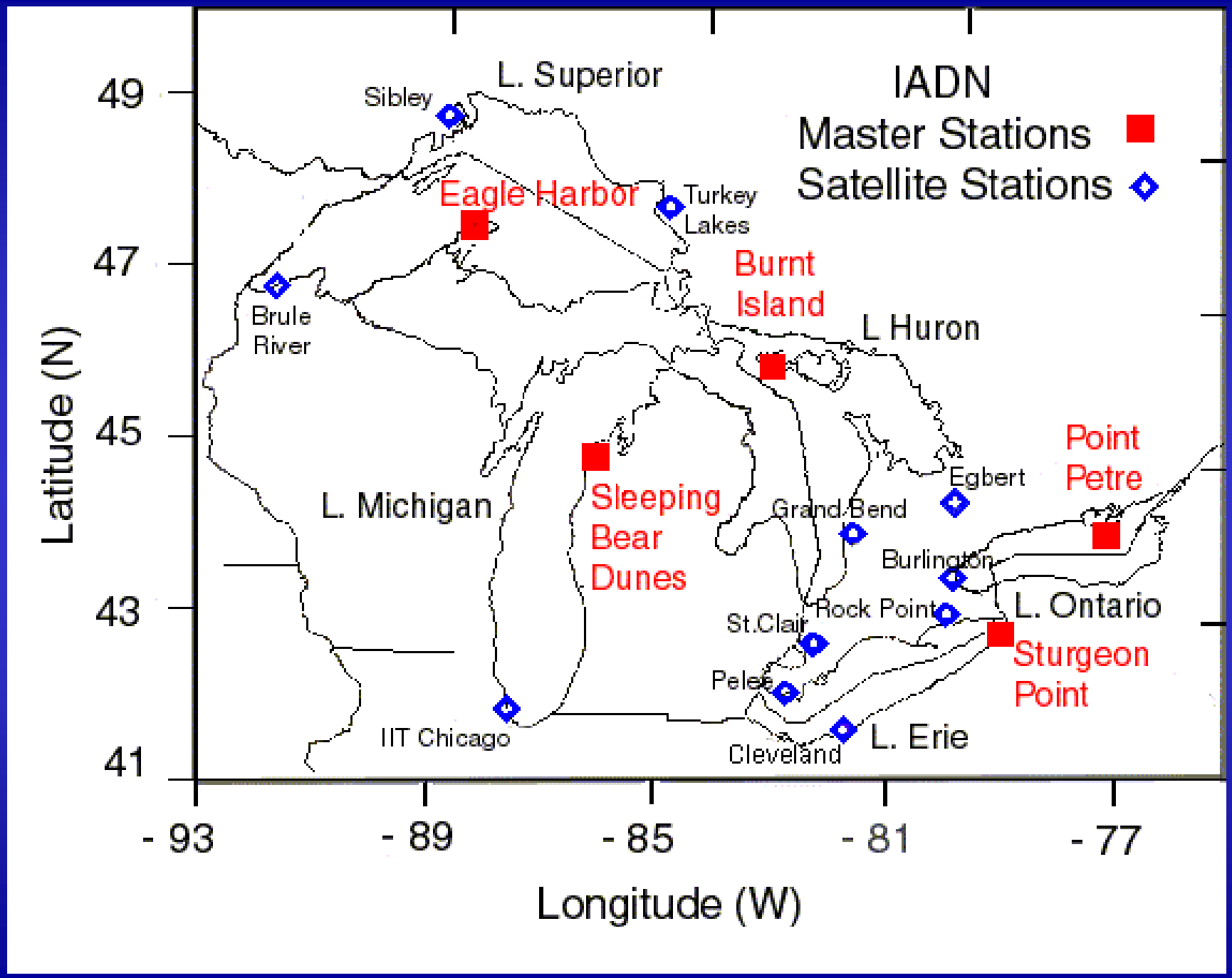
PCBs: an Integrated Atmospheric Deposition Network (IADN) perspective

Todd Nettesheim
U.S. EPA Great Lakes National Program Office

30 November 2004

The Integrated Atmospheric Deposition Network

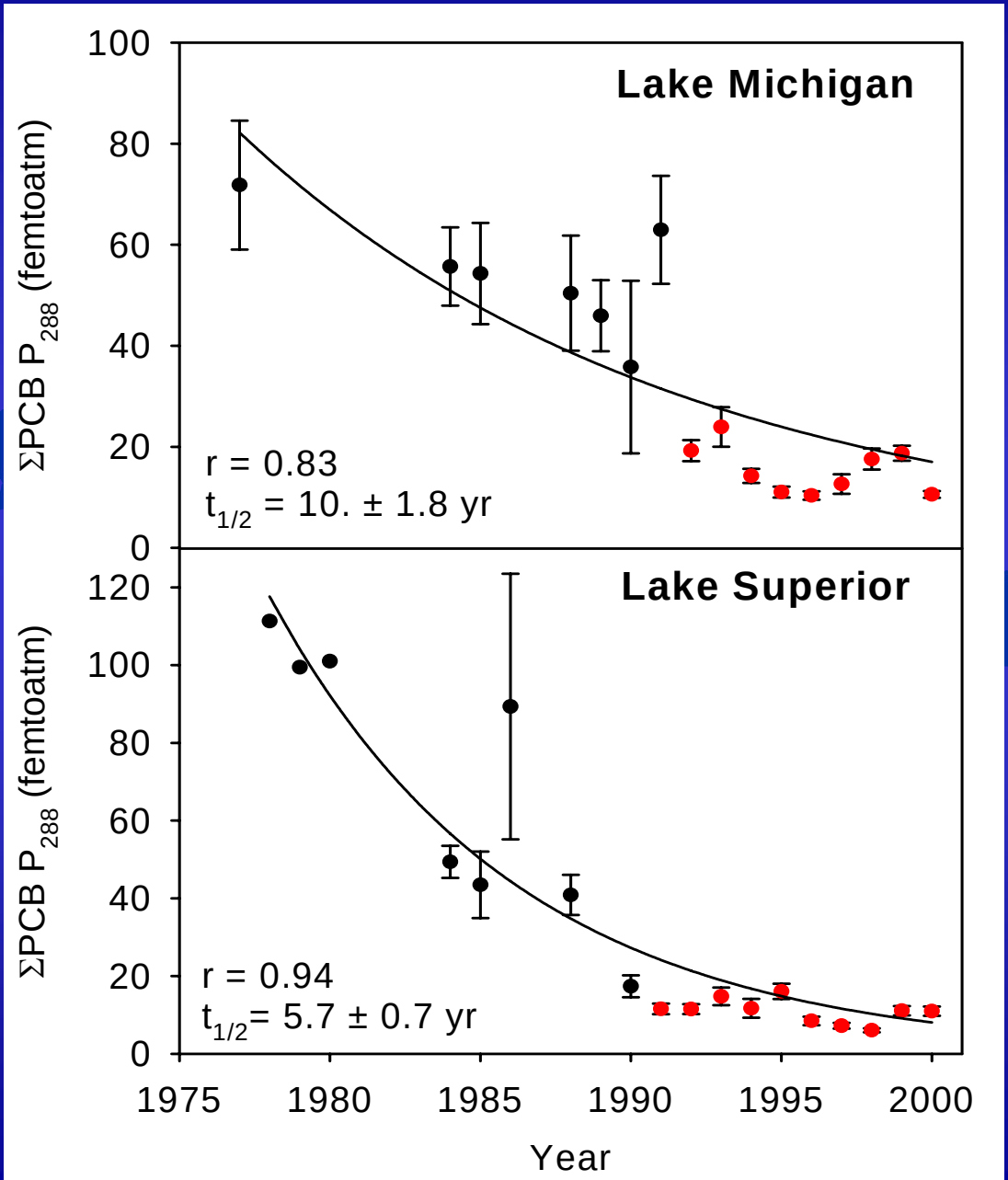
- Annex 15 of GLWQA
- PCBs, PAHs, organochlorine pesticides, metals
- Gas, particulate, precipitation concentrations; weather measurements
- Partnership: U.S. EPA, U.S. grantee (IU), Environment Canada (MSC, EHD)
- Primary goals: Annual atmospheric loadings to lakes, concentration trends


IADN
Master Stations
Satellite Stations
L. Superior
Sibley
Eagle Harbor
Turkey Lakes
Burnt Island
L Huron
Brule River
L. Michigan
Sleeping Bear Dunes
Egbert
Point Petre
Grand Bend
Burlington
Rock Point
L. Ontario
St.Clair
Sturgeon Point
Pelee
IIT Chicago
Cleveland
L. Erie
49
47
45
43
41
Latitude (N)
- 93
- 89
- 85
- 81
- 77
Longitude (W)

IADN PCB Suite congeners

4+10	28	70+76	100	156+171+202
5+8	31	74	101	169
6	33+53	77+110	105+132+153	170+190
7+9	37+42	83	114+131	172
12+13	41+64+71	85	118	174
15+17	44	87+81	119	180
16+32	45	89	123+149	194+205
18	47+48	91	126	199
19	49	95+66	128+167	201
22	52	97	135+144	206
26	56+60+84+92	99	138+163	207

Long-term suite-PCB gas-phase trends



Recent suite-PCB gas-phase trends

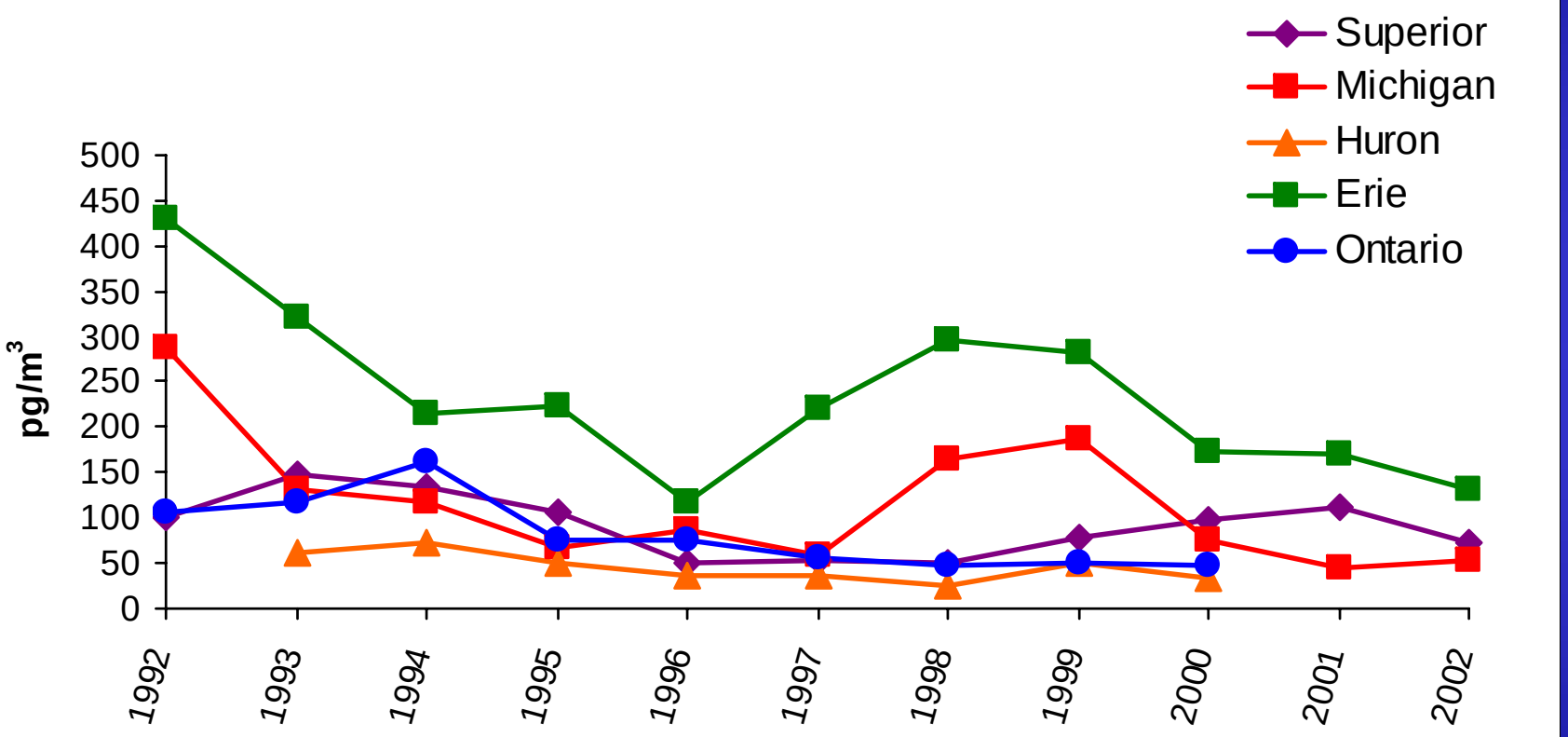
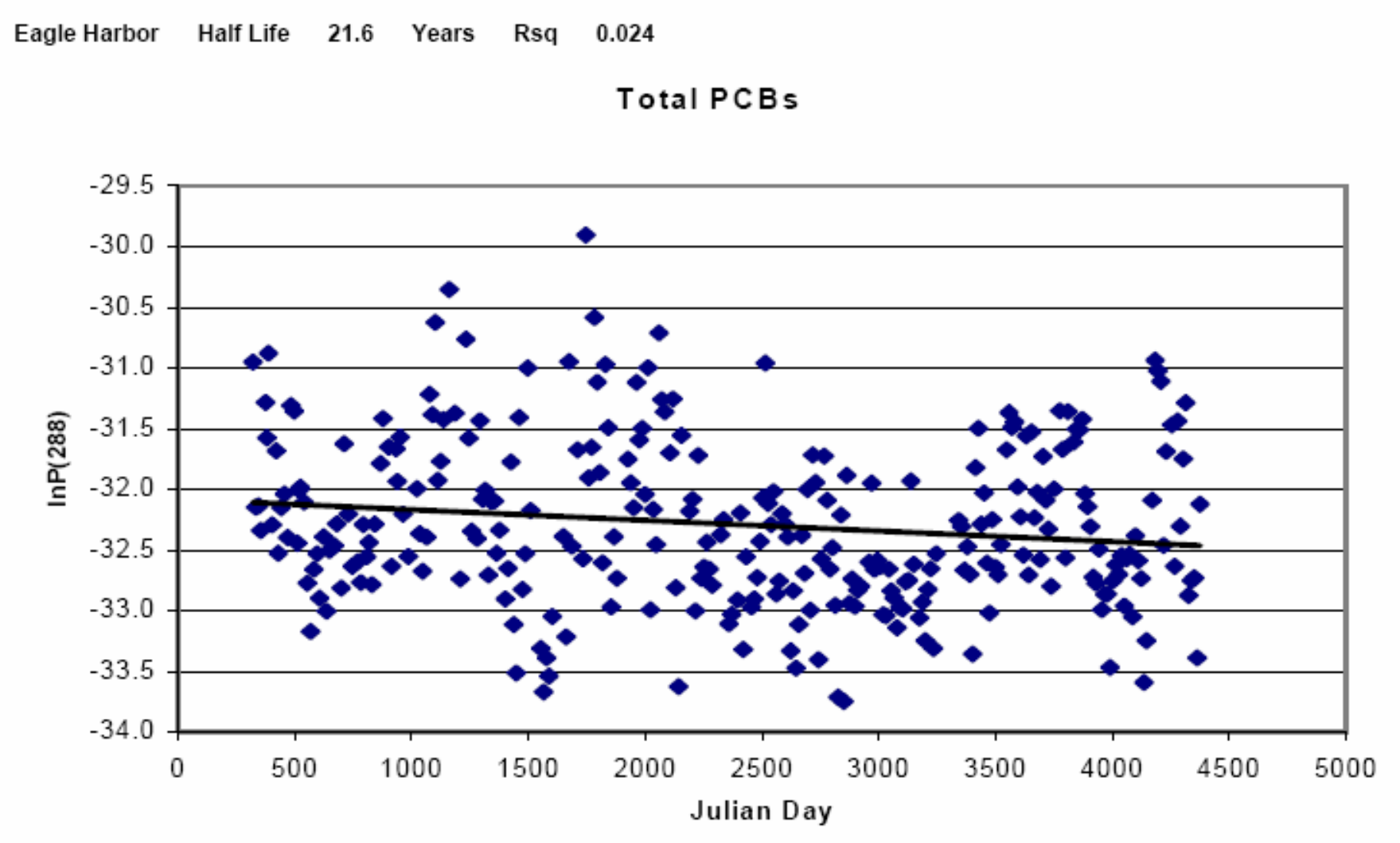


Figure 1. Gas Phase Concentrations of Total PCBs (PCB Suite)

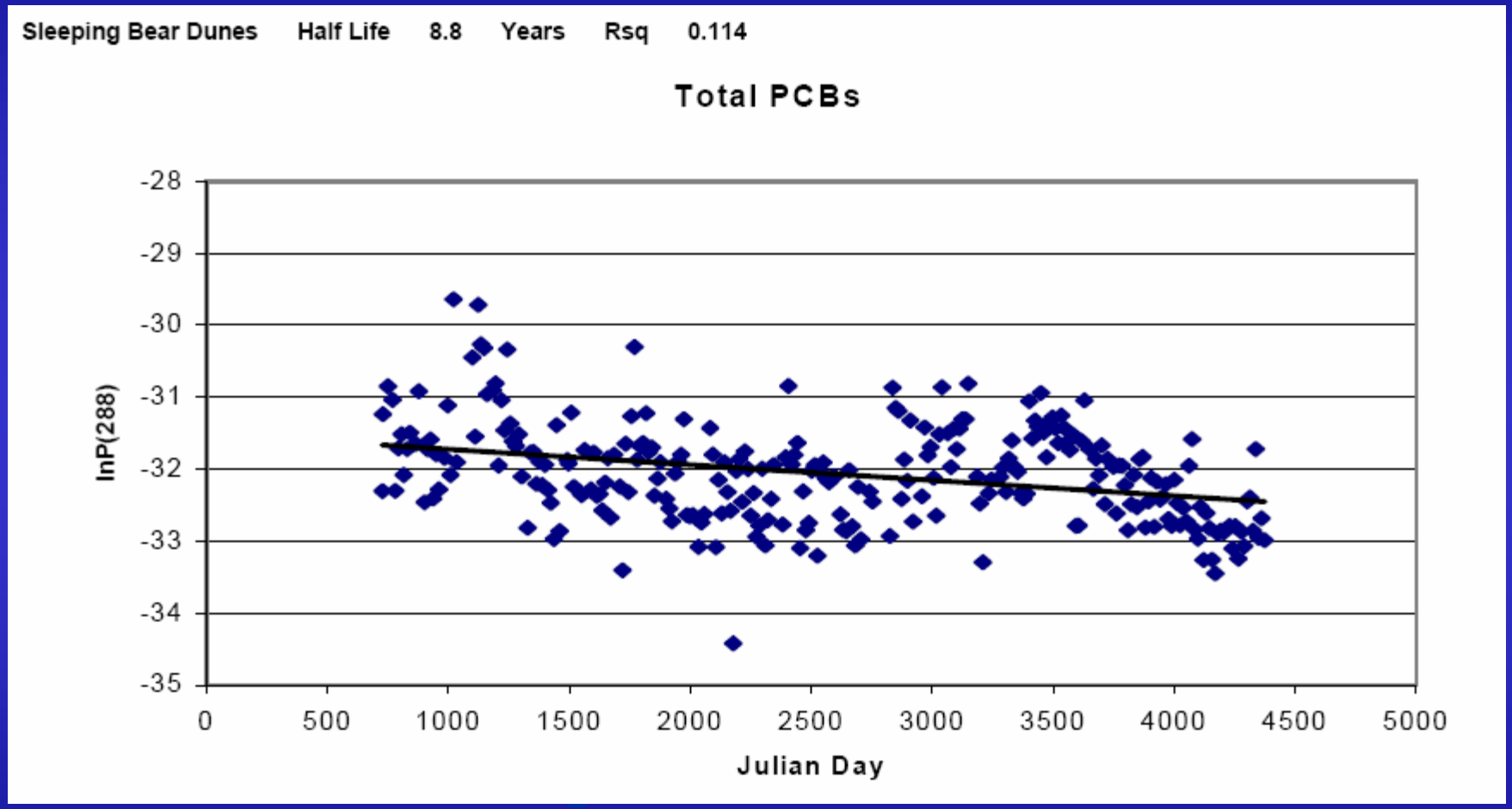
Source: SOLEC 2004

Total PCBs: Eagle Harbor



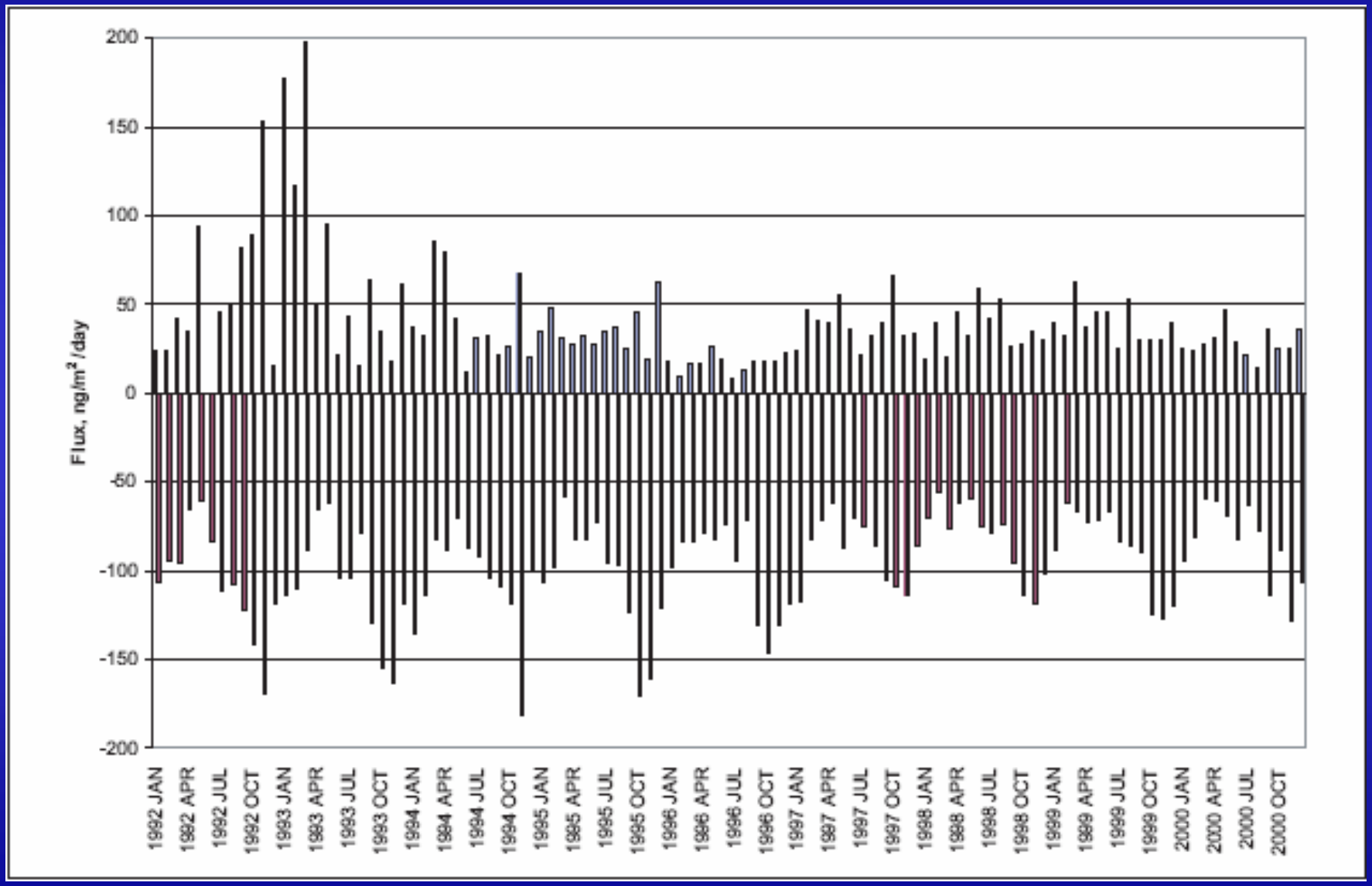
Half-life = 21.6 years, r^2 = 0.024

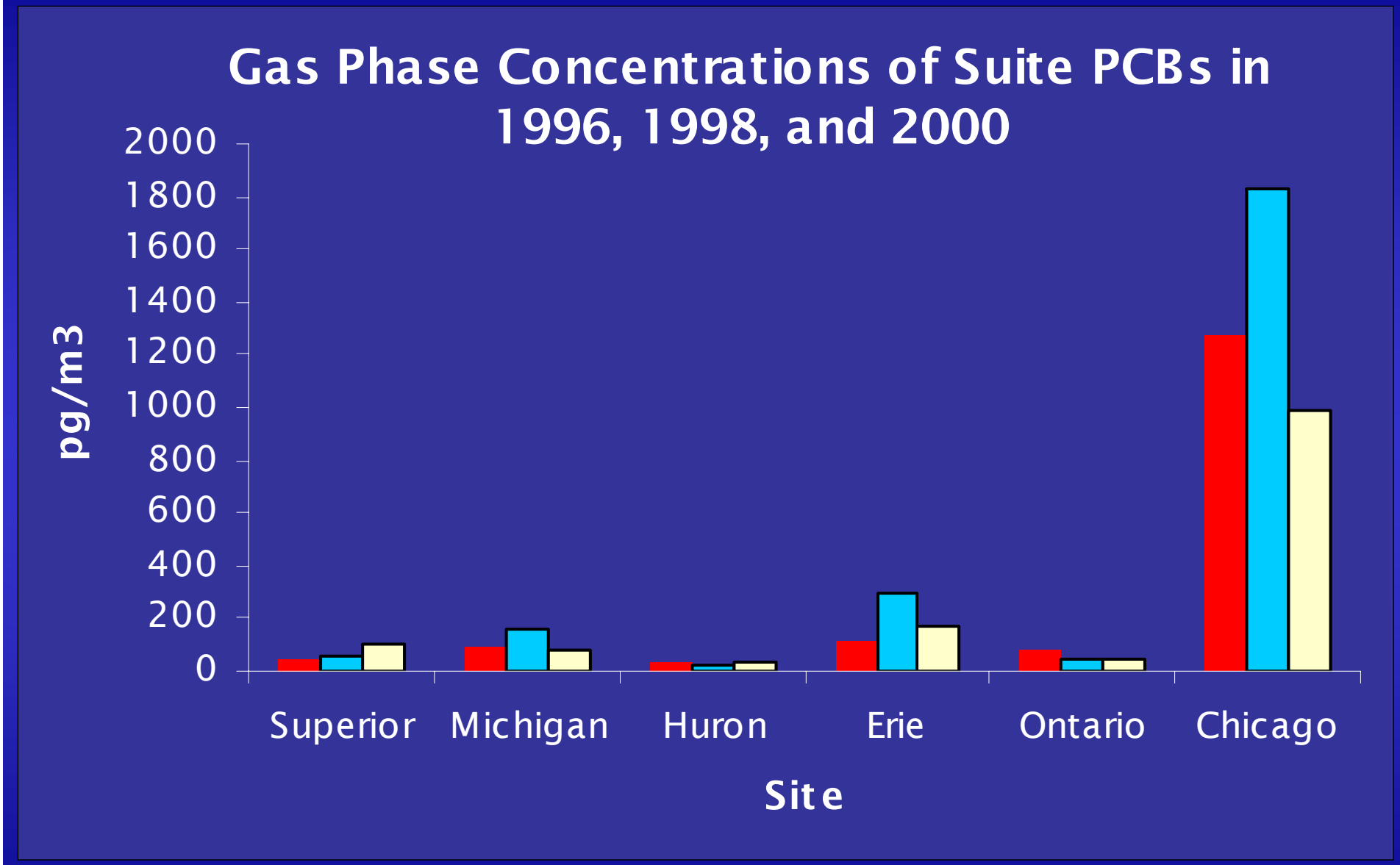
Total PCBs: Sleeping Bear Dunes



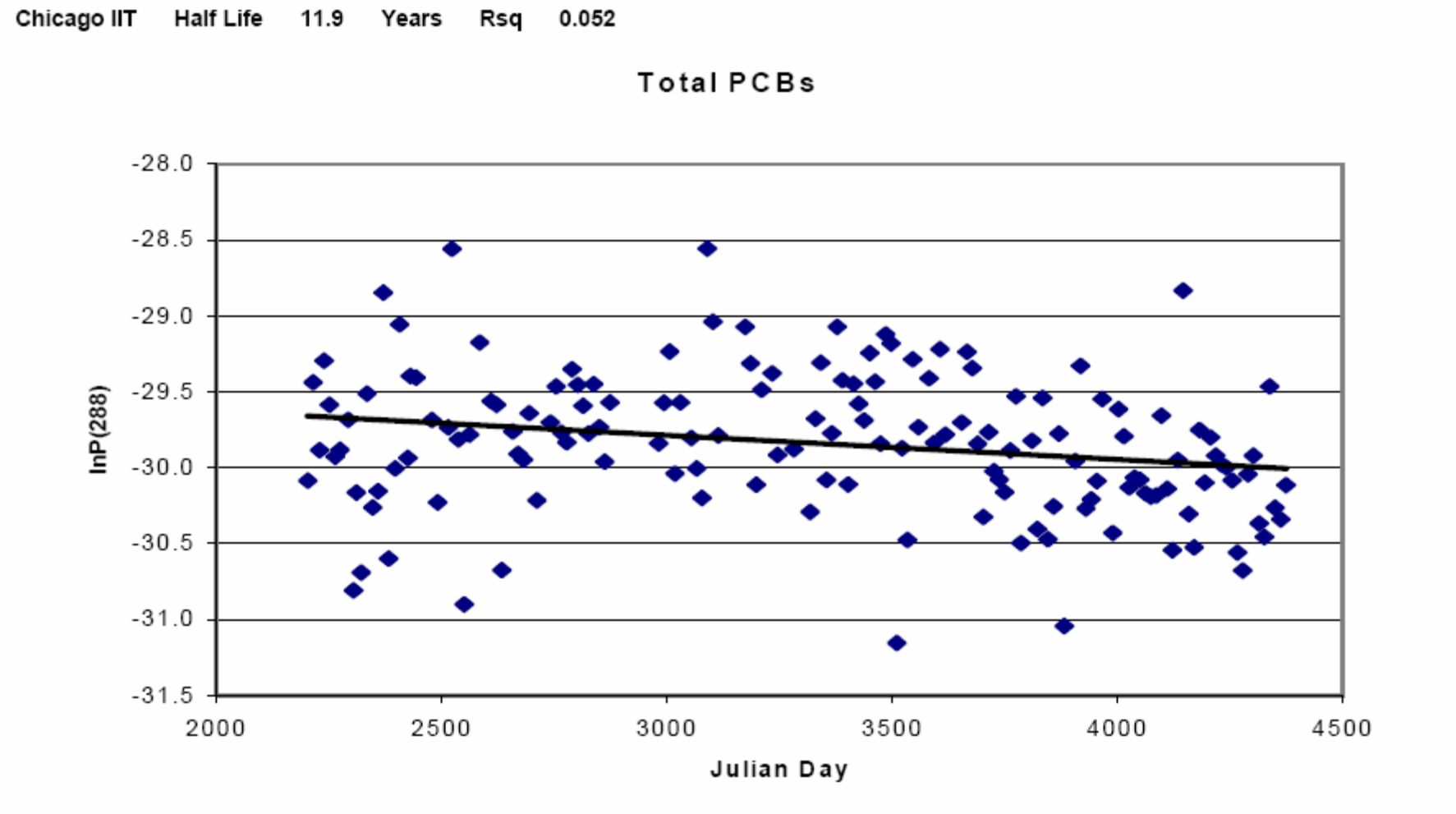
Half-life = 8.8 years, r^2 = 0.114

Suite PCB absorption and volatilization from Lake Erie



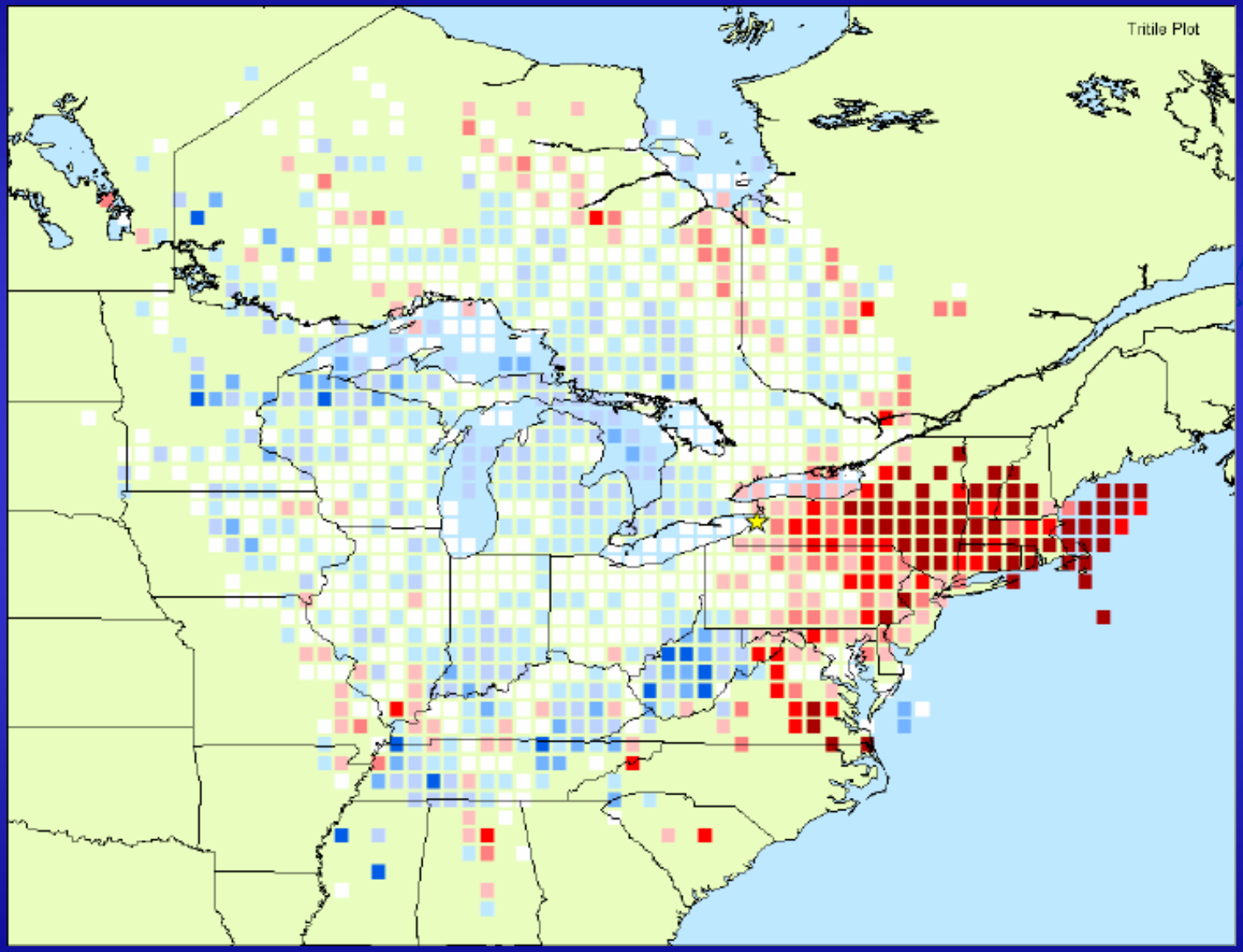

Gas Phase Concentrations of Suite PCBs in 1996, 1998, and 2000
pg/m3
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Superior
Michigan
Huron
Erie
Ontario
Chicago
Site

Total PCBs: Chicago IIT



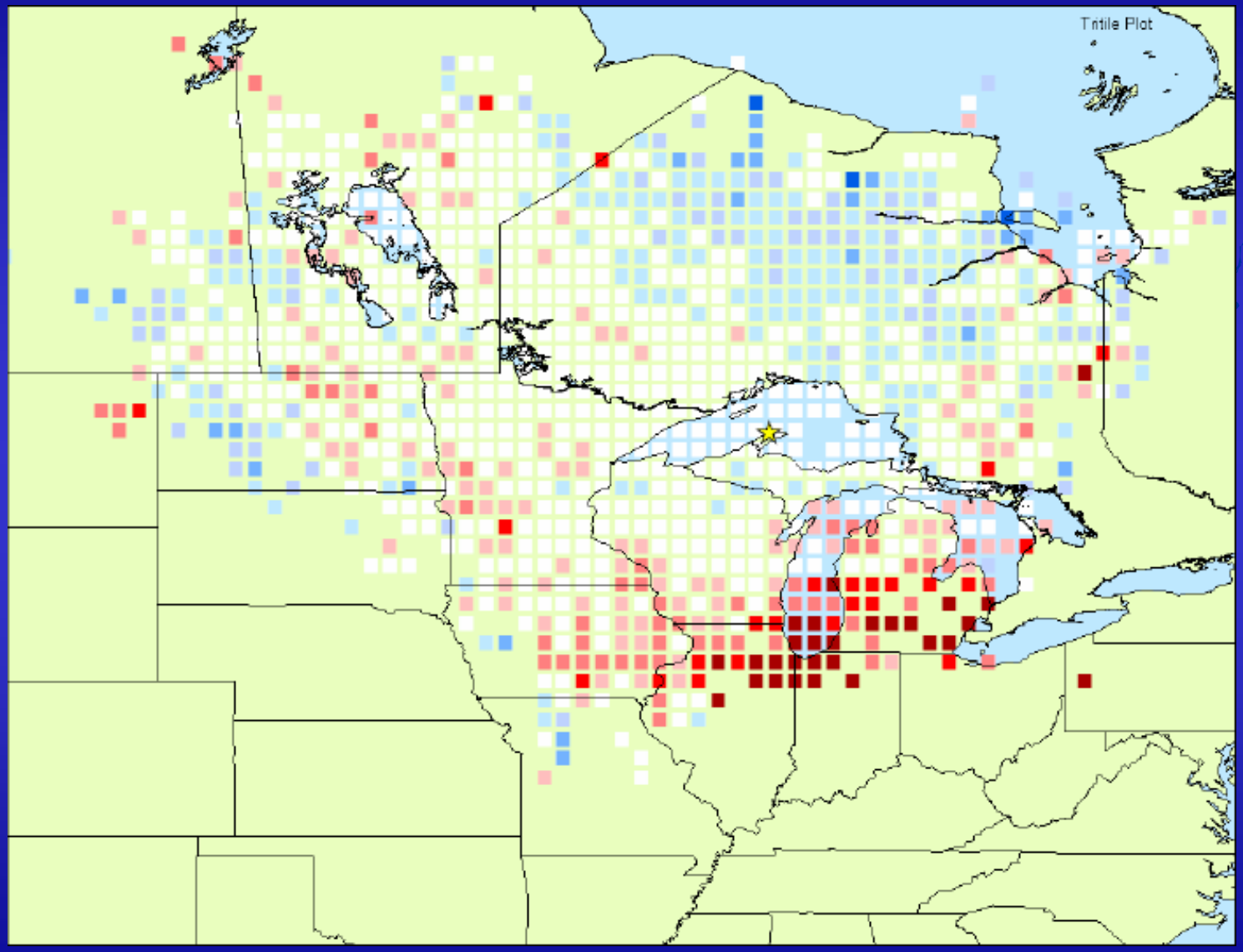
Half-life = 11.9 years, r^2 = 0.052

PSCF modeled estimates for PCBs at Sturgeon Point



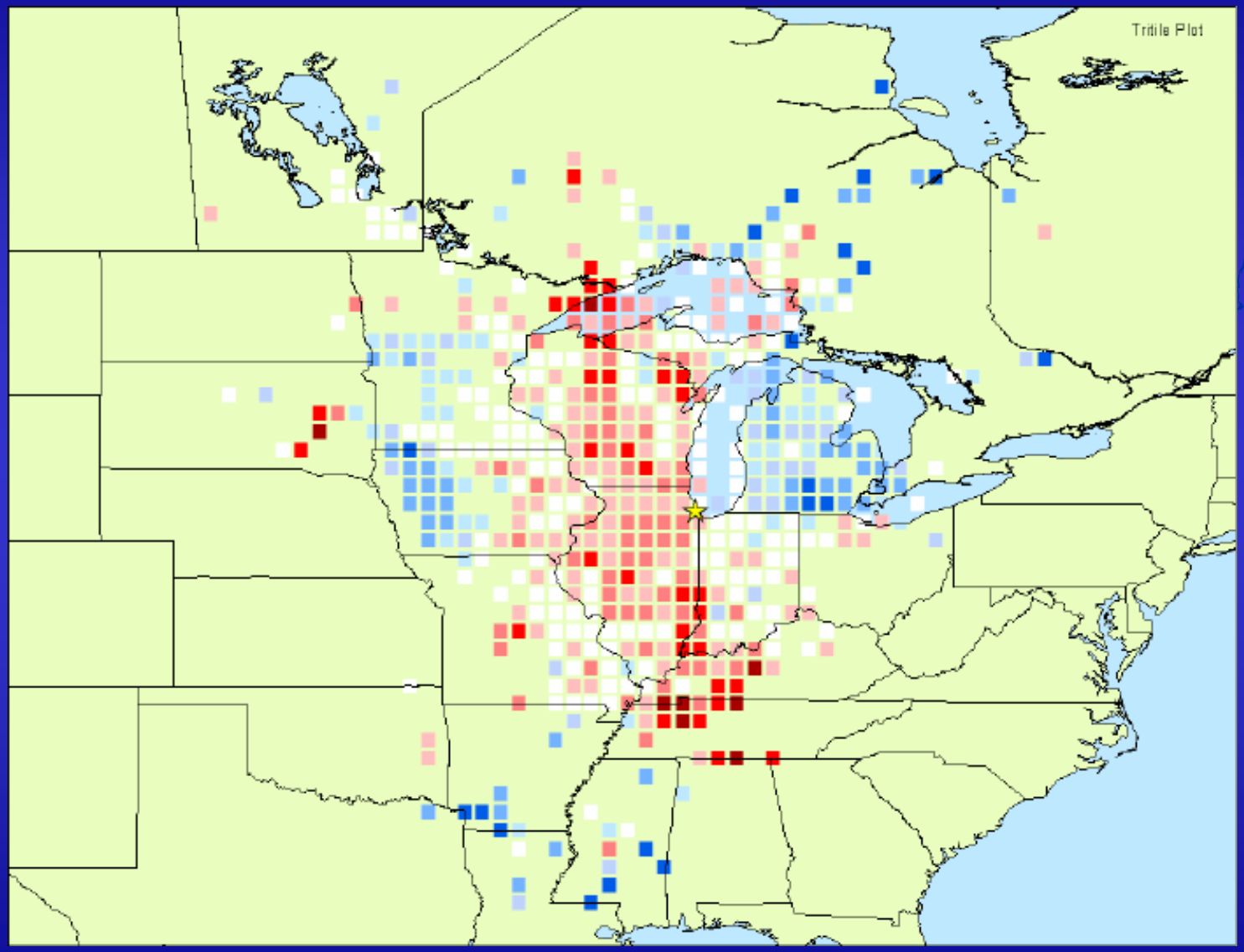
Source: Hafner and Hites, 2003

PSCF modeled estimates for PCBs at Eagle Harbor



Source: Hafner and Hites, 2003

PSCF modeled estimates for PCBs at Chicago IIT



Source: Hafner and Hites, 2003

Acknowledgements

- IADN Steering Committee
- Environment Canada
- U.S. EPA GLNPO
- Indiana University

The End