Using a Geographic Information System to Determine Wet Deposition Trends of Ammonium in the Central U.S.

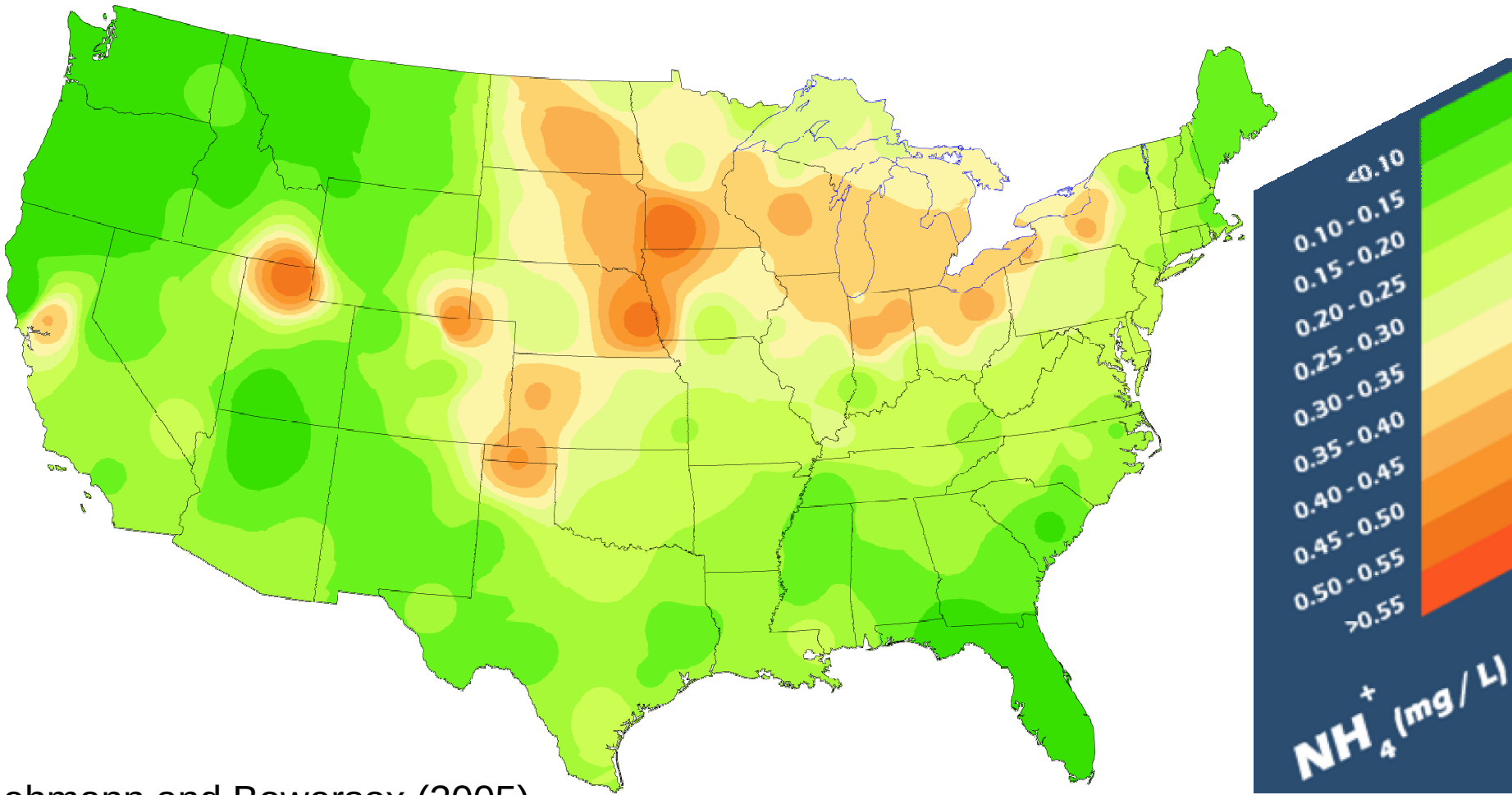
Natalie Latysh

&

Greg Wetherbee

USGS science for a changing world

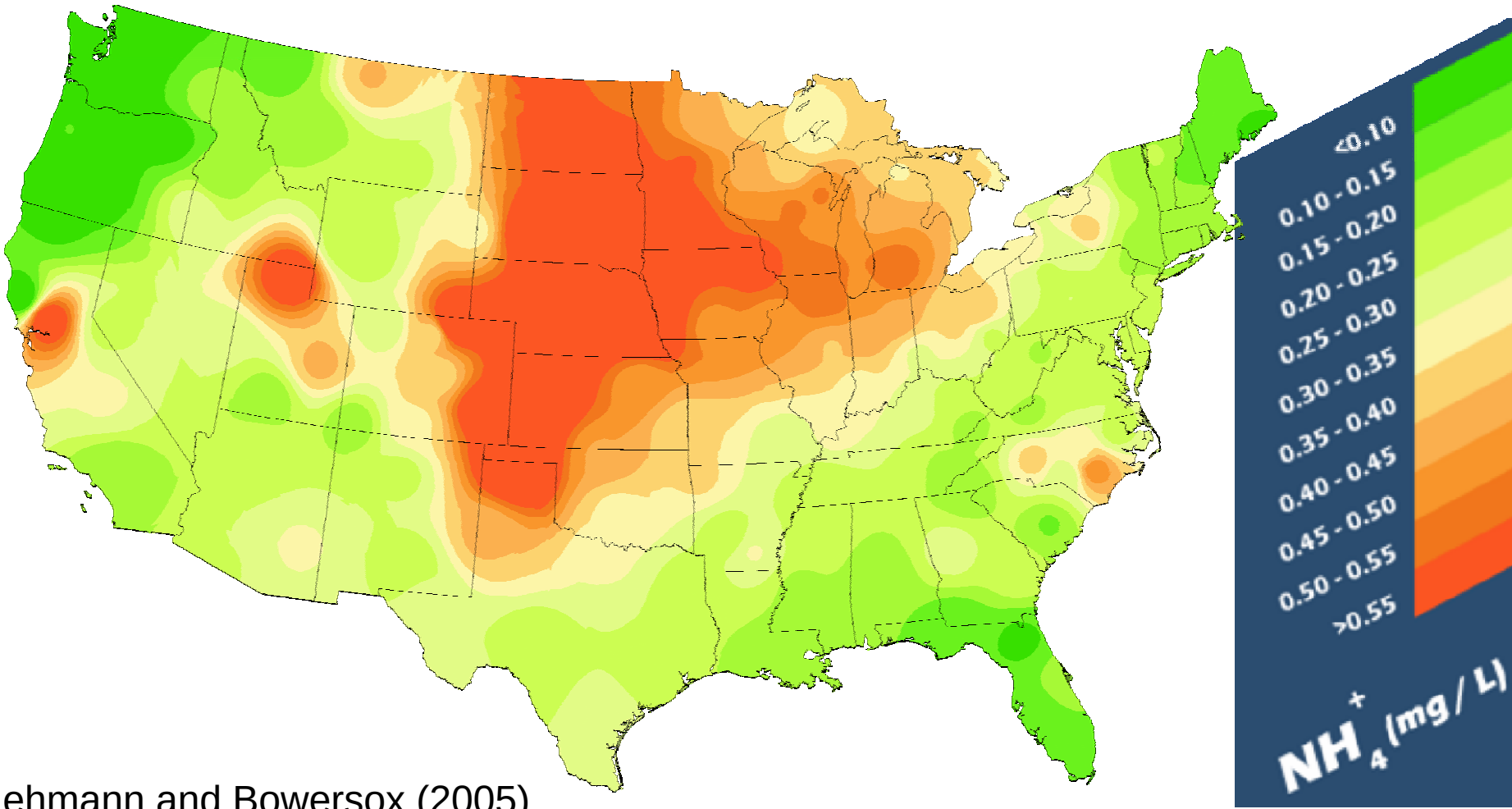
NADP/NTN Ammonium Concentrations 1984 - 1986



Lehmann and Bowersox (2005)

National Atmospheric Deposition Program/National Trends Network

NADP/NTN Ammonium Concentrations 2003 - 2005

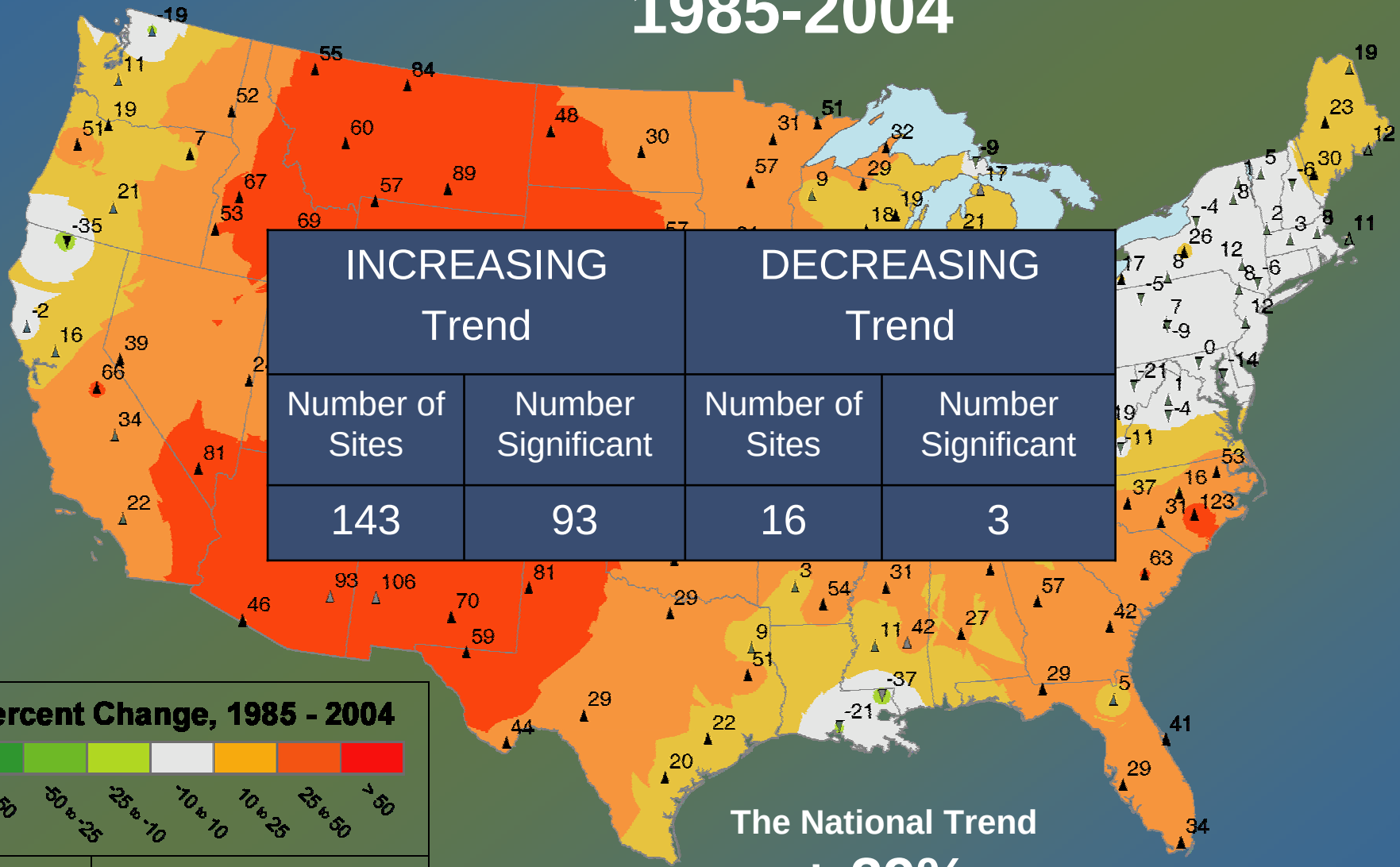


Lehmann and Bowersox (2005)

03 **04** 05

National Atmospheric Deposition Program/National Trends Network

NADP/NTN Ammonium Trend 1985-2004



INCREASING Trend		DECREASING Trend	
Number of Sites	Number Significant	Number of Sites	Number Significant
143	93	16	3

Percent Change, 1985 - 2004

≤ -50 | -50 to -25 | -25 to -10 | -10 to 10 | 10 to 25 | 25 to 50 | > 50

Trend	Significance
Δ Increasing	Significant and Homogeneous
∇ Decreasing	Significant, not Homogeneous
	Not Significant

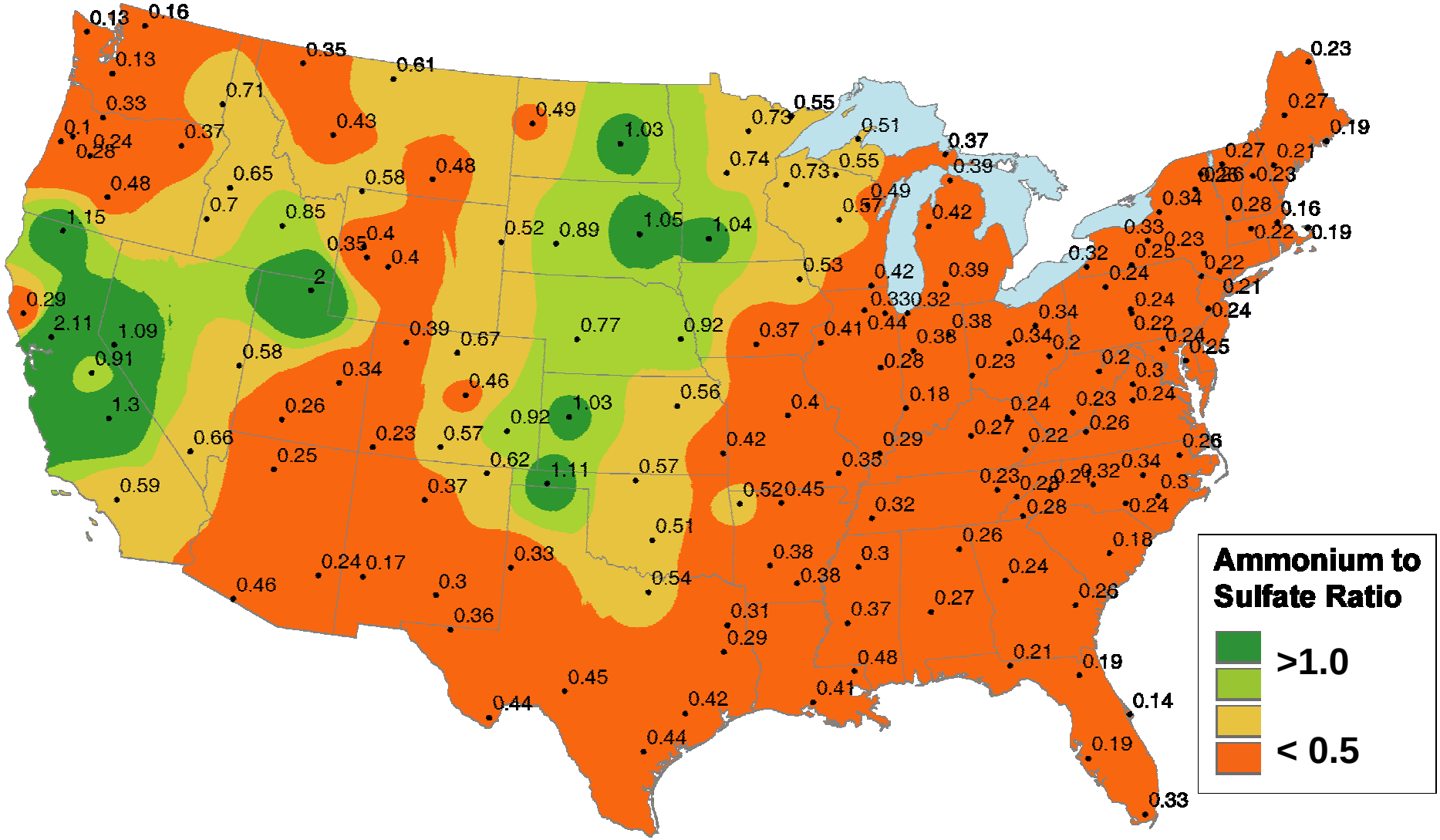
The National Trend

+ 29%

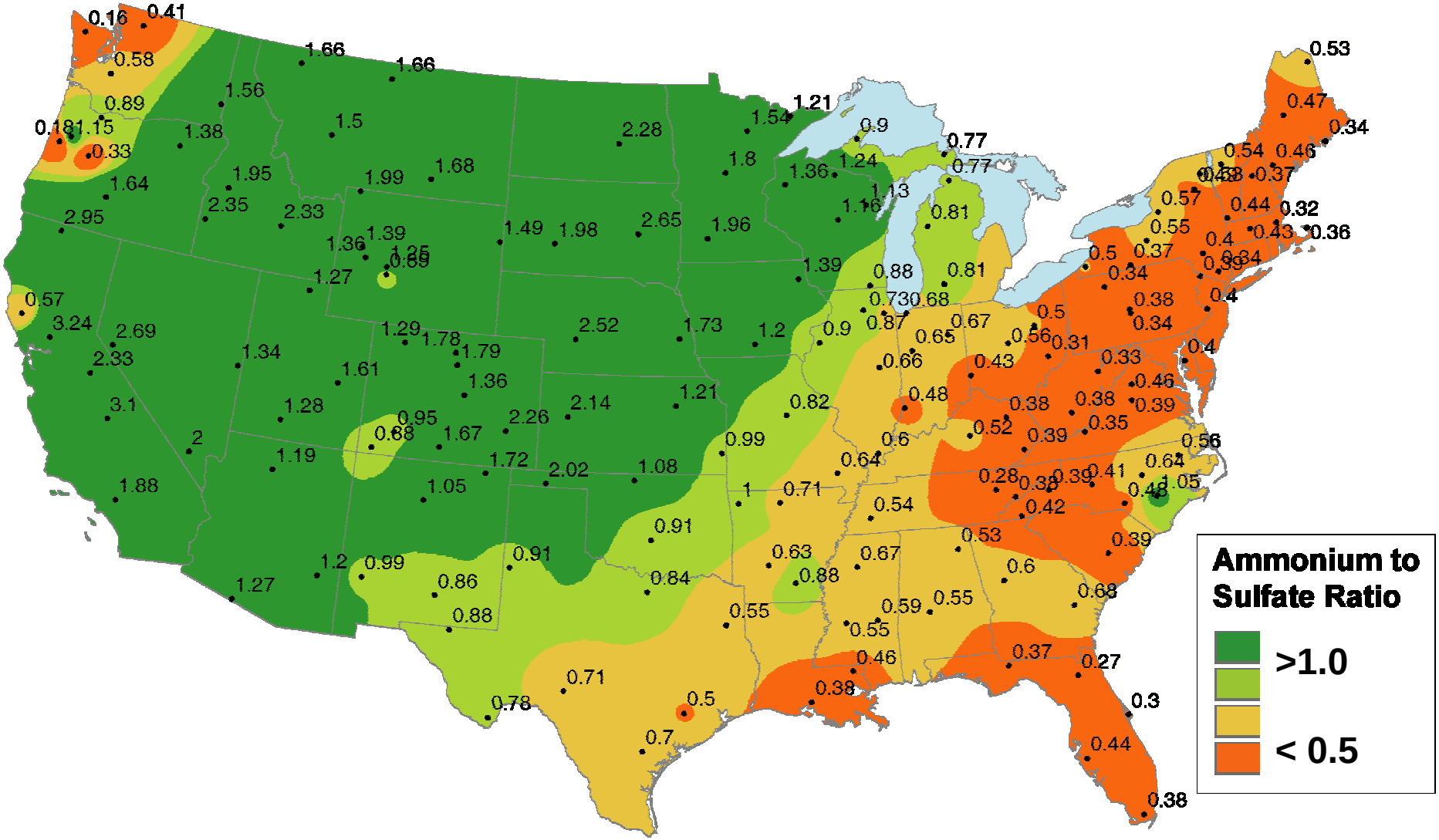
(median change)

Lehmann and Bowersox (200

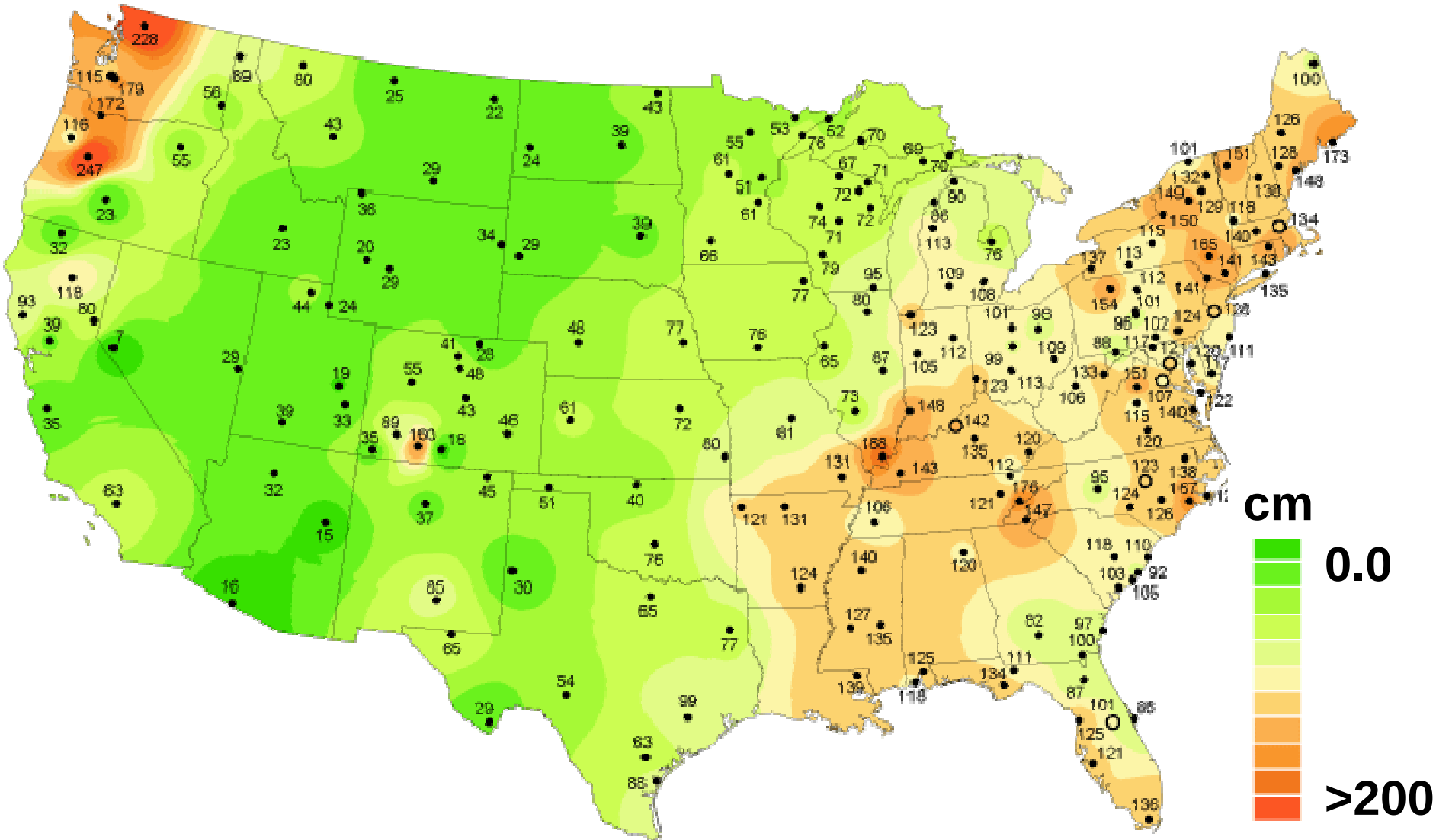
Ammonium/Sulfate Ratio, 1984-1986



Ammonium/Sulfate Ratio, 2002-2004



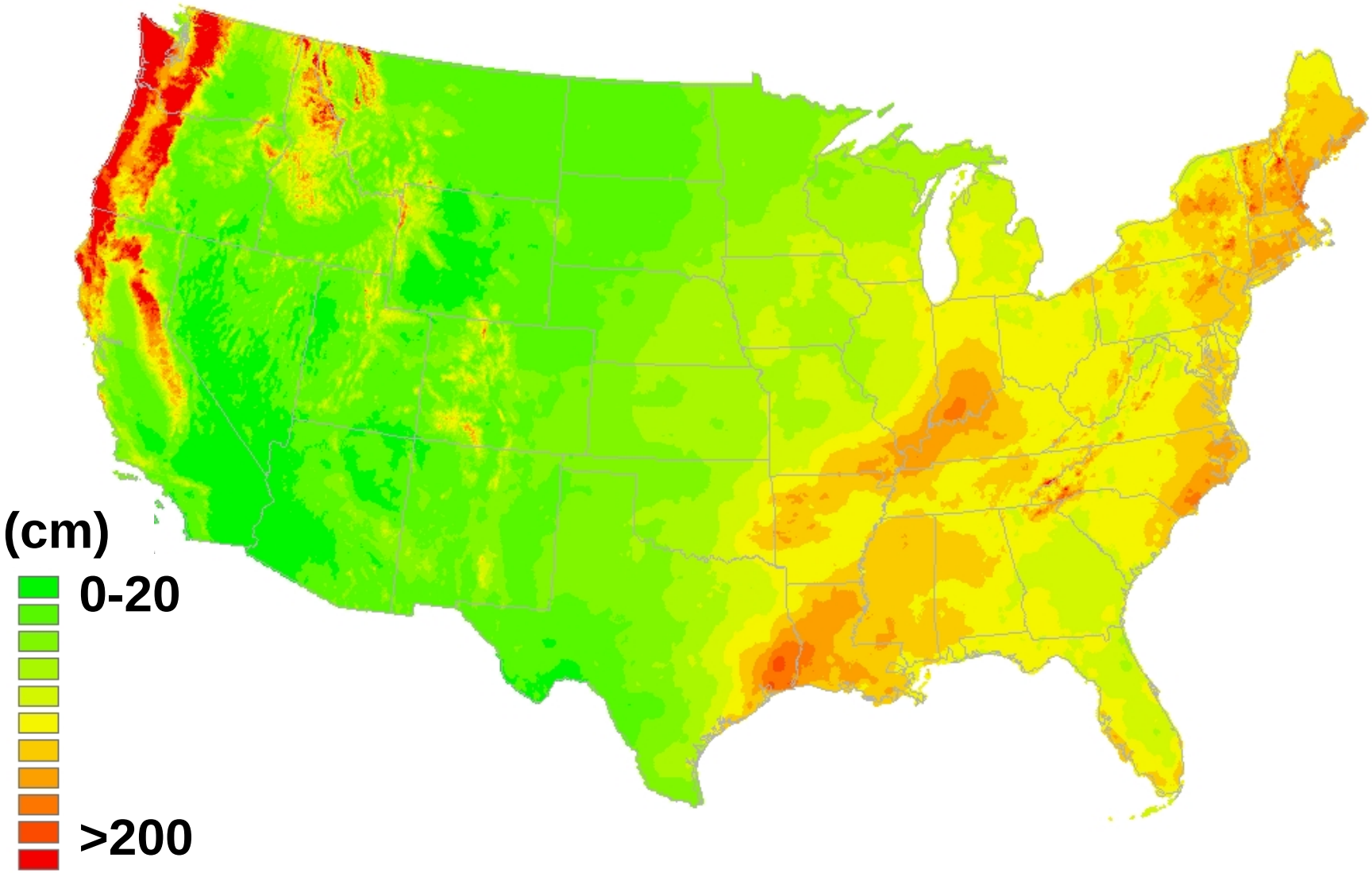
Total precipitation, 2006



National Atmospheric Deposition Program/National Trends Network
http://nadp.sws.uiuc.edu

PRISM

Total precipitation, 2006



What's New!

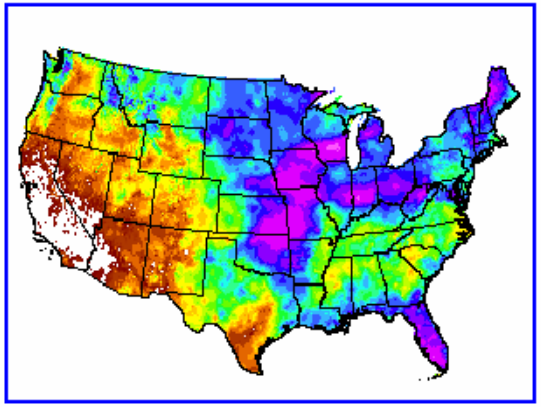
7/2/08: 1971-2000 800m Normals Query now available on Data Explorer.

6/9/08: Updated informational presentations. See presentations

10/24/07: The PRISM Group has moved to new offices. See contacts

Complete History

Latest PRISM Data - Jun 2008



Precipitation
Max Temp
Min Temp
Dewpoint
PPT %

Click to see full-size map. More...

Quick Links

Data Alerts!
Monthly Data
800m Normals (1971-2000)
Internet Map Server

Warning: Updates for the monthly time series data set have been suspended until sufficient funding can be obtained! If you value this product, it is time to do your part to support its continuation. If you can contribute funding to this effort, please contact us.

The data sets available on this web site were created using the PRISM (Parameter-elevation Regressions on Independent Slopes Model) climate mapping system, developed by Dr. Christopher Daly, PRISM Group director. PRISM is a unique knowledge-based system that uses point measurements of precipitation, temperature, and other climatic factors to produce continuous, digital grid estimates of monthly, yearly, and event-based climatic parameters. Continuously updated, this unique analytical tool incorporates point data, a digital elevation model, and expert knowledge of complex climatic extremes, including rain shadows, coastal effects, and temperature inversions. PRISM data sets are recognized world-wide as the highest-quality spatial climate data sets currently available. PRISM is the USDA's official climatological data.

Important notice:

PRISM data sets were developed through projects funded partly by the USDA Natural Resources Conservation Service, USDA Forest Service, NOAA Office of Global Programs, and others. However, there is little operational funding for maintaining and updating or expanding the data sets. Data are provided as a public service for a limited time. If you find them valuable, please consider doing your part to support the PRISM Group. Contact us for details at 541-737-2531.

Use this site to access up-to-date and historical monthly climate data sets and graphics for the US, explore our data online with our Internet Map Server, view related papers and presentations, or contact us.

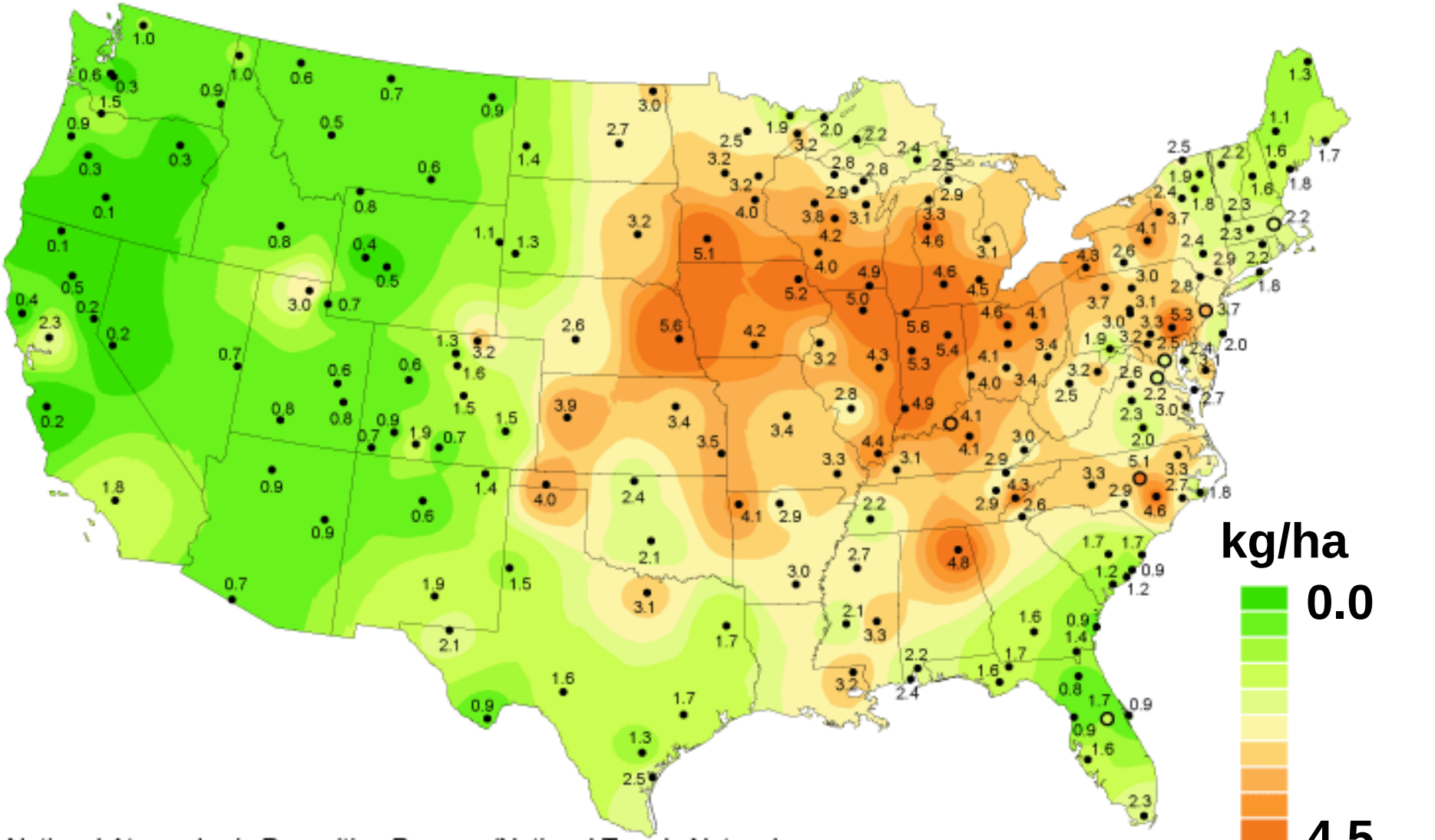
Best viewed with Internet Explorer 5.0+ or Netscape 6.0+ (Updated 6 May 2007.)

PRISM GROUP

NRCS
USFS
NOAA

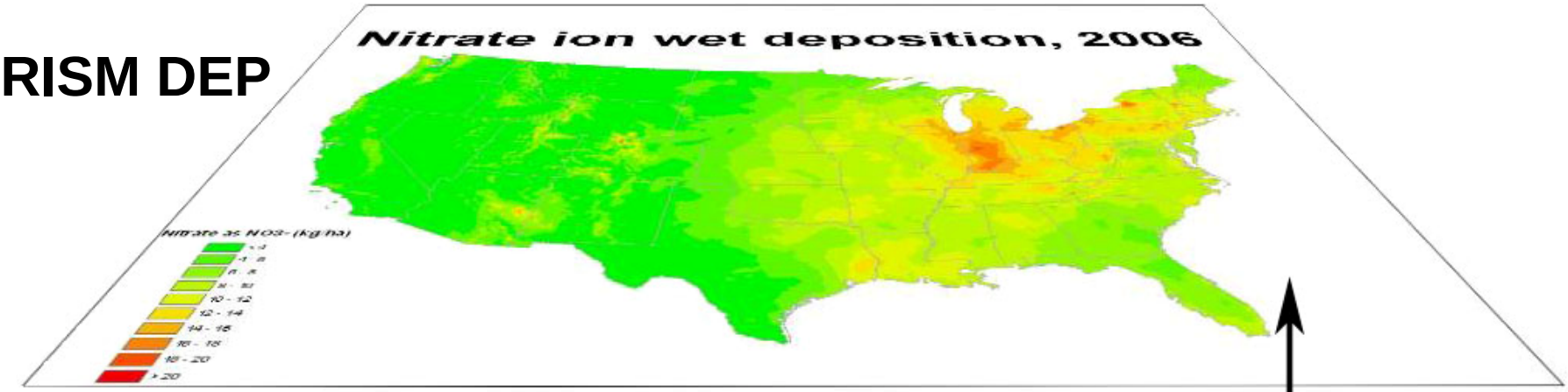
OREGON STATE UNIVERISTY

NADP
Ammonium ion wet deposition, 2006

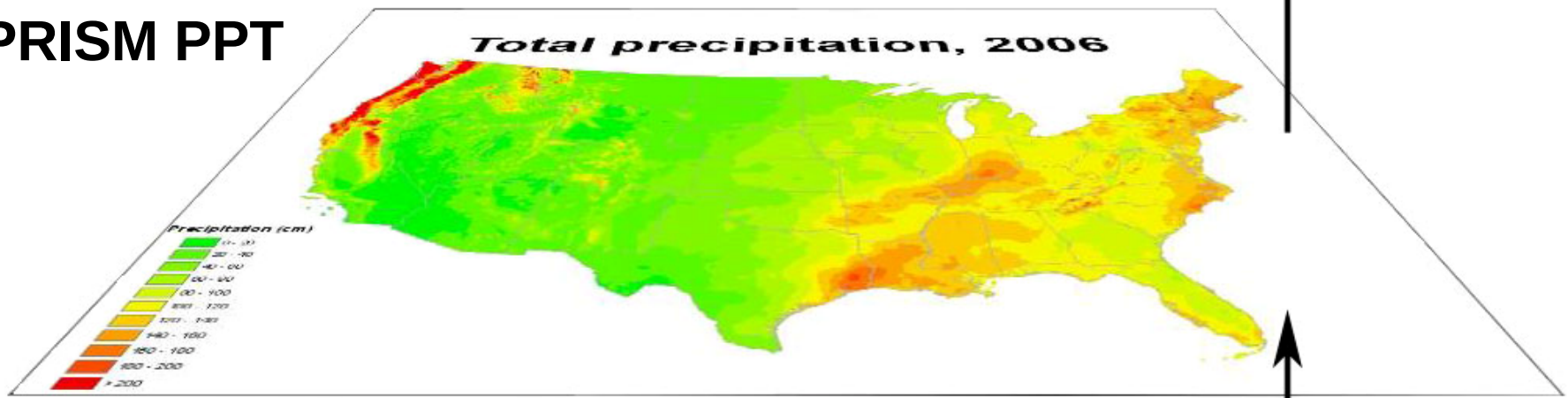


National Atmospheric Deposition Program/National Trends Network
http://nadp.sws.uiuc.edu

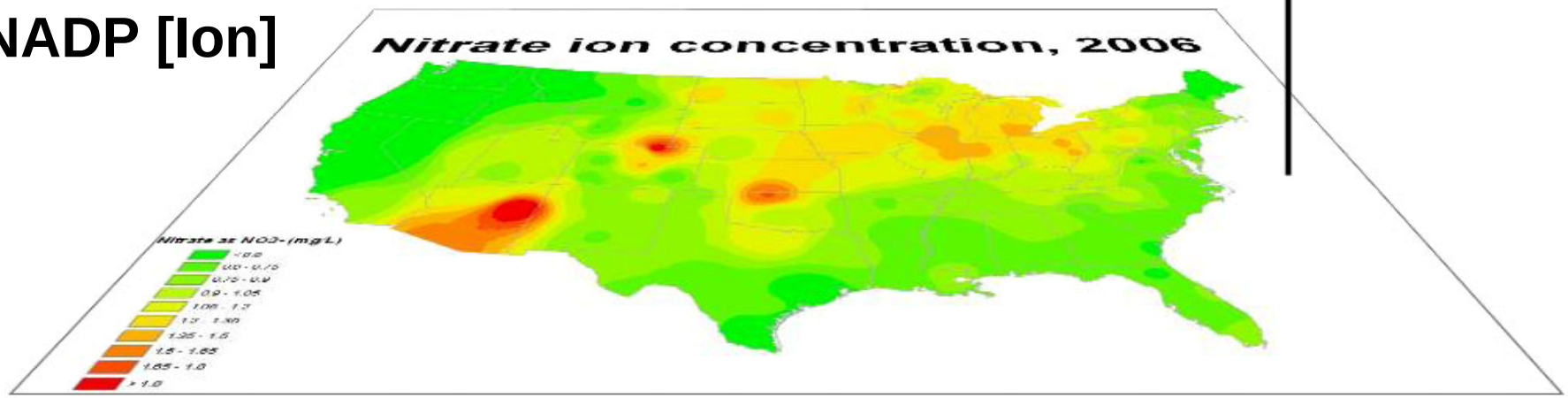
PRISM DEP



PRISM PPT

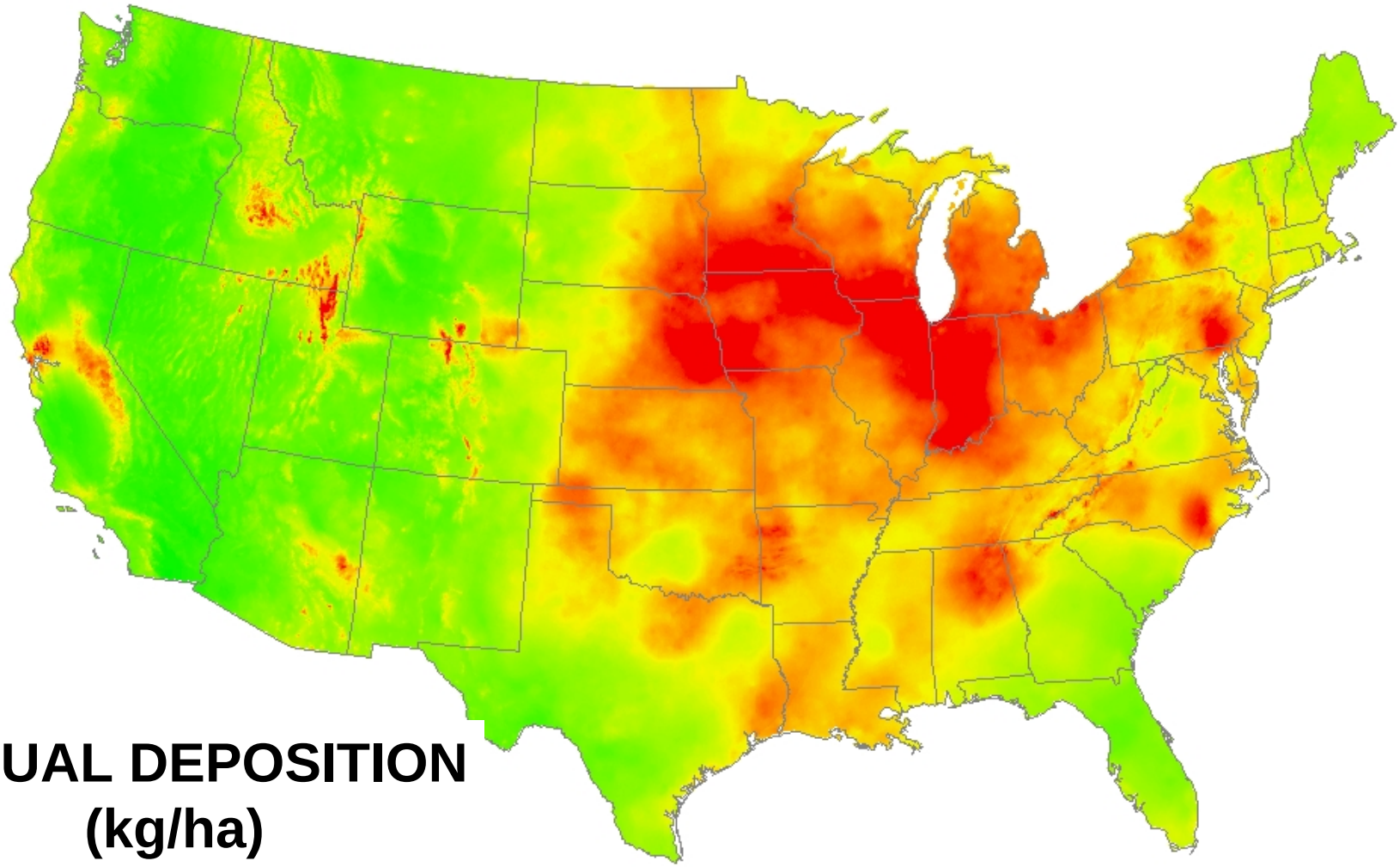


NADP [Ion]



2006 - NH4 Deposition

PRISM Precipitation * NADP NH4 precipitation-weighted mean concentration * 1/10

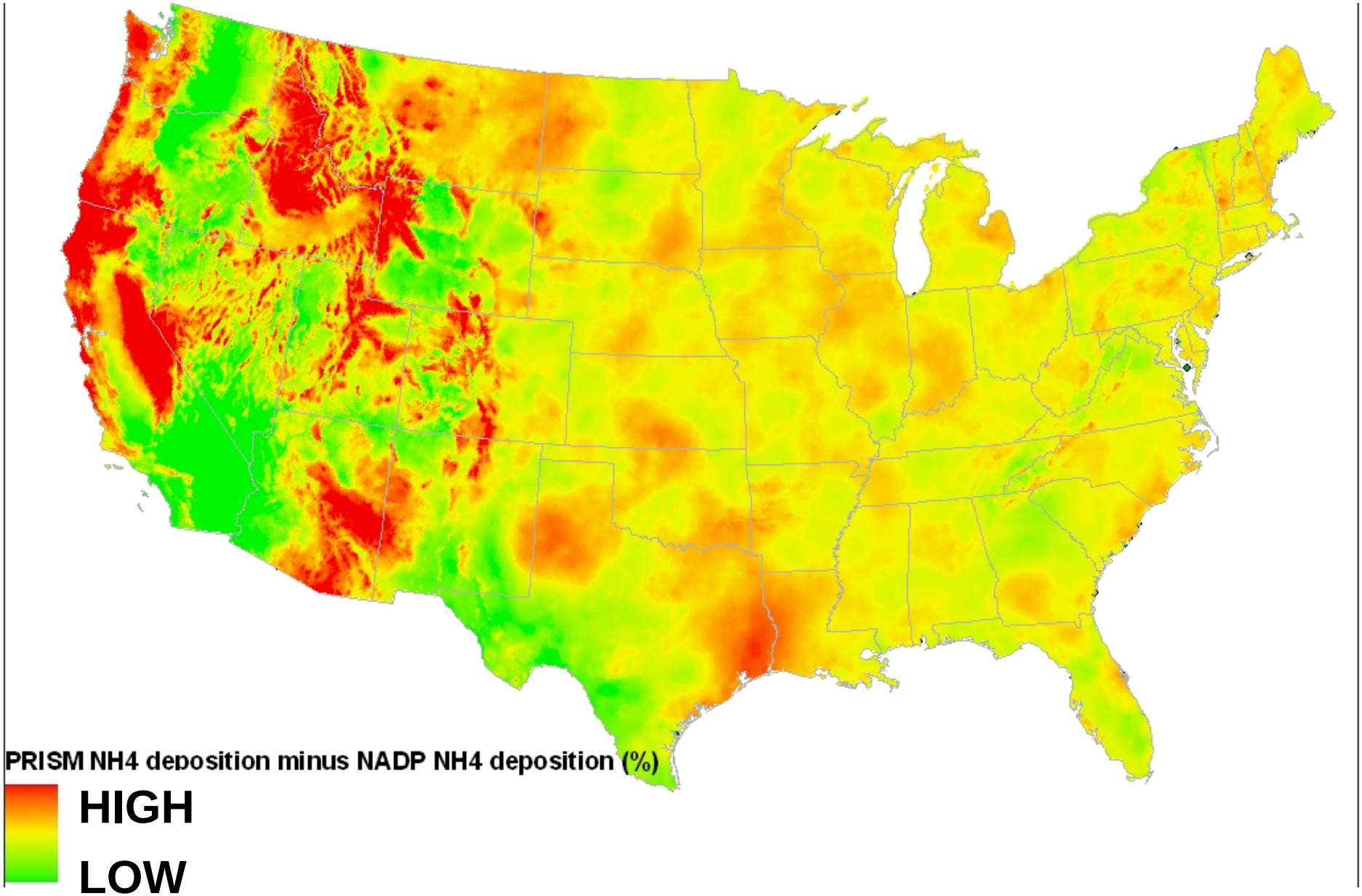


ANNUAL DEPOSITION (kg/ha)

HIGH 11.8

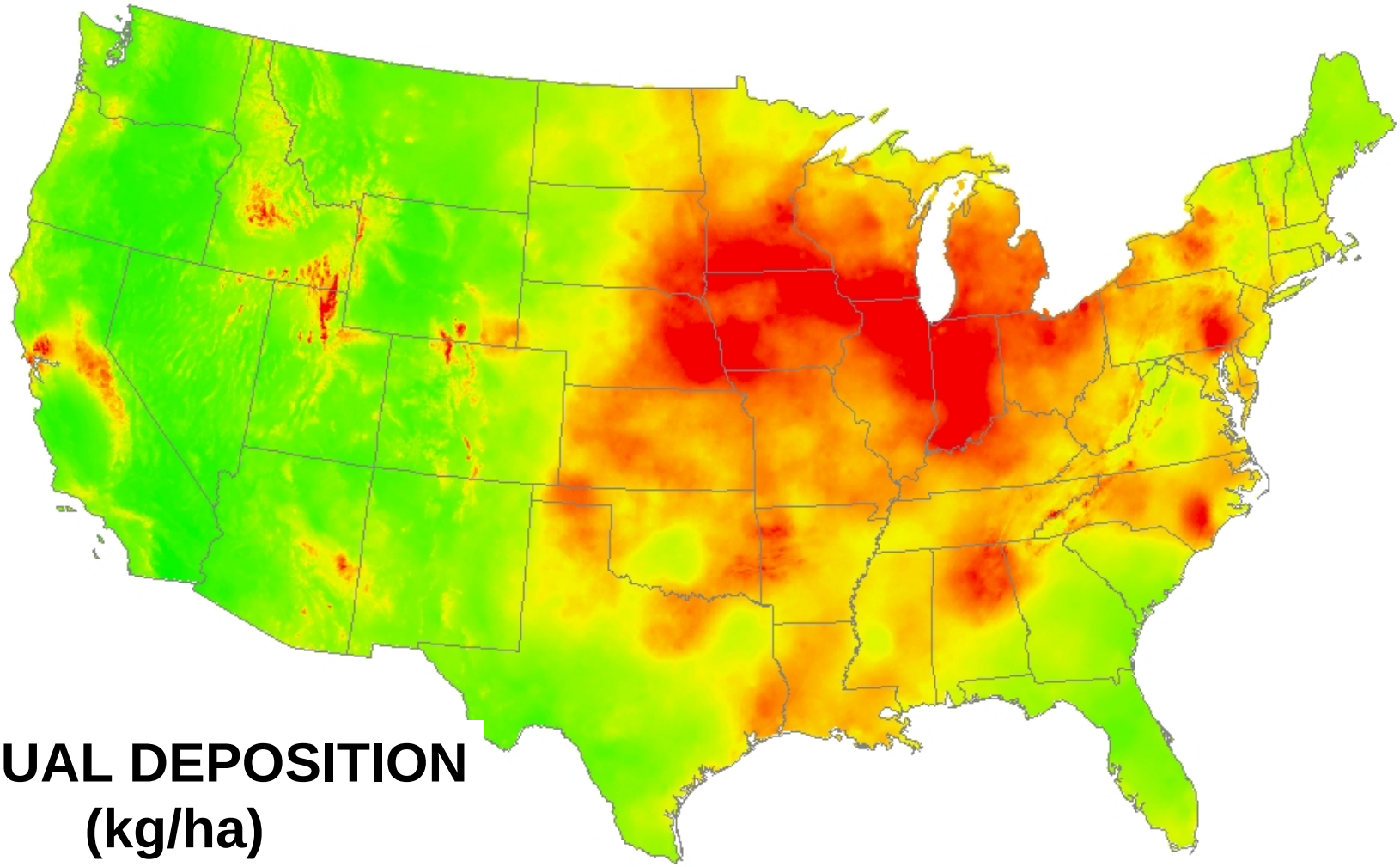
LOW 0.0

2006 PRISM – MINUS – NADP AMMONIUM DEPOSITION



2006 - NH4 Deposition

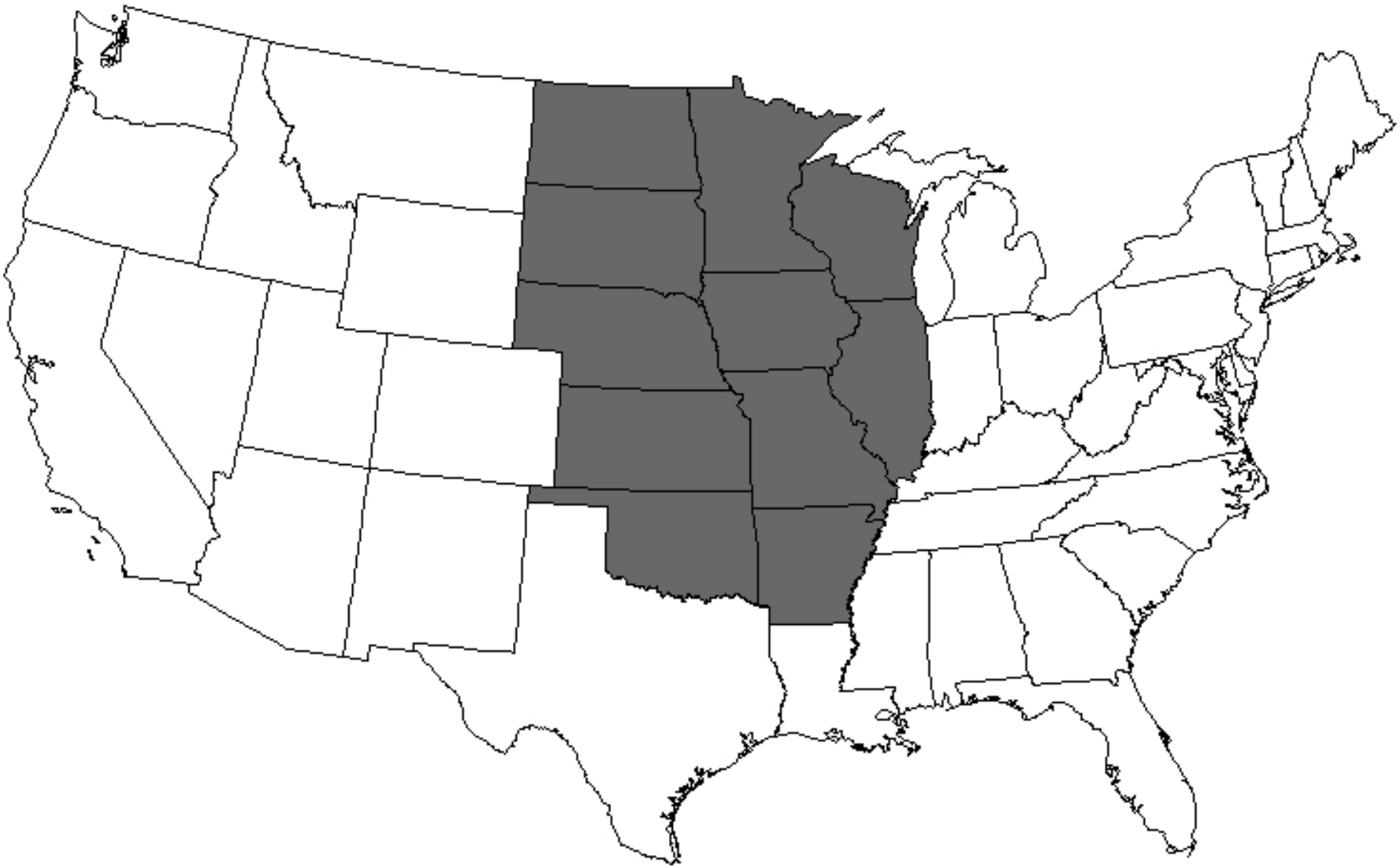
PRISM Precipitation * NADP NH4 precipitation-weighted mean concentration * 1/10

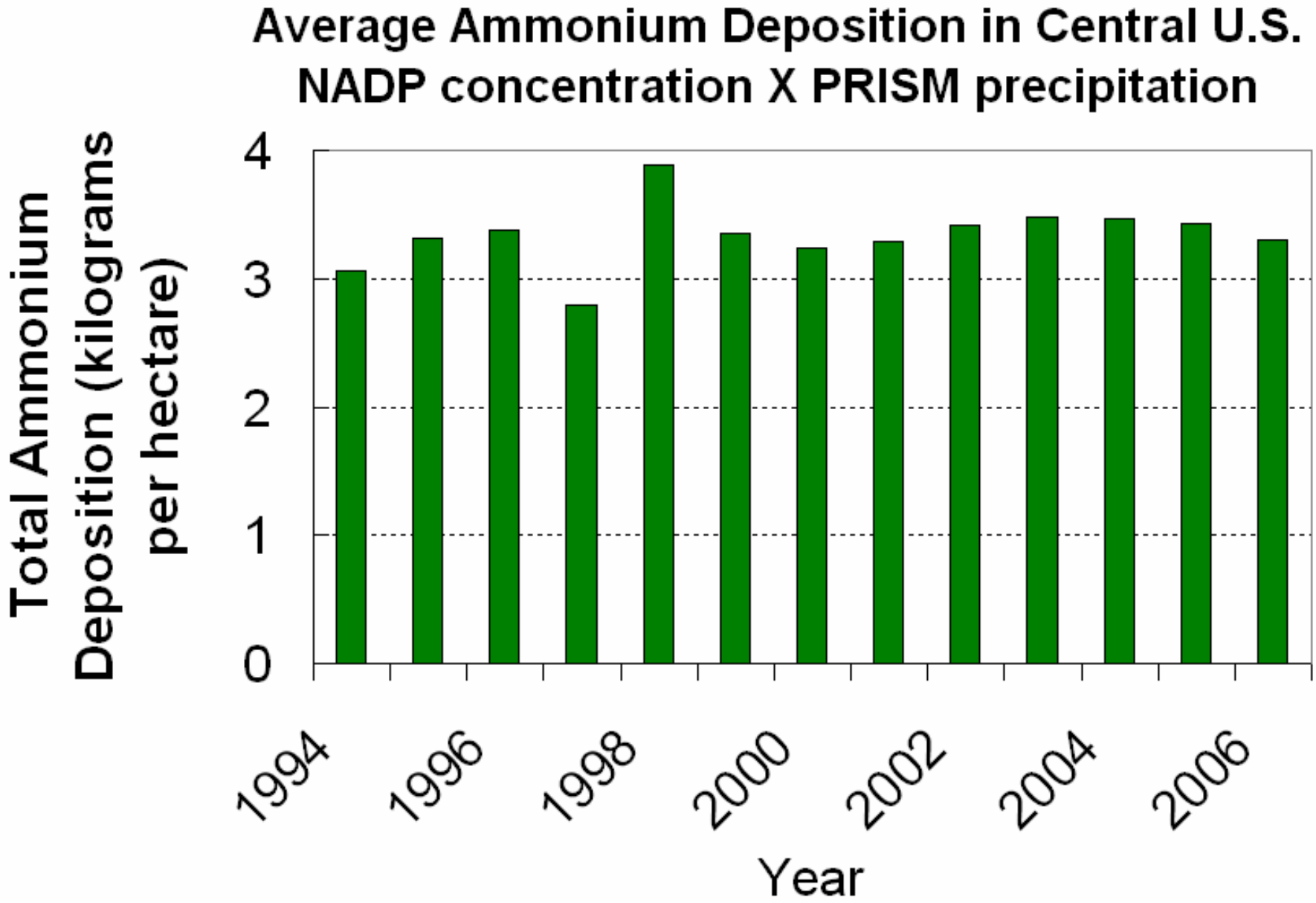


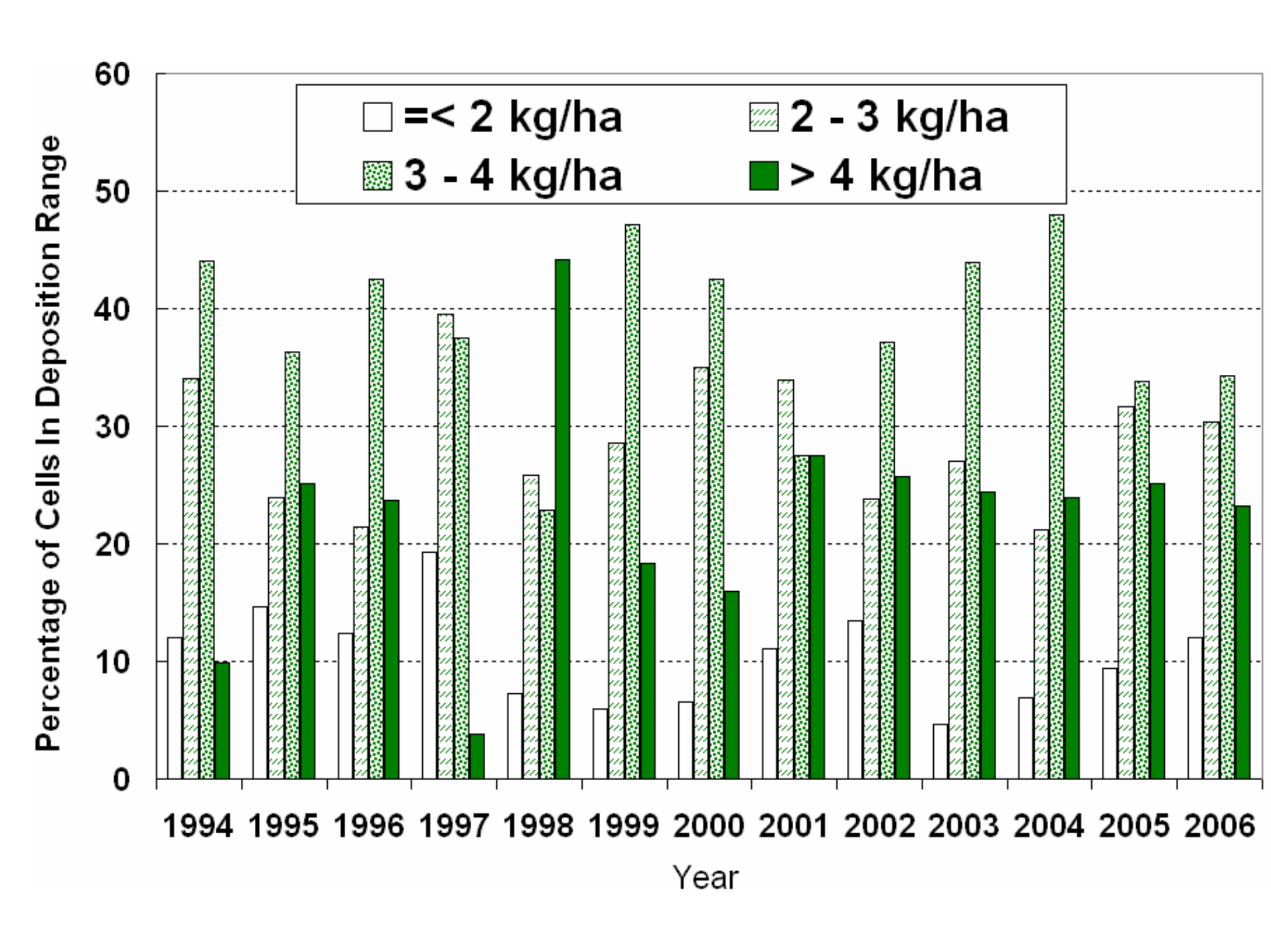
ANNUAL DEPOSITION (kg/ha)

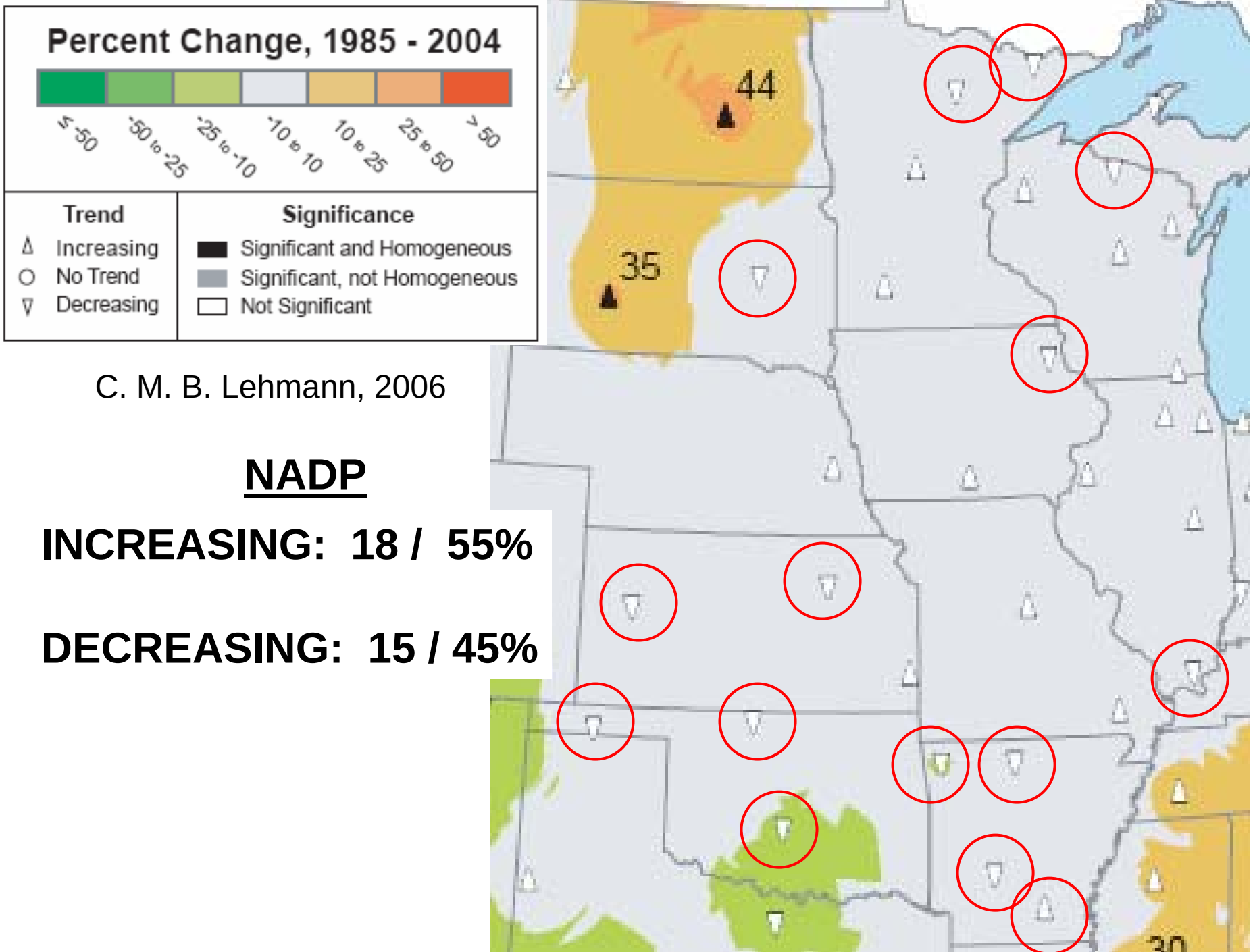
HIGH 11.8

LOW 0.0




Average Ammonium Deposition in Central U.S.
NADP concentration X PRISM precipitation
Total Ammonium Deposition (kilograms per hectare)
4
3
2
1
0
1994
1996
1998
2000
2002
2004
2006
Year


=< 2 kg/ha
2 - 3 kg/ha
3 - 4 kg/ha
> 4 kg/ha
Percentage of Cells In Deposition Range
0
10
20
30
40
50
60
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Year



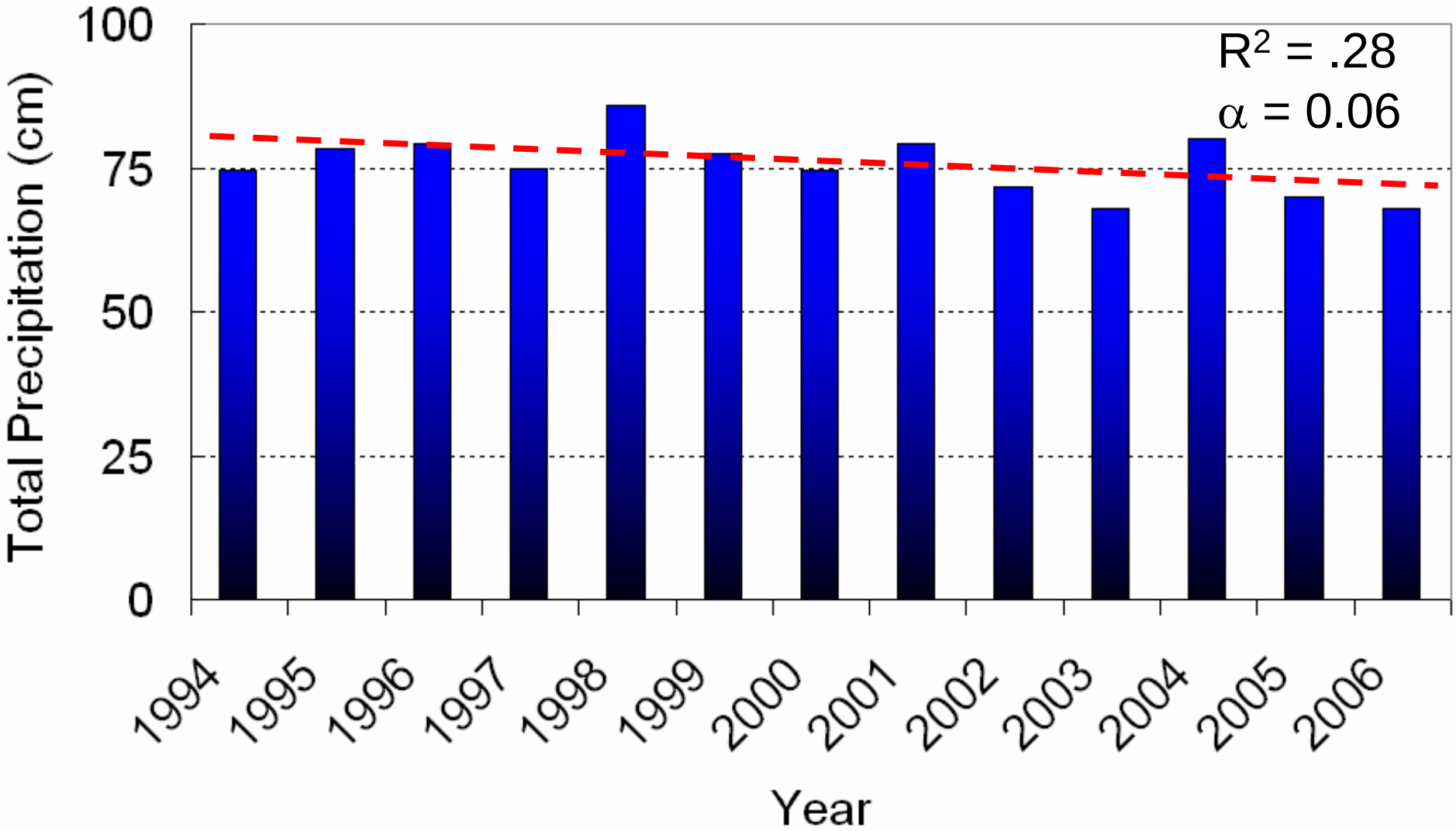
C. M. B. Lehmann, 2006

NADP

INCREASING: 18 / 55%

DECREASING: 15 / 45%

PRISM


Total Precipitation for Central U.S.
R^2 = .28
α = 0.06
Total Precipitation (cm)
100
75
50
25
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Year

CONCLUSIONS

- **DECREASING TREND IN HEARTLAND PRECIPITATION OBSERVED, WHICH…**
- **CONINCIDES WITH INCREASING TREND IN AMMONIUM CONCENTRATION**
- **NO TREND OBSERVED IN HEARTLAND AMMONIUM DEPOSITION DURING 1994-2006 USING GIS METHOD**