

# Harnessing the Sensor Revolution: democratizing environmental data

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Environmental Defense Fund



# Environmental Defense Fund



- Environmental stewardship
- Science-based advocacy
- Market-based solutions
- Drives innovation



# Methane Detectors Challenge – Innovation<sup>2</sup>

## Define user needs, pilot technology



## Convene and catalyze



## Innovate!

- Colorado start-up (Quanta3)
- Fortune 500 company (Honeywell w/SenseAir)
- Chinese laser company (Dalian Actech)
  - Academic (U of Colorado w/NDP)

## Advise



...and more...

# Methane Detectors Challenge

- **Industry/EDF-driven innovation challenge for technology developers**
- Technology gap for cost-effective, continuous methane detection
- Estimated market size: \$200+ million<sup>1</sup>
- **For developers:** opportunity to get out in front with solutions for early adopter customers, define and drive new market
- **For O&G sector:** first-look, first adopters of cutting-edge technologies
- Seven oil and gas companies represented (e.g., Shell), accounting for **>\$350 Billion combined market cap**



<sup>1</sup> Assumes 20% market penetration of 1,000,000 US oil and gas wells, at \$1,000+ per detection system. Market expands with non well applications (e.g., compressors, pipelines), and international markets



# Bringing Tech Innovators to the Oil and Gas Fields of South Texas



Putting our finger on potential emission sources...



...and checking out command central, where remote monitoring could occur...



...while getting a first glimpse of a potentially promising *handheld*, laser based detector

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# Approach and inputs



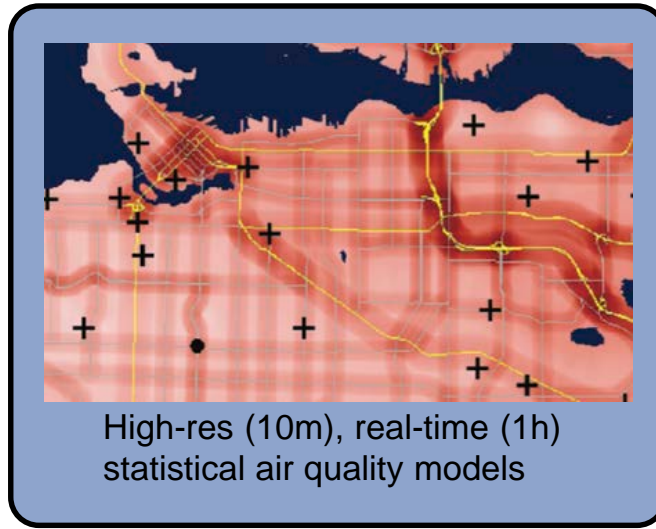
Regulatory monitoring



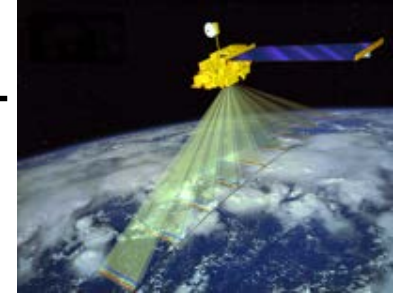
Autonomous sensors



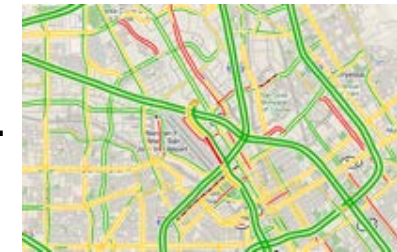
Mobile Monitoring



High-res (10m), real-time (1h) statistical air quality models



Satellite remote sensing



Real-time traffic data



Geospatial data:  
Urban geometry, population

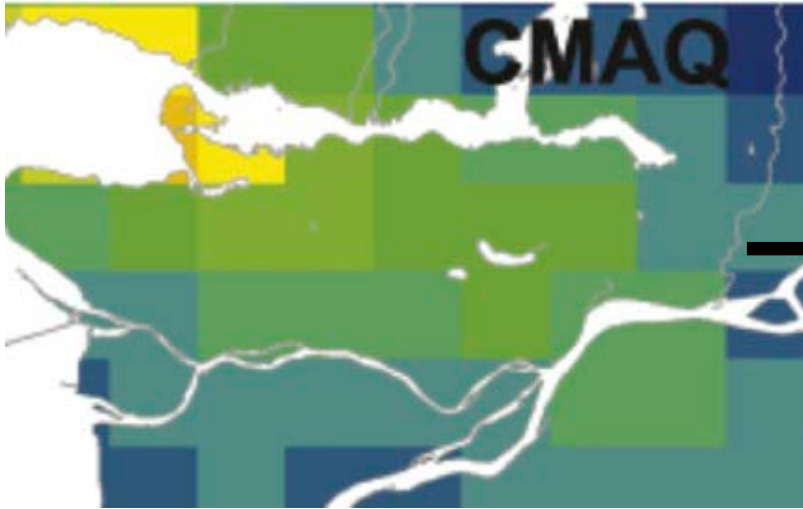


Street-level imagery

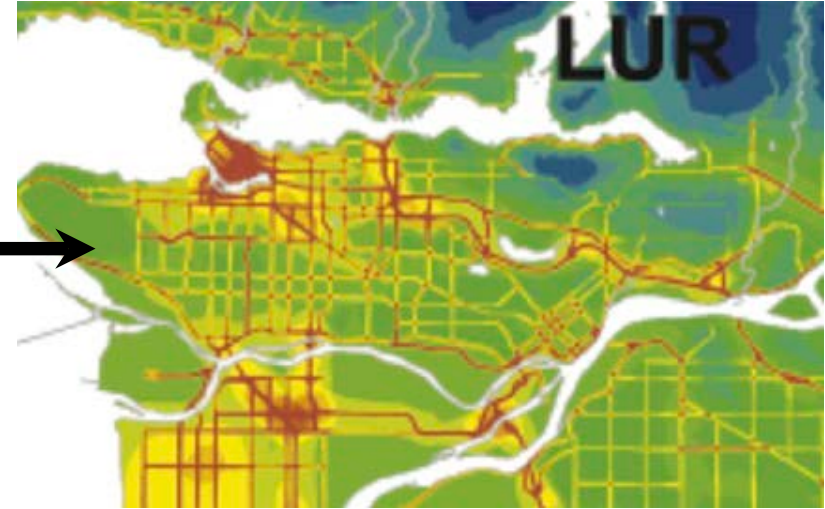


# Vision: Big Data for Air Quality

Physics-based AQ models have poor resolution



Statistical models can predict AQ at street level



**Goal:** Real-time, high-resolution maps of urban air quality

- Approach: mobile monitoring and distributed sensors inform real-time models
- Apply data to inform...
  - the public via cellphone apps: where are levels high?
  - management and policy: identify new priority areas for control
  - environmental health science: improve understanding of relationship between emissions, exposures and health effects of urban air pollution

From J. Apte



Google maps  
Street View

[google.com/streetview](http://google.com/streetview)



Donate now

Climate and energy

- ▶ The problem
- ▶ Cleaner, smarter energy
- ▶ Stronger laws and policies
- ▶ Private-sector partnerships

EDF Climate Corps

Work with labor unions

▶ Maps of natural gas leaks

Why leaks are a problem

- ▶ How to fix the problem
- ▶ City snapshots
- ▶ How this data is different

About the partnership

- ▶ Global initiatives
- ▶ Policy and resources
- Our experts

Oceans

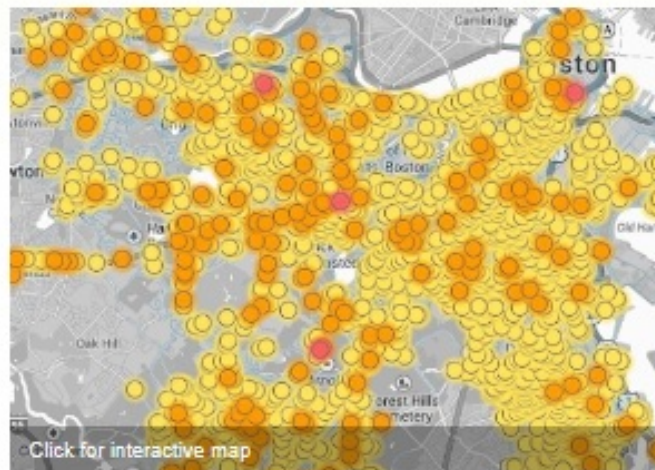
Ecosystems

# Natural gas: Local leaks impact global climate

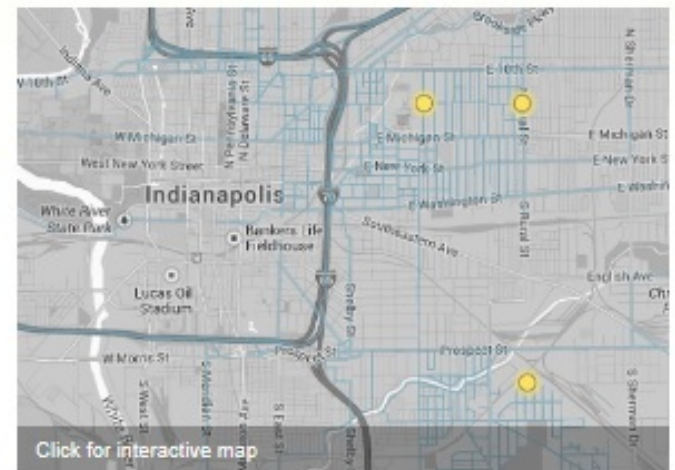
## EDF and Google Earth Outreach use new approach to pinpoint climate pollution

Natural gas heats our homes and cooks our dinner. But when natural gas—mostly methane—leaks into the air, it's a big problem for the climate. So EDF and Google Earth Outreach teamed up to build a faster, cheaper way to find and assess leaks under our streets and sidewalks. We tested it as part of a pilot mapping program, and here's what we found.

### Boston: Older pipes, more leaks



### Indianapolis: Newer pipes, fewer leaks

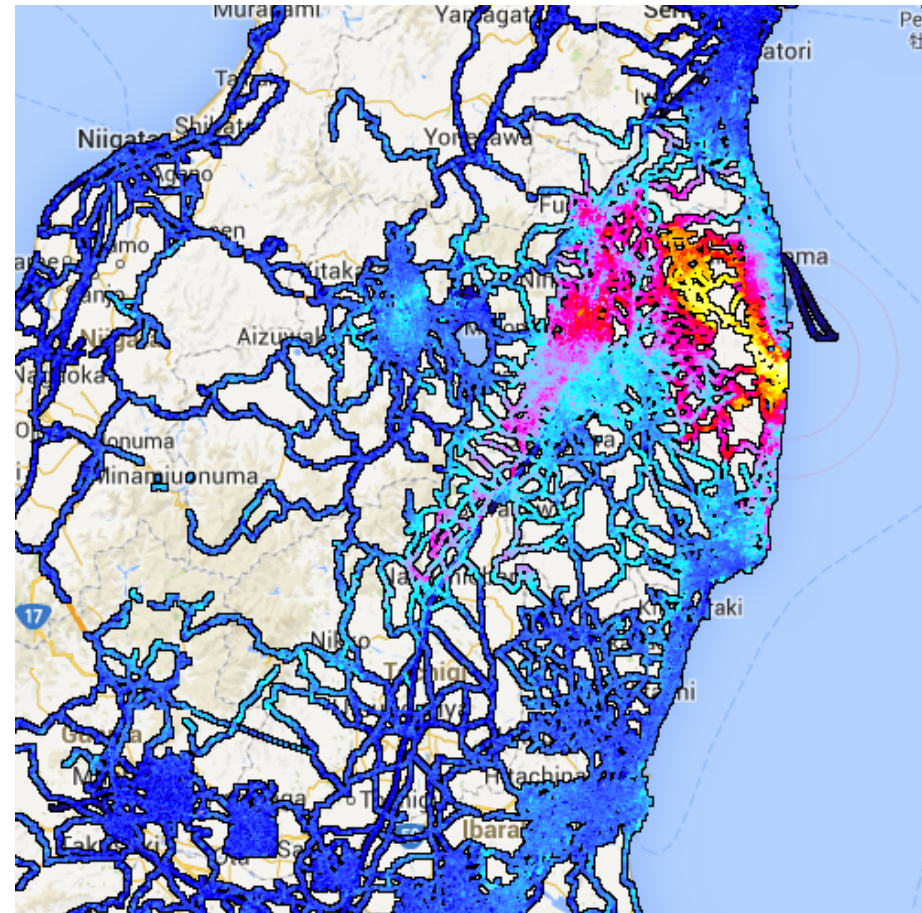
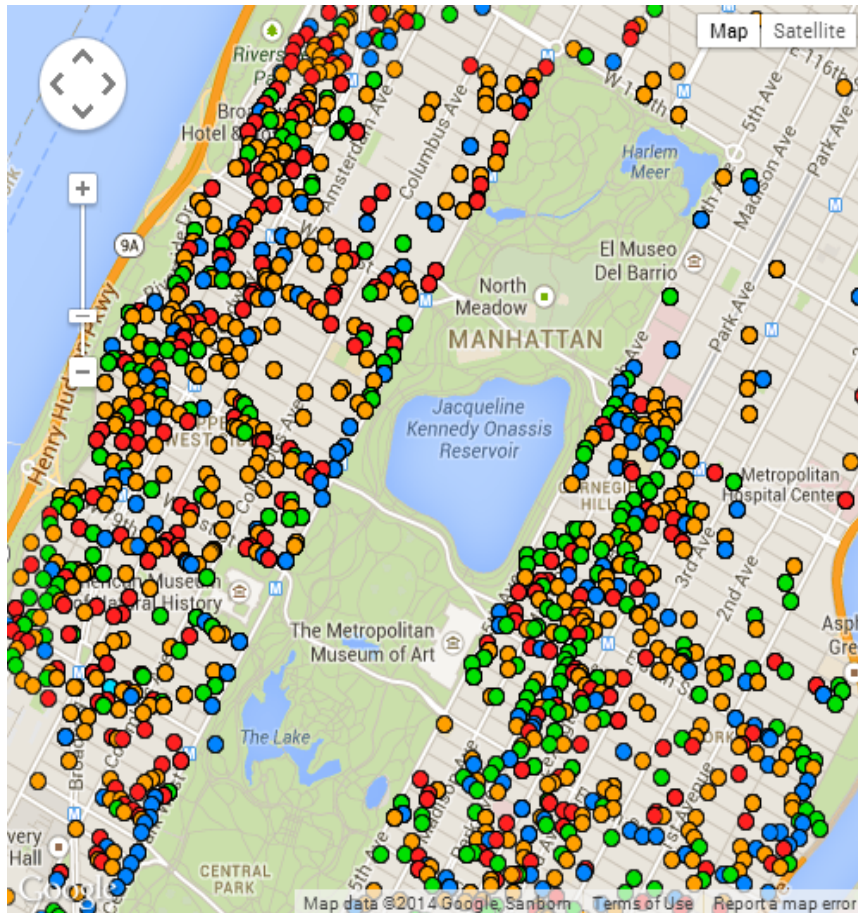




# Sensor Revolution

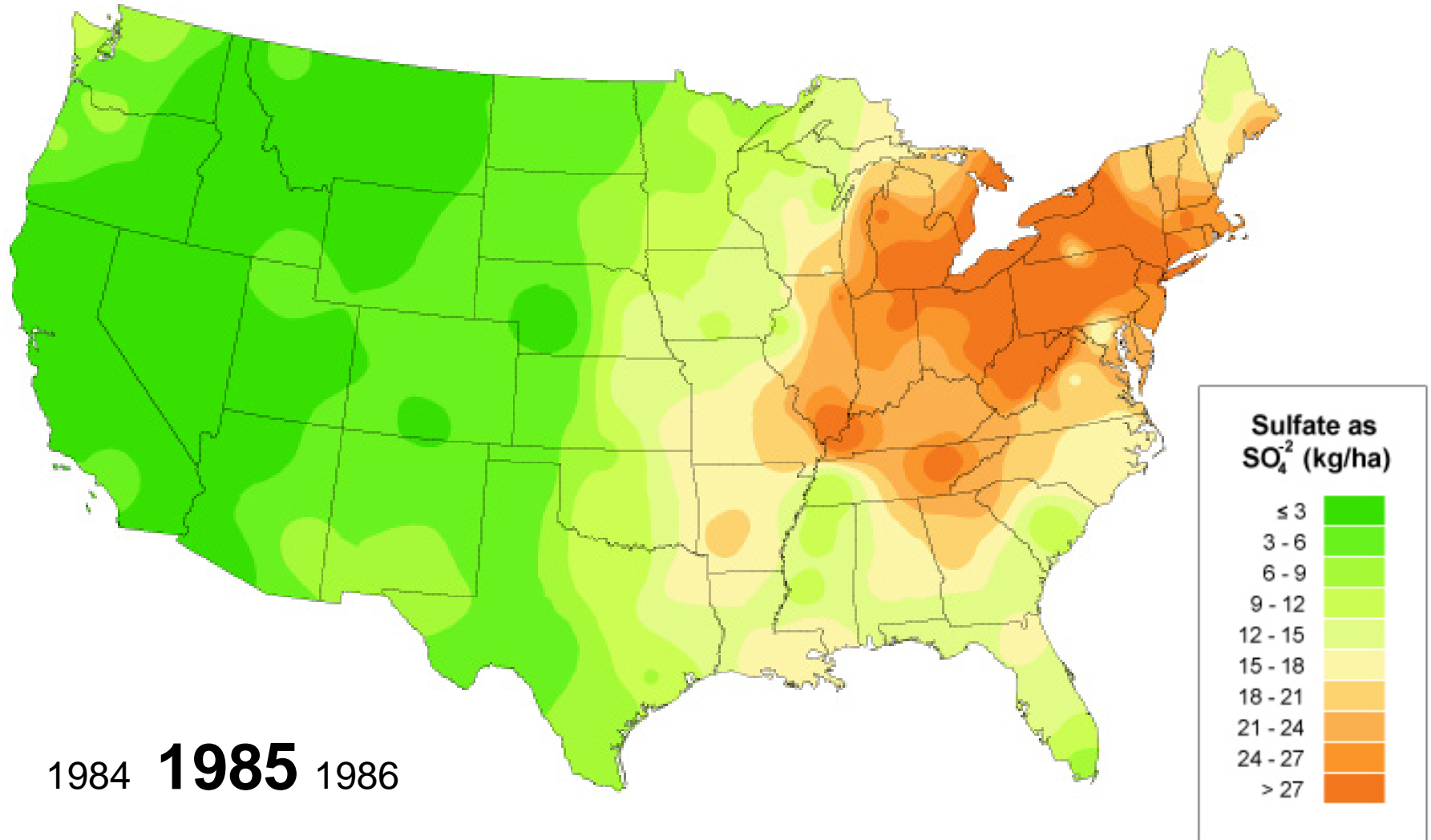
NYC Clean Heat

Safe Cast

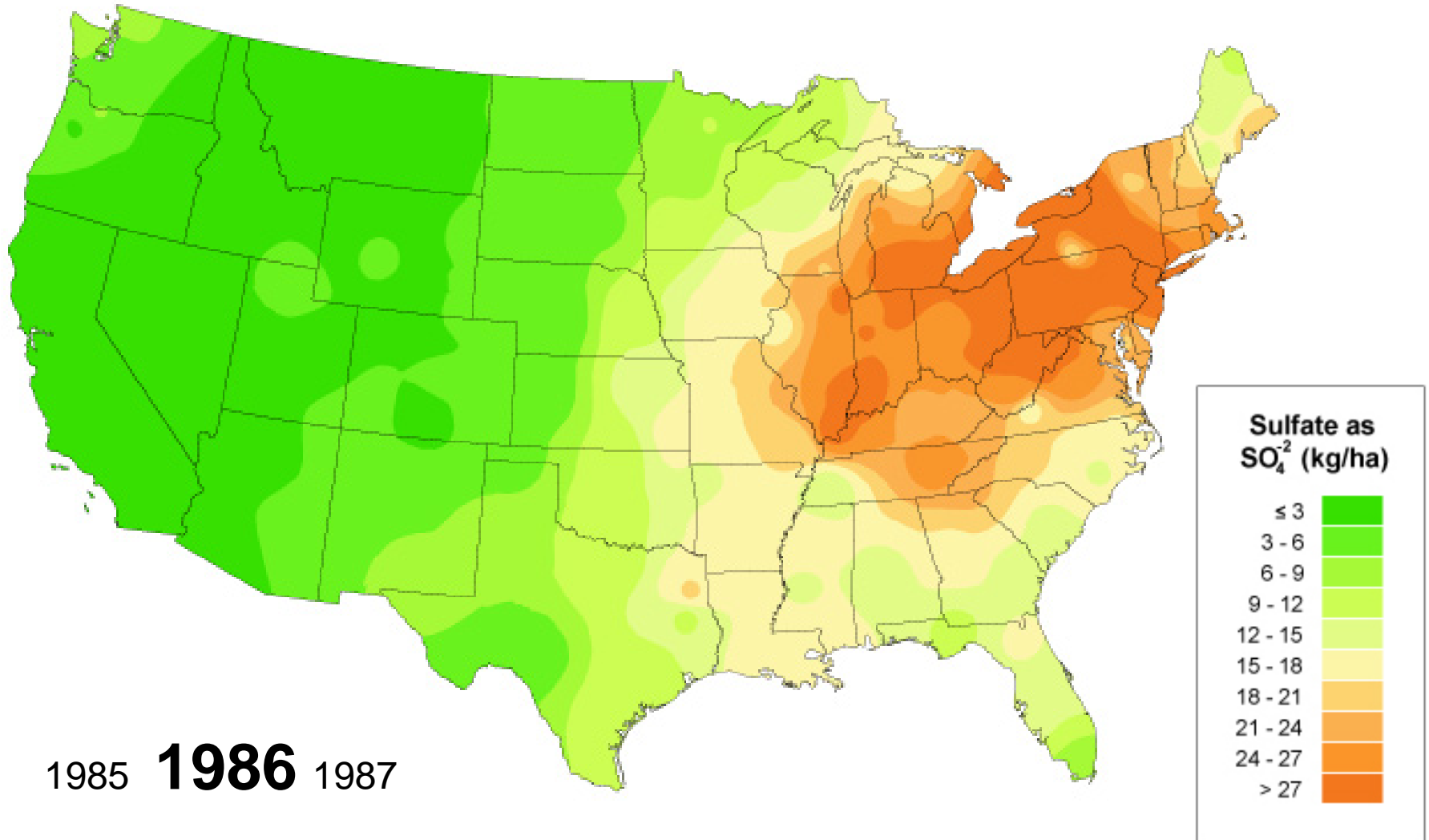




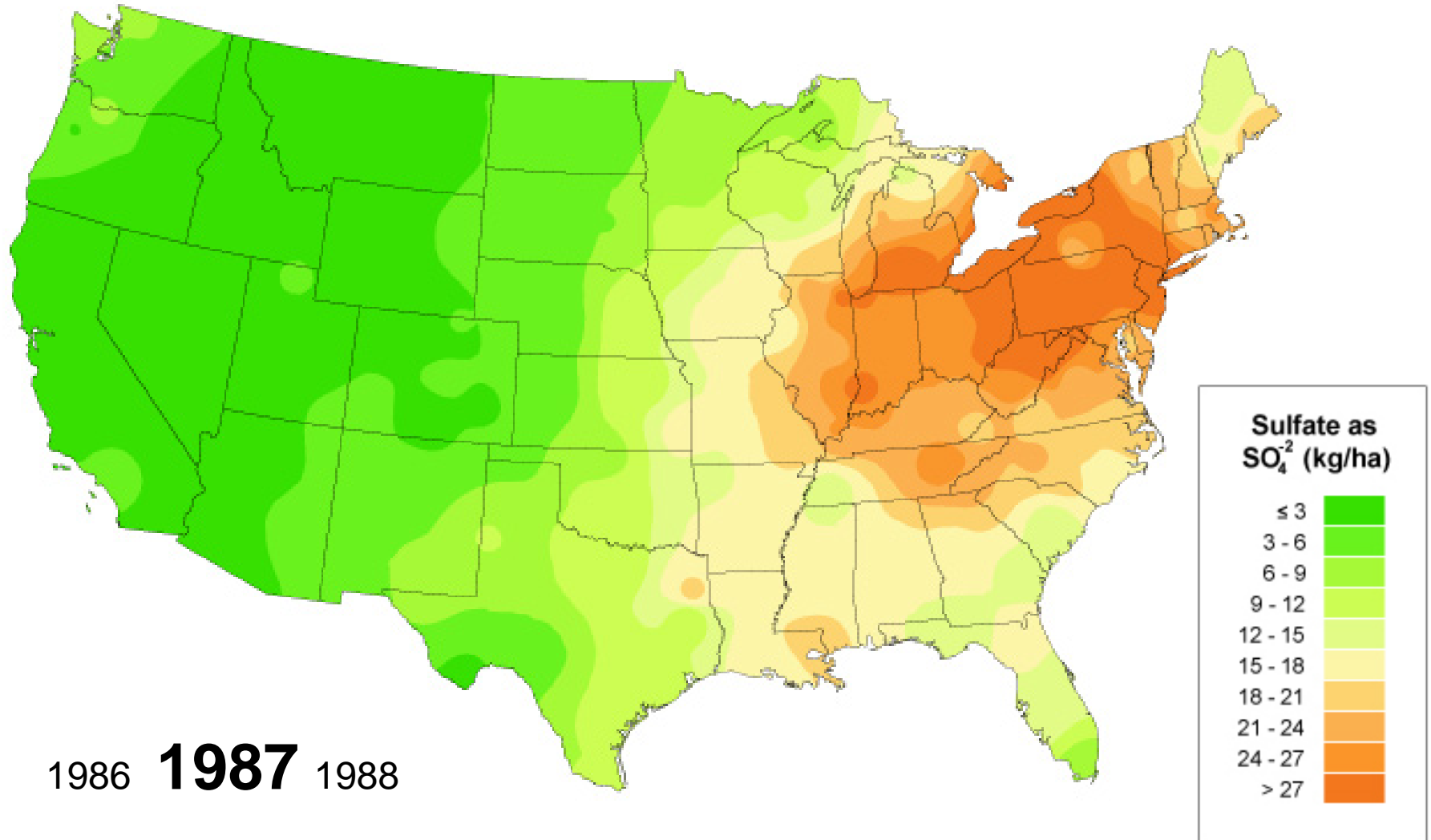
# Sulfate Ion Wet Deposition 1985-2008



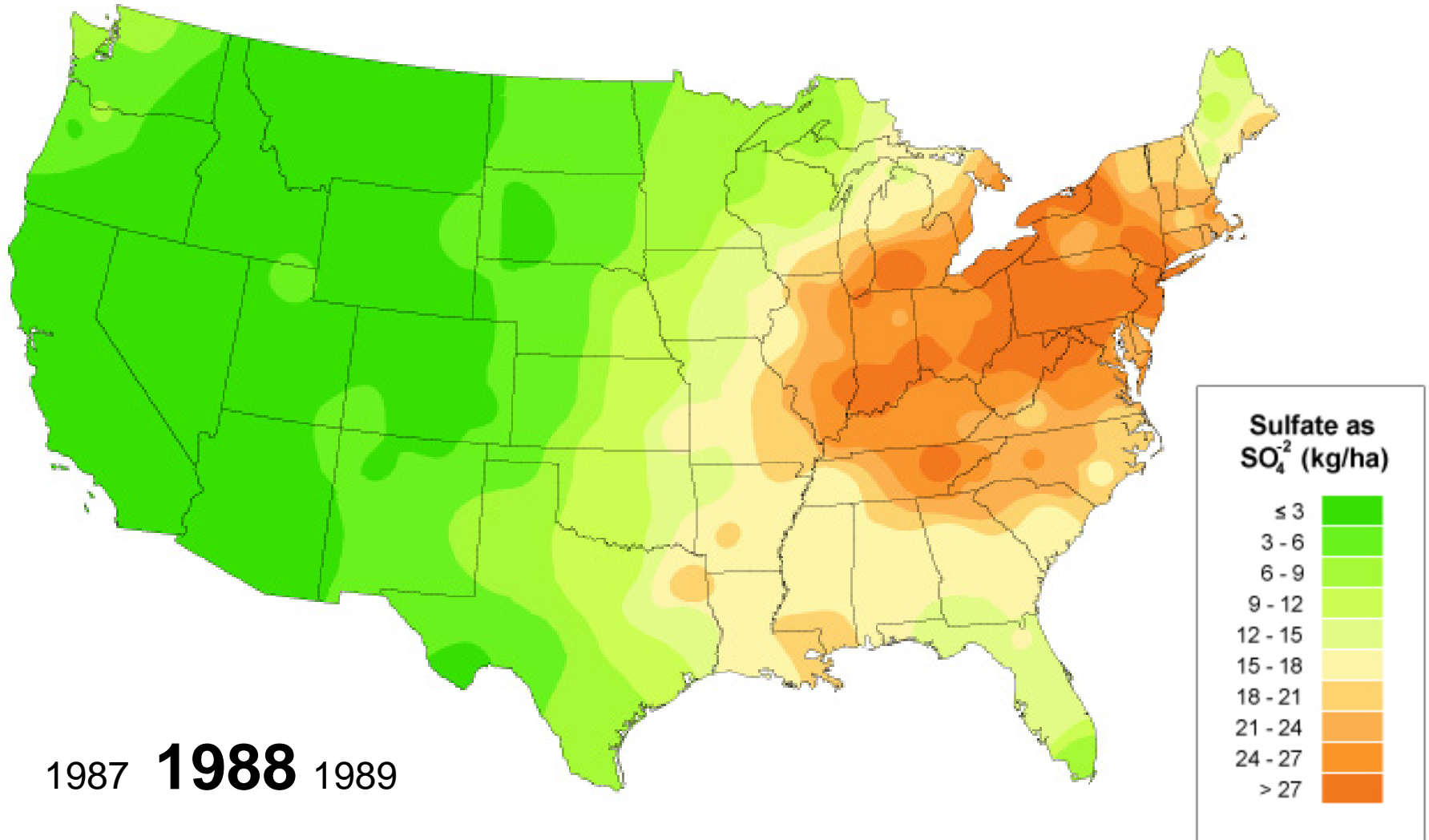
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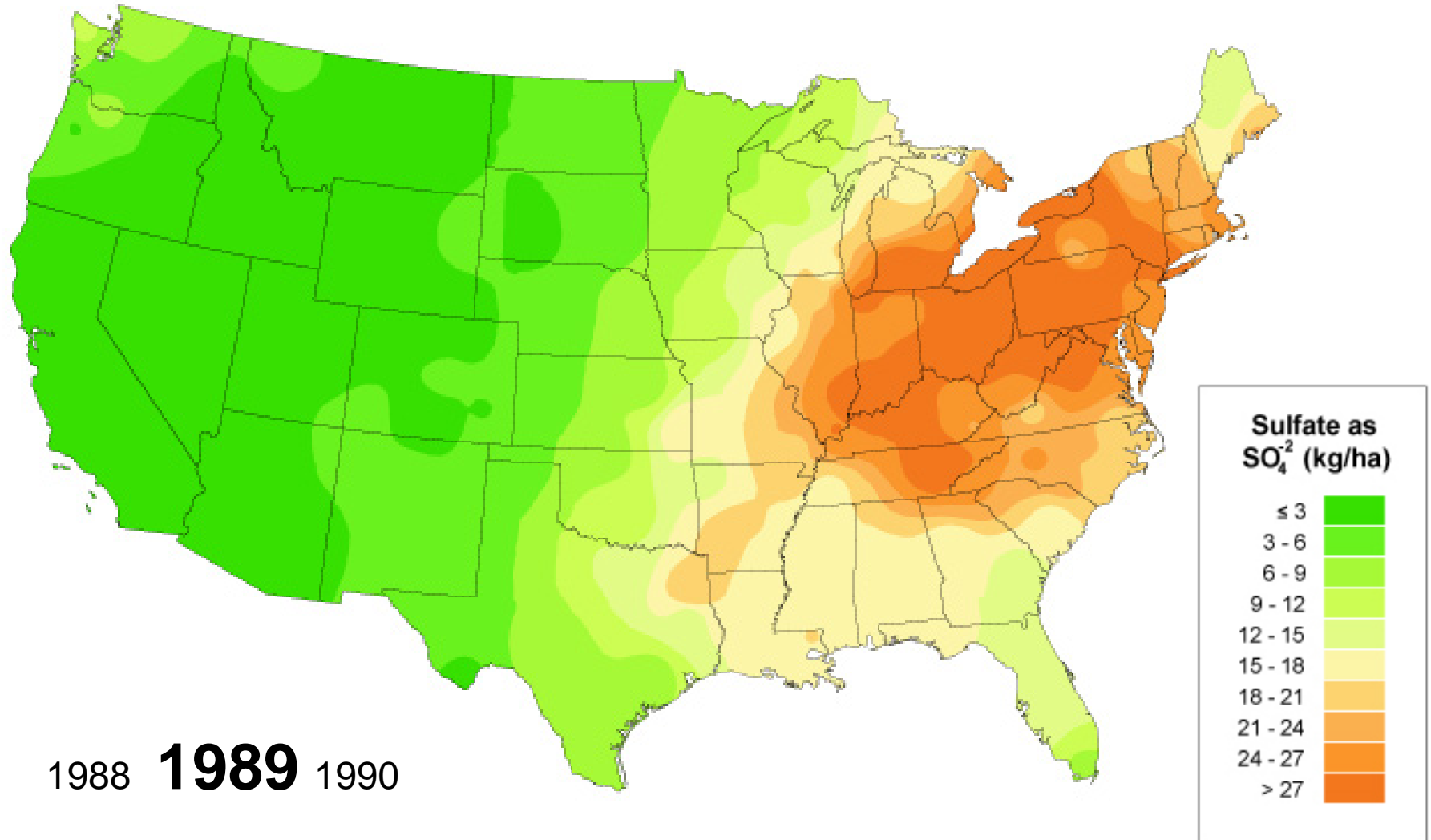
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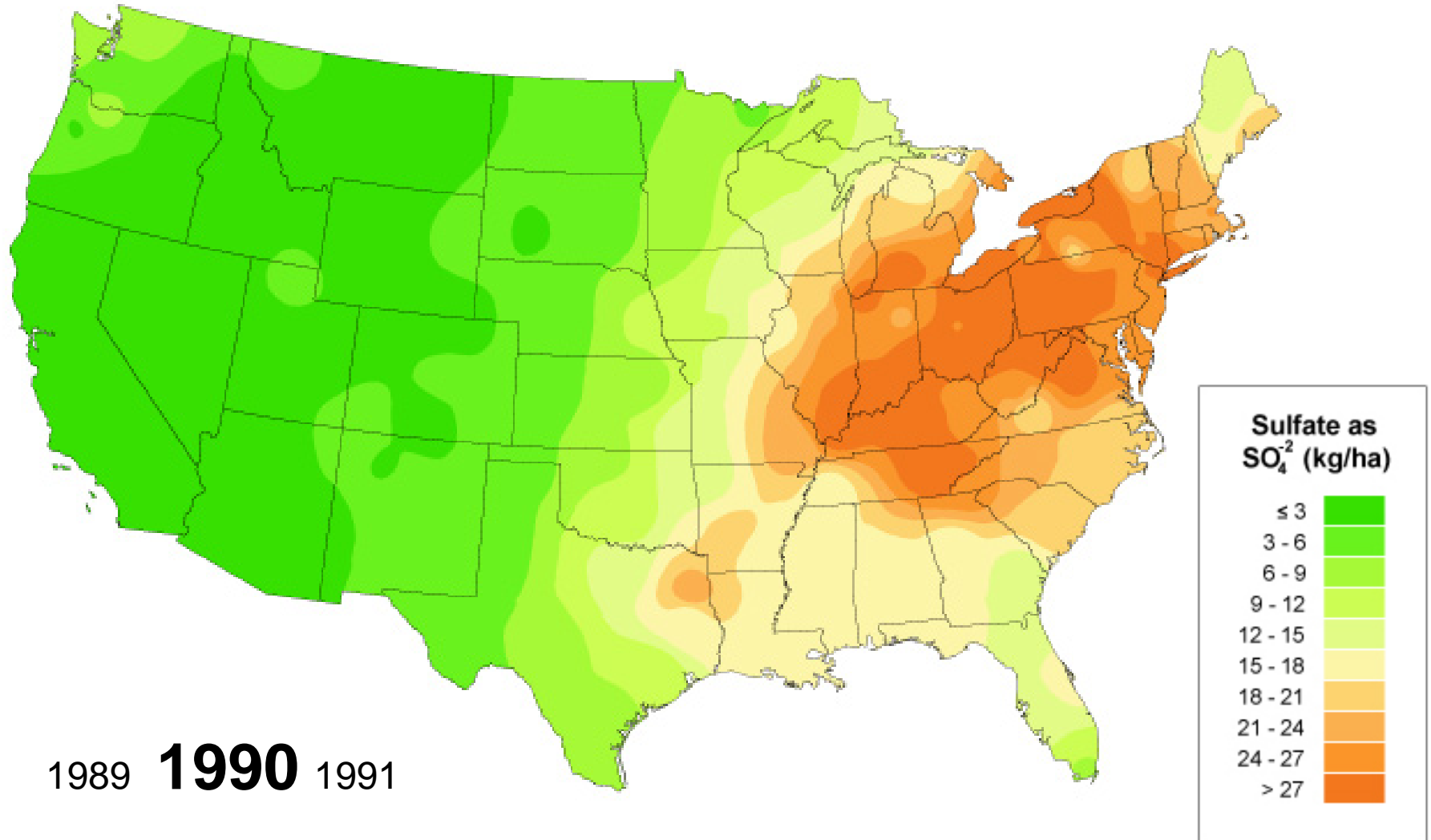
1987 **1988** 1989



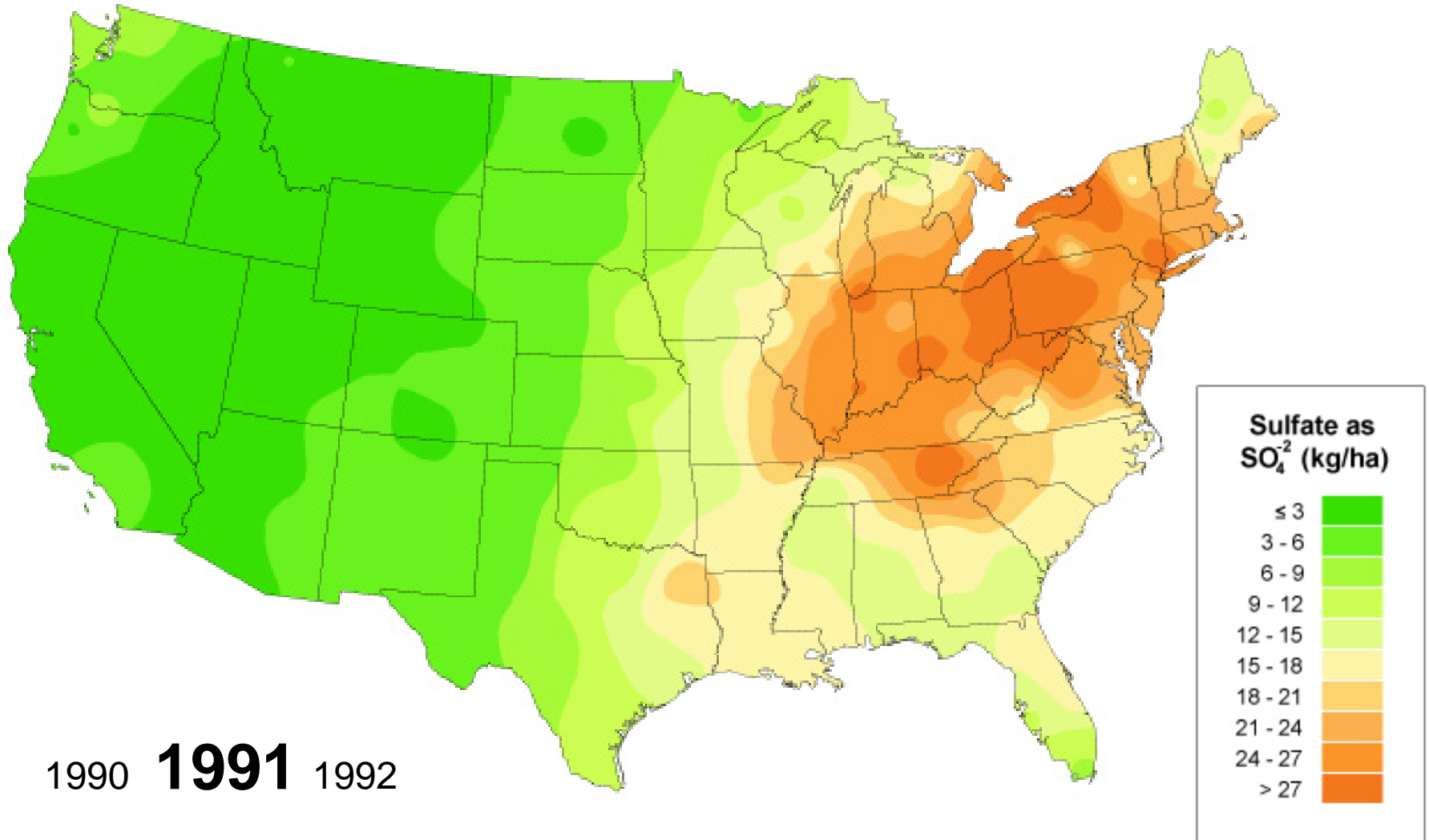
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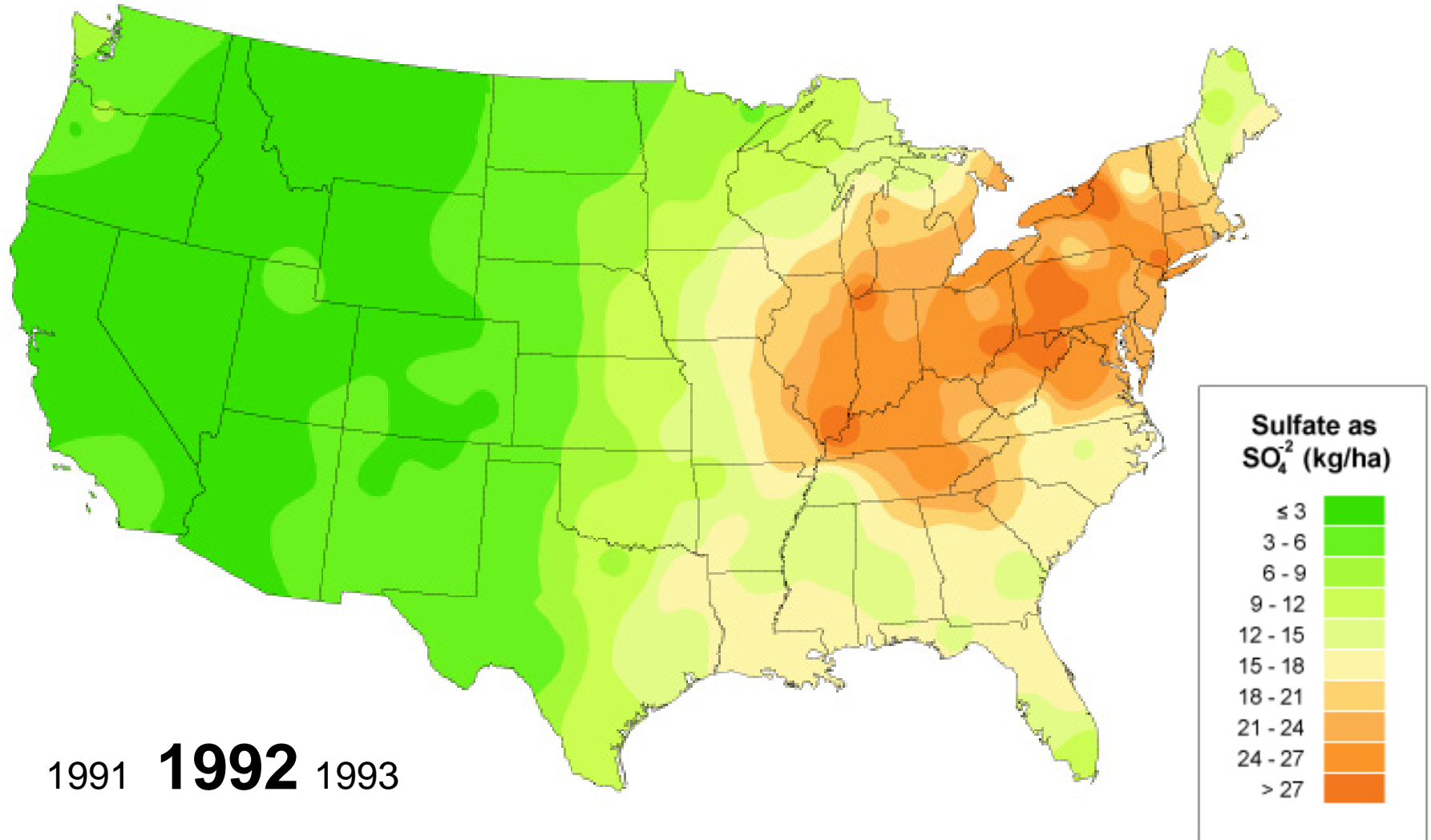
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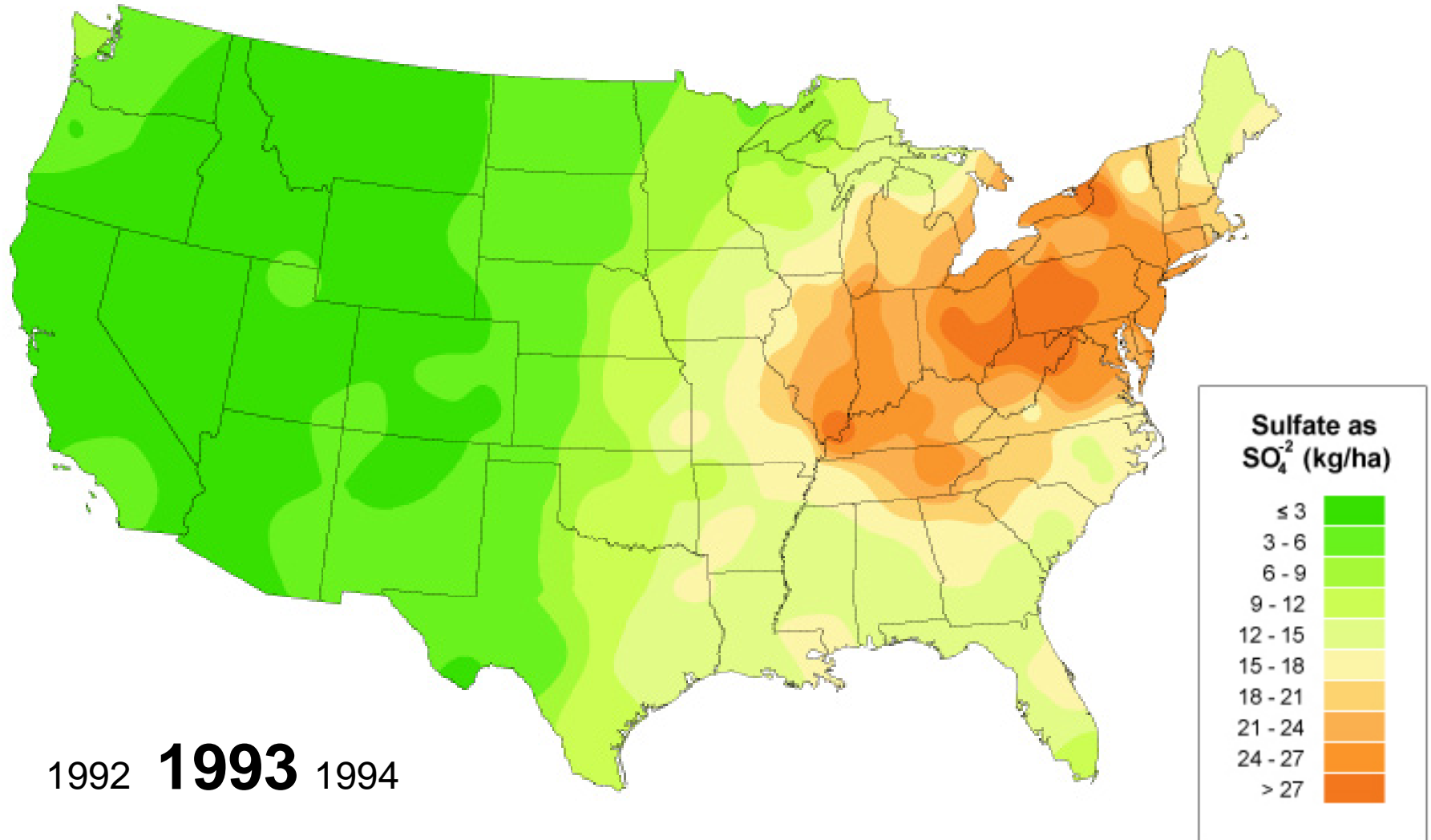


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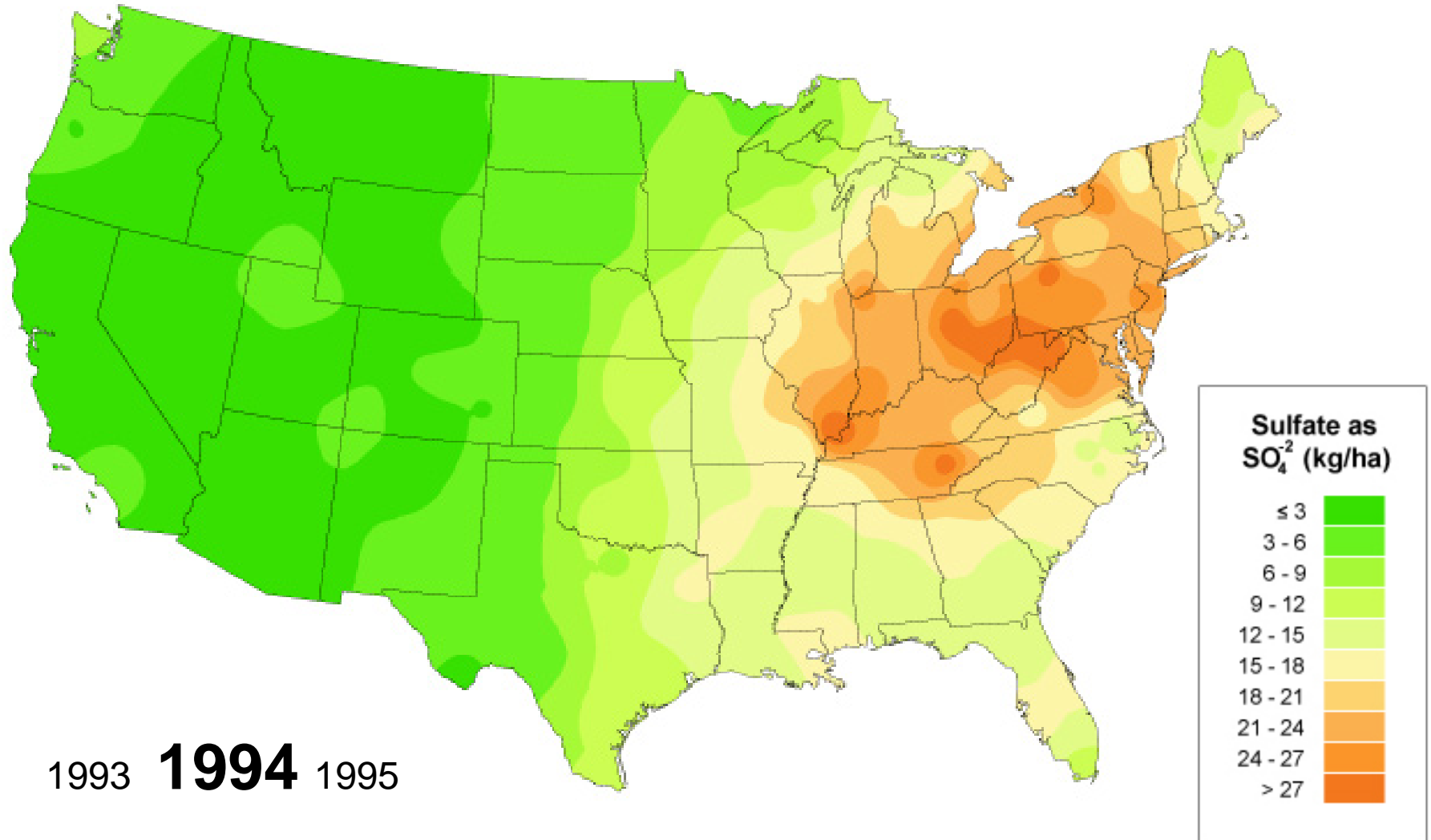




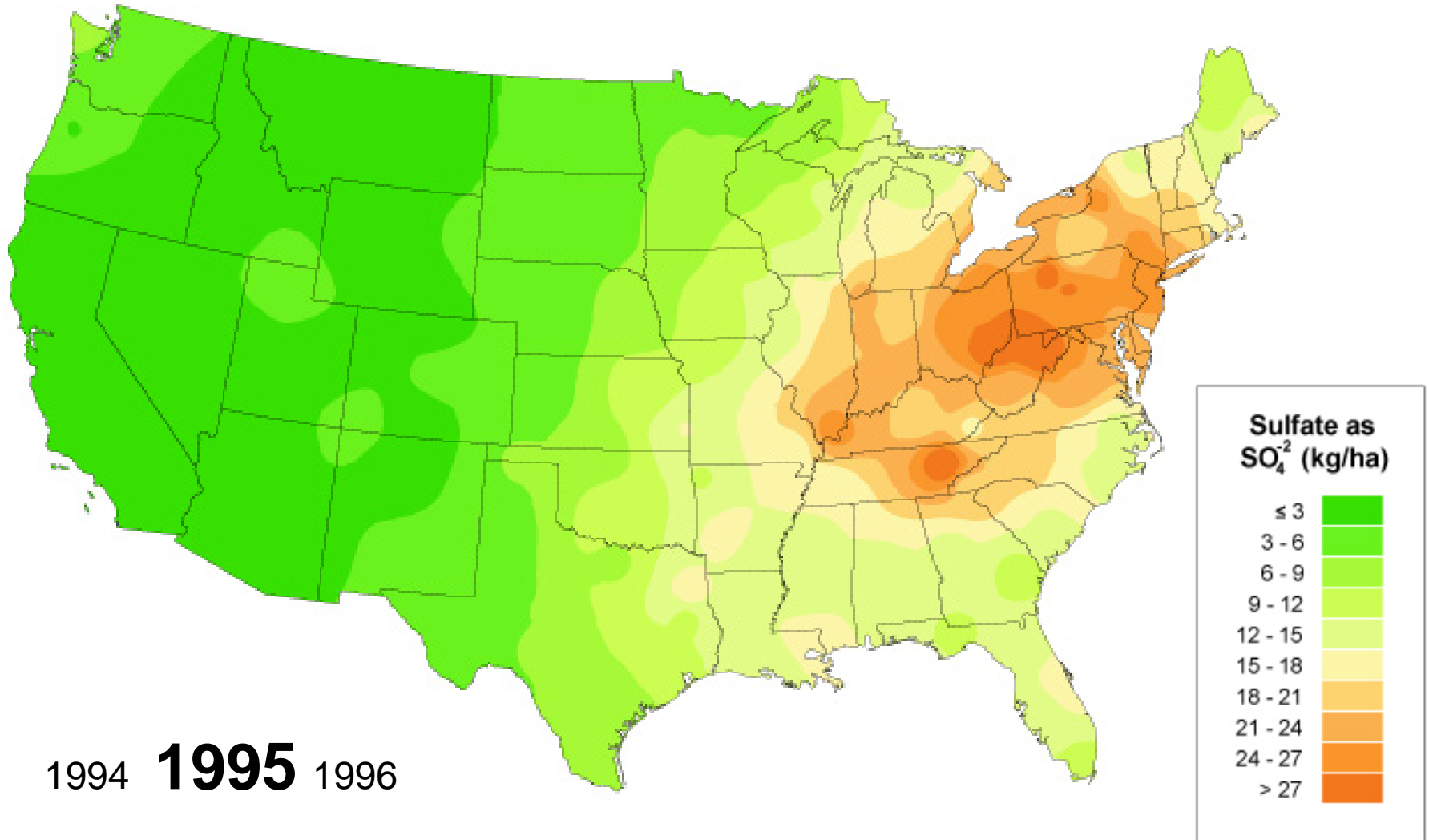
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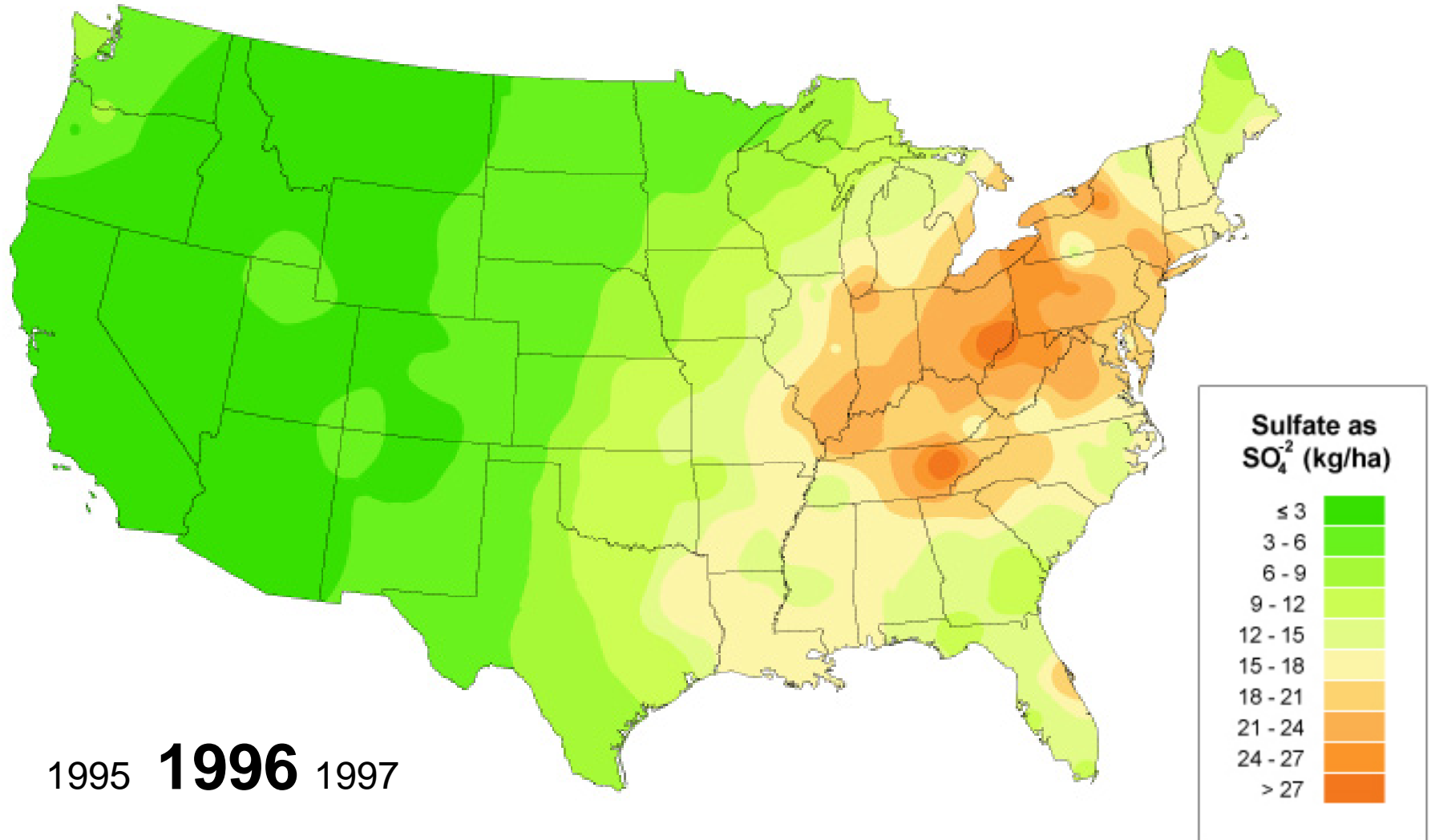
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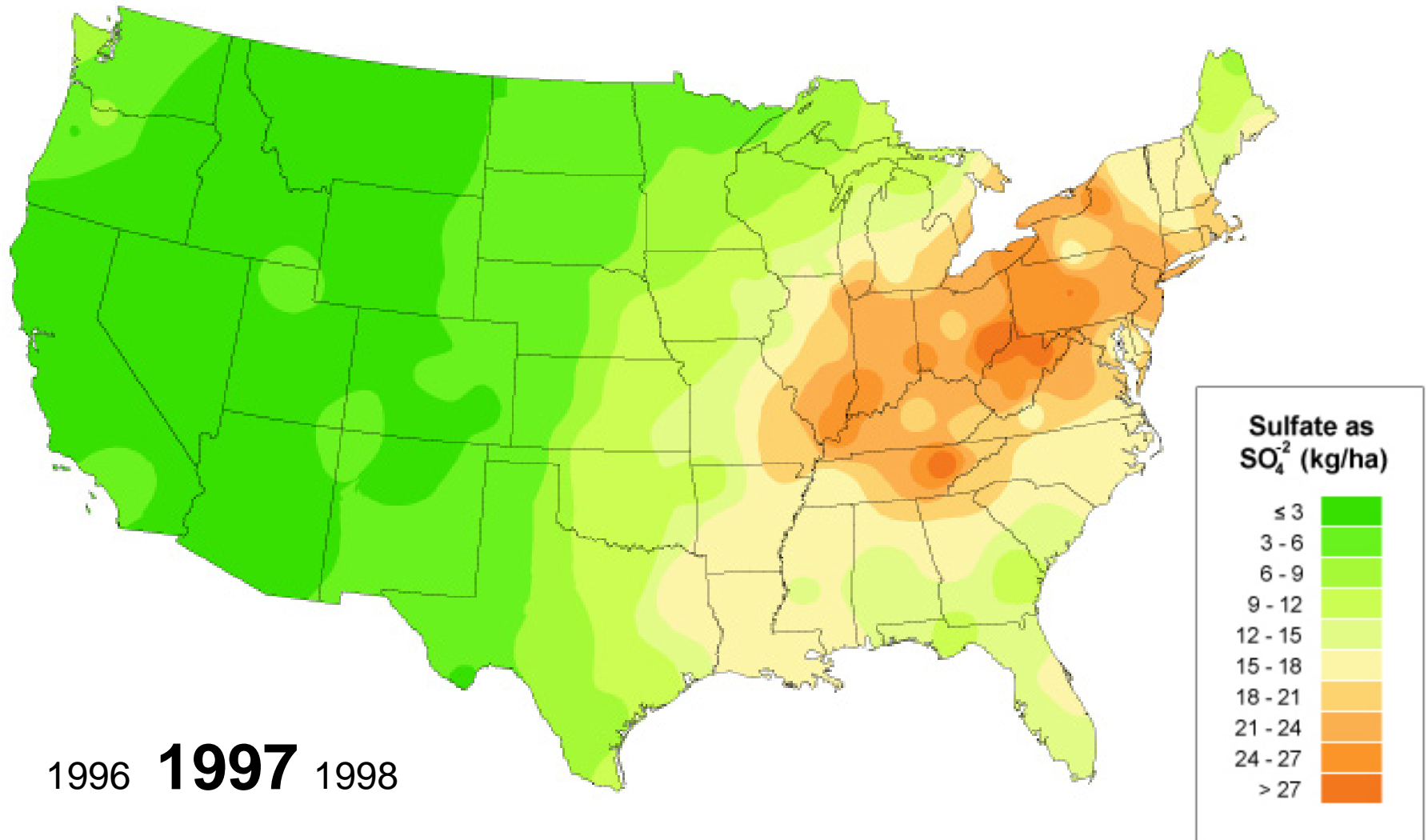


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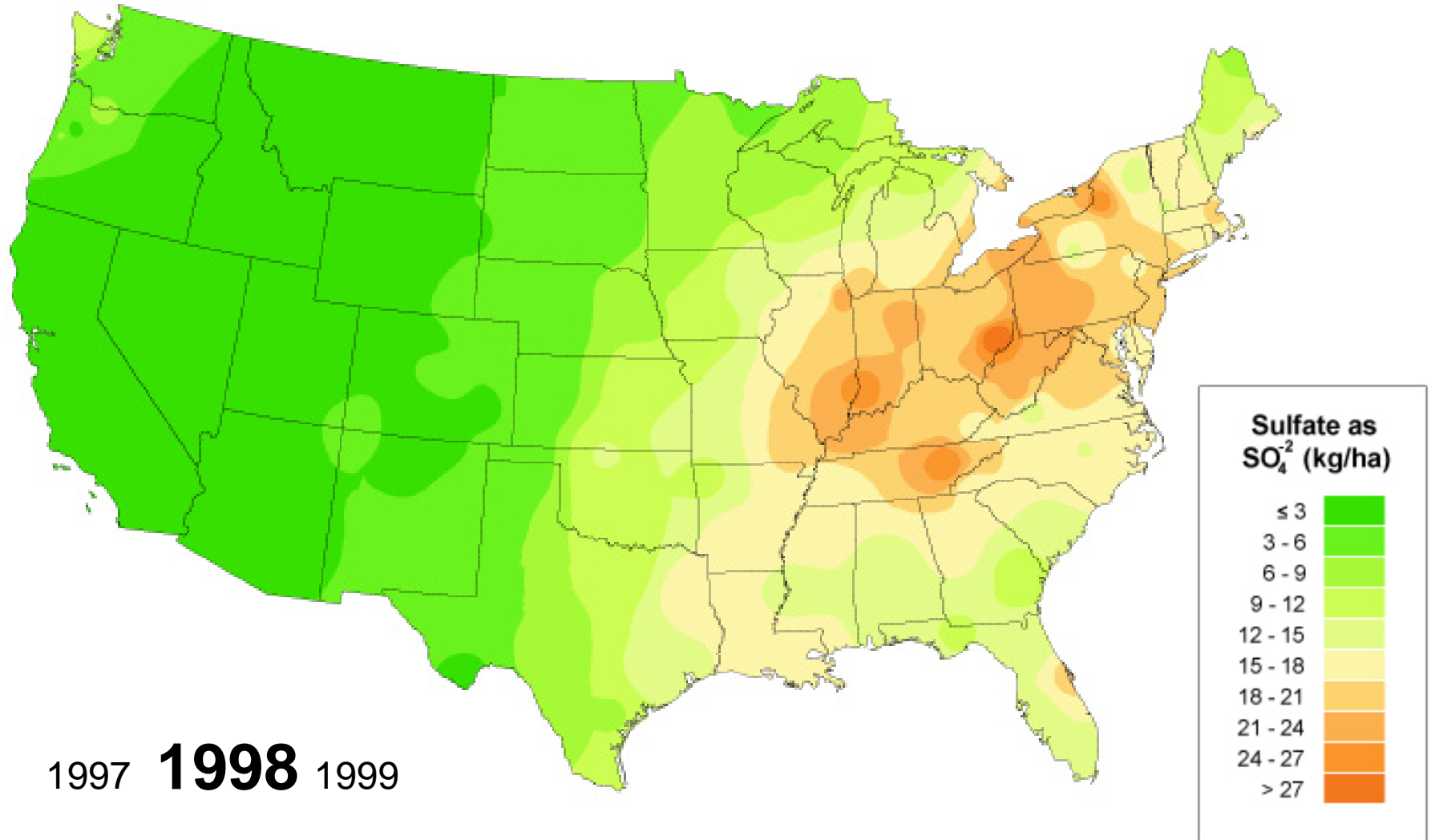




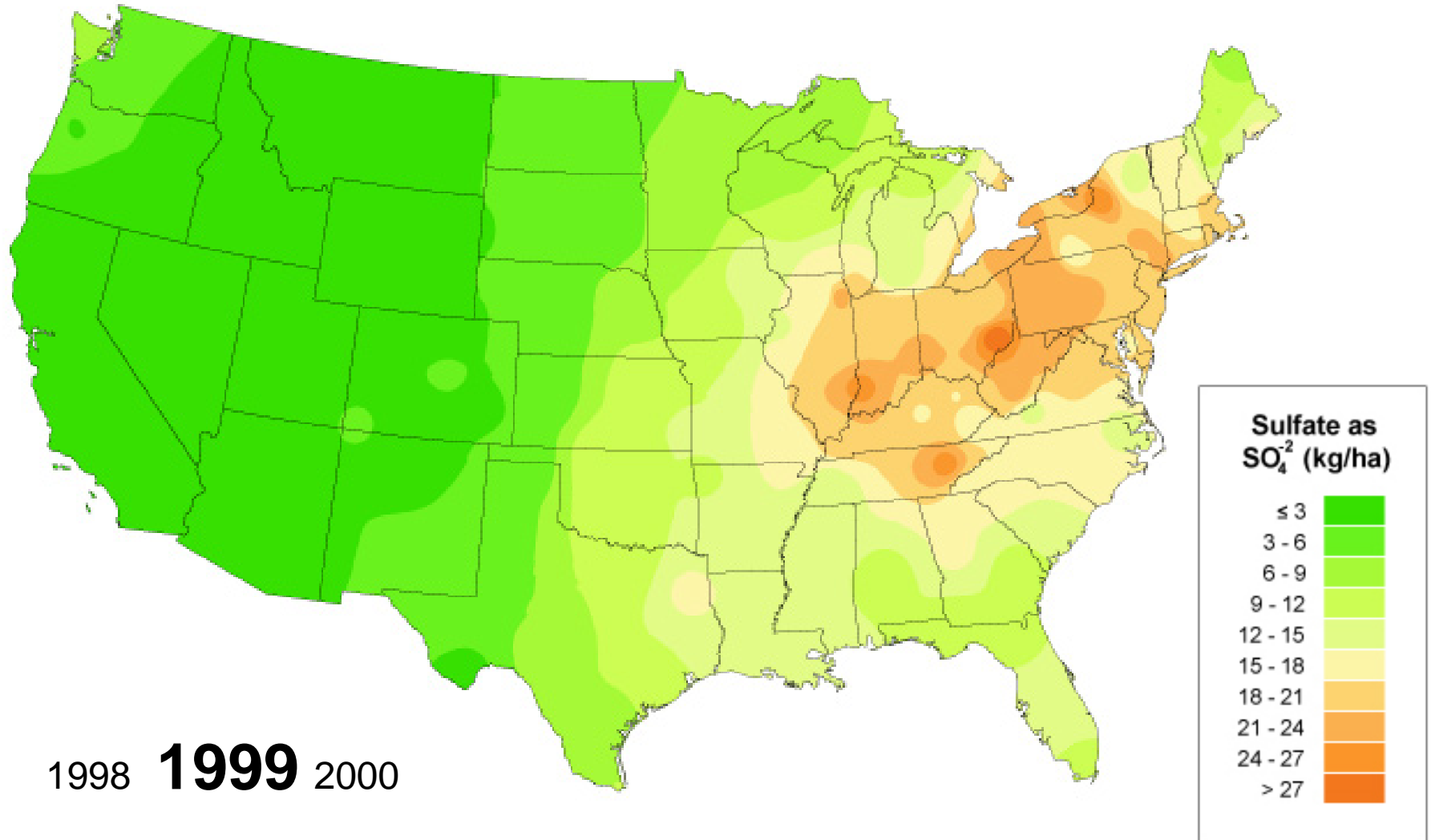
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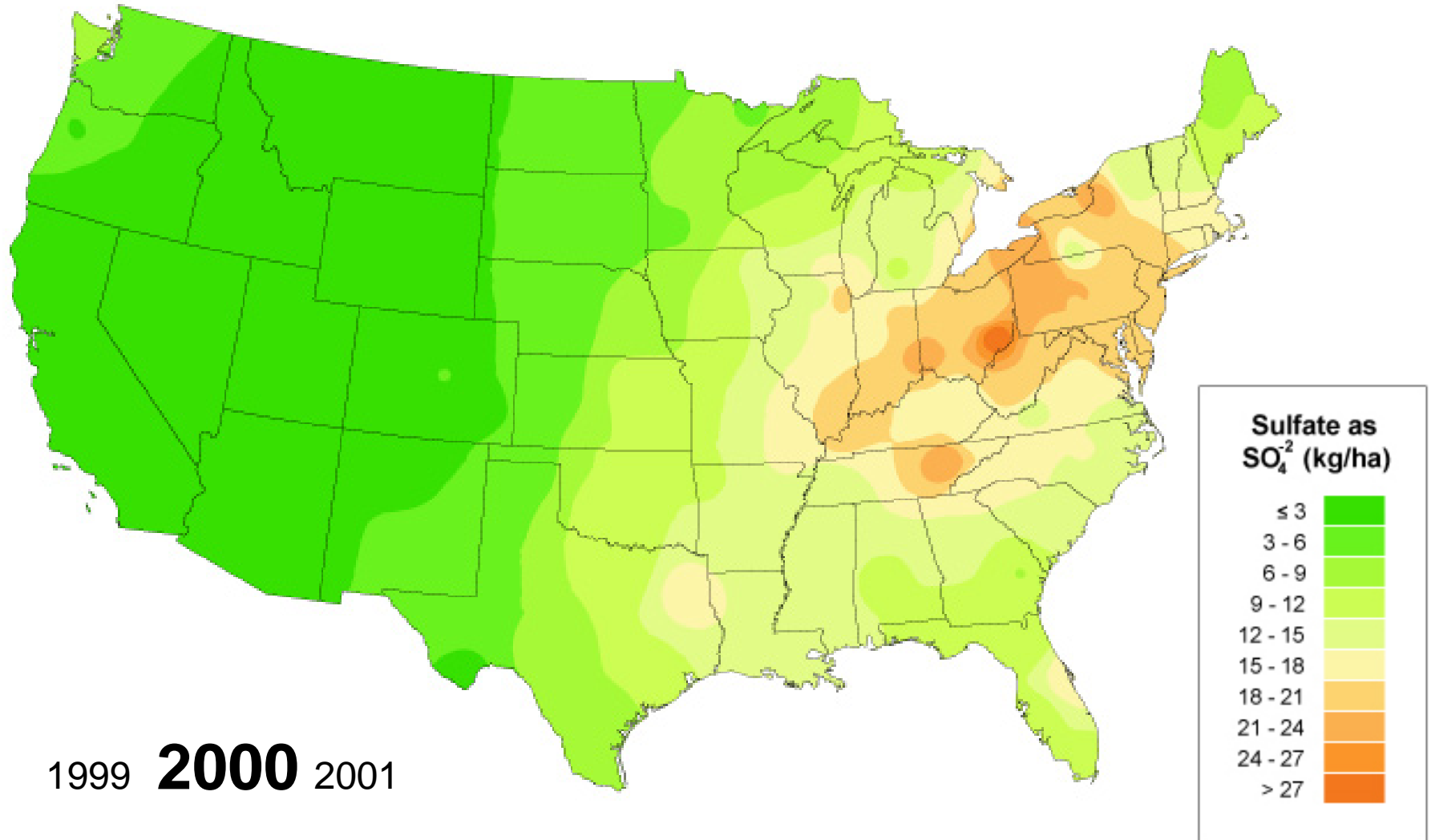
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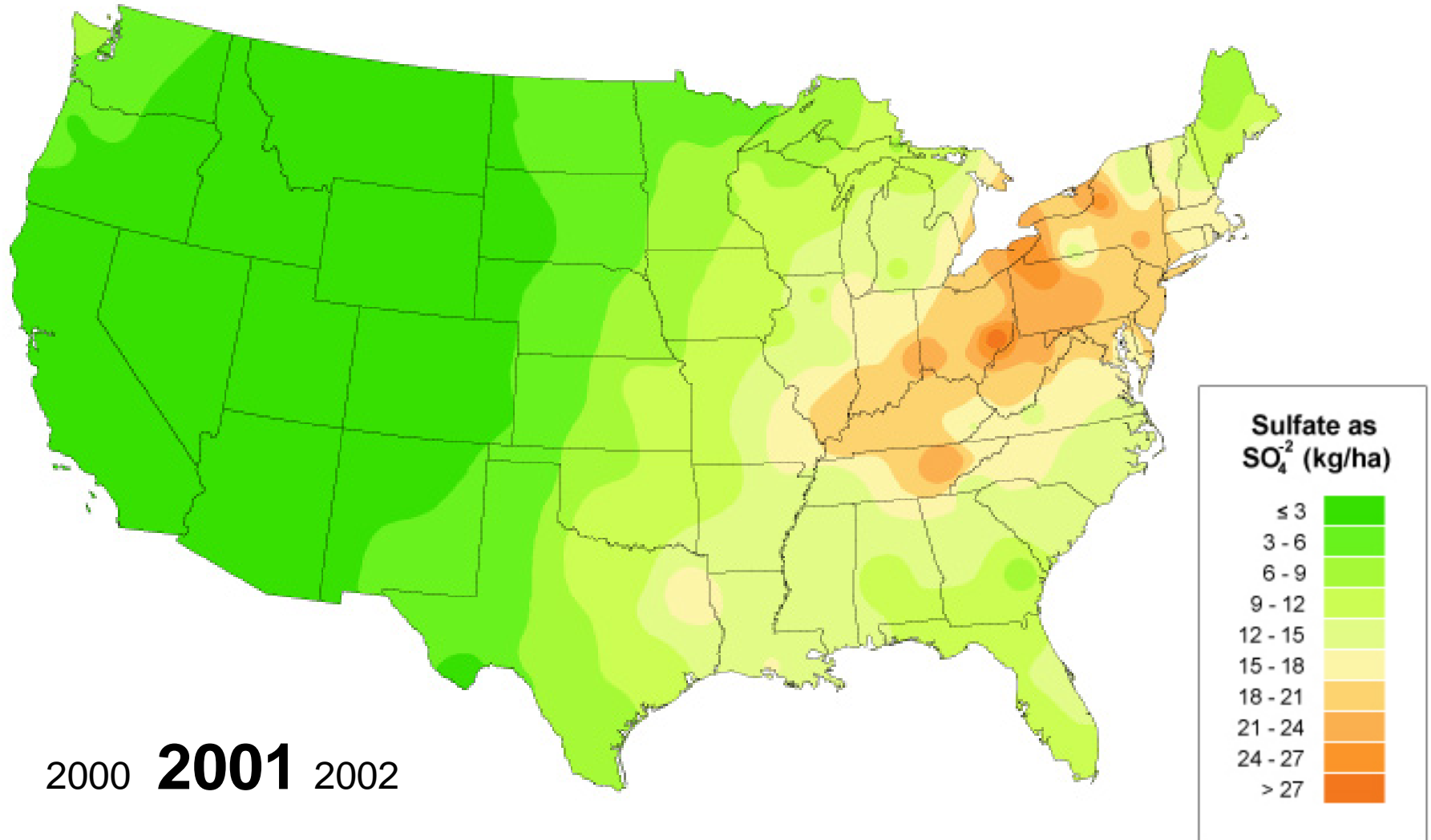
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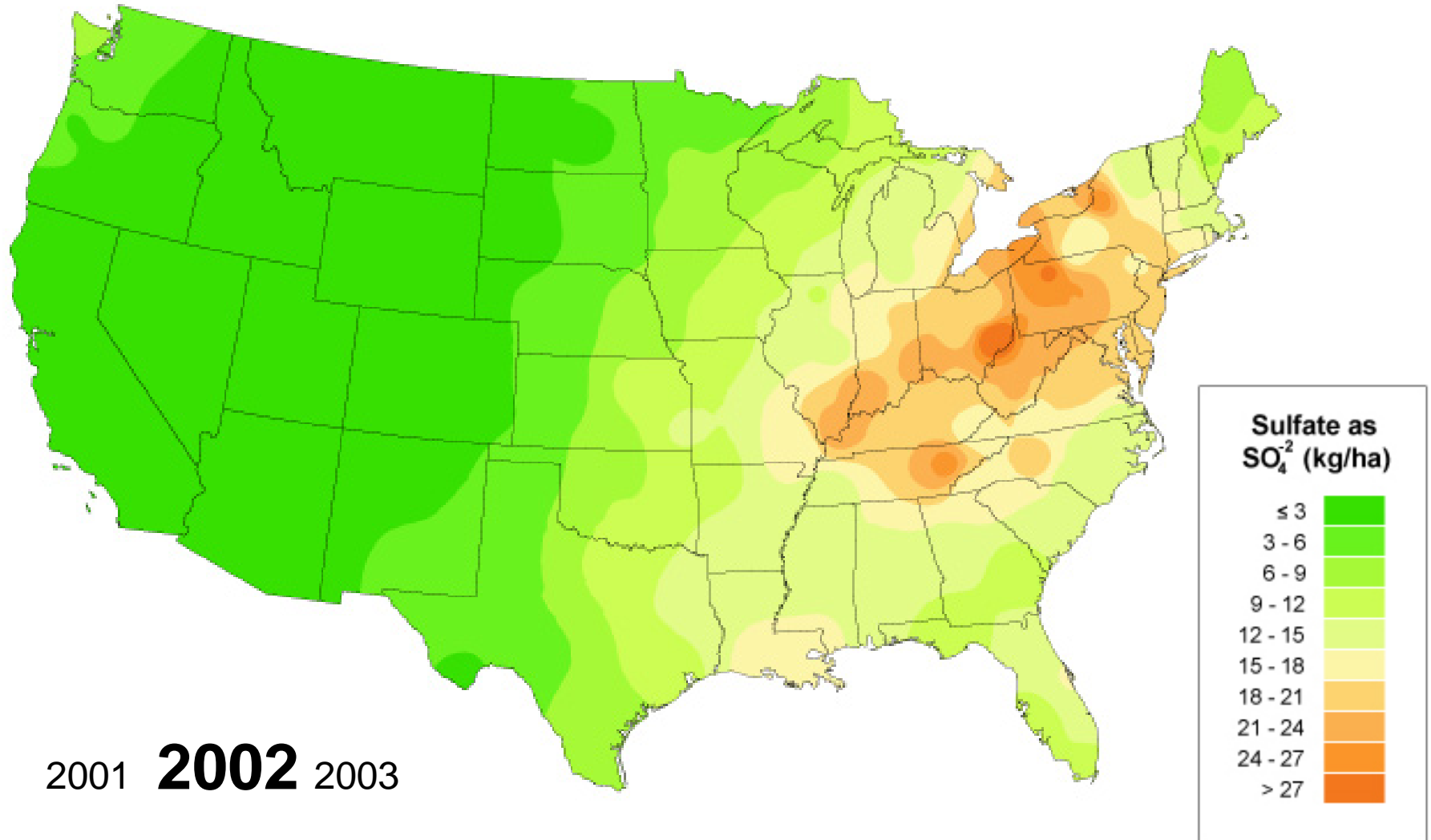
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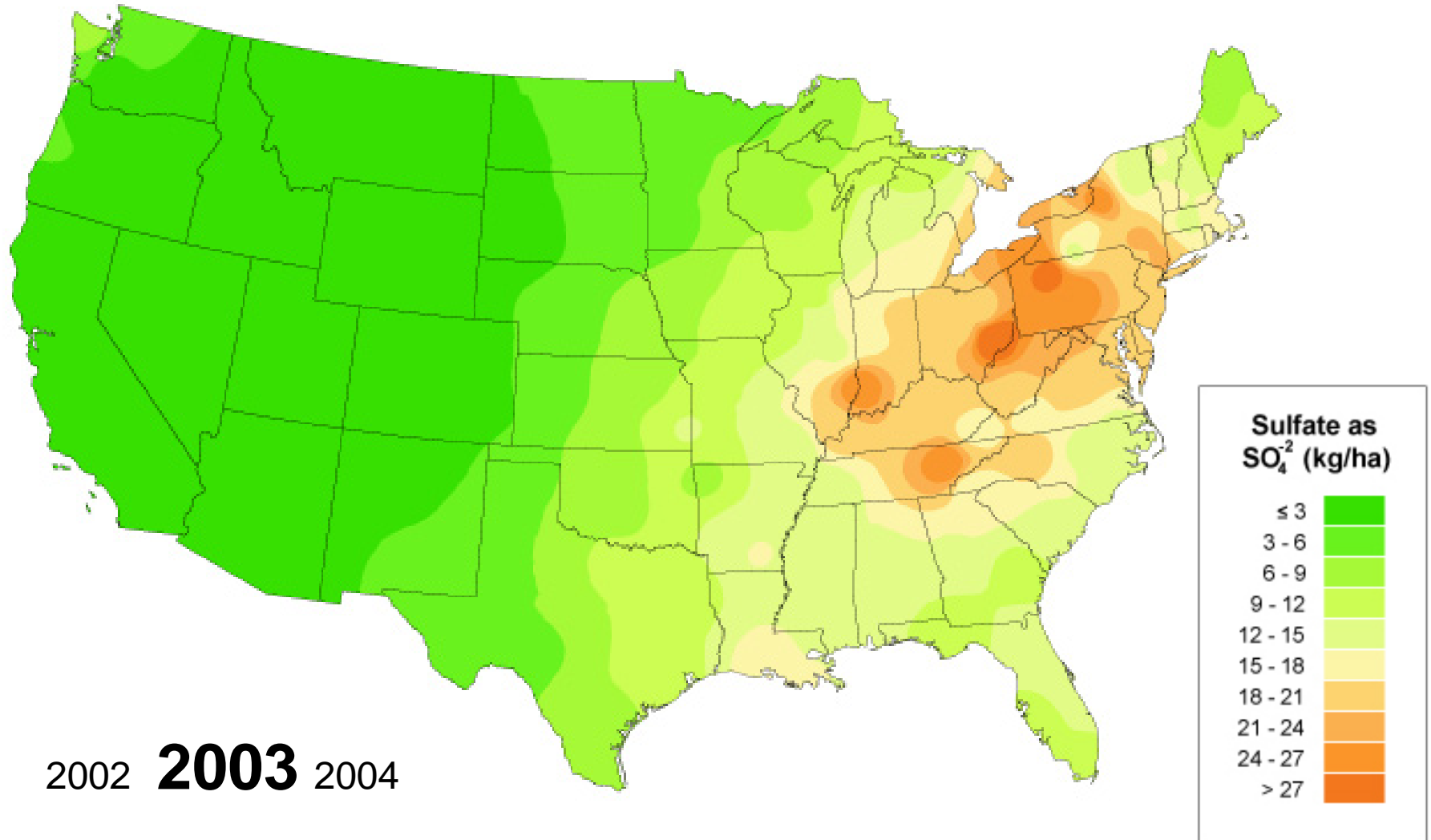


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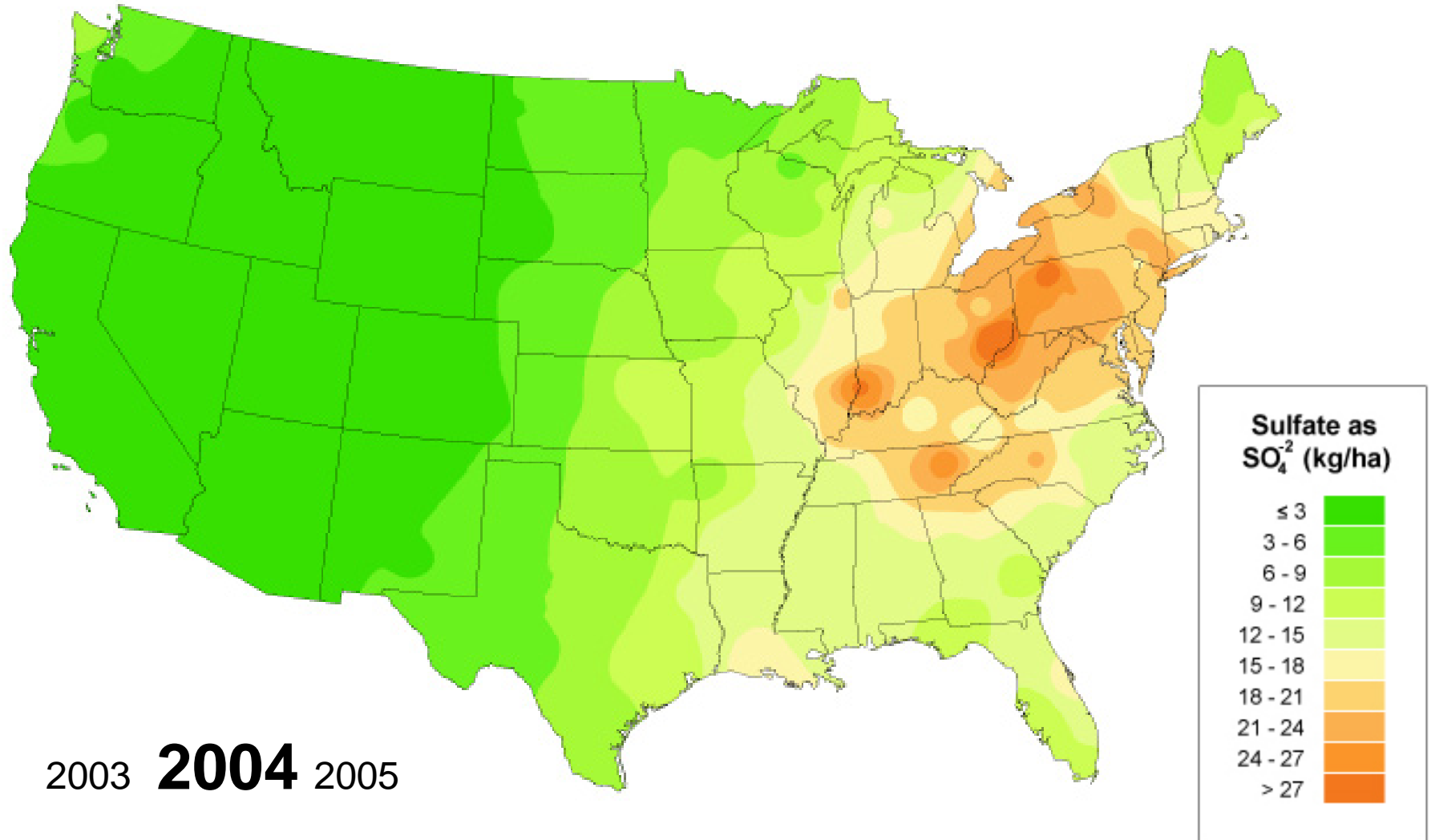




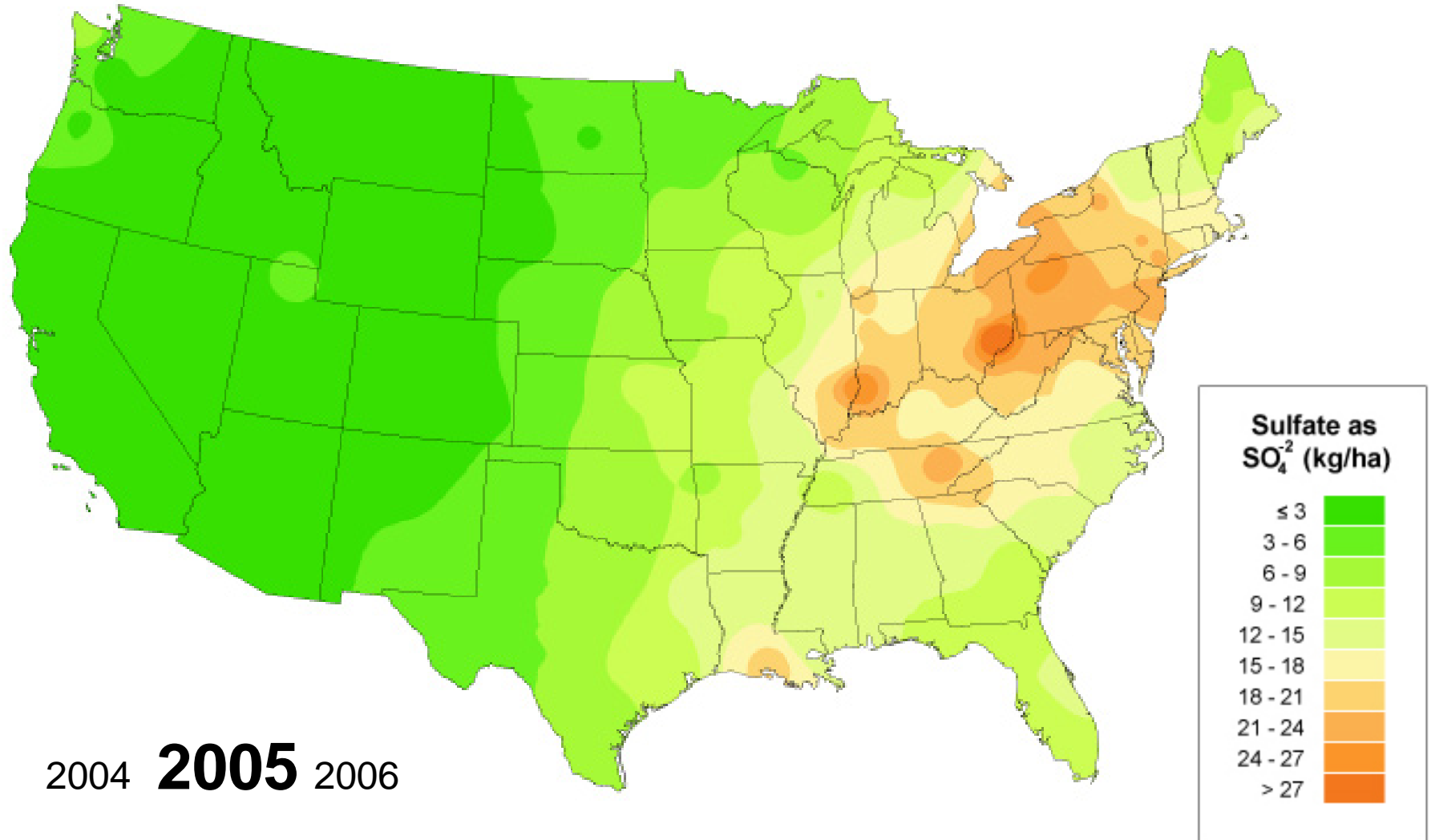
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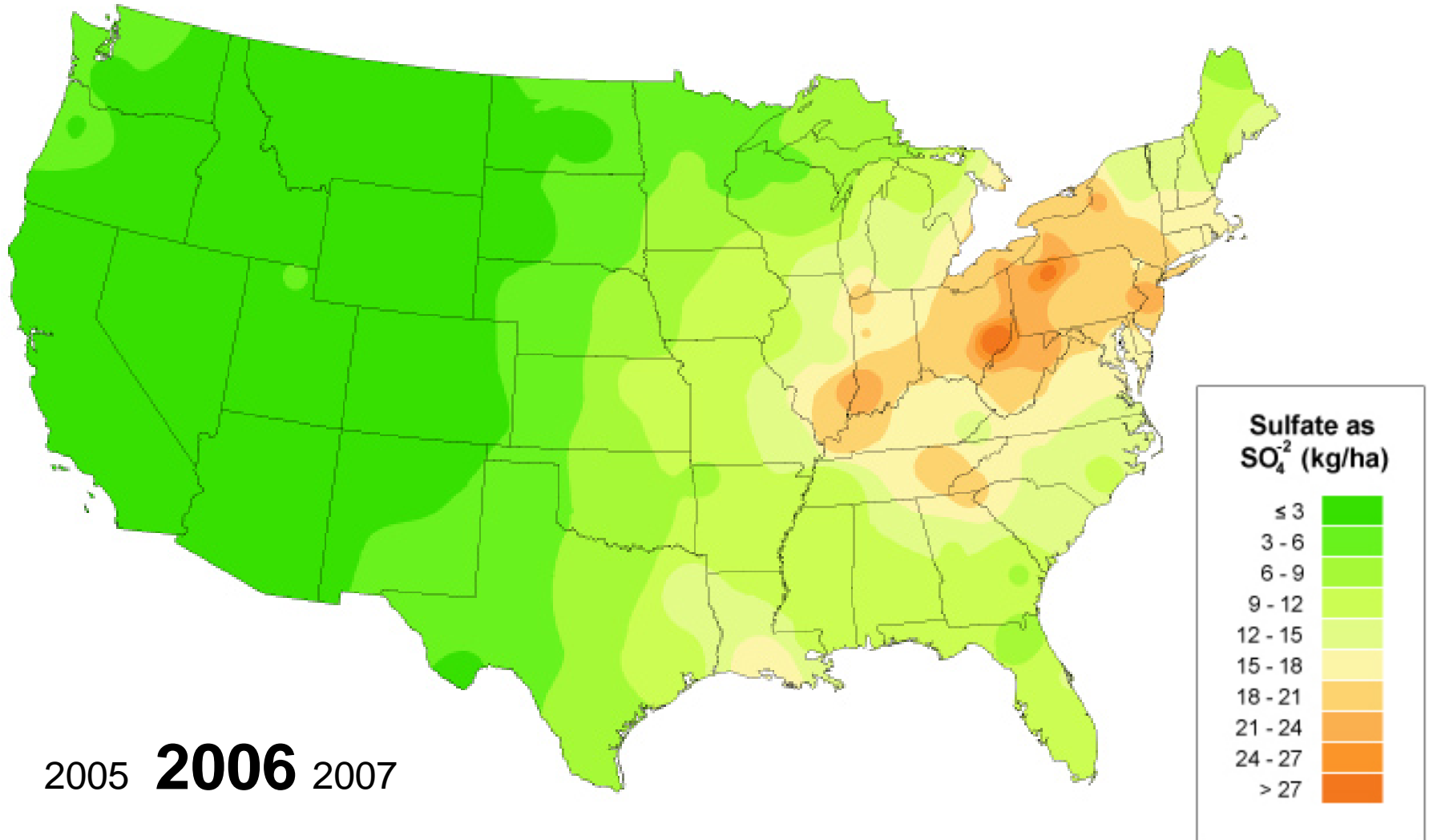
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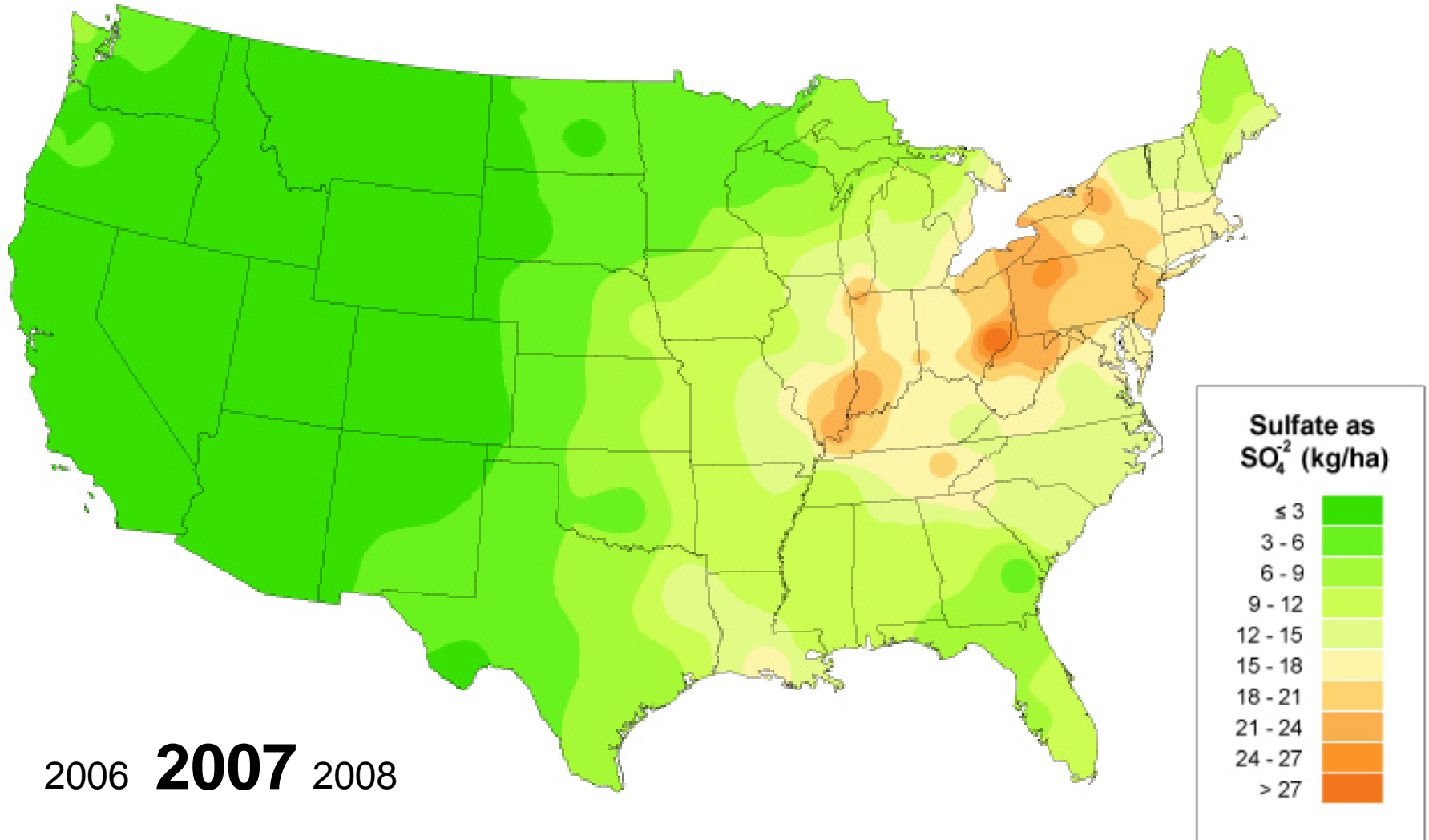
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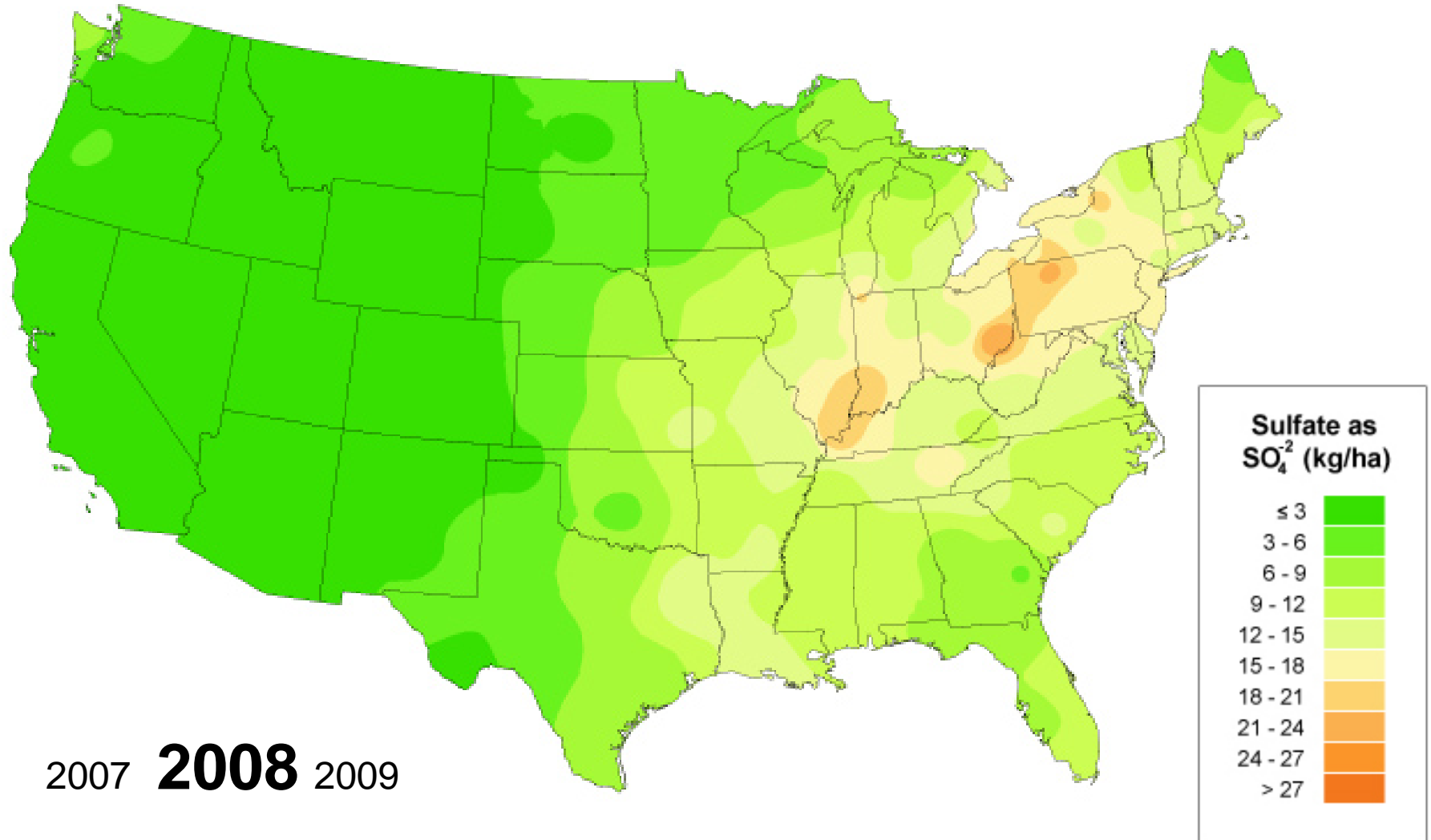
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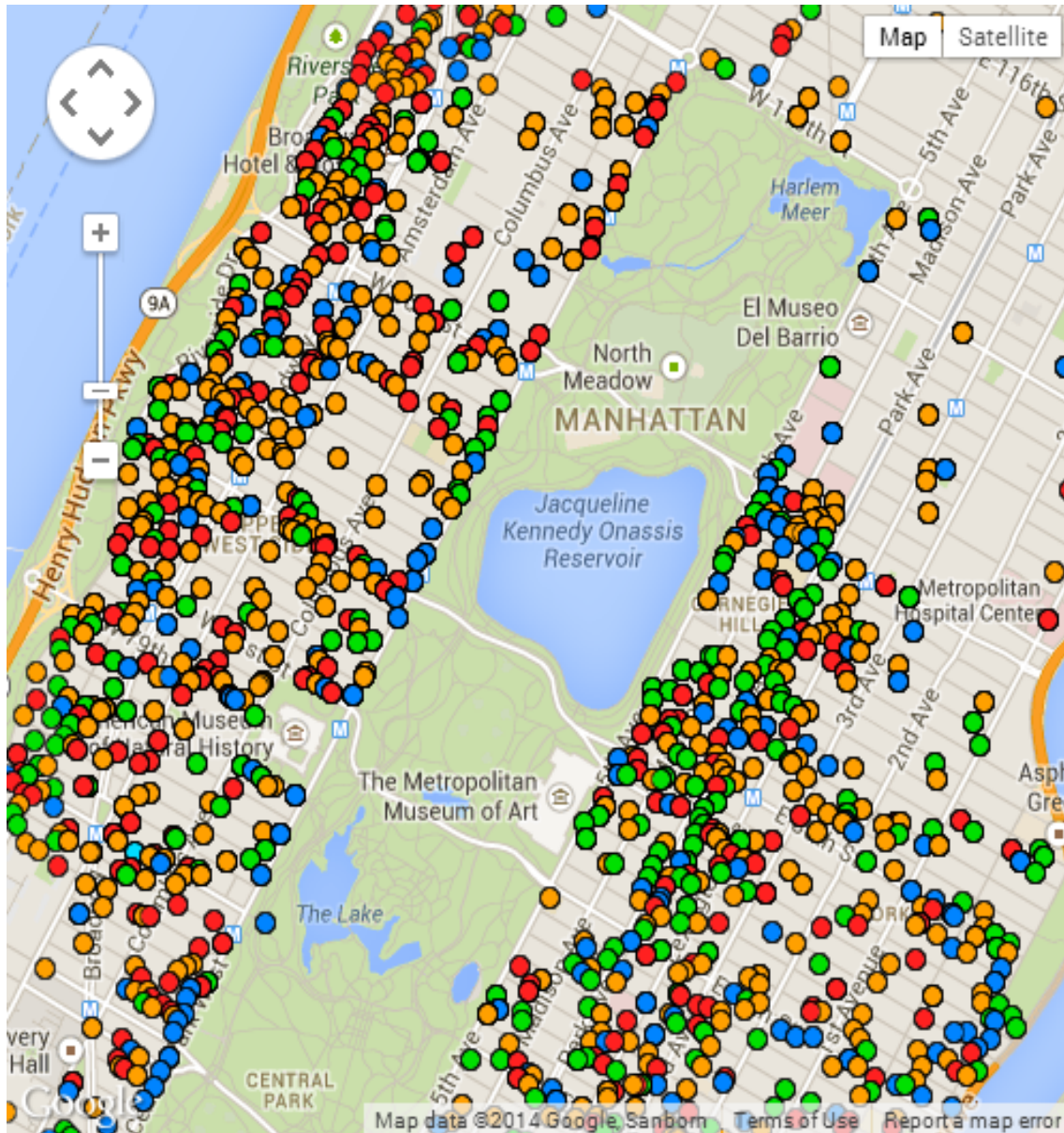
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Imagine a dynamic map of air quality shifting in real time as these buildings eliminate #6 fuel oil!

# Thank You

Contact information  
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