# News Media Coverage of Environmental Policy in Switzerland

**Exploring Topics and Themes Through Automated Content Analysis**

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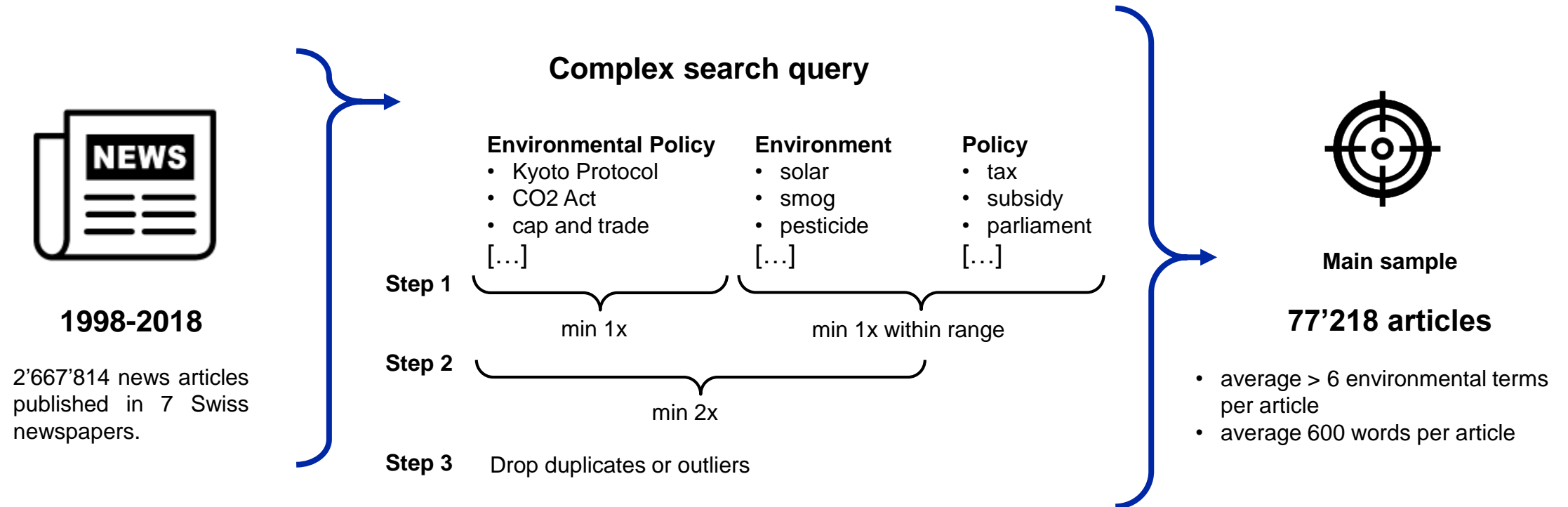
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# Swiss Environmental Policy

- Switzerland as a leader in **environmental policy** (Socioeconomic Data and Applications Center, 2020; Wendling et al., 2020)

- Switzerland with long tradition of **environmental research** and **international cooperation** (Dupuis, 2020; IPCC, 2020)

- **Direct democratic** particularities (initiative and referendum) (Linder, 2010)

# Research Questions

– **RQ1:** *How **salient** was environmental policy in Swiss media from 1998 to 2018?*

– **RQ2:** *Which **themes and topics** can be identified in Swiss media coverage about environmental policy?*

– **RQ3:** *How **prevalent** were these themes and topics between 1998 and 2018?*

– **RQ4:** *To what extent does this media coverage correspond with **actual developments** in environmental policy?*

# Method: media sample (1)

## Complex search query

**NEWS**

**1998-2018**

2'667'814 news articles published in 7 Swiss newspapers.

| Environmental Policy | Environment | Policy |
|---|---|---|
| • Kyoto Protocol | • solar | • tax |
| • CO2 Act | • smog | • subsidy |
| • cap and trade | • pesticide | • parliament |
| […] | […] | […] |

**Step 1**  min 1x  /  min 1x within range

**Step 2**  min 2x

**Step 3**  Drop duplicates or outliers

**Main sample**

**77'218 articles**

- average > 6 environmental terms per article
- average 600 words per article

# Method: media sample (2)

**Broadsheet papers:**
- Neue Zürcher Zeitung (39'296)
- Tages Anzeiger (23'105)

**Tabloid paper:**
- Blick (3'308)

**Sunday papers:**
- Sonntagsblick (1'607)
- Sonntagszeitung (3'959)

**Weekly papers:**
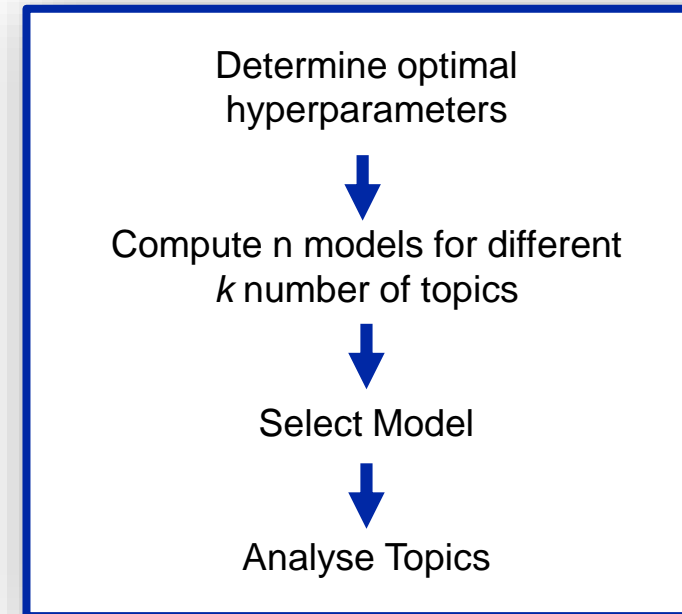- Wochenzeitung (3'176)
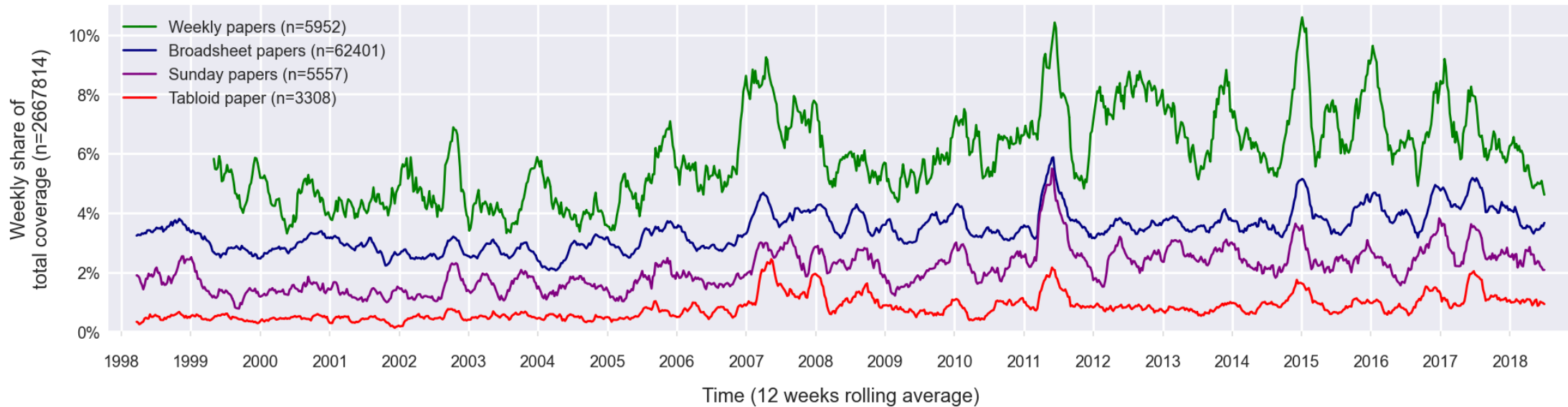- Weltwoche (2'776)

**Main sample**

**77'218 articles**

- average > 6 environmental terms per article
- average 600 words per article

# Method: Topic Model with latent Dirichelet allocation Algorithm

# Results: Weekly Share of total News Coverage

# Themes

| Theme | Number of topics | share of documents | avg. keyw. count | coherence score | consistency |
|---|---|---|---|---|---|
| Sustainable Development | 2 | 13% | 7.25 | 0.51 | 41% |
| Mobility & Transport | 3 | 10% | 5.45 | 0.72 | 78% |
| Climate | 2 | 11% | 14.09 | 0.74 | 50% |
| Energy | 4 | 17% | 8.37 | 0.71 | 53% |
| Land use & Natural Resources | 11 | 34% | 6.37 | 0.55 | 34% |
| Swiss Politics | 7 | 31% | 4.84 | 0.65 | 61% |
| Politics Abroad | 5 | 20% | 4.80 | 0.59 | 42% |
| Economy | 4 | 24% | 5.01 | 0.59 | 67% |
| (boilerplate) | 6 | 18% | 4.43 | 0.42 | 30% |

# Sustainable Development Theme

| Theme | Topic | Keywords | share of documents | avg. keyw. counts | coherence score | Consistency |
|---|---|---|---|---|---|---|
| Sustainable Development | Sustainable Development | country, development, goal, Switzerland, sustainability, organization, project, environment, state, resource | 7.9% | 7.5 | 0.40 | 19% |
| | Science | study, researcher, research, investigation, risk, university, institute, Greenpeace, science, ETH | 5.0% | 7.0 | 0.61 | 63% |

# Mobility & Transport Theme

| Theme | Topic | Keywords | share of documents | avg. keyw. counts | coherence score | Consistency |
|---|---|---|---|---|---|---|
| Mobility & Transport | Sustainable Cars | car, vehicle, VW, kilometer, electric cars, battery, model, manufacturer, km, engine | 4.3% | 7.5 | 0.82 | 100% |
| | Freight Transportation | traffic, railroad, SBB, car, roads, street, tunnel, train, tube, highway | 4.2% | 4.3 | 0.68 | 89% |
| | Air Traffic | Airport, airplane, flight, noise, Dübendorf, runway, airport_Zurich, pilot, takeoff, airline | 1.6% | 4.5 | 0.66 | 46% |

# Climate Theme

| Theme | Topic | Keywords | share of documents | avg. keyw. counts | coherence score | Consistency |
|---|---|---|---|---|---|---|
| Climate | Climate Policy | energy, Switzerland, electricity, target, subsidy, technology, CO2_emission, coal, solar, share | 6.4% | 14.7 | 0.70 | 49% |
| | Climate Governance | climate, climate change, climate protection, emission, CO2, climate policy, degree, earth, Paris, atmosphere | 5.0% | 13.4 | 0.77 | 51% |

# Energy Theme

| Theme | Topic | Keywords | share of documents | avg. keyw. counts | coherence score | Consistency |
|---|---|---|---|---|---|---|
| Energy | Nuclear Energy | NPP, reactor, nuclear power plants, Beznau, exit, energy turnaround, nuclear power, construction, safety, operator | 5.2% | 9.2 | 0.81 | 84% |
| | Energy Policy | Federal Council, federal government, energy transition, levy, measures, parliament, tax, Switzerland, cost, subsidy | 4.8% | 8.0 | 0.59 | 14% |
| | Power Grid | Electricity, power plant, hydropower, grid, price, market, nuclear phase-out, energy, plant, security of supply | 4.7% | 10.8 | 0.77 | 95% |
| | Fossil Fuels | Iran, natural gas, sanction, Turkey, Israel, pipeline, gas, country, Syria, Tehran | 2.3% | 5.4 | 0.66 | 19% |

# Land use & Natural Resources Theme

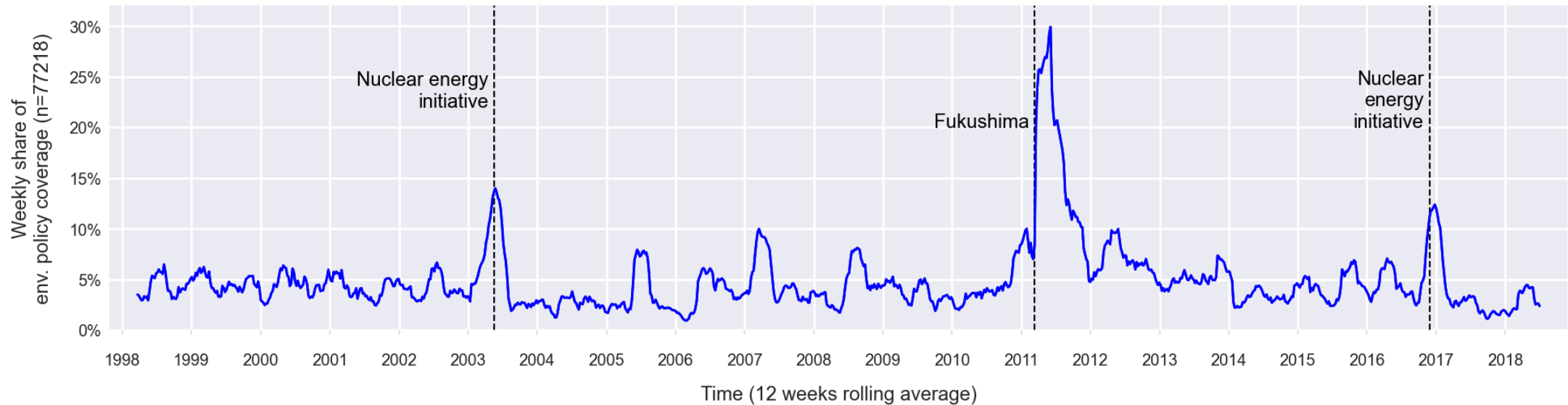| Theme | Topic | Keywords | share of documents | avg. keyw. counts | coherence score | Consistency |
|---|---|---|---|---|---|---|
| Land use & Natural Resources | Construction Projects | canton, project, municipality, federal, site, construction, decision, federal court, case, region | 6% | 5.40 | 0.51 | 42% |
| | Waters | Water, meter, kilometer, sea, island, region, lake, country, coast, million | 6% | 5.96 | 0.60 | 72% |
| | Nature Conservation | Animal, nature, wolf, protection, Switzerland, bird, biodiversity, fish, hunter, hunting | 4% | 5.46 | 0.73 | 53% |
| | Agriculture | product, agriculture, food, consumer, pesticide, plant, switzerland, meat, farmer, production | 4% | 8.19 | 0.72 | 84% |
| | Architecture | city, apartment, house, building, construction, space, project, architect, quarter, building | 3% | 4.88 | 0.49 | 74% |
| | Waste Management | ton, waste, plant, material, company, device, operation, quantity, system, water | 3% | 7.68 | 0.56 | 18% |
| | Spacial Planning | Farmer, agriculture, soil, landscape, land, community, spatial planning, area, building zones, farmer | 3% | 6.06 | 0.64 | 18% |
| | Air pollution | city, air, limit, authority, fire, air pollution, value, problem, fire, measures | 2% | 7.34 | 0.67 | 5% |
| | Environmental Associations | Association, WWF, environmental, organization, Weber, Greece, environmental, organizations, homeland, protection, complaint, environmentalists | 1% | 6.57 | 0.49 | 4% |
| | Timber Production | Japan, forest, tree, Canada, Tokyo, wood, Japanese, Romania, Morocco, rainforest | 1% | 6.27 | 0.28 | 2% |
| | Resource Extraction | coal, Australia, Indonesia, South Africa, palm oil, mine, raw material, mining, New Zealand | 0.1% | 6.23 | 0.41 | 2% |

# Economy Theme

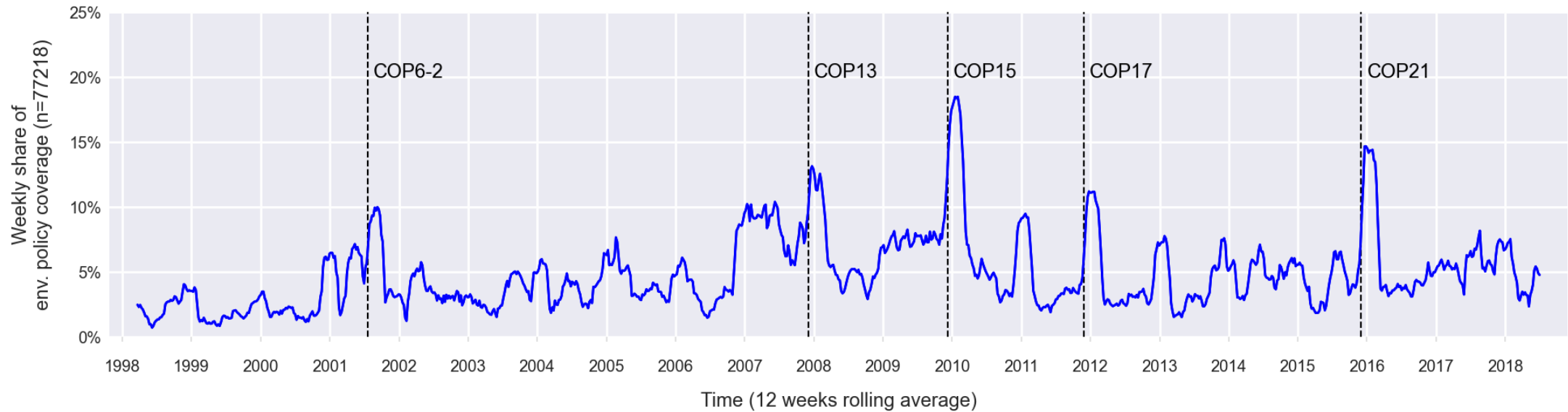| Theme | Topic | Keywords | share of documents | avg. keyw. counts | coherence score | Consistency |
|-------|-------|----------|-------------------|-------------------|-----------------|-------------|
| Economy | Finance | company, corporation, business, investor, share, market, industry, profit, sale | 8.5% | 5.2 | 0.70 | 89% |
| | Economy | economy, country, state, money, problem, growth, population, company, crisis, people | 3.5% | 4.6 | 0.45 | 32% |
| | Expenditure | franc, million_francs, money, million, cost, billion_francs, foundation, price, contribution, number | 2.2% | 4.4 | 0.50 | 75% |
| | Oil Price | price, oil, billion, demand, dollar, oil price, market, USA, barrel, Rosneft | 9.4% | 5.8 | 0.71 | 72% |

# Swiss Politics Theme

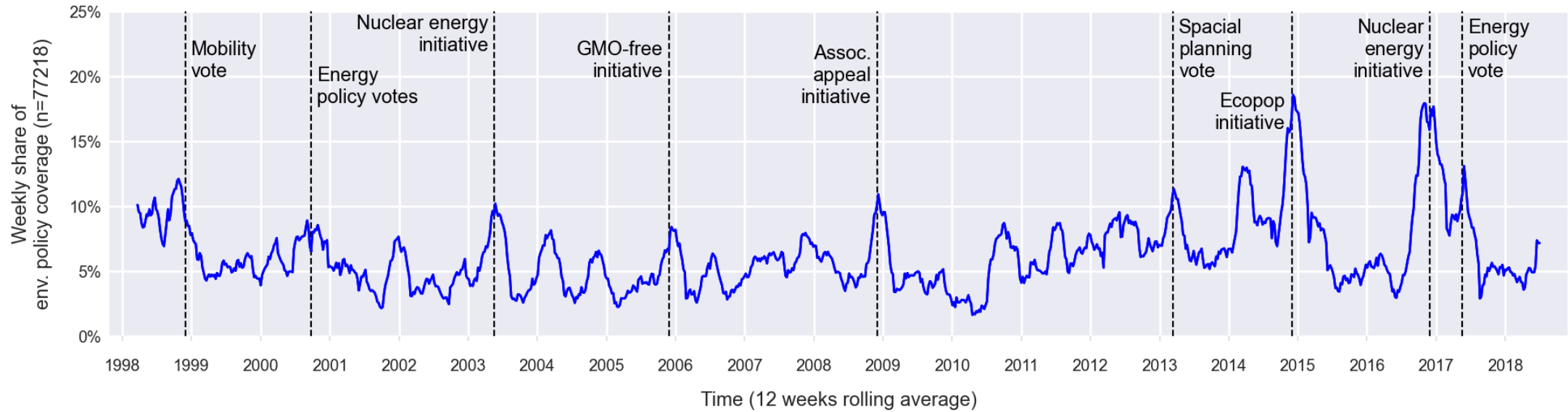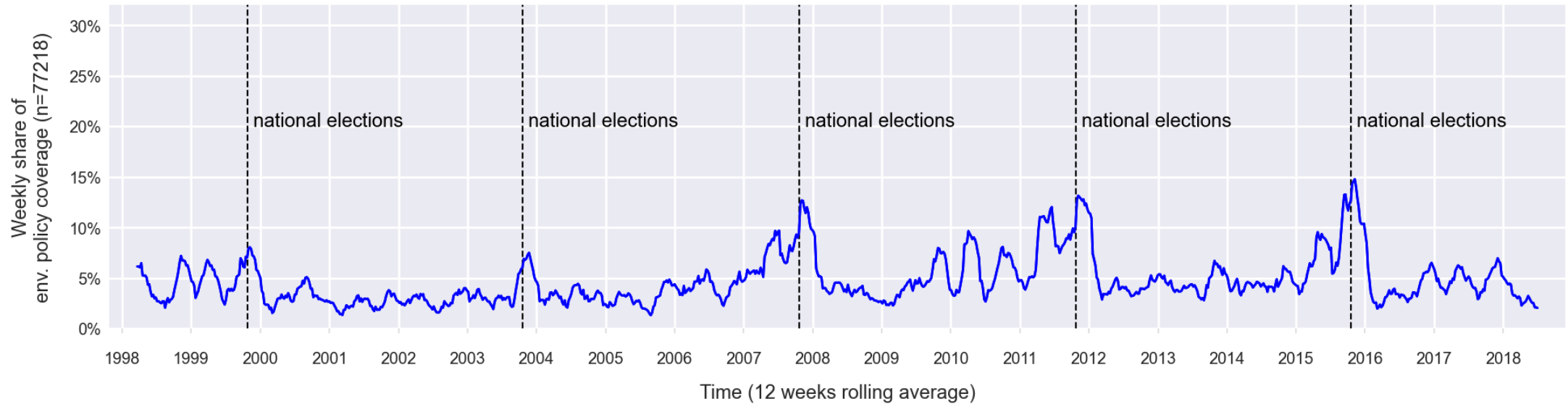| Theme | Topic | Keywords | share of documents | avg. keyw. counts | coherence score | Consistency |
|---|---|---|---|---|---|---|
| Swiss Politics | | | | | | |
| | Political Initiatives | Initiative, Federal Council, Vote, People, Parliament, Counterproposal, Leuthard, SVP, Popular initiative, Switzerland | 6.4% | 5.7 | 0.70 | 70% |
| | National Politics | SVP, National Council, CVP, FDP, SP, Council of States, vote, council, commission, parliament | 6.1% | 5.0 | 0.83 | 65% |
| | Elections | Party, Greens, election, Left, seat, politics, SP, FDP, campaign, voters | 4.9% | 4.4 | 0.72 | 96% |
| | Cantonal Politics | Zurich, city, city_council, city_of_Zurich, canton_of_Zurich, city_council, municipality, Winterthur, EWZ, canton | 4.3% | 4.8 | 0.66 | 81% |
| | National Governance Processes | law, government, commission, proposal, parliament, rule, measures, state, plan, ban | 4.0% | 5.4 | 0.46 | 4% |
| | Relationship EU | EU, Switzerland, Europe, agreement, country, Brussels, treaty, negotiation, EU_Commission, immigration | 3.5% | 5.0 | 0.62 | 91% |
| | Judicial Processes | Case, court, police, protest, action, judge, refugee, lawsuit, authority, verdict | 2.3% | 3.6 | 0.54 | 21% |

# Nuclear Energy

# Climate Governance
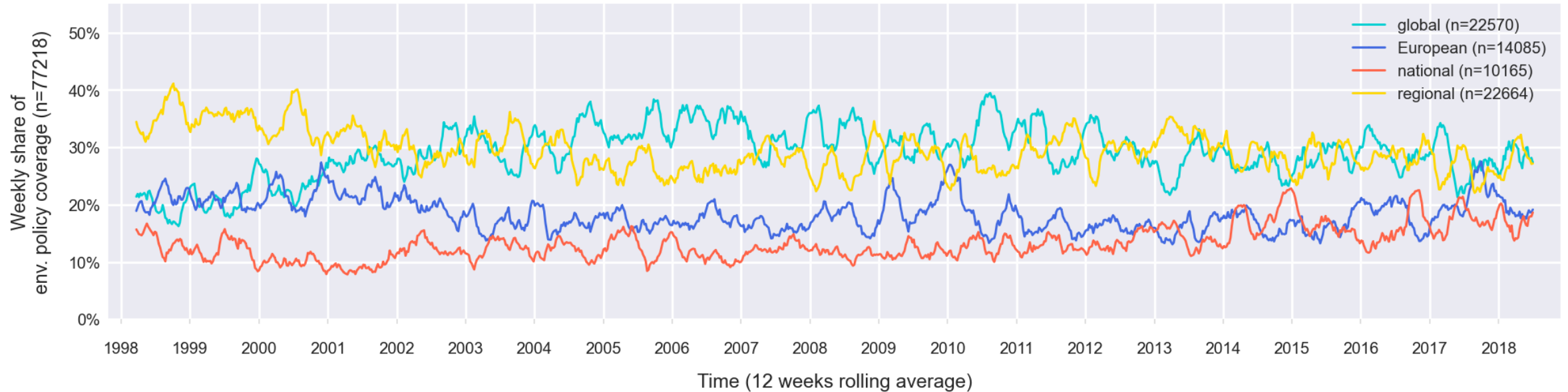
# Public Votes

# Elections

# Conclusion & Limitations

## Conclusion

- well-captured multidimensionality of environmental policy

- News media coverage typically triggered through:

  - impactful events (UN conferences, Fukushima nuclear disaster, protests) (Bonfadelli, 2016; Kristiansen & Bonfadelli, 2014; Stauffacher et al., 2015)

  - Democratic processes (elections, political initiatives, referenda) (see Marcinkowski & Donk, 2012; Udris et al., 2015).

  - Actual governance process or judicial decisions (decisions in government and parliament)

- Weekly and broadsheet papers leading, Sunday and tabloid papers tend to jump on the news-cycle (Jarren & Vogel, 2011; Russ-Mohl, 2008, Boykoff, 2007)

## Limitations

- time-intensive process

- instability of the models

Legend:
- global (n=22570)
- European (n=14085)
- national (n=10165)
- regional (n=22664)

Y-axis: Weekly share of env. policy coverage (n=77218)

X-axis: Time (12 weeks rolling average)

# What next?

- More detailed analysis of topics and their drivers
  - Explore **issue competition** and external factors
  - Actors and geographic entities through **Named Entity Recognition**
  - Valence of coverage through **sentiment analysis**

- Combine analysis with data on **venture capital deals** in Switzerland

- Explore if/how media attention affects **voting behavior**

# Thank You for your Attention!

**Discussion:**

- what can investors, policymakers and market actors learn from this project?

- What would they still like to get a better understanding of?

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**Backup Slides**

# Boilerplate Topics

| Theme | Topic | Keywords | share of documents | avg. keyw. counts | coherence score | Consistency |
|---|---|---|---|---|---|---|
| boilerplate | Society | World, politics, society, book, future, problem, history, life, century, democracy | 8.3% | 5.3 | 0.40 | 51% |
| | Life | child, family, people, life, father, world, house, film, school, mother | 4.4% | 3.8 | 0.58 | 86% |
| | Cantons | Switzerland, Bern, Zurich, Basel, Geneva, Swiss, Valais, Canton, ZH, Lucerne | 3.2% | 4.4 | 0.58 | 40% |
| | - | hotel, world, guest, California, tourism, Davos, London, York, travel, Republicans | 1.6% | 4.3 | 0.39 | 2% |
| | - | game, Müller, Ecopop, association, Swiss, Martin, BLICK, letter, Marco, action plan | 0.4% | 4.7 | 0.30 | 2% |
| | - | Mountain, winter, snow, ice, alp, arctic, Schmid, star, summer, Filippo_Leutenegger | 0.1% | 4.1 | 0.25 | 2% |

# Politics Abroad Theme

| Theme | Topic | Keywords | share of documents | avg. keyw. counts | coherence score | Consistency |
|---|---|---|---|---|---|---|
| Politics Abroad | French Politics | government, president, Paris, office, France, country, election, opposition, parliament, politician | 6.3% | 3.9 | 0.51 | 39% |
| | Global Conflict | USA, country, state, Washington, war, president, Africa, America, Americans, government | 5.6% | 4.5 | 0.63 | 56% |
| | Global Politics | China, country, Beijing, India, Brazil, USA, government, world, Chinese, Putin | 3.3% | 5.6 | 0.64 | 68% |
| | Eastern European Politics | Russia, Moscow, Ukraine, Gazprom, Russia's, Kremlin, prosecution, Russian, Kiev, state | 3.0% | 5.0 | 0.61 | 12% |
| | Neighboring Countries | Germany, Berlin, Italy, Merkel, Euro, Austria, SPD, Germans, Rome, coalition | 1.6% | 4.9 | 0.55 | 35% |

# Environmental Policy in News Media

- News media: key role in communicating risks and policies (Hansen & Cox, 2015)

- Agenda-setting theory (Arlt et al., 2011; Carmichael & Brulle, 2017; McCombs & Shaw, 1972) and issue attention cycle (Ader, 1995; Djerf-Pierre, 2013; Downs, 1972)

- climate change communication (Bonfadelli, 2016; Boykoff, 2007; S. C. Moser, 2010; Schmidt et al., 2013)

- specific topics within the realm of environmental policy (e.g. Jacobi et al., 2016; Stauffacher et al., 2015)

- the *Environment* is a "complex multidimensional issue and so are its associated regulations" (Brunel & Levinson, 2016: 48)

- longitudinal analyses of news coverage of *environmental policy in general* are rare (exceptions: Djerf-Pierre, 2013, Eisner, Graf, & Moser, 2003)

# Topic Modelling

- unsupervised machine learning technique (Blei et al., 2003; Quinn et al., 2010; Wilkerson & Casas, 2017)

- captures "hidden" (latent) thematic structures in large collections of text (Jacobi et al., 2016)

- "clusters of words that co-occur" in the text according to a distinct pattern (Jacobi et al., 2016: 90)

# Method: Data Preparation and Analysis

*Python,* Version 3.8 (Python, 2020)

- data analysis: *Pandas* (McKinney, 2010)

- natural language processing: *NLTK* (Bird et al., 2009)

- machine learning / POS-tagging:

  *Scikit-learn* (Pedregosa et al., 2011)

- topic modelling: *gensim* (Rehurek & Sojka, 2010)

Remove single characters / noise

↓

Extract nouns & lemmatize

↓

Find & apply collocations

↓

Prepare LDA inputs