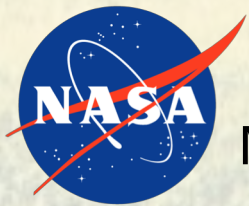


Identifying the spatiotemporal variability of NH_3 across the contiguous U.S.



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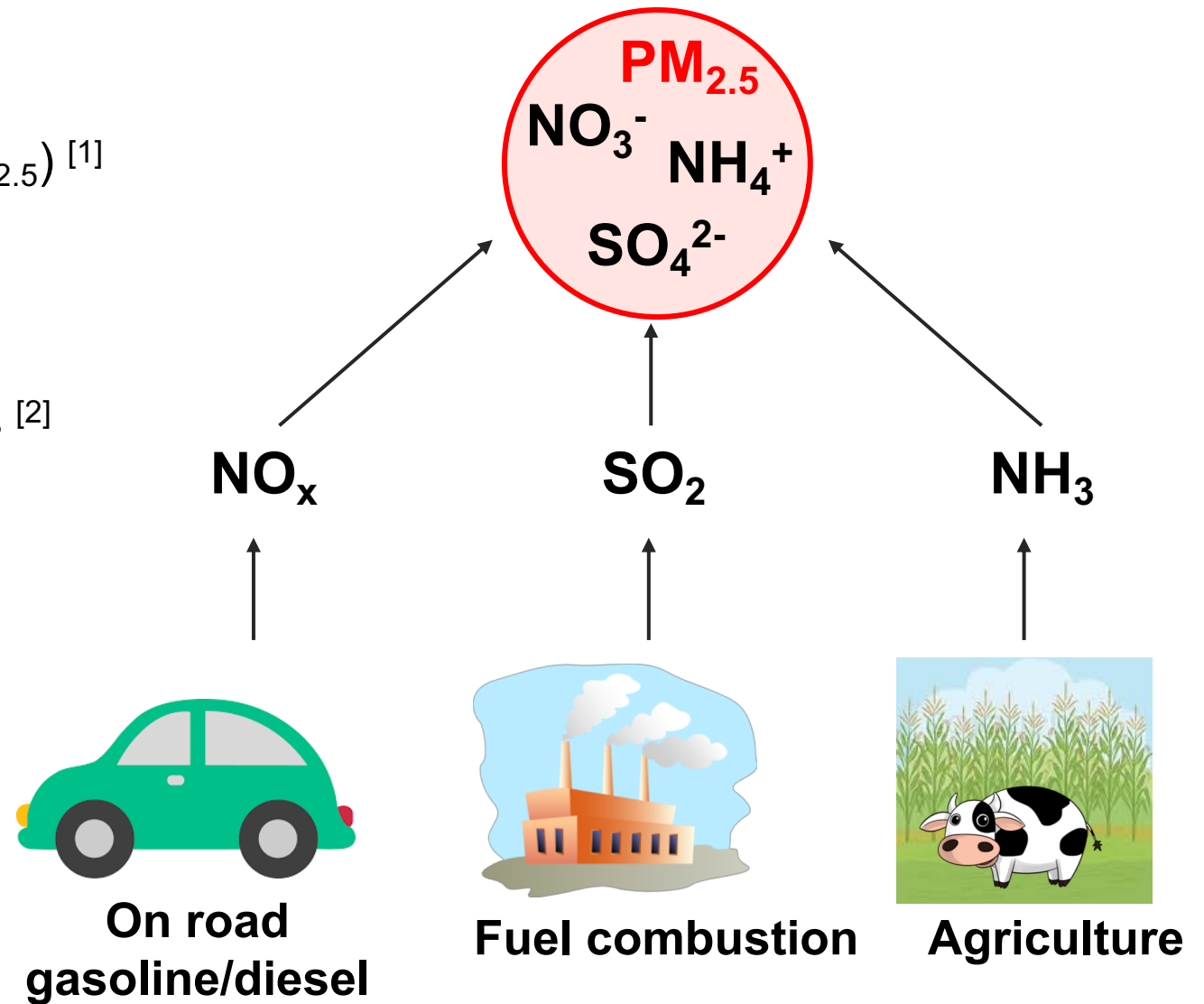
Introduction & motivation

NH₃: important pollutant

- Key precursor to fine particulate matter (PM_{2.5}) ^[1]
- Unregulated in the U.S.
- Large spatial and temporal variations
- Model NH₃: discrepancies with observations ^[2]
- Large uncertainties in NH₄NO₃ simulation ^[3]

Objectives

- Evaluate the emission inventory
- Derive land use impact on NH₃ by using satellite NH₃ observation



Emission inventory comparison

NH₃ short lifetime: directly compare satellite column concentration & emission

Satellite measurements:

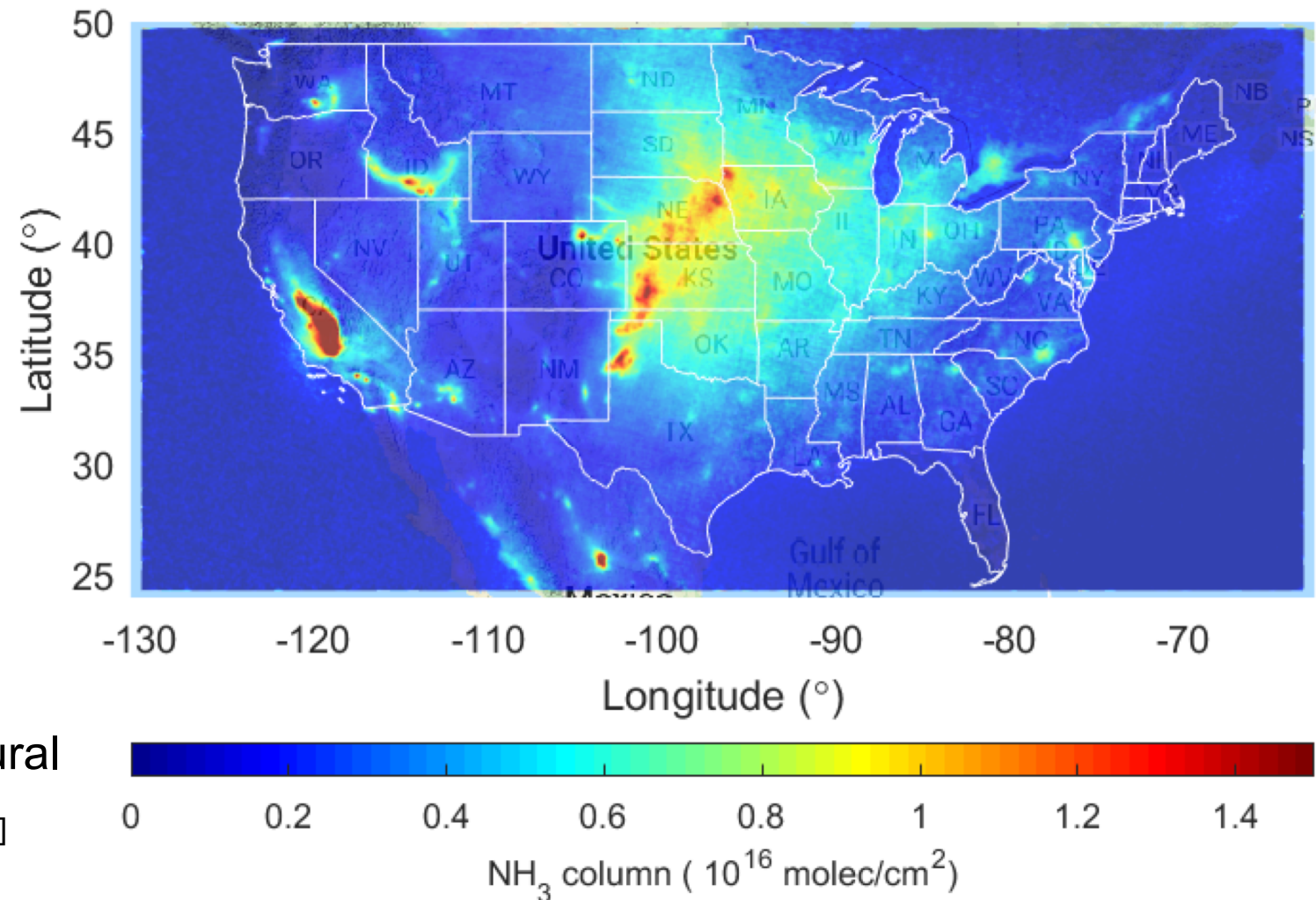
- IASI oversampling results [1]

Land use data

- USDA [2]

Emission inventory

- Magnitude And Seasonality of Agricultural Emissions model for NH₃ (MASAGE) [3]
- National Emission Inventory [4]



Emission inventory comparison: case study

1. Feedlots & cropland

Lancaster county, PA

2. Feedlots dominated

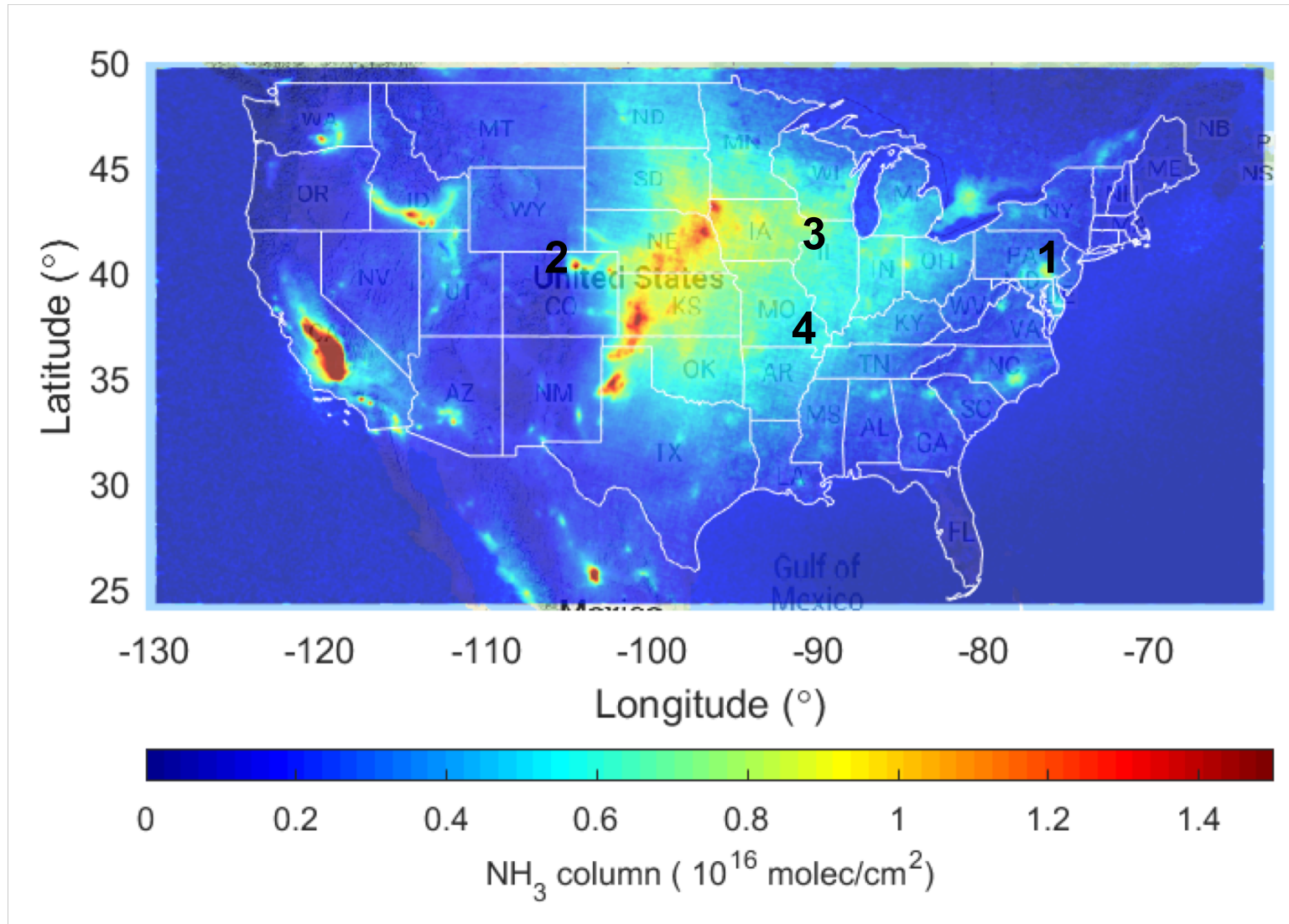
Weld county, CO

3. Corn dominated

Whiteside county, IL

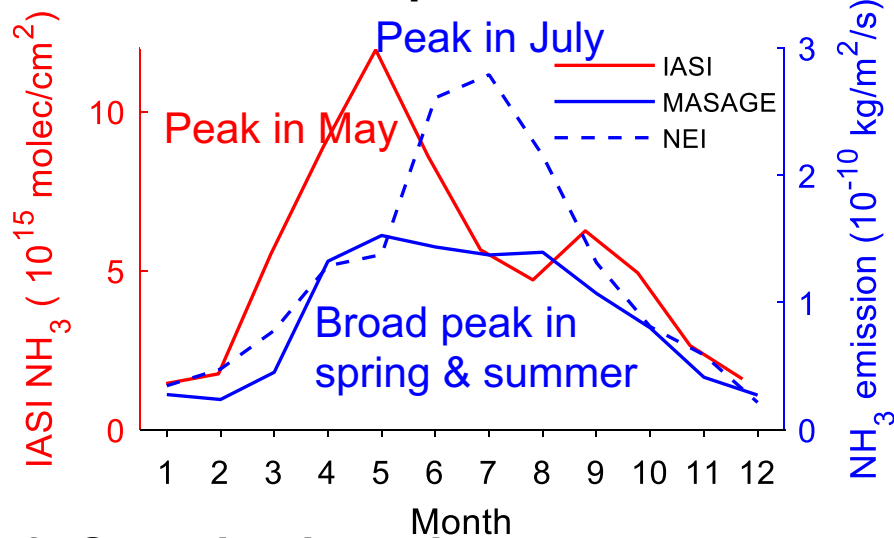
4. Soybean dominated

Mississippi county, MO

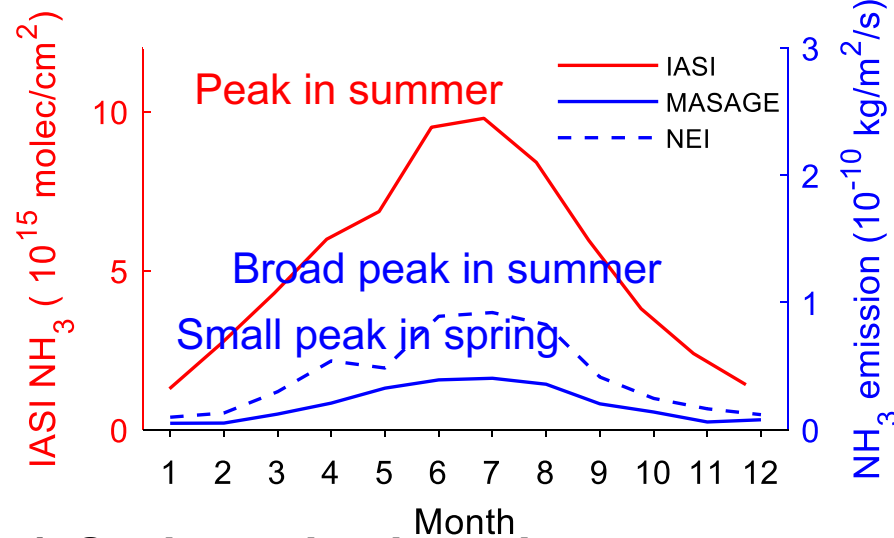


Emission inventory comparison: case study

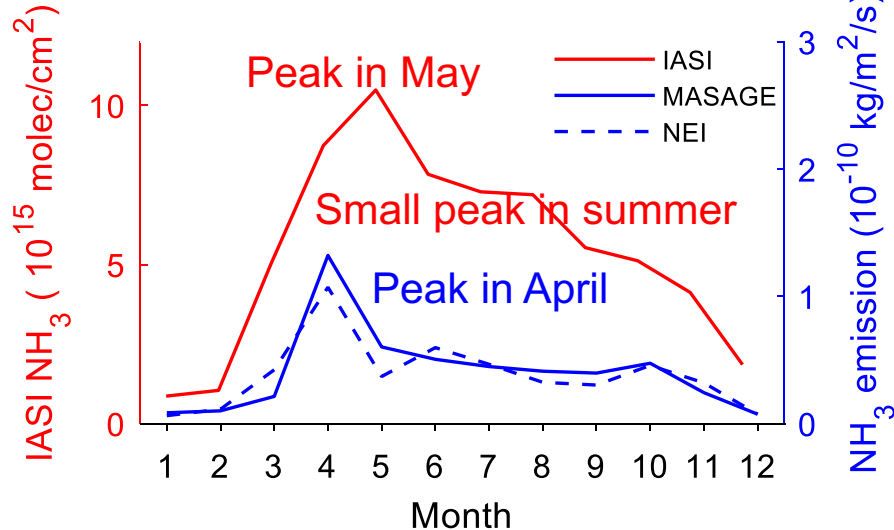
1. Feedlots & cropland



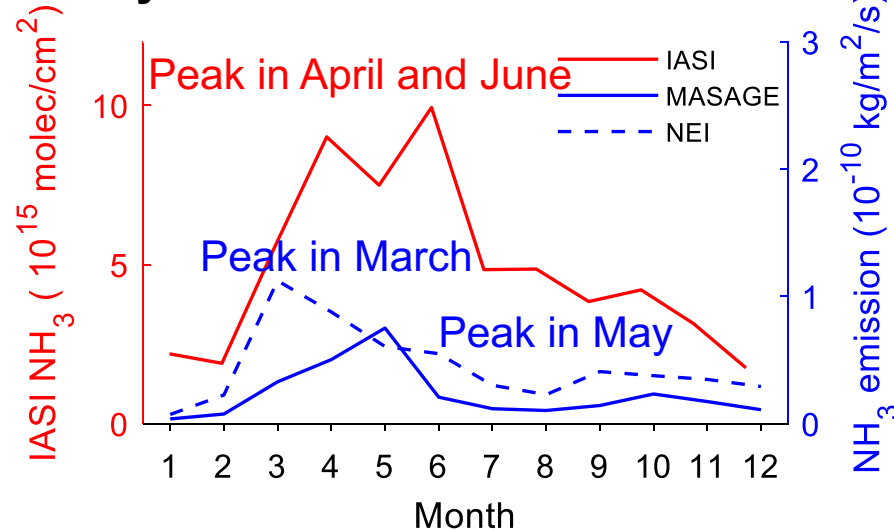
2. Feedlots dominated



3. Corn dominated



4. Soybean dominated



Major NH₃ source:
agriculture (livestock
waste + fertilization)

Emissions from livestock
waste: peak in summer
(temperature driven)

Emissions from fertilizer
application: peak in spring
(match with crop planting
dates)



Emission inventory comparison: case study

- Feedlots dominated: good agreement
- Cropland dominated: moderate agreement may suggest the inaccurate estimate of fertilization time or other factors
- Feedlots & cropland: moderate agreement may suggest the overestimate of livestock waste emission/underestimate of fertilization emission
- Further comparison: e.g. MASAGE NH_3 emission from livestock waste

Land uses	Feedlots & Croplands	Feedlots dominated	Croplands dominated
Agreements	Moderate	Good	Moderate

