

# Characterization of Water-Related Narratives in Local US Newspapers

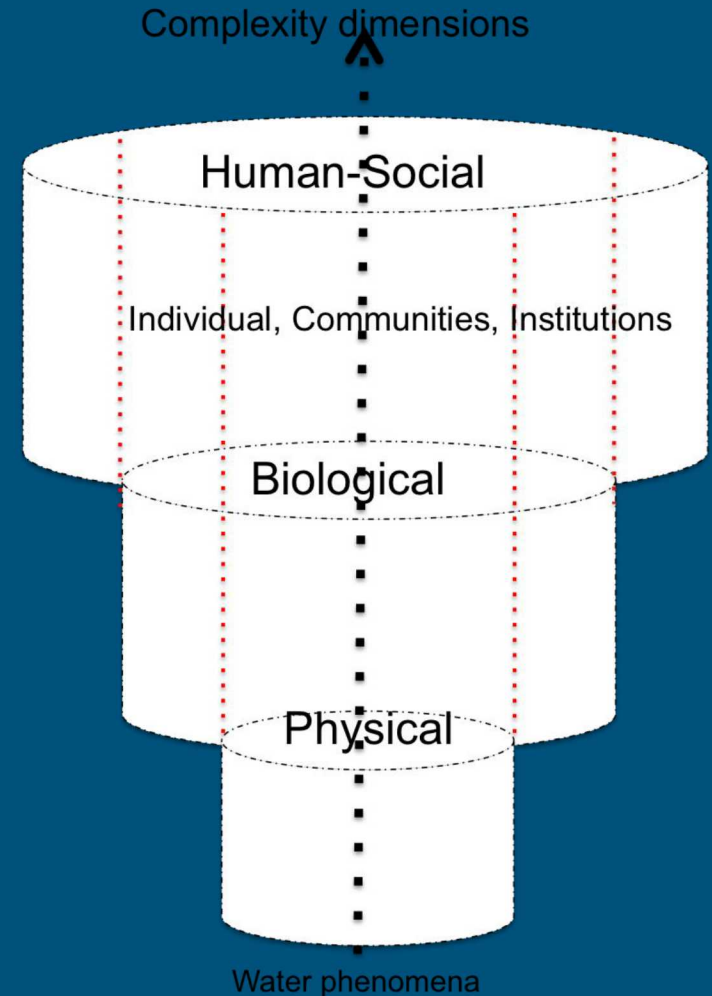
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Thushara Gunda  
Sandra Murillo-Sandoval

Conor Finn  
Jennifer Huff  
Matthew Sweitzer

# Evolution of Understanding

System-oriented perspective: Socio-ecological systems

- Physical dynamics
  - Evaporation
  - Recharge
- Biological dynamics
  - Wetlands
  - Flora & Fauna
- Social dynamics
  - Agriculture, energy, & other economic needs
  - Recreation: swimming, fishing, ...
  - Culture: rituals...
  - Policy: planning, conservation, ...



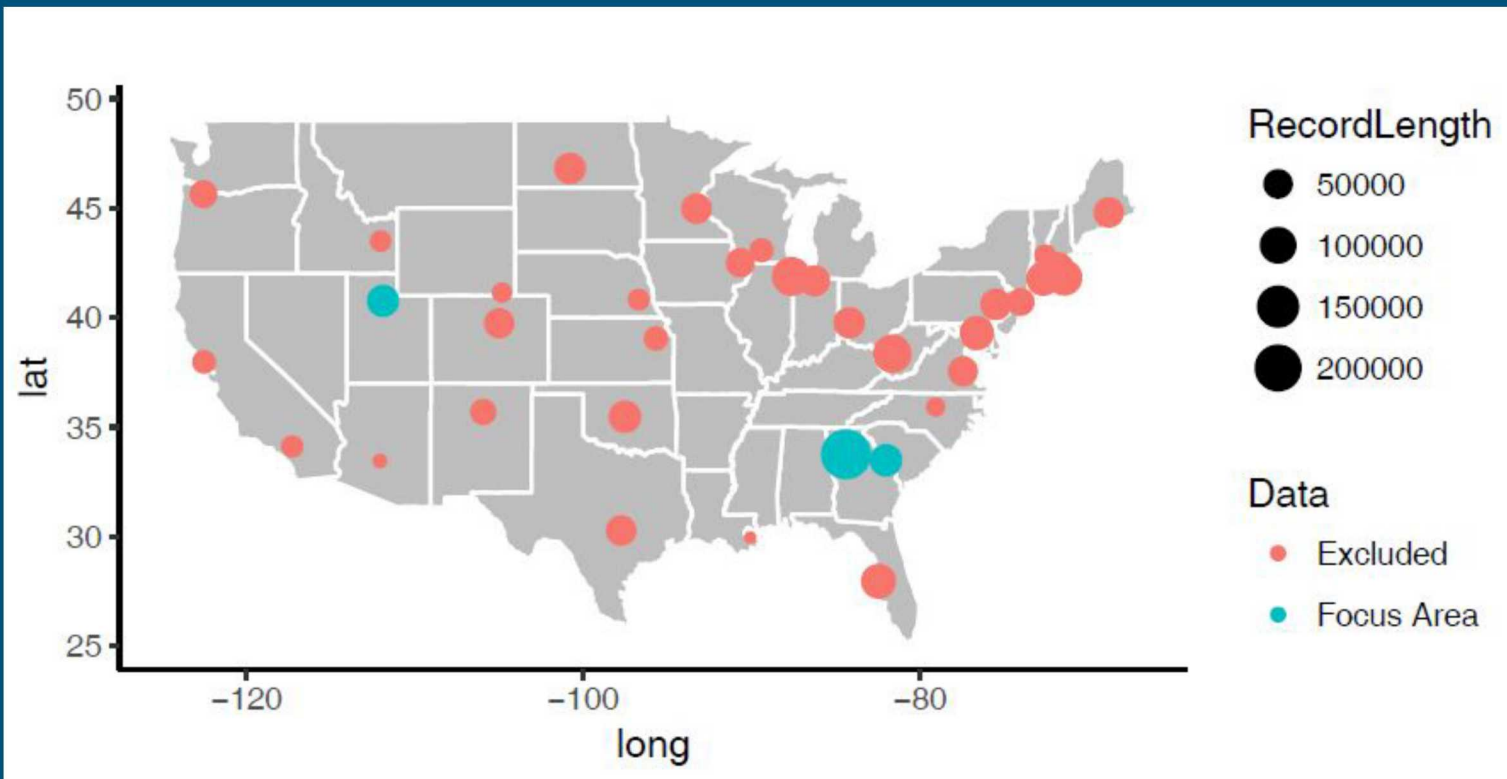
“We have to fundamentally change the mindset of the public, and the way we manage this resource...and one of the ways you do it is, you have to change the terminologies that we use in dealing with water.”

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- Newsha Ajami, a hydrologist and the director of urban water policy at Stanford University's Water in the West program

(from High Country News's Emily Benson "In the Southwest, 'drought' doesn't tell the whole story")

# Dataset



# Overview of Structural Topic Models

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- Form of topic modeling (unsupervised)
- Groups documents based on FREX words
  - **FR**requently occurring within group
  - **EX**clusive to that group
- Includes procedures for determining topic count
- Allows for covariate specification with document metadata

# Topics in Filtered Dataset

**Hurricanes (3):** forecasters, nino, landfall, typhoon, haiti

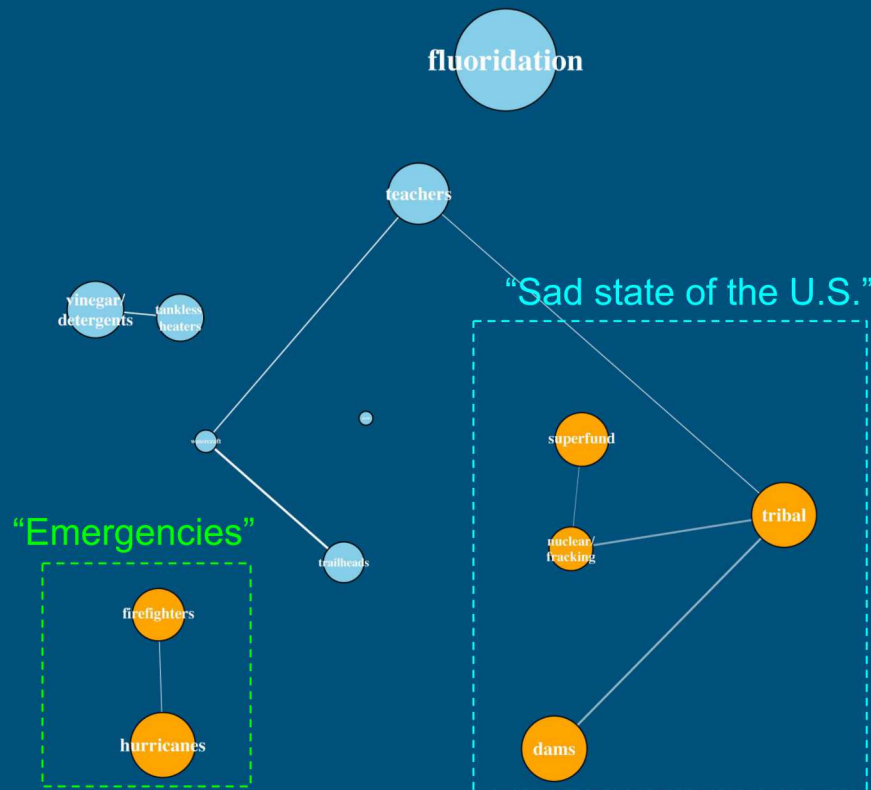
**Dams (4):** acre-feet, julander, cfs, chub, mussel

**Firefighters (5):** firefighters, blaze, arson, extinguished, smoldering

**Tribal (7):** tribe, tribal, rep, sitla, suwa

**Superfund (8):** arsenic, superfund, phosphorus, coliform, fecal

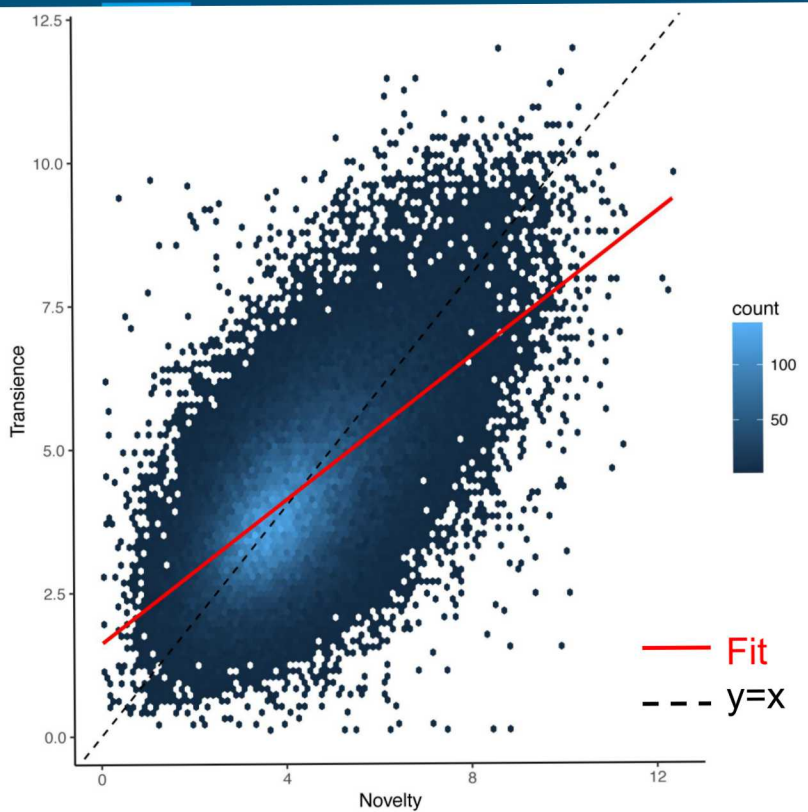
**Nuclear/Fracking (9):** nuclear, reactors, ethanol, deepwater, plutonium



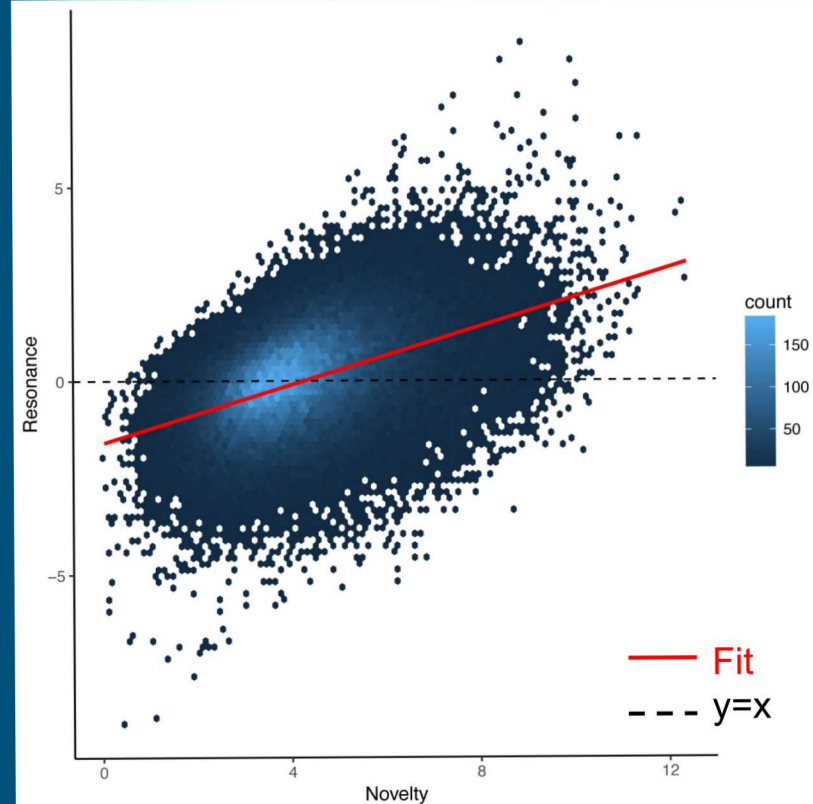


Novelty: “New-ness” of ideas given what you know about the past  
Transience: Presence of the present given what you know about the future  
Resonance: Difference from the past and leaving traces into the future

# K-L Divergence

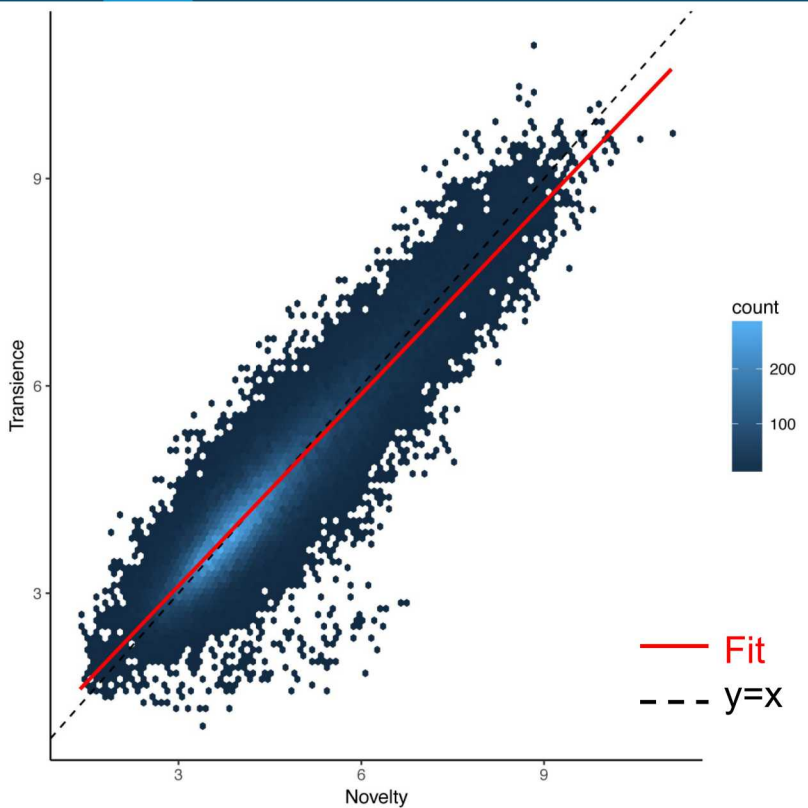


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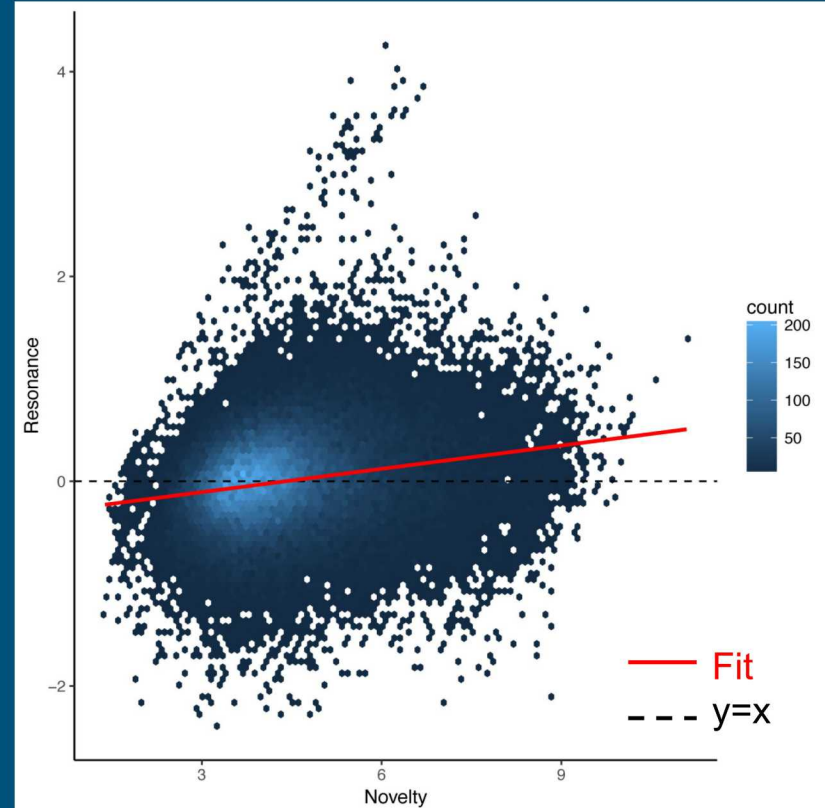


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# K-L Divergence



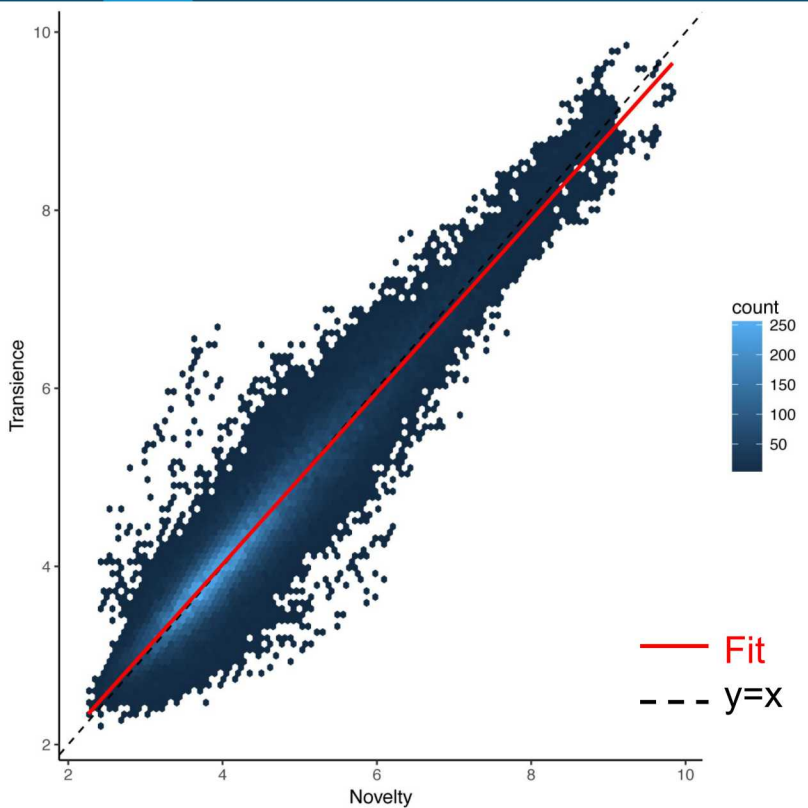
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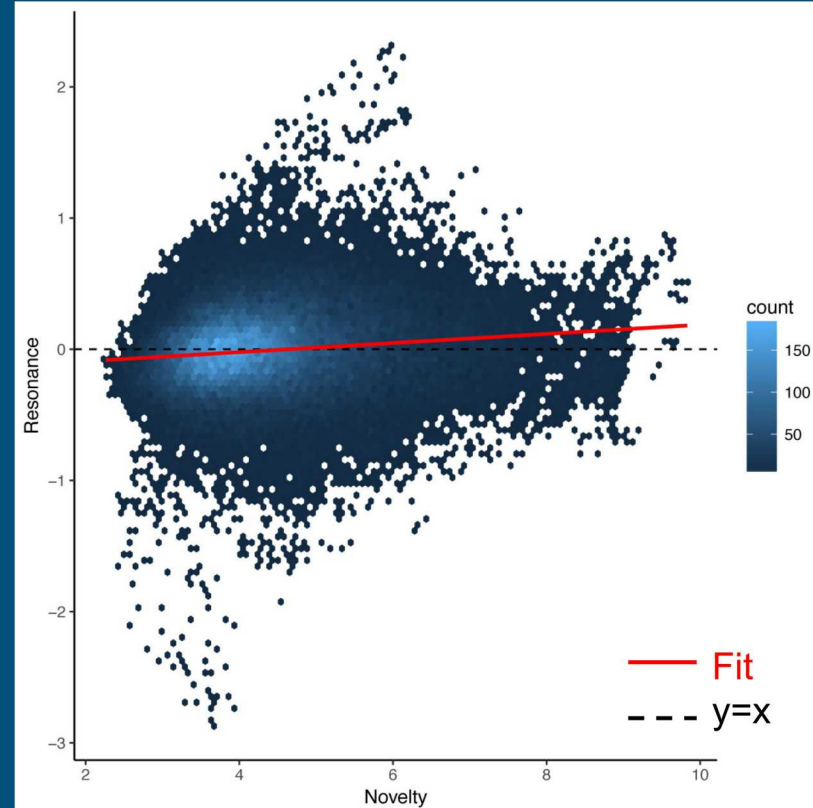


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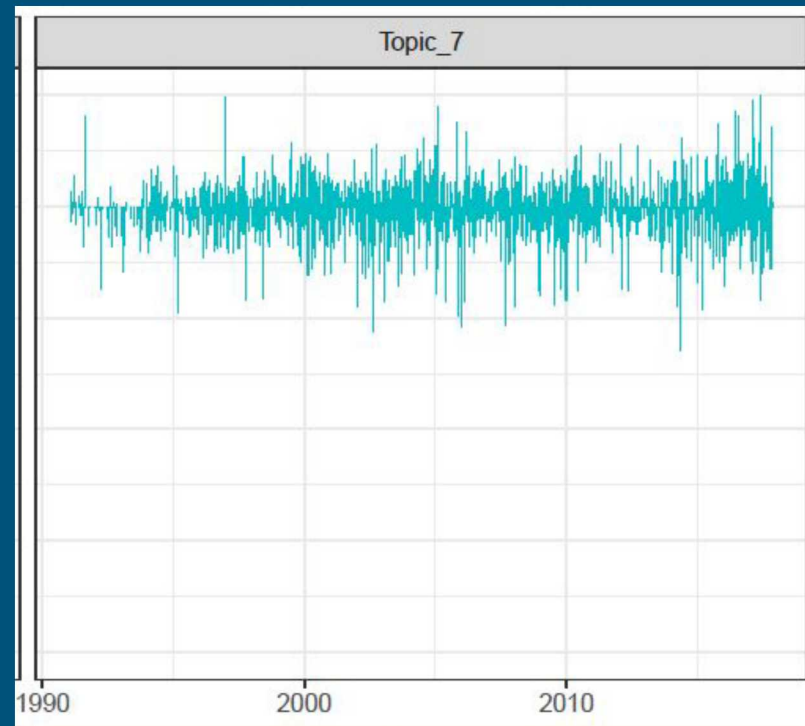
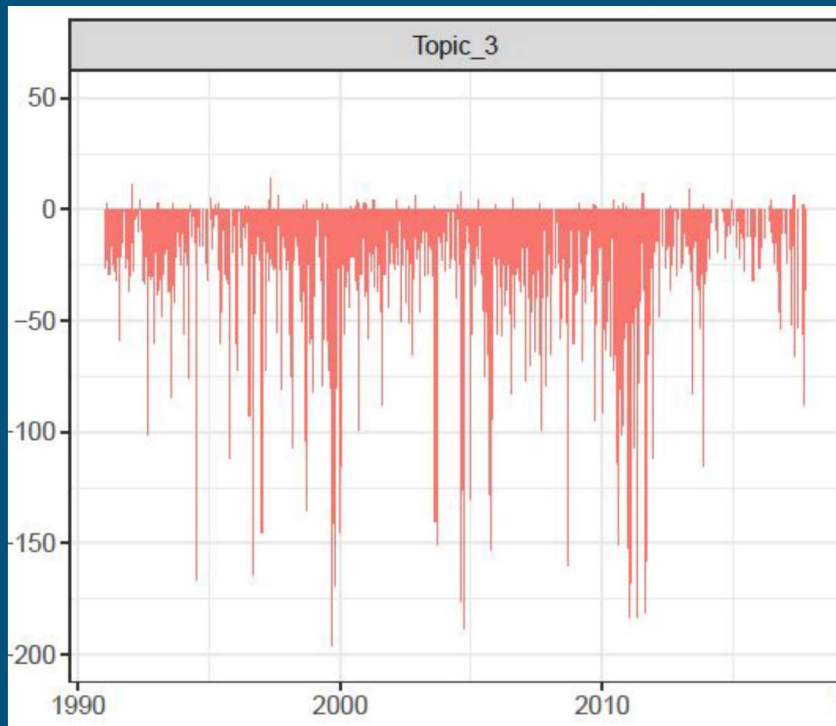


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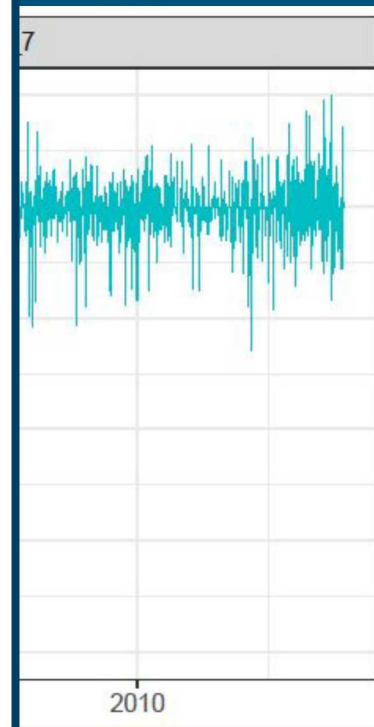
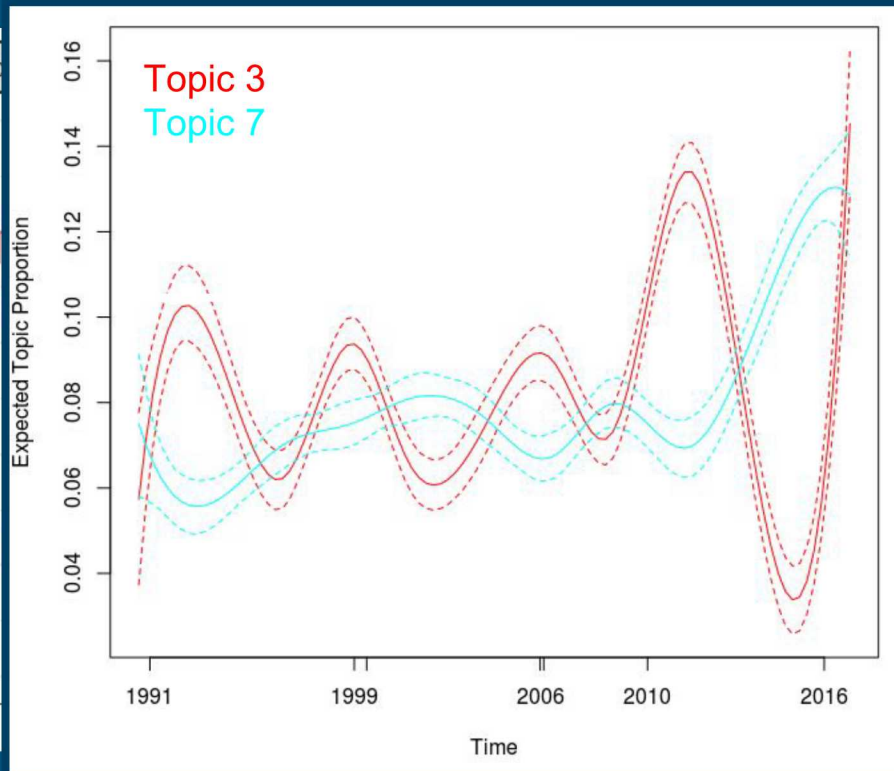
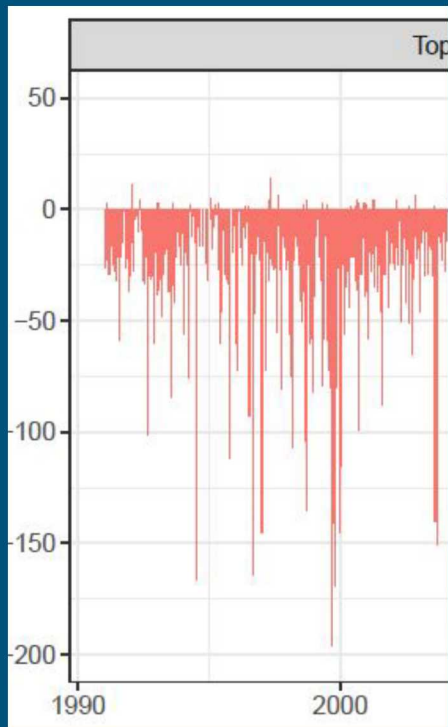


# Patterns over Time

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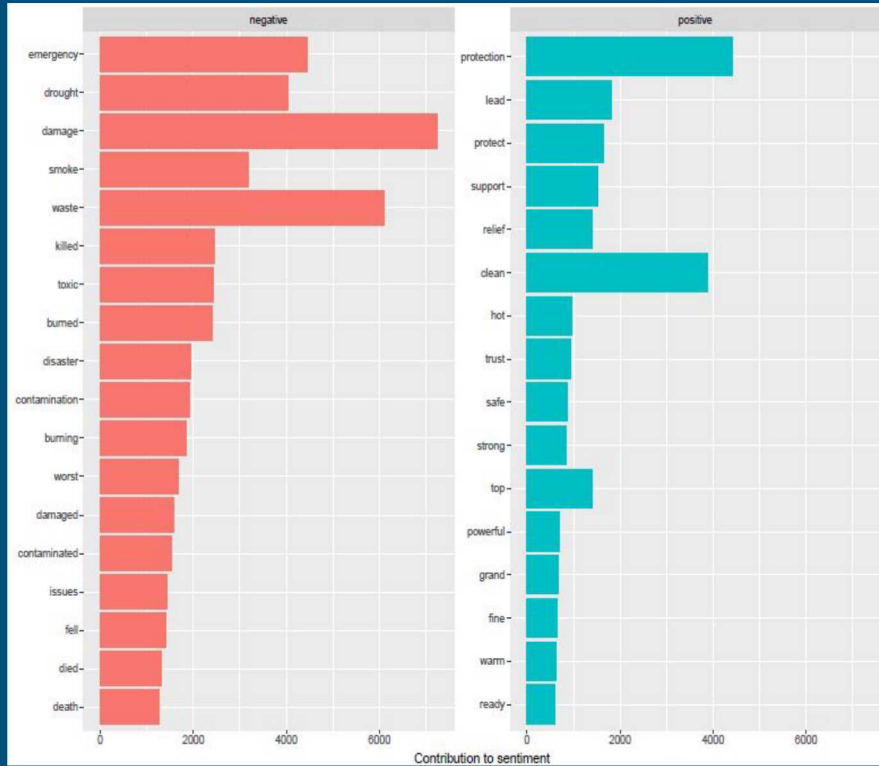
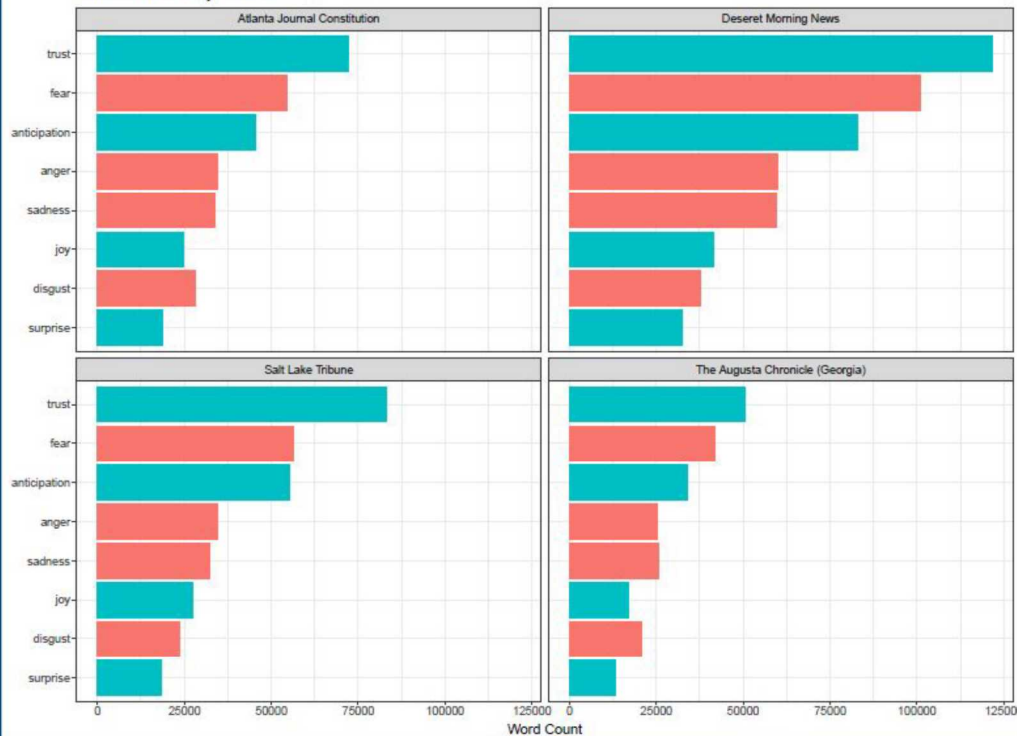


# Patterns over Time



# Sentiment Analysis

NRC Sentiment by Source



# Failed Attempts

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Running full newspaper dataset: too slow for our given timeframe :-)

Performing other metadata analysis (readership, watershed location, etc.)

Linking sentiment to changes in policy (increased litigation, regulation, etc.)

# References

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## Methods/Data mining:

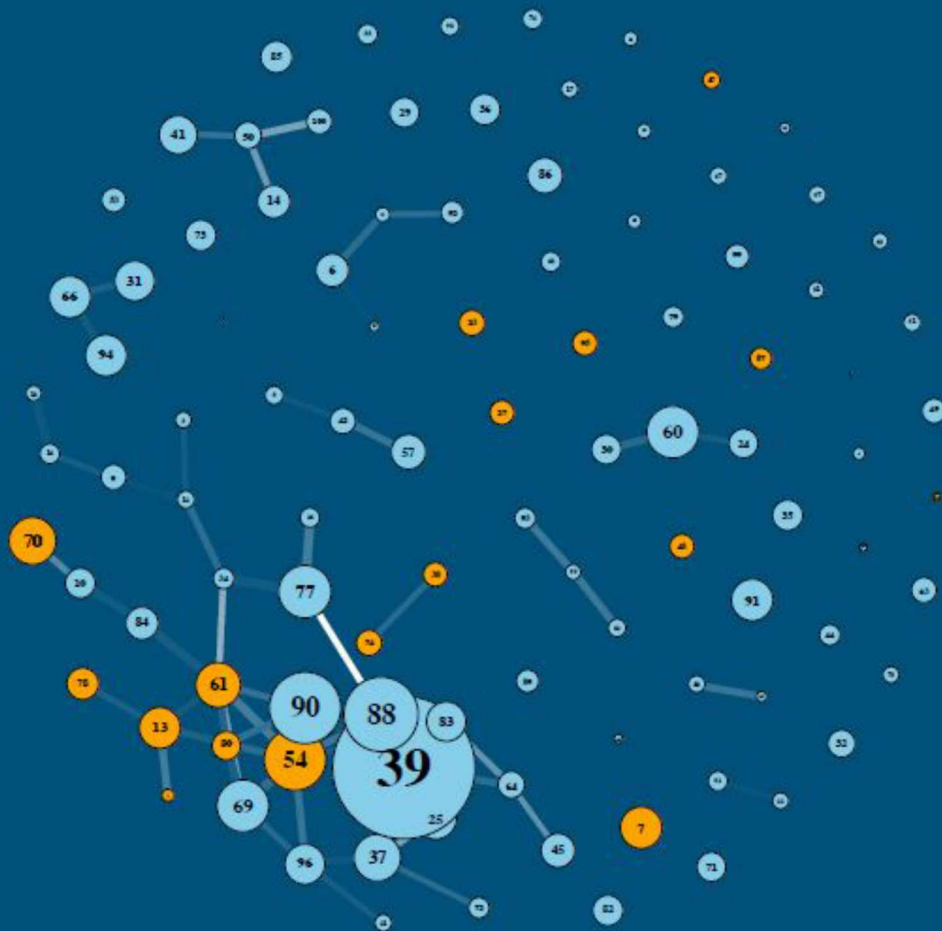
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# Thanks!

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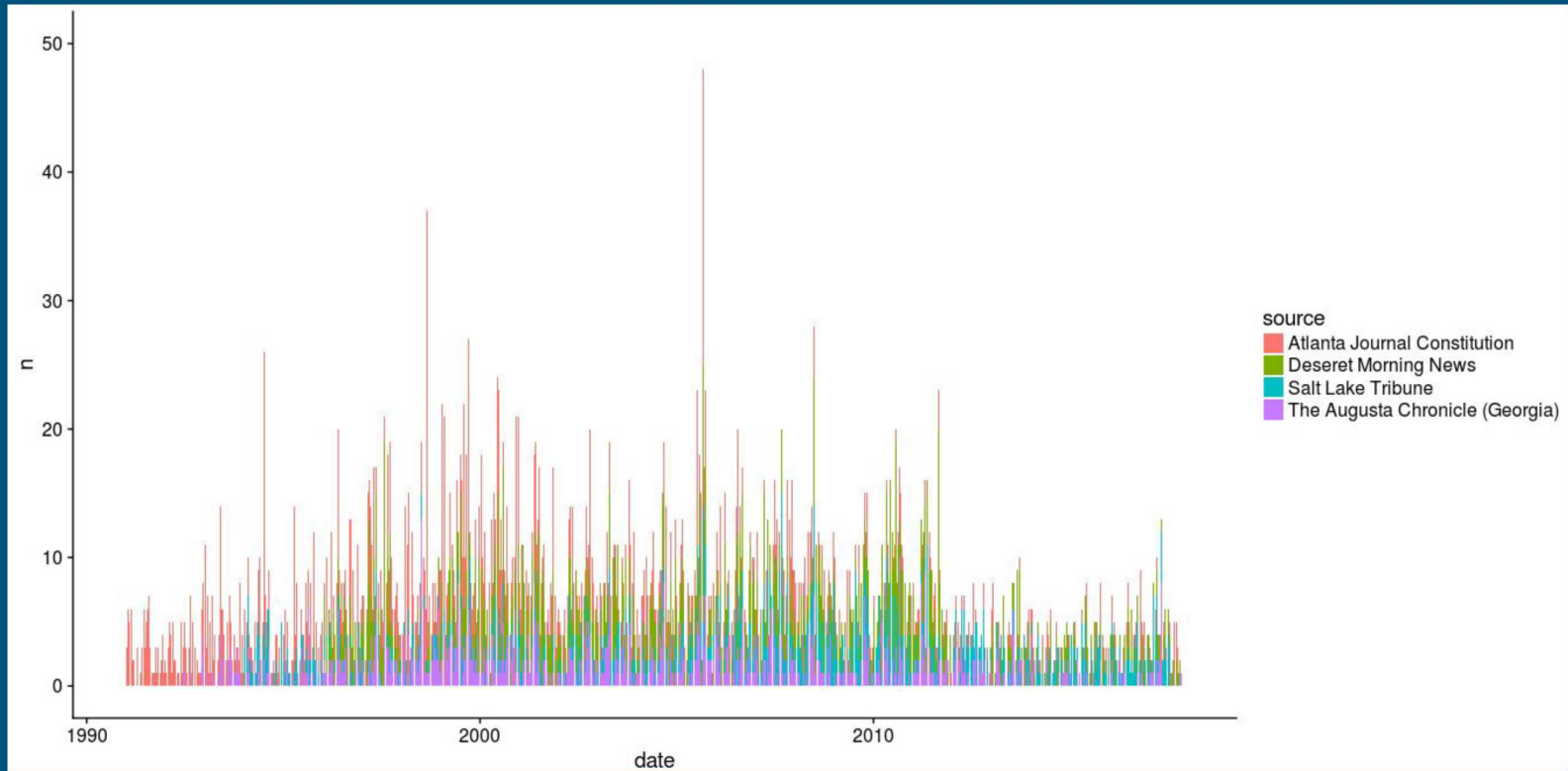




# Supplementary Slides



# Number of Articles over Time



# Initial Filtering

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54: public, state, issues

7: hurricanes, floods

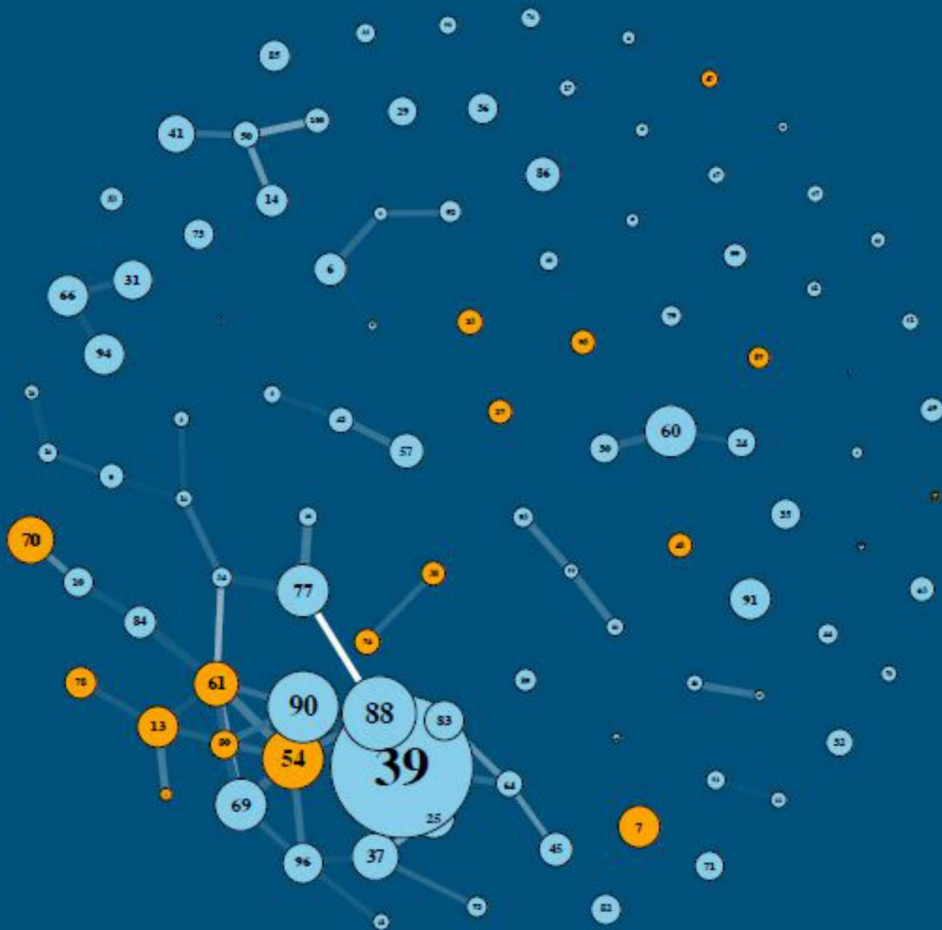
13: sewage, treatment

70: plastic, towelettes

38: dam, lake, corps

23: hot, ice, weather

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# Stm model variations explored

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Compared stm model without metadata, with metadata, and with prevalence

Topic coherence was similar across the 3 versions of the stm models

Opted to keep stm with prevalence info to enable exploration of metadata effects

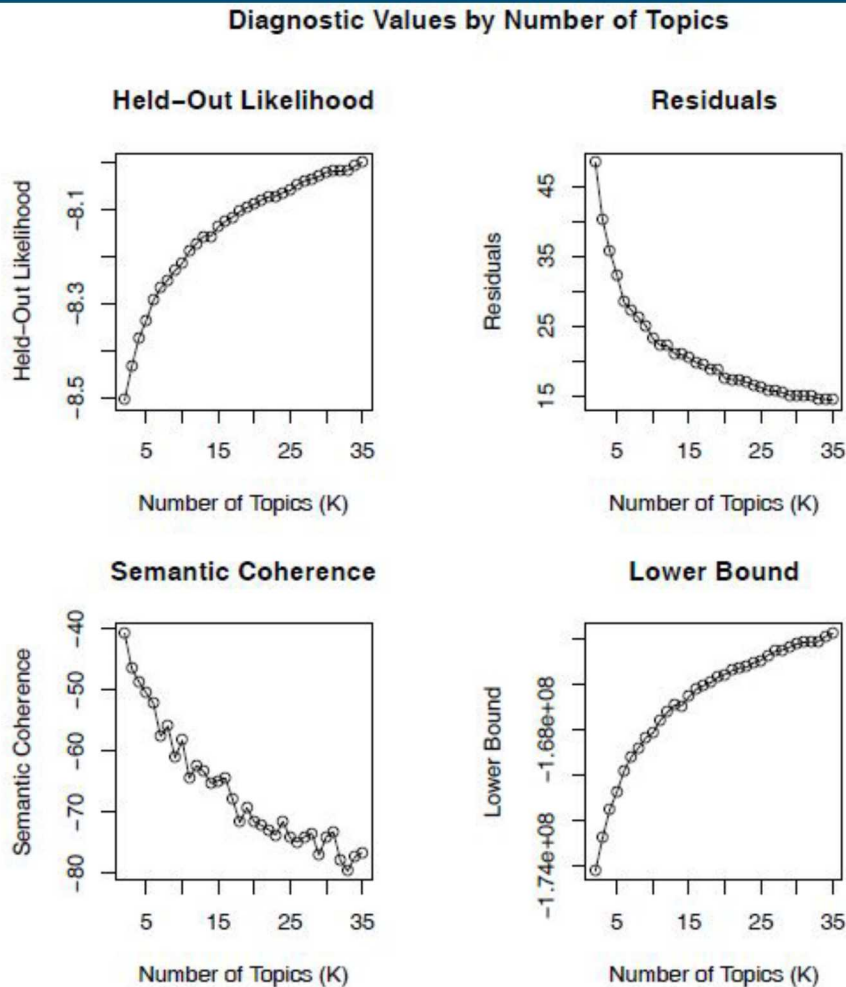


# searchK results

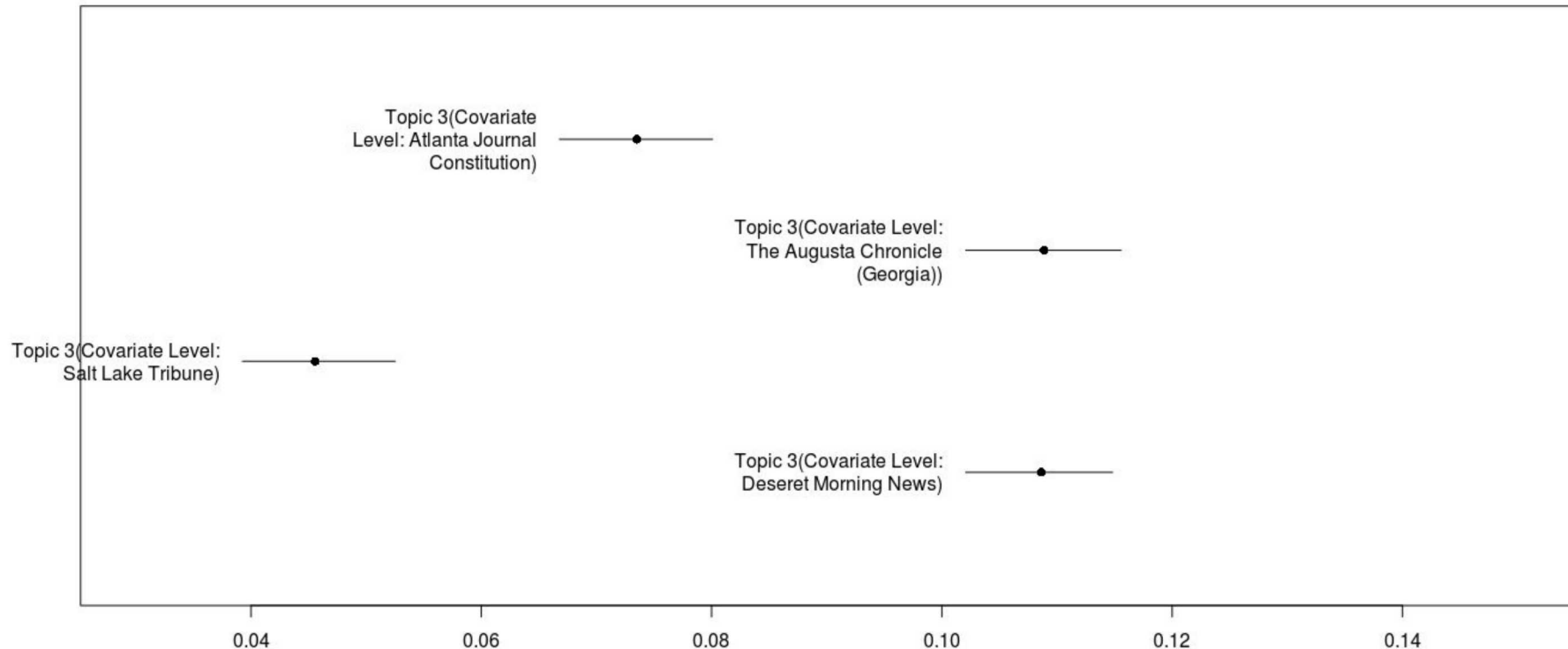
Executed searchK on the filtered corpus of ~85K articles

Observed slight kink in semantic coherence at K=20

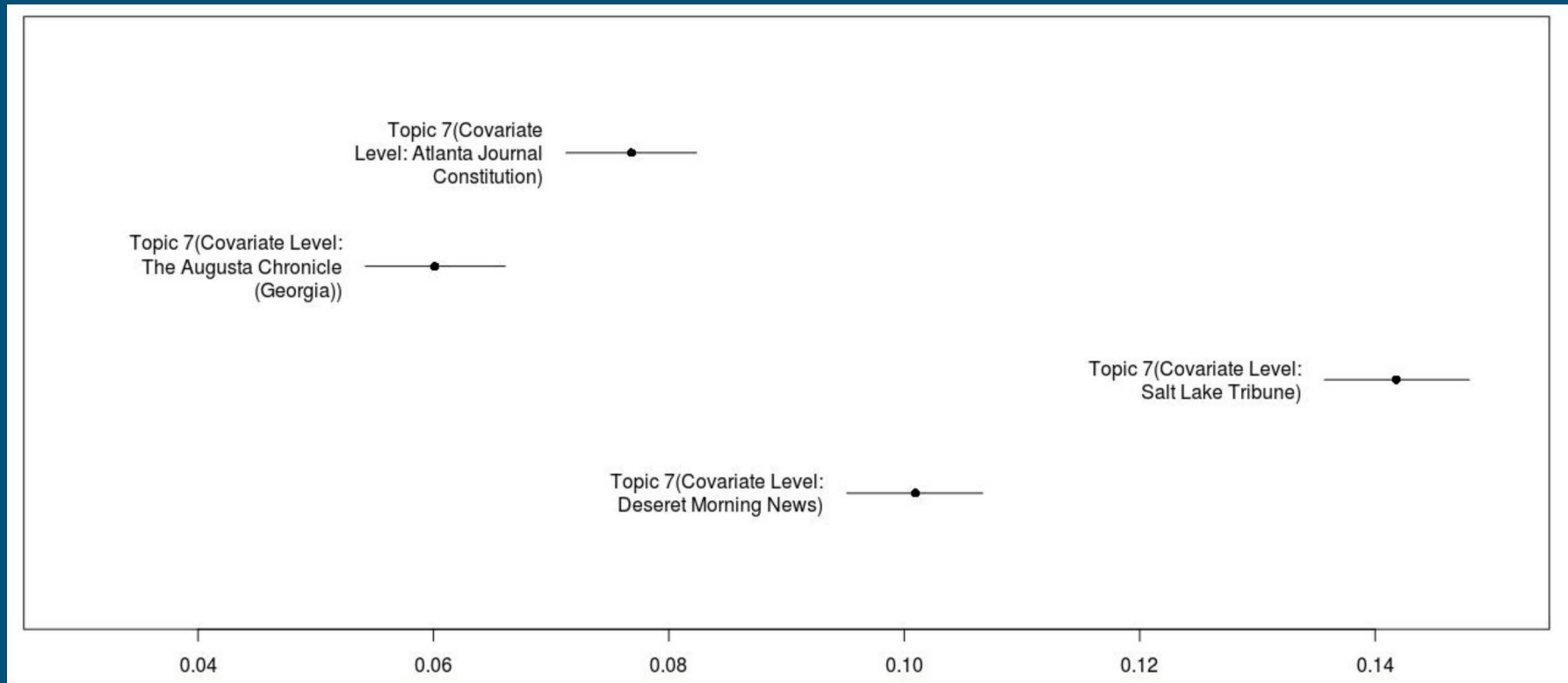
Chose K=20 for 2nd round stm analysis



# Variations across Newspapers: Topic 3



# Variations across Newspapers: Topic 7



# Literature Review

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Concepts and approaches to main water management.

1. Integrated Water Resources Management
2. One Water

International conferences and conventions on water management cover a range of topics.

- Introduction of water in political agenda?
- Actions and guidelines principles
- Stakeholders decisions
- Good governance
- Public participation
- Water policy

# Timeline

