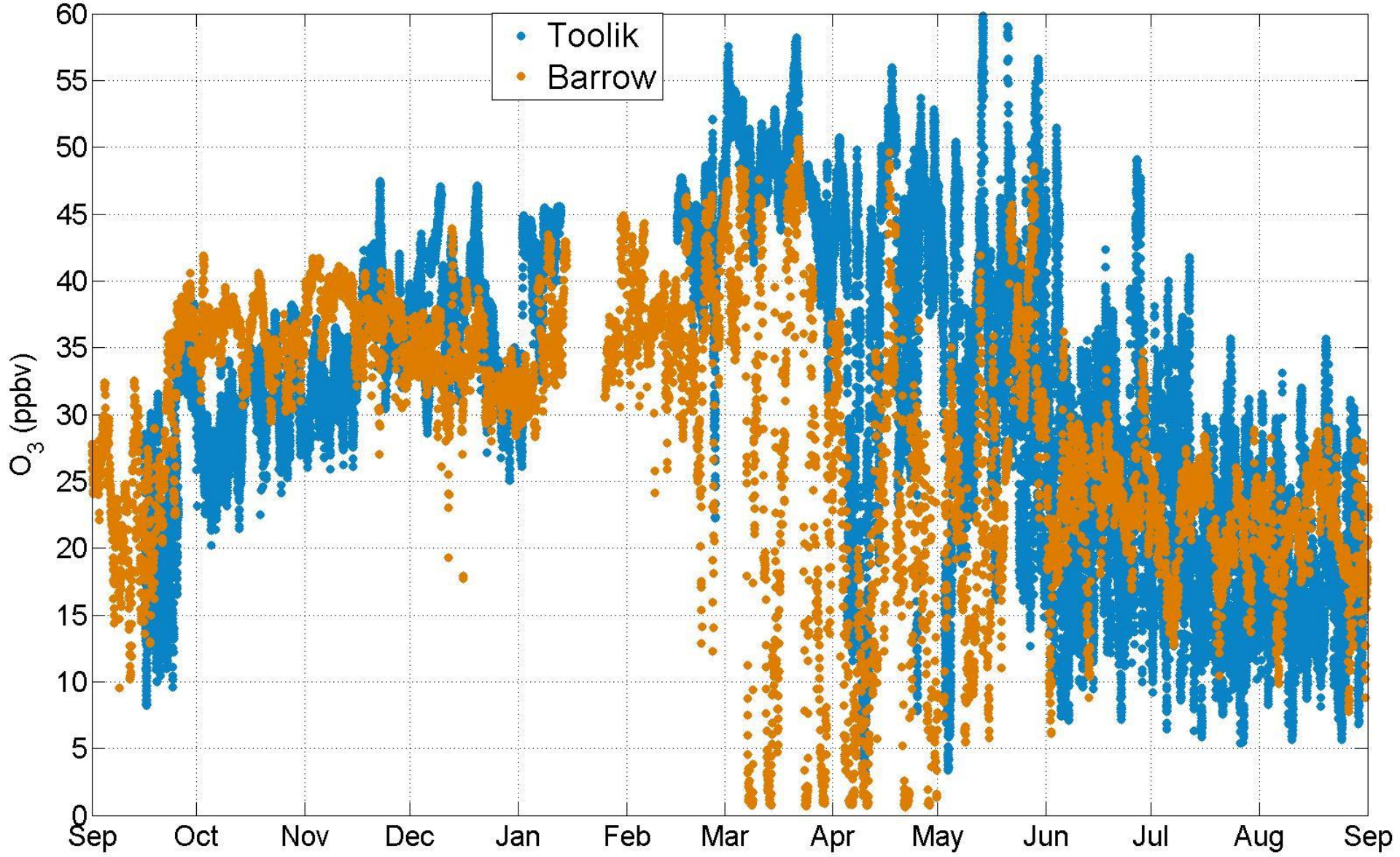
Toolik Lake, AK



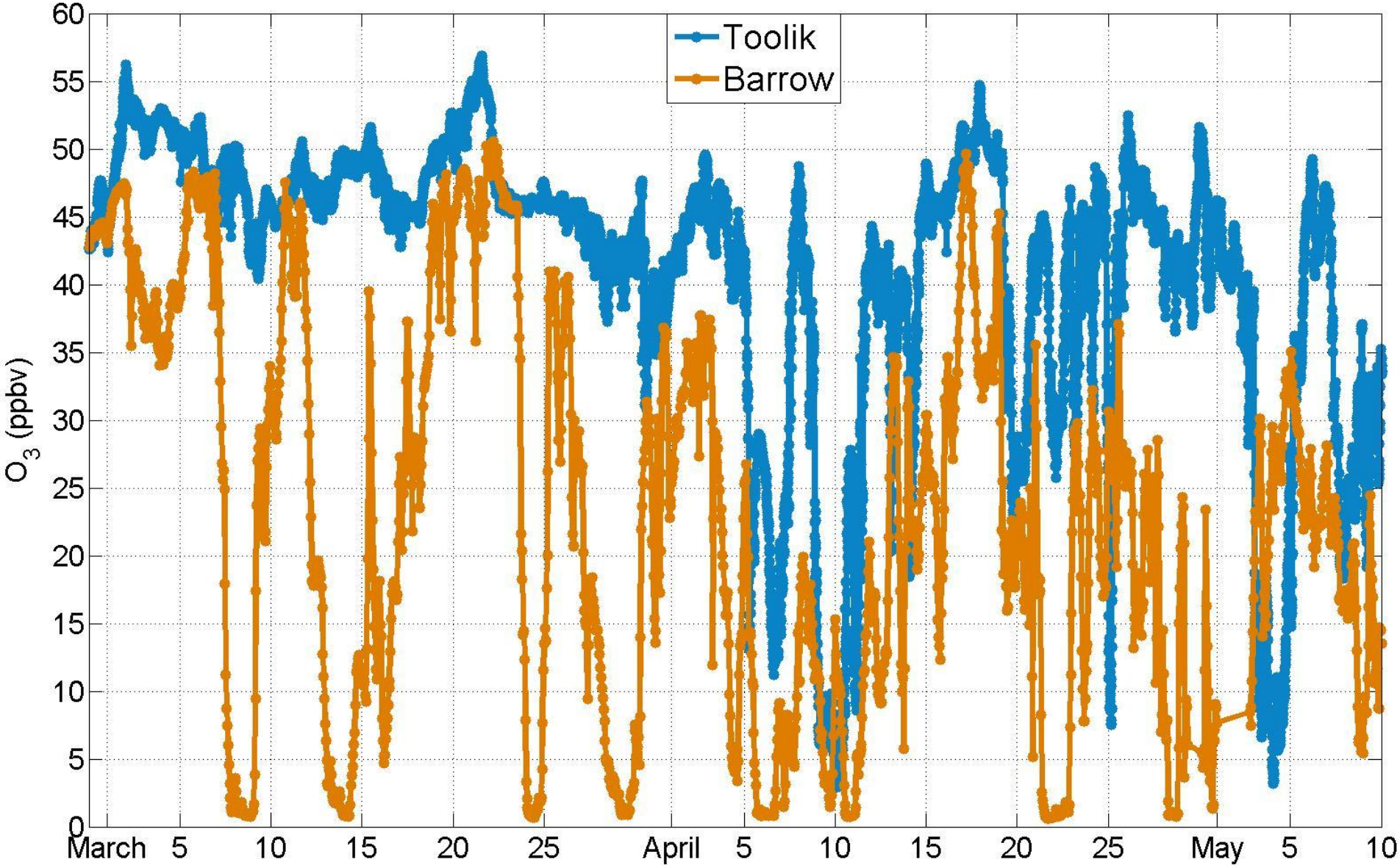
http://toolik.alaska.edu/gis/

Toolik Lake Field Site

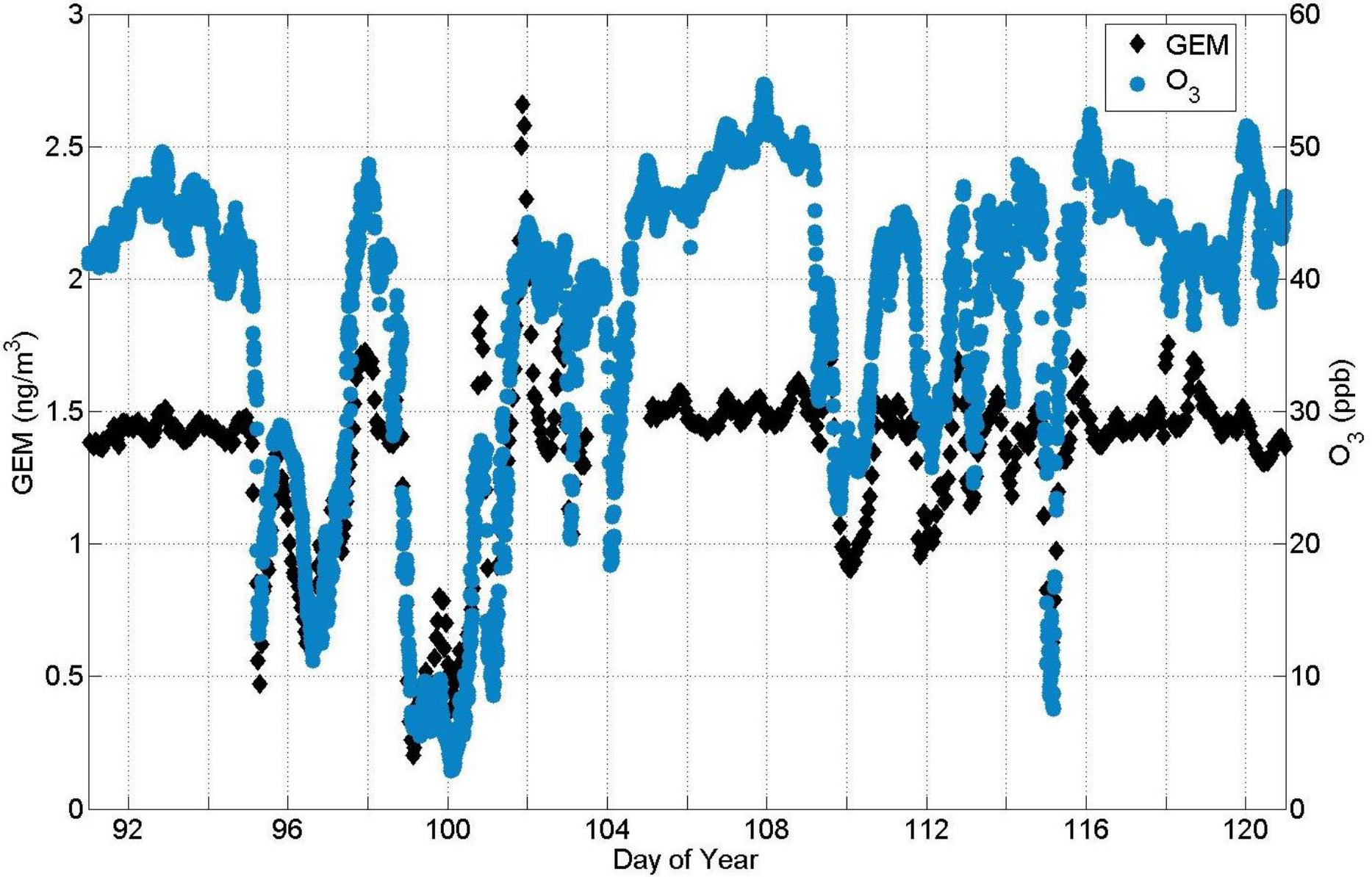
Surface O_3 at Toolik Lake and Barrow, AK: Sep 2010 – Sep 2011



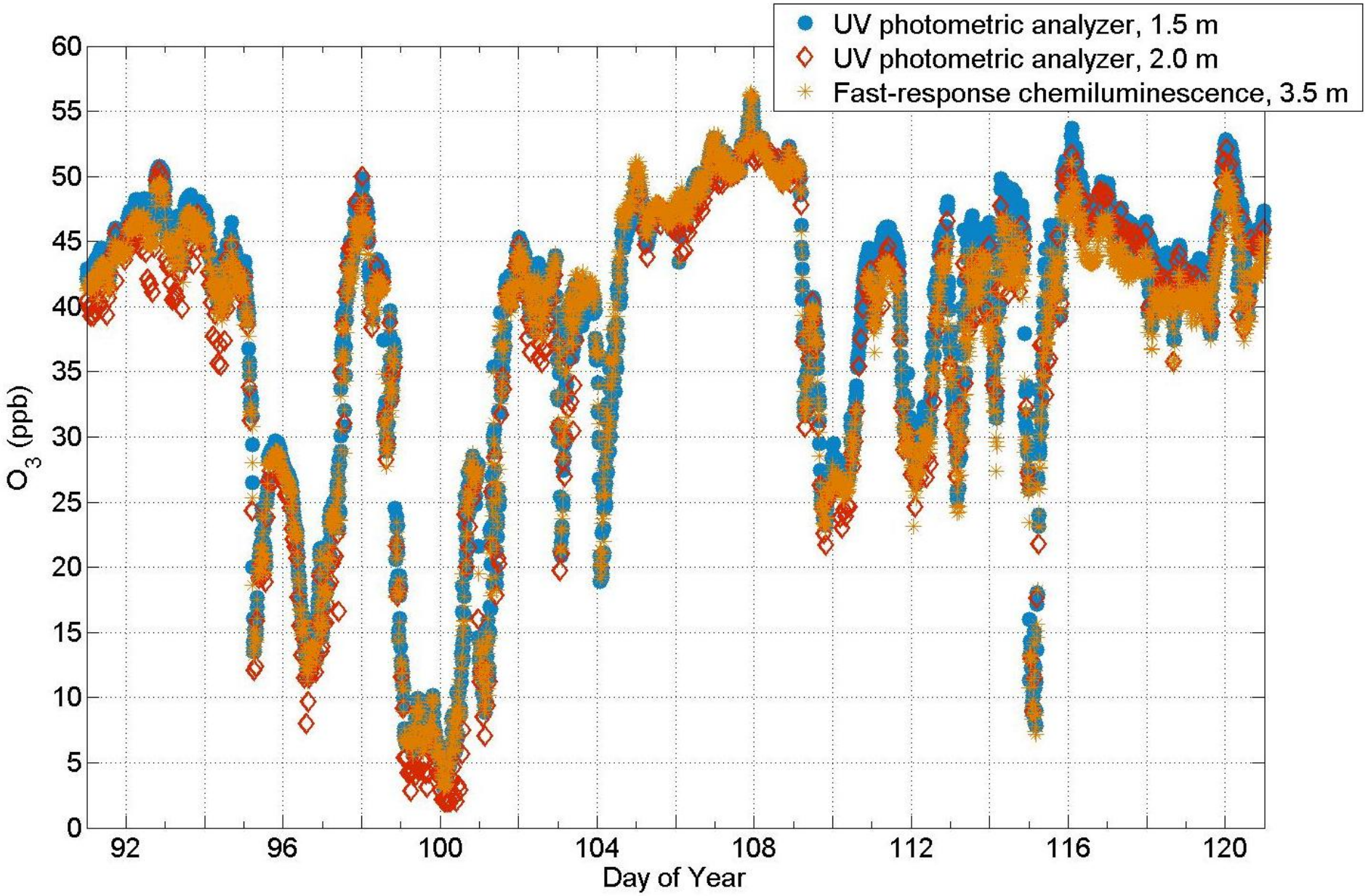
Surface O_3 at Toolik Lake and Barrow, AK: Spring 2011

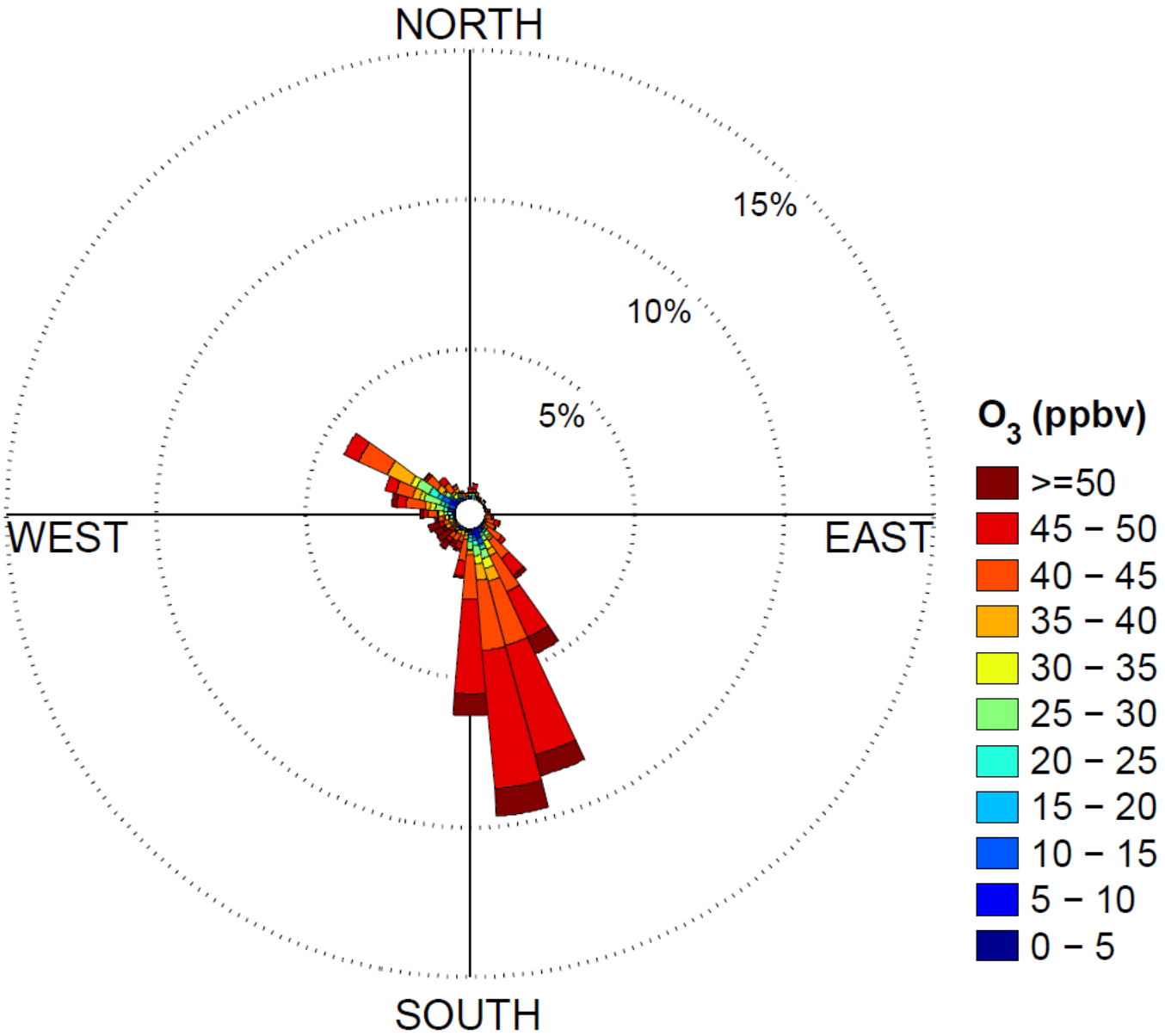


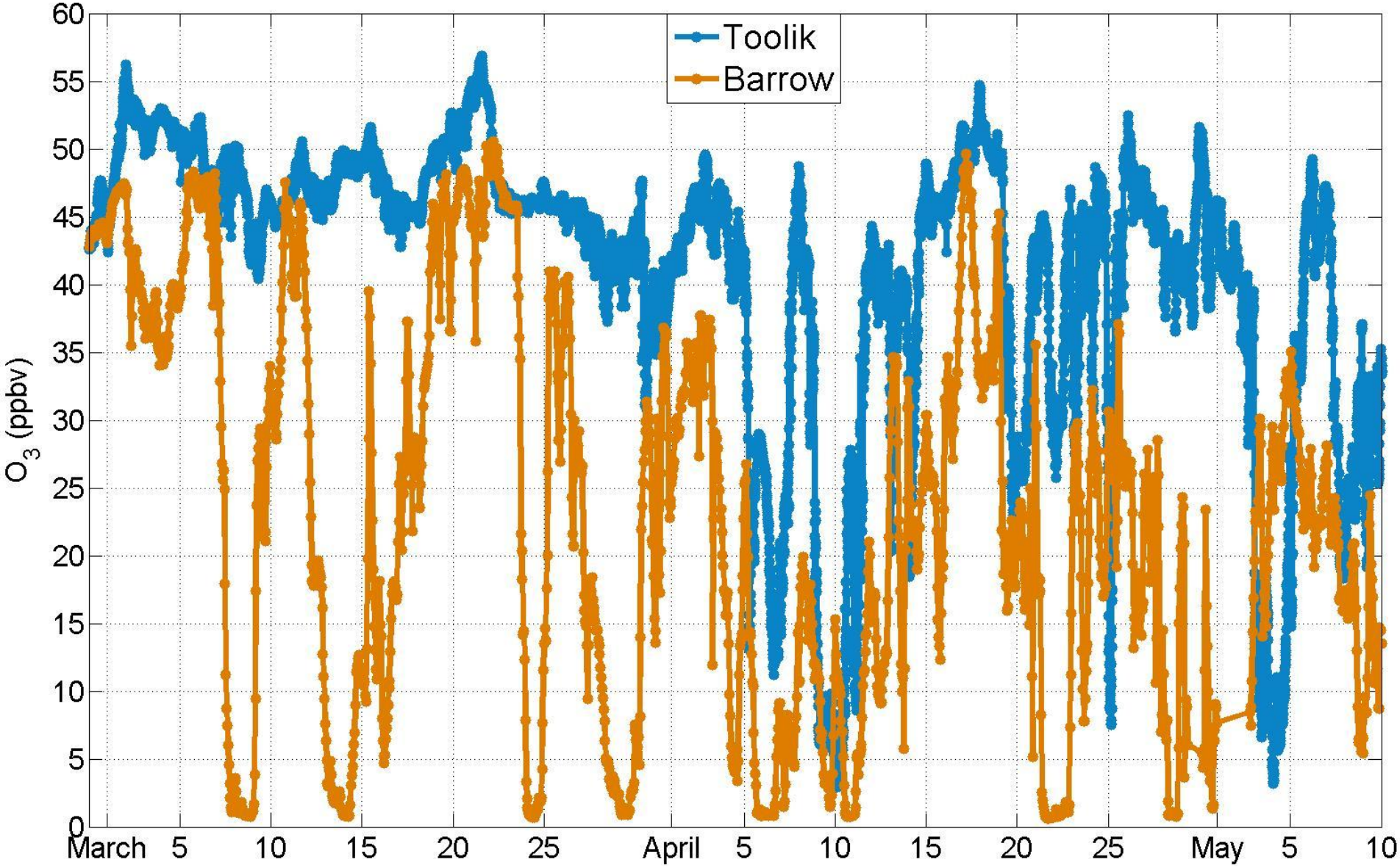
Observed GEM depletion at Toolik Lake: April 2011

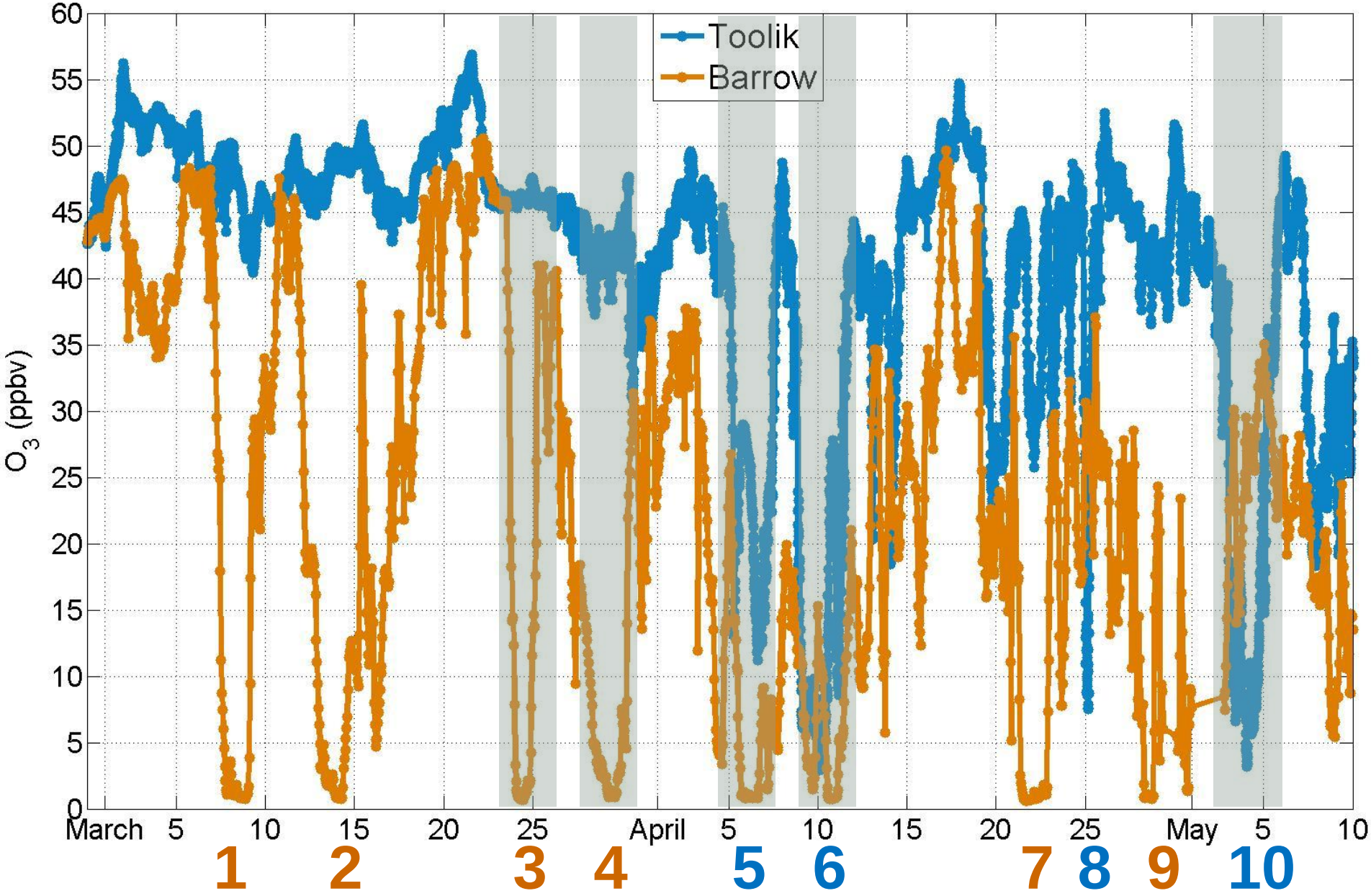


Surface O_3 Measurement Comparison: April 2011

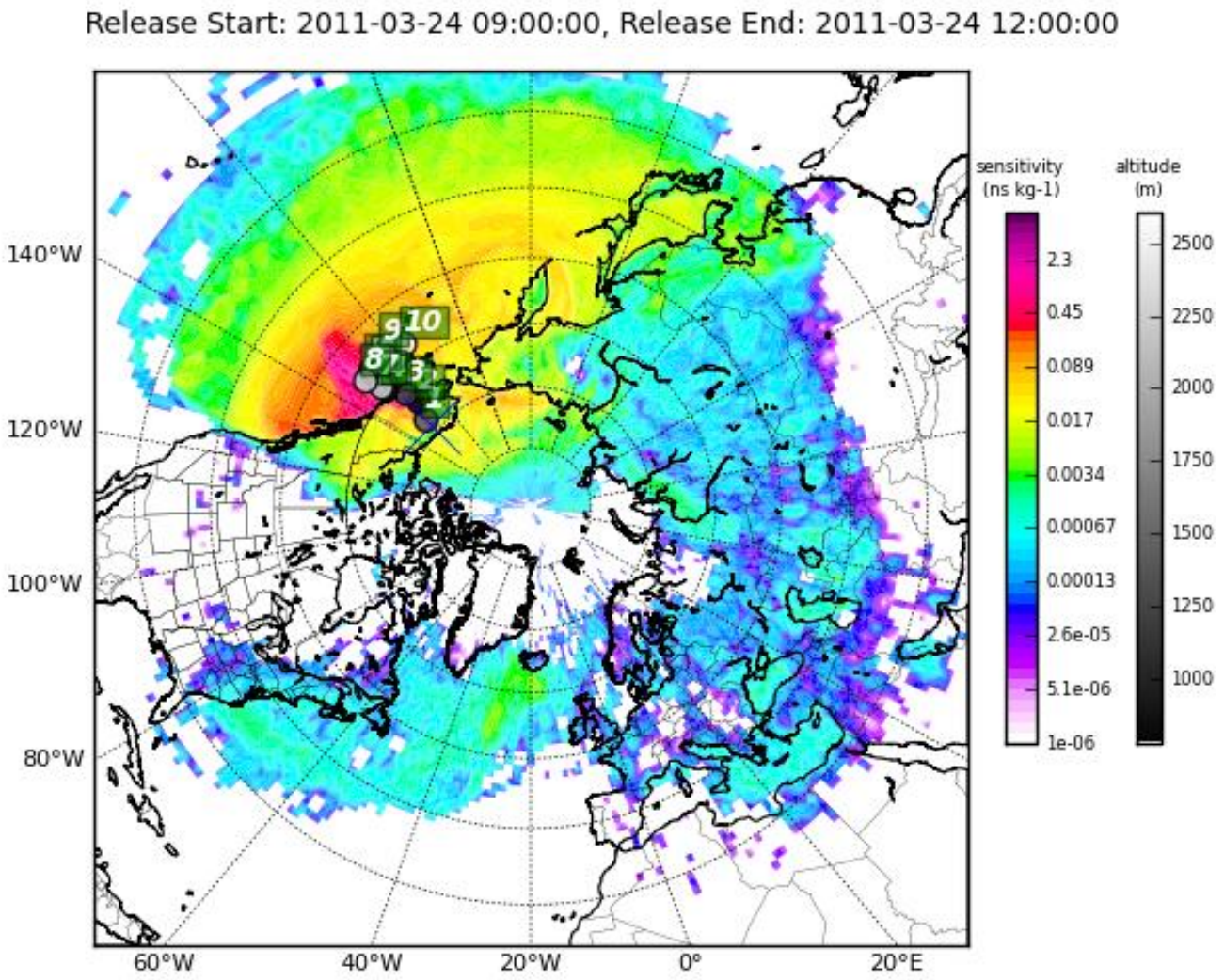



NORTH
15%
10%
5%
WEST
EAST
SOUTH
O3 (ppbv)
>=50
45 – 50
40 – 45
35 – 40
30 – 35
25 – 30
20 – 25
15 – 20
10 – 15
5 – 10
0 – 5


Toolik
Barrow
O_3 (ppbv)
0
5
10
15
20
25
30
35
40
45
50
55
60
March
5
10
15
20
25
April
5
10
15
20
25
May
5
10


Toolik
Barrow
O_3 (ppbv)
0
5
10
15
20
25
30
35
40
45
50
55
60
March
5
10
15
20
25
April
5
10
15
20
25
May
5
10
1
2
3
4
5
6
7
8
9
10

3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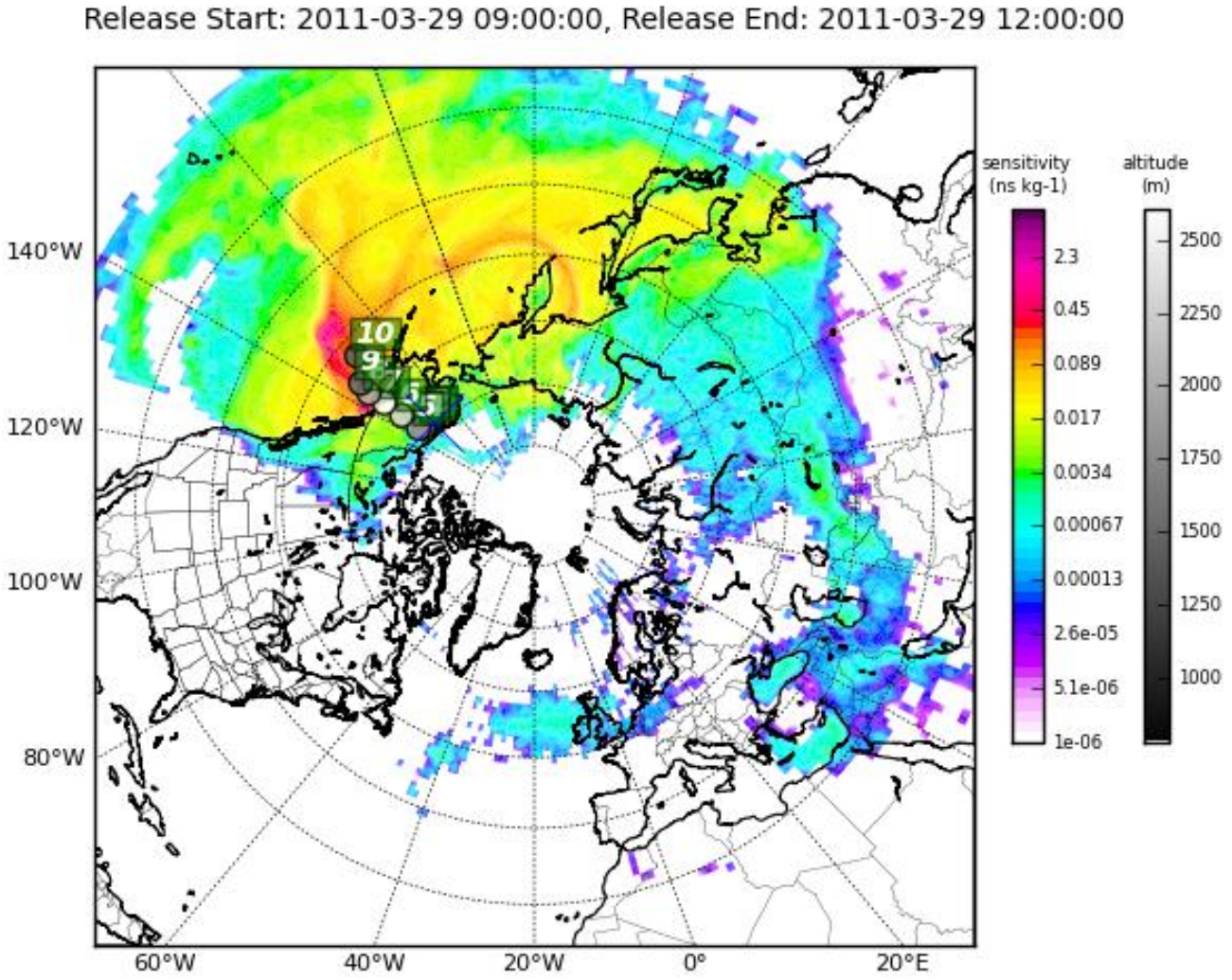
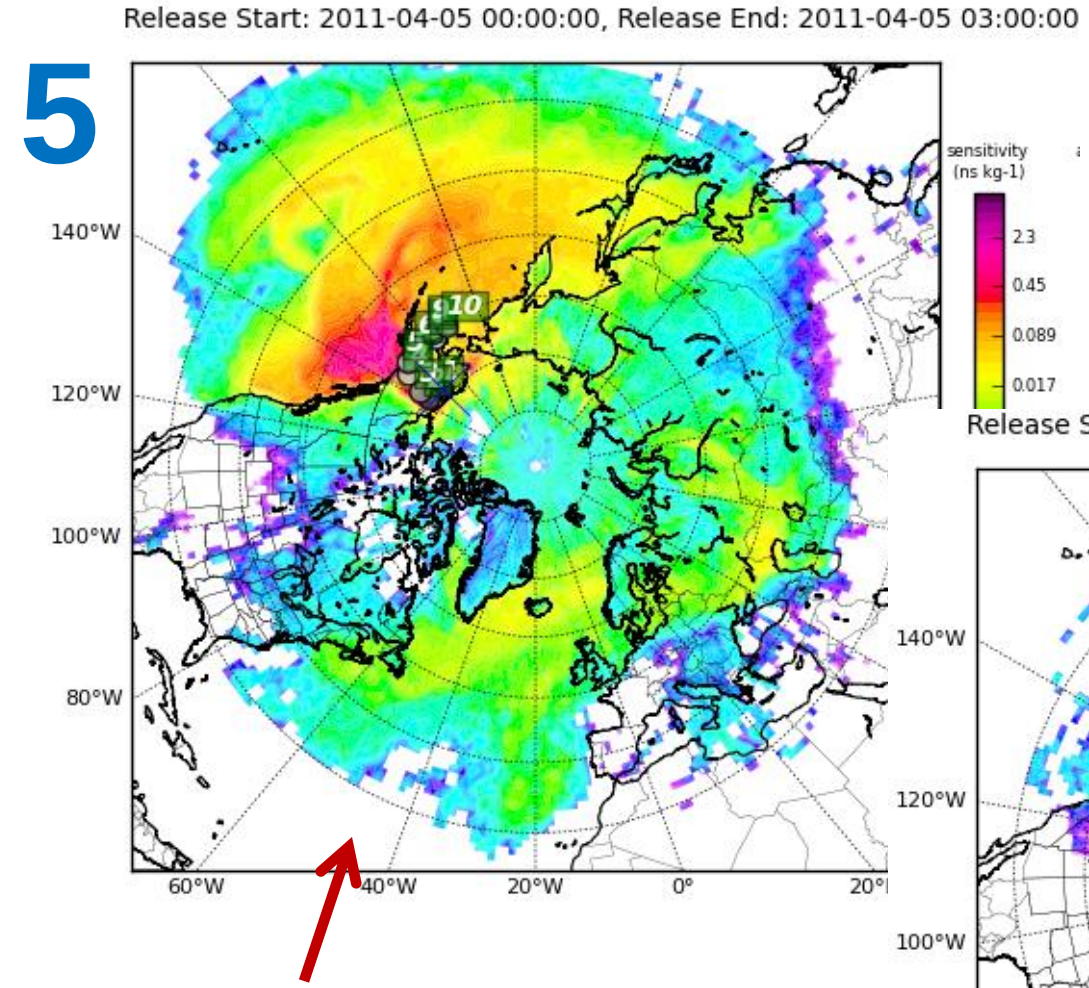
140°W
120°W
100°W
80°W
60°W
40°W
20°W
0°
20°E
9
10
8
3
sensitivity (ns kg-1)
2.3
0.45
0.089
0.017
0.0034
0.00067
0.00013
2.6e-05
5.1e-06
1e-06
altitude (m)
2500
2250
2000
1750
1500
1250
1000

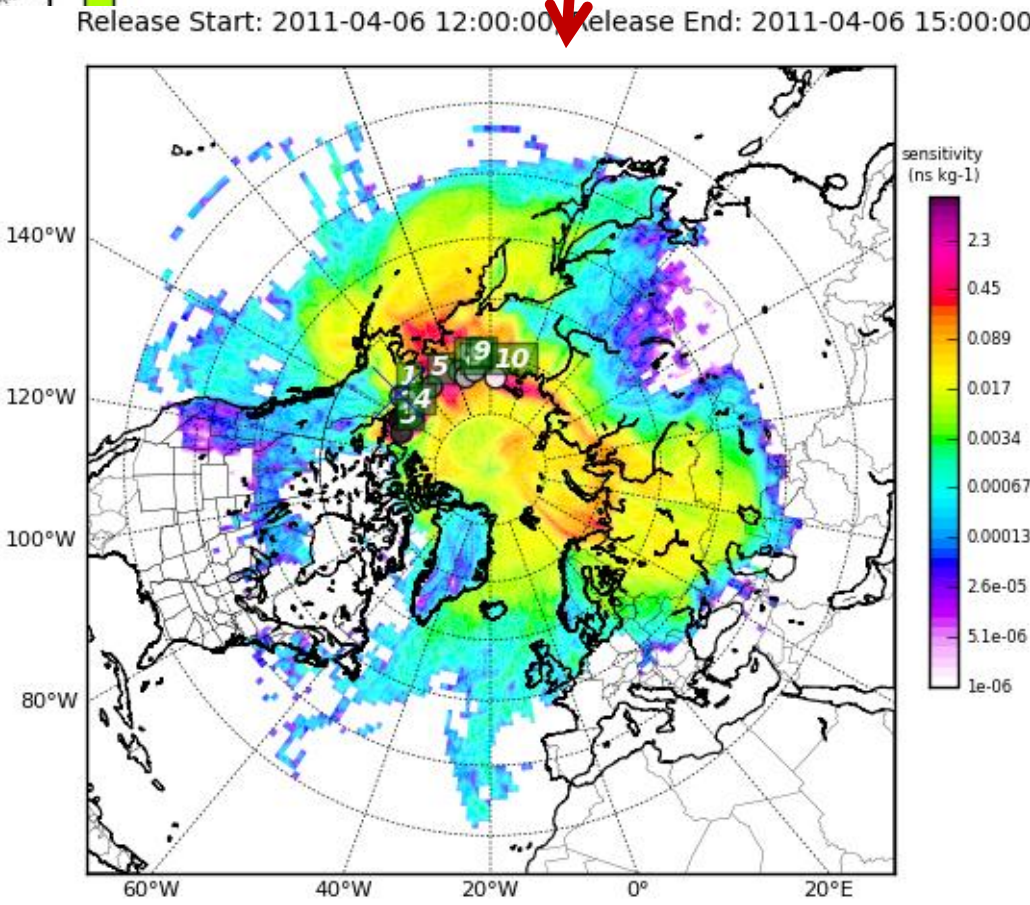
4


Release Start: 2011-03-29 09:00:00, Release End: 2011-03-29 12:00:00
140°W
120°W
100°W
80°W
60°W
40°W
20°W
0°
20°E
10
9
sensitivity (ns kg-1)
2.3
0.45
0.089
0.017
0.0034
0.00067
0.00013
2.6e-05
5.1e-06
1e-06
altitude (m)
2500
2250
2000
1750
1500
1250
1000



Before Event

During Event



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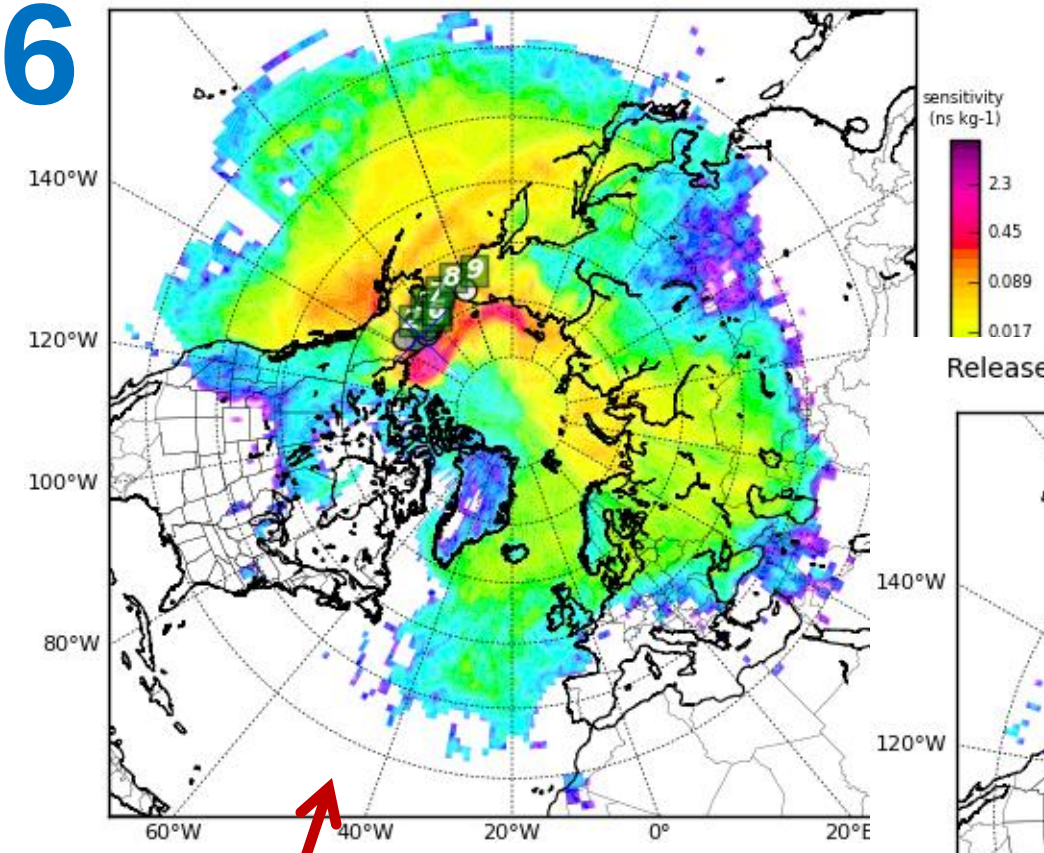
6



Before Event

During Event

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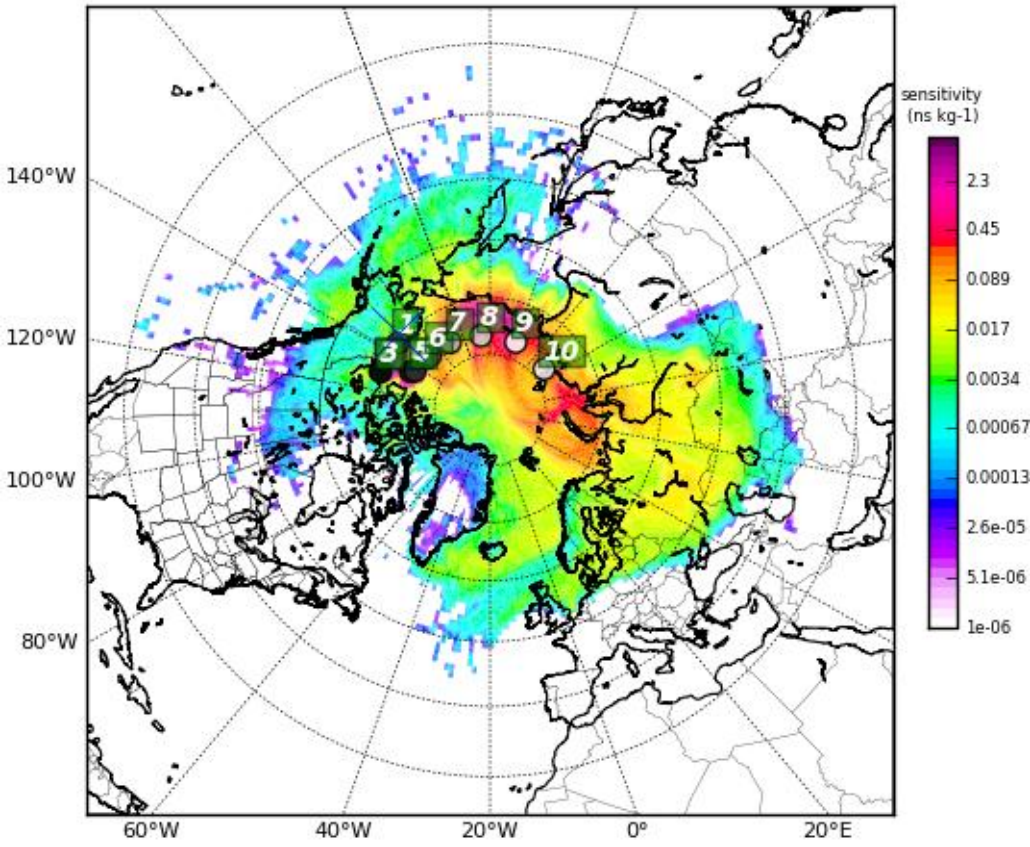

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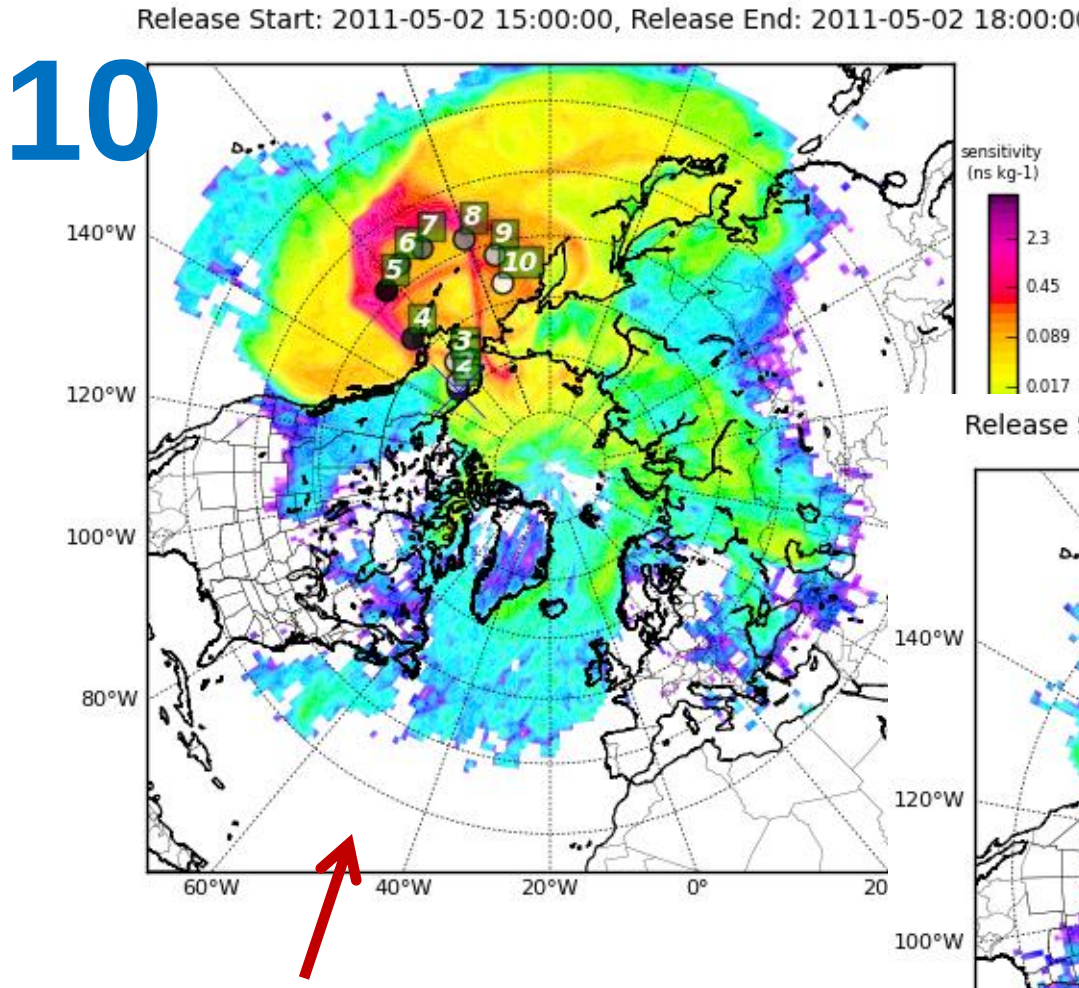
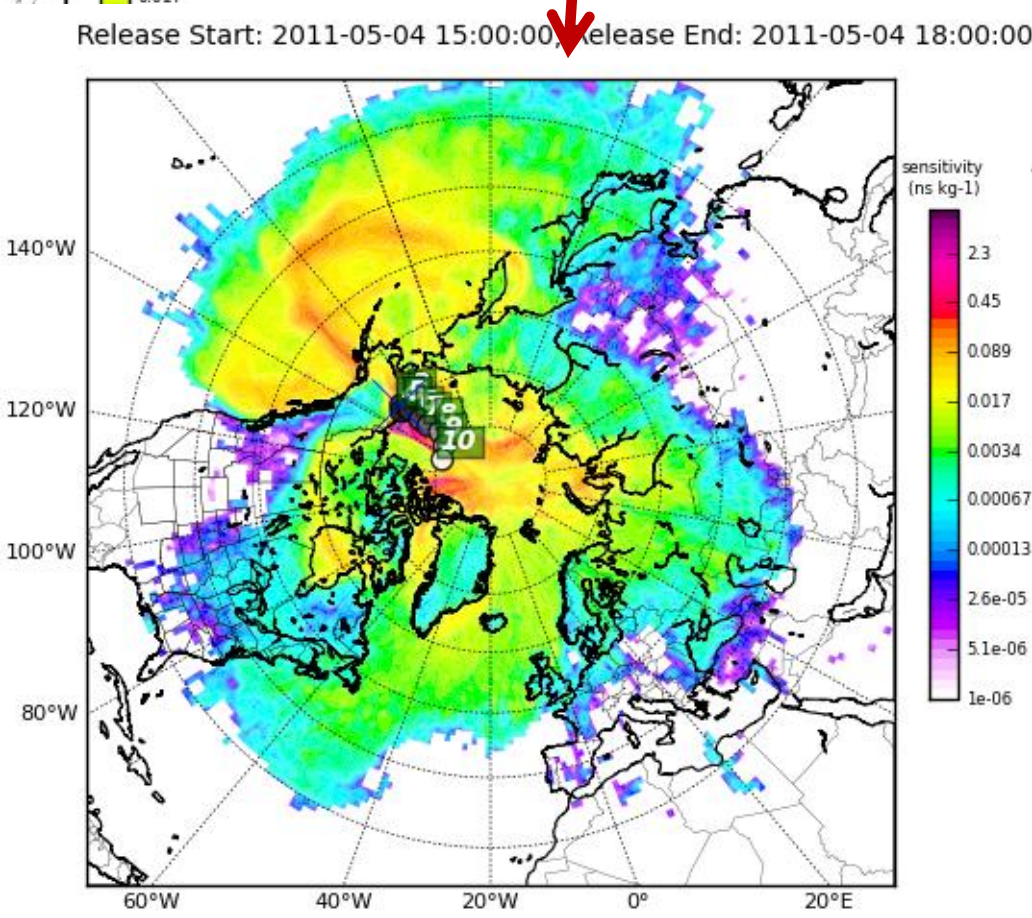


During Event



Before Event

Conclusions

- Springtime surface O_3 and GEM depletion observed at Toolik Lake.
  - O_3 < 5 ppbv; GEM < 0.2 ng/m^3
- Inland depletion events are correlated with over-ocean transport
- Unique far inland measurements of O_3 and GEM depletion
  - How are ODEs and MDEs transported inland from the ocean?
  - What potential impact does this have on surface chemistry and Hg cycling in the north slope/low Arctic environments?

Acknowledgements

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