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Actors and issues in climate change policy: The maturation of a policy discourse in the national and international context

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ABSTRACT

Policy discourses are important platforms for political actors to express their preferences on certain issues and are usually linked to a specific policy subsystem. From a research perspective, they have the potential to indicate ideological coalitions, policy change and learning. Using discourse network analysis, we identify core policy actors, issues, and coalitions in Switzerland's climate policy discourse and investigate how they have evolved over the past 15 years. In line with the policy process literature, we expected to see more stability than change in the discourse linked to the mature climate policy subsystem. However, our results have shown that policy discourses are more volatile than policy subsystems, and that national and international policy developments are able to trigger change, particularly in terms of the configuration of actor coalitions and the issues discussed.

Introduction

The international community will soon celebrate the 30th anniversary of the Rio Conference, at which the United Nations Framework Convention on Climate Change (UNFCCC) was presented and opened for signatures. Since 1992, many international summits and Conferences of the Parties (COPs) have taken place while, at the same time, countries have developed their own climate policies and programmes. Switzerland is no exception: The Swiss government began developing climate change mitigation measures immediately after the Rio Conference, and finally, in the year 2000, the Swiss CO_2 Act was introduced. To this day, this act constitutes Switzerland's key policy programme for fighting climate change. However, despite its effective implementation, the country is still struggling to reach current international standards like the Paris Agreement. Nevertheless, international summits, at least in some cases, can act as important triggers to raise public awareness and impact the salience of the climate issue at a national scale. Although it is not a sufficient condition for policy change, greater public attention to a topic pressures policymaker to at least take some form of action. In this regard, a lively policy discourse can be an important spark for policy change (see Baumgartner and Jones, 1993).

Policy discourse is interesting and relevant for several reasons. First, it is the "location" where different public and private actors express their support for or rejection of a certain policy issue and/or offer a solution to a specific problem (Leifeld, 2016). Second, the discourse offers an initial indication of how policies could look once they are introduced. A discourse is not only about policy issues; it also provides us with information about issue salience, major political and ideological conflict lines, dominant key players, among other things. Some policy issues will end up in legal texts or regulations, which in turn will become the public solution to the climate change dilemma. Lastly, over the years, this results in the development of a policy discourse that matures over time, reflecting stability and change in a complex multi-level context between international and domestic policymaking.

In this context, we ask: How has the Swiss policy discourse around climate change mitigation developed over the last two decades? Who and what were the key actors, issues and coalitions involved?

To answer these questions, we combine an in-depth analysis of the policy discourse for three selected periods with conceptual argumentation that has been developed in policy process theories. More concretely, we investigate stasis and change in the policy discourse, as constituted by actors, issues, and coalitions, after the climate change conferences in Bali (November 2007 to December 2008), Copenhagen (November 2009 to December 2010), and Marrakech (November 2016 to December 2017).

Discourse network analysis (DNA) is a well-developed and widely

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applied method of data collection and analysis (Leifeld, 2018, 2016). In the first step, researchers systematically code text material (e.g., media articles, consultation statements) and identify policy actors and their support for or rejection of a specific policy issue. In the second step, the actors and issues are linked and presented in a network. Public policy researchers frequently apply this tool to identify key policy issues and key actors (e.g., Brandenberger et al., 2020; Černý and Ocelík, 2020; Kukkonen et al., 2020), to measure and explain the polarisation of the discourse (e.g., Abzianidze, 2020; Fisher et al., 2012; Leifeld, 2013), or to identify discourse coalitions (e.g., Ghinoi and Steiner, 2020; Kukkonen et al., 2018). While DNA researchers often study one period at a time (for an exception, see Hilton et al., 2020), the method is well suited to comparing several periods as well. Thus, we will be contributing to this literature with a dynamic approach that allows us to learn about change and stasis in a policy discourse and to link moments of change to international and/or national events. While we are aware that it is difficult to disentangle the impact of different, almost simultaneous events on politics and policy outcomes, the DNA approach helps us to understand more precisely which policy actors (co-)support or (co-)reject which policy issues about climate policy and how they change (or do not change) over time.

Our results show that a majority of actors and issues change in the media discourse over time. However, at the same time, we also see that this change is less pronounced among the key actors, as well as in terms of the most salient issues in the discourse. Specifically, we find that issues change in line with the political agenda and that the media has a tendency to discuss new policy instruments or targets (in contrast to old or existing ones). Furthermore, we show that important international events can have the momentum to bring more substantive change to a national policy discourse, even in the context of a mature policy subsystem.

Political discourse and policy issues

Issue attention is a central concept in policymaking (Baumgartner and Jones, 1991; Howlett, 1997). Public policies are only formulated if an issue generates enough attention to be put on the political agenda (Baumgartner and Jones, 1991). One platform or arena where policy issues are expressed are policy discourses, and an argumentative turn in the public policy literature can be observed towards the increasing investigation of the nexus between discourses and policies (Fischer and Forester, 1993). A policy discourse is therefore defined as a verbal interaction between actors about a certain policy and/or policy issues (Leifeld, 2016). The support for or rejection of a certain policy issue in policy processes shapes decisions starting at the agenda-setting stage (Béland, 2010). In this way, a discourse develops, changes and matures. Over the years, policy discourse therefore takes different shapes in that diverse actors become involved and new issues and ideas are expressed (Baumgartner and Jones, 1993; Holt and Barkemeyer, 2012). We are interested here in the maturation of policy discourse, and in factors that might affect the policy discourse over time. The literature on policy processes is very rich when it comes to the investigation of stasis and change (Baumgartner and Jones, 1993; Meijerink, 2005; Sabatier and Jenkins-Smith, 1993). We deduce our key expectations from this literature on policy processes and will see if they also hold true in policy discourses that are investigated over time.

Policy discourses are often studied in relation to policy subsystems (Leifeld, 2013; Shanahan et al., 2011; Ylä-Anttila et al., 2018). The defining characteristics of policy subsystems include the geographic scope, the topical area, and the policy actors involved (Jenkins-Smith et al., 2018). Policy subsystems emerge because formulating and implementing public policies and achieving any desirable outcome requires both specialisations among policy actors and the dedication of governmental resources through a wide variety of institutional structures, such as those that could be found in various administrative arrangements (see Jenkins-Smith et al., 2018). When a new policy discourse emerges, this often comes close to what is referred to as a "nascent policy subsystem" (Stritch, 2015), in which actors do not yet have clear and well-formed policy preferences. In such a situation, the actors rely either on experiences from other policy fields or on the recommendations of peers or experts (see Ingold et al., 2017). Alternatively, some researchers argue that a new policy is either absorbed by an existing subsystem (and policy issues and related conflict lines are reproduced in the discourse), or that a proper discourse and subsystem are built (Beverwijk et al., 2008). In both cases, a subsystem becomes "mature". Theoretical expectations and empirical analysis highlight that actors within a subsystem, as well as the conflict and coalition structures therein, largely remain the same (Pierce et al., 2017; Sabatier and Jenkins-Smith, 1993).

Thus, theory suggests that change, in particular in a mature policy subsystem, is usually of minor magnitude and occurs iteratively in recurring medium- to short-term cycles of policymaking and issue attention (Meijerink, 2005).

Early elite studies have already come to the conclusion that policymaking is in the hands of a few actors (Dahl, 1961). Using and combining different approaches to identify key players demonstrates that the same set of actors is heavily and repeatedly involved in policymaking (Tait et al., 1978). This has also been confirmed by a very recent study of policy networks and the most central actors therein (Ingold et al., 2021). Similar conclusions can be found in the literature related to issues: In his seminal work, Downs (1972) describes issue-attention cycles as a process in which an issue passes through five stages from problem perception to media attention and public interest all the way to its eventual decline. The same logic is followed by the policy cycle (Howlett and Ramesh, 1995; Lasswell, 1956), where a problem is perceived and put on the agenda and, if successful, a policy is formulated, implemented, evaluated, and sometimes terminated. Policy terminations are rare, however; more frequently, reformulations or revisions of a policy transcend the policy cycle, once again leading to a repetition of policy issues in a policy subsystem.

The Advocacy Coalition Framework (ACF) assumes that actors and issues are resistant to change (Fischer, 2015; Nohrstedt, 2008; Sabatier and Smith-Jenkins, 1999), and that actors who support similar policy issues (referred to as core beliefs and secondary aspects) tend to organise in so-called advocacy coalitions and jointly coordinate their actions to influence policies. These advocacy coalitions are similarly resistant to change as their members (actors) and beliefs (issues) remain stable (Sabatier and Jenkins-Smith, 1993). Research investigating coalitions over time has come to the conclusion that coalition structures are reproduced over time within a policy subsystem even after shocks or other events that draw focus to certain issues (Fischer, 2015; Meijerink, 2005; Nohrstedt, 2008). Furthermore, discourse network analysis has convincingly linked advocacy to discourse coalitions (Leifeld, 2013; Schaub and Metz, 2020).

On the basis of this connection between the literature on policy processes and the literature on policy discourses, we have formulated the following expectations[1] for a policy discourse that has matured over time:

Expectation 1: Over time, the majority of policy actors involved in the discourse will stay the same.

Expectation 2: Over time, the majority of policy issues in the

[1] We use the term "expectation" (in contrast to the more common term hypotheses), since we are not investigating the relationship between two variables. Rather we expect the policy discourse in a mature policy subsystem to behave in a certain, theoretically predicted way. In a next step, one could then test specific hypotheses that explain why actors, preferences, and coalitions stay the same, over time in a mature subsystem.

discourse will stay the same.

Expectation 3: Over time, the actor coalitions involved in the discourse will largely[2] stay the same.

Case, data, and methods

In this section, we introduce our case, justify the selected periods we use for our analysis, and present our methods of data gathering and analysis.

Switzerland's climate policy in an international context

Switzerland is a small country that is only responsible for less than 1% of global greenhouse gas (GHG) emissions. Nevertheless, it tends to act as a forerunner and role model in the global climate regime. For example, it was among the first to introduce a domestic GHG emissions reduction target and a carbon tax, and pushed early for industrialised countries to support and finance climate adaptation in developing countries. The country's strong stake in climate protection measures is partly due to its Alpine geography, which makes it more vulnerable to the effects of climate change, as well as its awareness of its dependency on other countries to take action to fight climate change. Domestically, climate policy has a long tradition. In fact, the first ideas to implement a carbon tax were introduced in the 1970s when the two oil crises raised awareness of the need to reduce the dependency on imported fossil fuels. This awareness was further increased by the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992. As a result, Switzerland introduced a national programme to increase energy efficiency in the early 1990s with the goal of stabilising fossil fuel consumption and therefore CO_2 emissions by 2000 (1990 baseline). Despite this promising beginning, the history of Swiss climate policy has turned out to be a difficult one, driven by a persistent conflict between two opposing advocacy coalitions (e.g., Ingold, 2011; Ingold and Fischer, 2014; Kammerer et al., 2020) – the pro-economy coalitions (actors from the economy, energy, and transport sectors, as well as right-wing parties) and the pro-ecology coalition (civil society organisations, non-governmental organisations, and green and leftist parties). As a result, Switzerland's climate policy has been torn between domestic setbacks and international ambitions.

The first version of the Swiss CO_2 Act was driven by international developments, since it aimed to implement the requirements laid out in the 1997 Kyoto Protocol, namely reducing total GHG emissions by 8 % (compared to 1990) by 2013 (FOEN, 2010). However, due to the influence of powerful actors from the business, transport, and energy sectors, the first act was rather weak, relying mainly on voluntary measures. CO_2 inventories indicated early on that this would not suffice to reach the Kyoto Protocol commitments. Hence, a carbon tax on combustibles from industry and new buildings was introduced in 2008 and augmented in stages in the following years. Conversely, lobbying activities by actors from the economy and fossil fuel industries prevented the introduction of a carbon tax on motor fuels. This significantly undermined the country's national climate policy insofar as the transport sector was one of the greatest producers of carbon emissions in Switzerland. Dissatisfied with the national climate policy and spurred on by the international enthusiasm that was not only the result of the successful Bali Climate Change Conference in late autumn 2007, but also was fired up by the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report (AR4) and Al Gore's film "An Inconvenient Truth", the Swiss Climate Alliance of green and leftist parties, civil society organisations and NGOs launched the federal popular initiative "'For a healthy climate" in 2008. The initiative demanded the adoption of a much stricter emissions reduction target of 30 % by 2020 (compared to 1990) and the inclusion of climate policy in the Swiss constitution.

Very soon thereafter, however, the world experienced a decline in political enthusiasm for climate policy triggered by the failure of the international community to deliver a new and legally binding agreement at the climate conference in Copenhagen. In addition, a mistake in the AR4 of the IPCC undermined the institution's credibility and climate science in general. On top of this, the global financial crisis in 2008 severely impacted the global economy and pushed climate change off of the political agenda as policymakers turned their attention to economic issues. Against this backdrop, as a counterproposal to the public initiative of the Climate Alliance, the Swiss federal government presented a draft to revise the Swiss CO_2 Act in 2009. The revision was supposed to create a new legal framework for the second commitment period (2013–2020) of the Kyoto Protocol, but already during the public consultation stage, in which stakeholders were invited to give their opinion on the draft, several lines of conflict between the two dominant coalitions were revealed: the size of the emission reduction targets, the degree to which carbon offsetting abroad is an appropriate tool to reduce emissions (flexibility mechanisms), and the introduction of a carbon tax on motor fuels. Taken together, these lines of conflict illustrate that there was general disagreement about the best policy instruments.

The revised version of the Swiss CO_2 Act, which entered into force four years later in 2013, was a compromise solution between the two opposing coalitions. While it included a moderate reduction target of 20 % by 2020 (compared to 1990) with a focus on domestic measures and a complex mix of different policy instruments targeting a wide range of sectors, the pro-economy coalition successfully prevented the introduction of a carbon tax on motor fuels, thereby curbing effective regulation of the transport sector – the only sector in Switzerland in which carbon emissions continue to rise (FOEN, 2014).

Despite its failure, the Copenhagen Climate Change Conference paved the way for the Paris Agreement of 2015. In small, iterative steps, the international community negotiated a completely new climate protection approach that relied on bottom-up, voluntary GHG emissions reduction pledges by all countries, instead of top-down obligations for industrialised countries only (Brun, 2016). So far, this development reached its peak in 2017 with the drafting of the Paris Rulebook as a first attempt to implement the Paris Agreement. In Switzerland, the adoption of the Paris Agreement led to two important developments: First, Switzerland ratified its new climate treaty in late 2017, and second, in 2016, a new governmental proposal that suggested new pathways for the next revision of the Swiss CO_2 Act to translate Switzerland's international commitments to national legislation went to public consultation. However, similar to the earlier revisions, the two main coalitions disagreed on specific policy targets (the size of the reduction targets) and instruments (in particular the flexibility mechanisms).

Methods of data collection and analysis

To test our expectations, we conducted an in-depth discourse network analysis (DNA) of the policy discourse during three crucial periods.

DNA periods

Presented in Table 1, we have undertaken a DNA of three decisive periods to test our expectations with regard to the stability of key policy issues, actors and coalitions.

We selected the periods so that they cover both important international events, such as influential climate summits, and key developments in Swiss climate policy as described above. Furthermore, the selection of

[2] "Largely" here means that we expect to observe the same coalitions, but these coalitions may be composed at least partly of different actors and/or preferences.

Table 1
Overview of the periods under review.

Period	November 2007 to December 2008	November 2009 to December 2010	November 2016 to December 2017
International developments	• Bali Climate Change Conference 2007: Bali Road Map towards a new agreement • IPPC and Al Gore win the Nobel Peace Prize • IPCC AR4 published	• The Copenhagen Climate Change Conference in 2009 fails to deliver a new international treaty	• Marrakech Climate Change Conference in 2016: Debate on implementing Paris Agreement starts • Bonn Climate Change Conference in 2017: Adoption of the Paris Rulebook
National developments	• 2008: Introduction of carbon tax on combustibles • 2008: Introduction of the "Climate Cent" tax • 2008: Public initiative "For a healthy climate"	Spring and summer 2009: • Governmental proposal to revise the Swiss CO_2 Act • Public consultation on the new proposal	• June to December 2016: Public consultation on the new governmental proposal for the next revision of the Swiss CO2 Act to implement new international obligations • October 2017: Switzerland ratifies the Paris Agreement in 2017

periods was also underpinned by the fluctuation of media attention between 1997 and 2017[3] as visualised in Fig. 1. We have selected three periods in which media attention peaked.

Although the roots of Swiss climate legislation date back to the 1980s, Switzerland's media was rather oblivious to climate change for a long time. Even important international developments like the adoption of the Kyoto Protocol in 1997 did not spark media interest. Media attention rose for the first time with the introduction of the Swiss CO_2 Act in 2000. In 2005, media attention reached a new high with the enforcement of the Kyoto Protocol. National public attention peaked in 2007 with the successful Bali Climate Change Conference. In the same year, the Swiss federal government introduced a carbon tax on combustibles and the "Climate Cent" – a voluntary tax on gas and diesel (Stiftung Klimarappen, 2013), and the Climate Alliance launched their initiatives "For a healthy climate". In 2009, the Copenhagen Climate Change Conference and the new governmental draft for the revision of the Swiss CO_2 Act attracted significant public attention, but it did not reach the same level as in 2007. This may have been related to the global financial crisis and the failure of international negotiations to deliver a substantial climate protection agreement. After 2009, media attention continued to drop before gaining new momentum in 2014 when the international community negotiated the Paris Agreement and its implementation step by step (Brun, 2016; Dimitrov, 2016; Obergassel et al., 2016) and Switzerland debated its ratification and translation into national law from 2016–2017.

DNA: data collection and analysis

As mentioned above, DNA is a well-established and widely applied method to identify important actors, salient issues, and prevailing coalitions, or to determine the level of polarisation around a specific issue (Leifeld, 2020, 2016). To conduct a DNA, the researcher identifies policy actors and their support for or rejection of a specific policy issue. This information can then be presented as an affiliation network between actors and issues.[4] In these discourse networks, actors are the nodes of the network and co-rejection or co-support forms the tie. Many researchers draw on newspaper articles to construct these kinds of networks (e.g., Broadbent et al., 2016), but in principle, this method can be applied to any kind of text material (e.g., parliamentary debates, consultations, hearings, Tweets) that presents policy actors and their support for or rejection of a policy issue (see for example Bossner and Nagel, 2020 for a DNA on Twitter data, Kammerer, 2018 for a DNA on a public consultation, or Schmidt et al., 2019 for a DNA on parliamentary debates).

For this analysis, we draw on media discourse based on newspapers, since they cover a multitude of actors and policy issues and reflect the public attention towards climate change and climate policy. We searched three national newspapers for articles published on climate change that reproduce important societal splits that were potentially relevant for the Swiss climate policy discourse: the left-liberal "Tages-Anzeiger" (TA), the conservative "Neue Zürcher Zeitung" (NZZ), and the francophone "Le Temps" (TEM). In all three newspapers, we searched for the following German and French keywords[5] : "klima*", "clima*", ("climate"), "Globale Erwärmung" ("global warming"), and "CO_2".[6] As shown in Table 2, our newspaper search resulted in 4,108 articles for the first period (2007–08), 3,476 for the second period (2009–10), and 2,495 (2016–17) for the third period.

To create the three discourse networks, we only need articles in which clearly identifiable collective actors, such as government entities, political parties, business actors, civil society groups, or scientific representatives (Coleman, 1974), state their support for or rejection of policy issues related to climate change and climate policy. This requires the researcher to read all of the articles and select the relevant articles to be coded. This process is very labour intensive; thus, it is important to narrow down the number of articles to a manageable amount. For this purpose, many DNA applications draw sub-samples, e.g., take every "fourth" (Vesa et al., 2020, p. 4) or "fifth" (Stoddart et al., 2017, p. 390) article from the full set of articles, read them, and code the relevant ones manually. This procedure is repeated until a number of statements is achieved that represents the policy discourse within a given period. We took a different approach, which we perceive to be more effective and less prone to missing out on important aspects of policy discourse. First, we excluded all articles that dealt with climate change in a marginal way. We assumed that articles in which the keywords of our search string only appear a few times are irrelevant for the discourse network, and we therefore excluded those. To do this, we counted the number of times our keywords appeared in each article of the complete corpus of articles and excluded all articles in which the sum of keywords was less than or equal to two. As shown in Table 2, this approach significantly reduced the number of articles. Second, we followed the example of other DNA applications and excluded all articles below a certain word count (e.g., Nagel and Satoh, 2019). In our case, we removed all articles shorter than 500 words from the body text, since we assume that such articles are on average less relevant for the purpose of our analysis (e.g.,

[3] See Appendix 1 for the number of articles dealing with climate change every year and their share relative to the number of all articles that were published on any topic in the three outlets. Based on these numbers, we were able to determine the development of media attention on the topic of climate change over time and to embed this development within the context of important external events.

[4] Please note that there are many ways to create discourse networks. For an overview, see (Leifeld, 2020, 2016).

[5] We systematically excluded false positives for the German search string, such as "Klimaanlage" or "Klimatechnik" ("air-conditioning") to reduce the noise in our data set. The exact search string we used in German is as follows: (Klima* or Globale Erwärmung or CO2*) **not** (Klimaanlage* or klimatisier* or Klimatechnik*).

[6] As a data source, we used Factiva, which is a media pool of around 35,000 news sources (newspapers, magazines and wire services) from 200 countries.

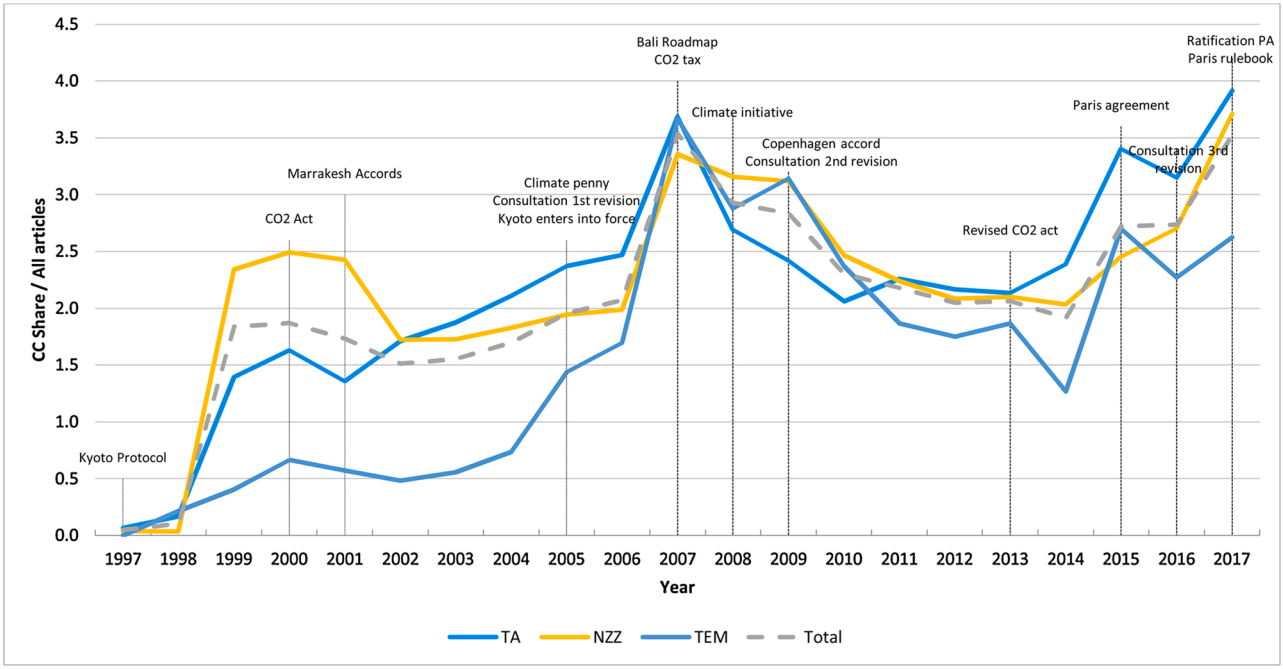

Fig. 1. Development of media attention over time (1997–2017).

Table 2
Number of articles, statements, actors and policy issues.

	Nov 07–Dec 08	Nov 09–Dec 10	Nov 16–Dec 17
ALL ARTICLES	4,108 (186)	3,476 (146)	2,495 (107)
SUBSTANTIVE ARTICLES	975	806	522
WORD COUNT > 100	975 (131)	735 (111)	522 (58)
WORD COUNT > 250	818 (77)	673 (99)	494 (55)
WORD COUNT > 500	558 (66)	441 (40)	404 (43)
USED FOR DNA	156	78	74
ACTORS IDENTIFIED	55	45	50
STATEMENTS IDENTIFIED	468	356	354
POLICY ISSUES IDENTIFIED	61	53	48

readers' comments, announcements of events).

To check whether this approach excluded too many important articles, we searched in different subsets, i.e., word counts smaller than 100, smaller than 250, smaller than 500, and the full sample, for articles that covered topics that are important for the Swiss policy discourse, such as the "CO2-Gesetz" ("loi sur le CO2" in English: "Swiss CO2 Act") and the "CO2-Abgabe" ("taxe sure le CO2", in English: "carbon tax"). As shown in Table 2, by cutting down the articles, we certainly lose a number of articles dealing with those two topics, but we keep the most relevant ones (with a key word count greater than 2). Thus, our approach seems to be a reasonable trade-off between reducing coding work and keeping the most relevant articles in the corpus of articles.

Finally, we import all the remaining articles into the Discourse Network Analyser (DNA) (Leifeld et al., 2018), which is the standard tool for manually coding discourse network data. Reading each article, we identified the articles that were relevant for constructing the discourse networks containing sentences or paragraphs that feature policy actors' preferences on climate policy. In these articles, we coded the names of the policy actors, identified different statements made by policy actors, and attributed them to policy issues. These policy issues are either climate policy beliefs (e.g., "climate change is real and anthropogenic"), targets (e.g., "drastic reduction in energy consumption"), or instruments (e.g., "market-based instruments instead of regulation"). For a full list of policy actors and issues for all three periods, please see Appendices 2 and 3[7] .

We started with a predefined list of actors and policy issues and extended and adjusted this list separately for each period. In several rounds of data cleaning and re-coding, we merged policy actors and issues to be sure that the data sets did not contain any duplicate actors or issues within a period, or contain policy issues that are very similar to each other across the different periods. Since there were two of us coding the data, we coded one period twice (2007–08), discussed any inconsistencies, and made refinements to the coding framework accordingly (see Buckton et al., 2019 for a commonly applied coding procedure in DNA). See Table 2 for the number of articles considered and the actors and statements coded. Once we assigned actors to policy issues, we were able to export and analyse our policy discourse networks. For this purpose, we used a combination of the "rDNA" R package and a Java-based DNA software tool (see Leifeld, 2018). Lastly, we loaded the DNA data set into our RStudio environment using the "rDNA" package.

To test our expectations, we needed to understand if the majority of the actors, issues and coalitions remained the same across the three networks. As a first test, we counted the number of new actors (Expectation 1) and issues (Expectation 2) as compared to the earlier period, and calculated the *ratio of new to old actors and issues* for each period. We also counted how many issues disappeared from the discourse and calculated the *total ratio of change*, i.e., the ratio of new and disappeared issues to old issues. If the ratio was lower than 1, we could conclude that the majority of actors and issues remained the same. However, relying on this simple, quantitative test alone would disregard the structure and meaning of our discourse networks. Thus, we also did two additional analyses.

First, we quantitatively analysed the most salient actors or issues entering the discourse in Periods 2 and 3 at the centre of the policy discourse, assuming that actor or issues might "pop up" at the periphery of the discourse, while its centre might remain constant. To determine

[7] We created our discourse networks using the Discourse Network Analyser (DNA).

the most salient actors or issues, we used the normalised degree centrality of the actor-actor and issue-issue network for all three periods. In these one-mode networks, a tie is present if a policy issue is commonly supported or rejected by policy actors. Since we are primarily interested the level of agreement (and not conflict) between two actors, we use "congruence" as qualifier argument. Congruence means that statements are only counted if two policy actors both agree, or both disagree, on a specific policy issue, i.e., a congruence network is a weighted network where the edge weight represents the number of times two policy actors co-support or co-reject an issue. Furthermore, we normalised our networks using the Jaccard similarity index to increase the comparability of the three discourse networks (Leifeld et al., 2018). The resulting network matrices are weighted, where values can float between 0 (no co-agreement or co-disagreement) and 1 (co-agreement or co-disagreement on all issues)[8] . Issue degree reflects how often an issue is co-supported or co-rejected by two actors and is therefore a proxy for its salience. Actor degree reflects how often an actor co-agrees or co-disagrees with other actors. Normalisation sets this number in relation with the overall number of ties and makes it comparable across networks. Higher degree centrality values are associated with greater prevalence in the discourse. To ensure comparability across the three periods, we assessed the change among the top 20 actors/issues, i.e., those actors/issues with the highest degree centrality values, for each period. Again, we calculated the *total ratio of change*, i.e., issues that become salient or disappear (change) versus the issues that remain in the policy discourse (stability). If the ratio was smaller than 1, we could conclude that the majority of the most salient actors/issues remained the same.

Second, we qualitatively analysed the most salient policy actors or issues in the discourse and compared them to the previous period, i.e., we compared Period 2 with Period 1, and Period 3 with Period 2. To do this, we identified the most salient actors/issues for both periods and determined whether (A) the actor/issue was present in all periods (Type A, stable actor/issue), (B) the actor/issue remained in the discourse from one period to the next (Type B, partially stable actor/issue), (C) the actor/issue increased in importance (Type C, actor/issue with increased salience), i.e., the actor/issue was already present in the earlier period, but not among the top 20 most salient actors/issues, (D) the actor/issue is not present among the top 20 within the current period(s), but was salient in the previous period (Type D, disappeared actor/issue), or (E) the actor/issue newly emerged in the discourse and was among the top 20 most salient actors/issues (Type E, newly emerged actor/issue), i.e., it was not present in the earlier period. For Type E issues, we also assessed whether they were connected to previous topics or were completely new. To do this, we checked if the new issues were being discussed not only in the media, but also in the political discourse (e.g., parliament) and if they were present on the political agenda during the respective period. Many Type D and E issues could be an indicator for major change in the policy discourse.

Finally, to test Expectation 3, we determined the prevalent discourse coalitions for all three periods. To do this, we conducted a cluster analysis of the three discourse networks using a clustering routine implemented in the rDNA package (Leifeld et al., 2018). To choose an appropriate clustering algorithm, we first calculated twelve different clustering algorithms for all three networks without a prior determination of the desired number of clusters. We selected the Walktrap algorithm since it shows a reasonably high modularity[9] value across all three networks. In contrast to the methods outlined above, we now used the "subtract" qualifier argument (see Leifeld et al., 2018, p. 7), since this was required by the clustering algorithm we selected. Here, conflict and congruence are combined in a weighted and signed network, with a positive number reflecting more congruence than conflict. To generate the clusters, we needed to disregard negative values and set them zero. Further, we excluded duplicate statements within the same document[10] .

We then qualitatively compared the results of the three cluster analyses with respect to the composition of the clusters in each discourse network. For this purpose, we identified the actor types for all actors in all clusters. We coded the actors into the following types: government, political party, business, civil society, science and international organisation (IO); see Appendix 2. Furthermore, we drew on earlier research on advocacy coalitions in Switzerland's climate policy (e.g., Ingold, 2011) to understand which actors usually form coalitions based on their shared beliefs (Sabatier and Jenkins-Smith, 1993). Both helped us to classify and name the observed clusters. Table 3 shows which actor type we expected to find in which discourse coalition. Accordingly, we assume that a "pro-ecology" discourse coalition that is composed of civil society organisations, governmental actors (e.g., environmental department), and left-wing parties would tend to support policy issues that are in favour of more ambitious climate change mitigation actions. Conversely, we assume that business groups and right-wing parties will be more in line with "pro-economy" policy issues. Lastly, we expect to find an "intermediate group" that consists of overwhelmingly governmental actors and scientists supporting both pro-economy and pro-ecology positions. At this point, it is important to note that discourse coalitions are not the same as the advocacy coalitions that are determined based on collaboration or coordination in policy networks (see Schaub and Metz, 2020 for a comparison between the two). Hence, we do not expect to find discourse coalitions that perfectly match with the theoretically expected advocacy coalitions in Switzerland.

Furthermore, we plotted heat maps for all three periods to identify which policy issues united the discourse coalitions (see Appendix 5, Figures D–F). To illustrate the discourse coalitions, we plotted the discourse coalitions in an actor-actor network using the R package ggplot2[11] and identified discourse coalitions using a colour code. To plot the networks, we selected the Fruchtermann-Reingold layout algorithm. For the actor-actor network, we used the "congruence" qualifier aggregation (Leifeld et al., 2018, p. 6) and normalised the network using the Jaccard similarity index. Furthermore, we reduced the size of the network by excluding all actors with a degree centrality below 1. In Appendix 6, Figures A–C, we also show the original dendrograms of the three cluster analyses. Expectation 3 will be confirmed if the number and composition of discourse coalitions stay the same.

Results

Stability and change in the Swiss climate policy discourse: actors and issues

To test Expectation 1 (the majority of actors remain the same over time), we analysed the change in the actor configuration. As shown in Table 4, the *ratio of new to old actors* for all three periods is less than 1.

Specifically, we observed that there are more "old" than "new" actors

Table 3
Expected coalitions in the climate policy discourse.

Pro-ecology	Pro-economy	Intermediate group
Civil society organisations	Business groups	Governmental actors
Left-wing parties	Right-wing parties	Science
Governmental actors		

Adapted from Ingold (2011) and Ingold and Varone (2012).

[8] To construct the one-mode networks, no thresholding was done, but we excluded self-loops, i.e., actors with a degree centrality equal to 1.

[9] In general, modularity is the likelihood that a component will break down into into smaller components.

[10] To construct the one-mode networks, no thresholding was done, but we excluded self-loops, i.e., actors with a degree centrality equal to 1.

[11] See https://cran.r-project.org/web/packages/ggplot2/index.html.

Table 4
Ratio of old to new actors.

	CHANGE BETWEEN PERIOD 1 AND 2	CHANGE BETWEEN PERIOD 2 AND 3	CHANGE BETWEEN PERIOD 1 AND 3
SAME ACTORS	29	32	28
NEWLY EMERGED	16	18	22
DISAPPEARED ACTORS	26	13	27
RATIO NEW/OLD	0.55	0.56	0.79
RATIO TOTAL CHANGE	**1.45**	**0.97**	**1.75**

in the policy discourse, which indicates stability. However, at the same time, a considerable number of actors leave the discourse. Hence, if we include the actors that disappear from the discourse from one period to the next in our calculation, the *total ratio of change* is greater than 1, which means that we observe at least some change in the configuration of actors in the policy discourse. Our analysis, therefore, shows mixed evidence and points to Expectation 1 not being met.

Since we find greater change among actors in the policy discourse than theoretically expected, it is now of interest to see who exactly stays and who leaves the discourse. Therefore, we went beyond the quantitative assessment of the stability and change across all actors and investigated the top 20 actors in the very same way that we later investigated the most salient policy issues. We determined the top 20 actors based on their normalised degree centrality and analysed if (A) the actor was present in all periods, (B) the actor remained in the discourse from one period to the next, (C) the actor increased in importance, i.e., was already present in the earlier period, but not among the top 20, (D) the actor disappeared from the top 20 in the previous period(s), or (E) the actor newly emerged in the discourse, i.e., was not already present in the earlier period.

Table 5 presents this additional analysis for the top 20 actors across the three periods. The analysis shows that despite the change we observed when testing Expectation 1, the climate policy discourse in Switzerland is rather stable with respect to its key protagonists and consists of several "usual suspects", such as the major political parties (Swiss People's Party, FDP. The Liberals, Christian People's Party, Green Party Switzerland, and Social-Democratic Party), environmental NGOs (in particular WWF Switzerland), governmental actors (in particular the Federal Council), and scientific representatives (in particular ETH Zurich). Overall, the analysis shows that more key actors remain constant across all three periods (Type A), remain at least in the next period (Type B), or exist in the periphery of earlier periods (Type C). In contrast, change among the key actors is less frequent. In the period from 2009–2010, only six completely new actors appeared, and in the period from 2016–2017 it was only two (Type E). Also, the *total ratio of change* in both periods is below 1, meaning that the majority of the top 20 actors remained the same. Thus, we observed change among actors both if we look at all actors and if we take a closer look at the centre of the policy discourse. However, at the centre of the discourse, we also observed that the majority of actors were constantly present.

To test Expectation 2 (the majority of issues remain the same over time), we assessed the change in the configuration of all issues from one period to the next. As shown in Table 6, the *ratio of new to old issues* between the first and second periods and between the second and third periods below 1. Similar to what we saw for the actors, if we include the issues that have disappeared from the discourse, the observed *total ratio of change* is always very clearly above 1, which points to more change than stability in the policy discourse network over time with regards to policy issues. This again provides mixed evidence and indicates that Expectation 2 was not met.

Table 7 presents the analysis of stability and change among the 20 most salient policy issues over time. As shown above, we distinguished

Table 5
Stability and change among the top 20 actors.

Period	2007–08	2009–10	2016–17
TOTAL	51	45	45
Unique	18	2	2
Top 20	22	21	20
Type A (stable)	ETH Zurich Federal Council Social-Democratic Party Green Party Switzerland FDP. The Liberals NGOs Christian People's Party WWF Switzerland		
TYPE B (partially stable)	**2009–10** Economiesuisse Cantonal government Energy industry Car importers		**2016–17** Federal parliament Green-Liberal Party Swisscleantech Environmental Committee (parliament) Bourgeois Democratic Party
Type C (increased importance)	Corporations, domestic Environmental Committee (parliament) Relief organisations		ETH Lausanne Federal Office for the Environment Greenpeace Switzerland Swiss Academies of Arts and Sciences Swiss People's Party
No. of stable actors (Type A + B+C)	15		18
Type D (disappeared)	City/Municipal Council Federal Dept. for Economic Affairs, Research and Education Federal Dept. of the Environment, Transport, Energy and Communications Swiss Trade Association Transport organisations Travail Suisse Churches Federal parliament Green-Liberal Party Oeschger Center for Climate Change Swiss Trade Association Swisscleantech		Cantonal government Car importers Churches Corporations, domestic Economiesuisse Energy industry Oeschger Center for Climate Change Research Relief organisations Swiss Trade Association Christian Social Party Construction industry
No. of changed actors (Type D + E)	12		11
Total ratio of change	0.80		0.61

Table 6
Ratio of old to new issues.

	CHANGE BETWEEN PERIOD 1 AND 2	CHANGE BETWEEN PERIOD 2 AND 3	CHANGE BETWEEN PERIOD 1 AND 3
ALL ISSUES			
SAME ISSUES	28	26	24
NEWLY EMERGED	25	22	24
DISAPPEARED ISSUES	33	27	37
RATIO NEW/OLD	0.89	0.85	1.00
RATIO TOTAL CHANGE	2.07	1.88	2.54

Table 7
Stability and change among the top 20 issues.

Period	2007–08	2009–10	2016–17
TOTAL	61	53	50
Unique	18	13	13
Top 20	20	22	20
Type A (stable)	Flexible carbon offsetting abroad Switzerland should take leading role		
	2009/10		**2016/17**
	Carbon tax on fuels		CC as business opportunity
	Coordination with EU CC regime		Energy tax
TYPE B (partially stable)	International carbon tax		Financial transfer to developing countries
	Promotion of energy efficiency		Revision of the Swiss CO2 Act
	Urge for immediate action (no wait-and-see strategy)		Stricter regulation of vehicles
	CC as business opportunity		Ambitious reduction targets (>20 %)
	CC is (also) a development issue		High-quality certificates
Type C (increased importance)	Compensation obligation for new gas-fired power plants		Link to EU ETS
	Drastic reduction in energy consumption needed		Promotion of nuclear power
	Stricter regulation of vehicles		
No. stable issues (Type A + B+C)	12		12
	2000-Watt-Society		20 % reduction (national target)
	CC is one of biggest challenges of humanity		Binding national emissions reduction targets needed
	CO2 label for food		CC action politically feasible
	"Climate Cent" valuable contribution to reducing emissions		CC is (also) a development issue
	Earmarking of carbon tax		Carbon tax on fuels
	Great(est) potential for GHG reductions/energy savings is in the buildings sector		Climate awareness is low
	Promotion of biofuels as alternative energy		Compensation obligation for new gas-fired power plants
Type D (disappeared)	Promotion of fossil energy		Coordination with EU CC regime
	Promotion of renewable energies		Drastic reduction in energy consumption needed
	Promotion of wood-fired power plants		Federal climate protection measures sufficient
	Strong international agreement/institutions		International carbon tax
			Promotion of alternative energies
	Switzerland's ambition/measures sufficient		Promotion of energy efficiency
			Urge for immediate action (no wait-and-see strategy)
			Voluntary instruments
	20% reduction (national target)		Energy law or strategy
	Binding national emissions reduction targets needed		Green investments
	CC action politically feasible		Prevention of climate risks
	Climate awareness is low		National measures in aviation sector needed
Type E (newly emerged)	Energy tax		Swiss ETS not efficient
	Federal climate protection measures sufficient		Trump administration is a threat for CC
	Financial transfer to developing countries		Swiss ratification of PA
	Revision of the Swiss CO2 Act		
	Promotion of alternative energies		Increased carbon tax on combustibles
	Voluntary instruments		
No. changed issues (Type D + E)	22		23
Total ratio of change	1.83		1.91

five possible scenarios of stability or change in the centre of the policy discourse: Type A (stable issue), Type B (partially stable issue), Type C (issue with increased importance over time), Type D (disappeared issue), Type E (newly emerged issue). Our analysis shows that policy issues seem to iteratively adjust over time in line with both international and domestic political developments, and that this was also the case in the centre of the policy discourse. As we can see in the last row of Table 7, the *total ratio of change* (which includes newly emerged and disappeared policy issues) is greater than 1 for both periods, which implies that the majority of policy issues among the 20 most salient ones do change. Thus, depending on the current political and policy context, a rather stable set of key policy actors (as we have seen above) apparently agree or disagree about different policy instruments and targets. Furthermore, only two of the most salient policy issues are reproduced over time: the discussion of whether or not

Switzerland's climate policy should allow for "flexible carbon offsetting abroad" and whether "Switzerland should take (a) leading role" in international climate change mitigation action. Similarly, we observe in total only ten Type B and nine Type C policy issues, i.e., very few policy issues are reproduced over time. In contrast, there are many policy issues that disappear from the discourse (Type D, 29) or newly emerge (Type E, 18).

If we take a closer look at the qualitative meaning of the policy issues, we find that the observed change is less radical than the pure quantitative analysis suggests. The second period (2009–2010) includes ten new policy issues, but they are all linked to topics that have been on the political agenda for a long time. Two of them are linked to the Swiss CO_2 Act, which was already adopted in 2000. If we focus on the next "revision of the Swiss CO_2 Act", policy actors discuss an increased emission reduction target (20 % instead of 10 %) and the suitability of well-known "voluntary instruments". Moreover, the debate about whether "climate action is politically feasible" and "climate awareness is low" is probably linked to the mistake that was discovered in the IPCC's AR4 and the decreased media attention to the topic of climate change after the failure of the Copenhagen conference. Similarly, the remaining policy issues are linked to international climate politics, such as the demand for "binding national emissions reduction targets" or a "financial transfer to developing countries", as well as the discussion of the adequacy of Switzerland's climate policy ("federal climate policy is sufficient") and its energy mix ("promotion of alternative energies"). These do not bring any real innovation to the discourse, but rather reflect the topics of an ongoing policy process. Only the discussion of the introduction of an "energy tax" in Switzerland marks a new policy issue and is likely a first indication of new policy developments concerning the adoption a new energy policy strategy and later a new energy law (for a study on Swiss energy policy, see Kammermann and Ingold, 2019).

In 2016 to 17, eight new issues appeared in the policy discourse, five issues increased in importance from Period 2–3, and seven issues were reproduced from the earlier periods, either as Type A or B issues. Two issues can be considered "brand new" topics, since they relate to current developments at international scale, i.e., the pending "ratification of Paris Agreement" and the climate policy of the administration of former US President Donald Trump, which is often perceived as "a threat to climate change mitigation". Two policy issues indicate a rather novel topic in Switzerland's domestic climate policy, namely the discourse around the "prevention of climate risks" and the closely related topic of "green innovations" triggered by insurance companies and pension funds. In addition, the discussion of whether "national measures in (the) aviation sector (are) needed", appears for the first time in Period 3. In contrast, the remaining topics relate to existing policy instruments, the emission trading system ("ETS not sufficient"), and the carbon tax on combustibles ("increased carbon tax on combustibles") and cannot be considered new topics in the discourse.

To conclude, our analysis provides some evidence that policy issues change over time according to international and national developments, but not radically.

Stasis and change of the Swiss climate policy discourse: discourse coalitions

To test Expectation 3 (actor coalitions remain the same over time), we used a cluster analysis to identify discourse coalitions, i.e., cohesive subgroups that support or reject similar policy issues in the respective discourse.

For the 2007–2008 network (see Fig. 2), we identified eleven clusters (see Appendix 5, Figure A, for the dendrogram). Eight of these clusters are single actors and cannot be assigned to a specific discourse coalition (grey nodes), but we were able to match the remaining three clusters to mostly meaningful discourse coalitions, namely the pro-ecology (dark green nodes), the intermediate group (light green nodes), and the pro-economy coalition (red nodes). The pro-ecology coalition is the largest of the three subgroups. As expected, it comprises left-wing parties, civil society organisations, environmental NGOs, a governmental body (the Federal Office of Energy), and local government actors. In addition, a number of science actors can be counted among the members of this coalition. The most important uniting policy issues are that coalition members mostly reject the "promotion of fossil fuels", "flexible carbon offsetting abroad", and the "promotion of nuclear power", but support a "carbon tax on motor fuels". The only outlier in this coalition is the Homeowners Association (HEV), which is usually not a natural member of the pro-ecology coalition. However, like other members of this coalition, the HEV supported the earmarking of the carbon tax. In contrast, the pro-economy coalition only comprises 17 actors and is made up of actors from private business, the economy, transport, industry, energy, conservative and liberal parties, as well as the State Secretariat for Economic Affairs and the Federal Council. The uniting elements are the rejection of the "carbon tax on motor fuels", the support of "flexible carbon offsetting abroad" and the "promotion of nuclear power". As expected, we identified a small third group of actors, the intermediate group, comprised of relief organisations, the Swiss Agency for Development and Cooperation, actors from the financial industry and insurance companies, and several scientific institutions. It is difficult to define uniting policy issues for this group, since they support policy issues across the range, but many of them perceive climate change "as a business opportunity". See Appendix 5, Figure D, for a heat map of the policy discourse in 2007–2008 that shows which policy issues are most commonly shared among the members of a discourse coalition. Overall, the climate policy discourse in 2007–2008 revealed coalitions in line with what we would have expected for the Swiss climate policy network at that time. The overall positive attitude towards climate protection is visible in the discourse and is reflected by the large number of pro-ecology actors prevalent in the discourse.

As shown in Fig. 3, the 2009–2010 discourse network seems to be divided between two main coalitions. In fact, our cluster analysis also allowed us to draw the same conclusion (see Appendix 5, Figure B, for the respective dendrogram). The clustering algorithm identified seven clusters. Five small clusters are comprised of only one or two actors and cannot be matched with any specific coalition (grey nodes). Two large clusters, however, fit very well with what we would expect to see with respect to a split into a pro-economy coalition (red nodes) and a pro-ecology coalition (dark green nodes). As in the previous period, the pro-ecology coalition is larger (n = 23) than the pro-economy coalition (n = 16). Also, the two coalitions are comprised of the actor types that we would expect: green and left-wing parties, civil society organisations,

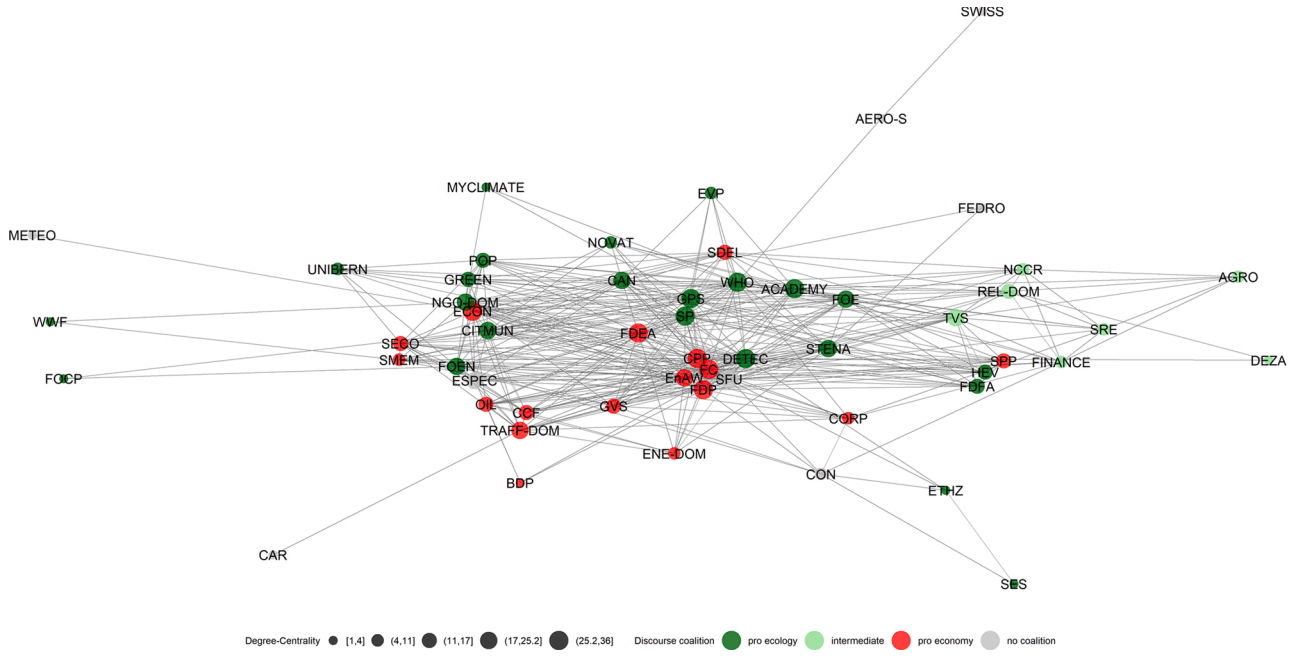

Fig. 2. One-mode network with discourse coalitions, 2007–08 (degree of centrality > 1; algorithm layout: Fruchterman-Reingold).

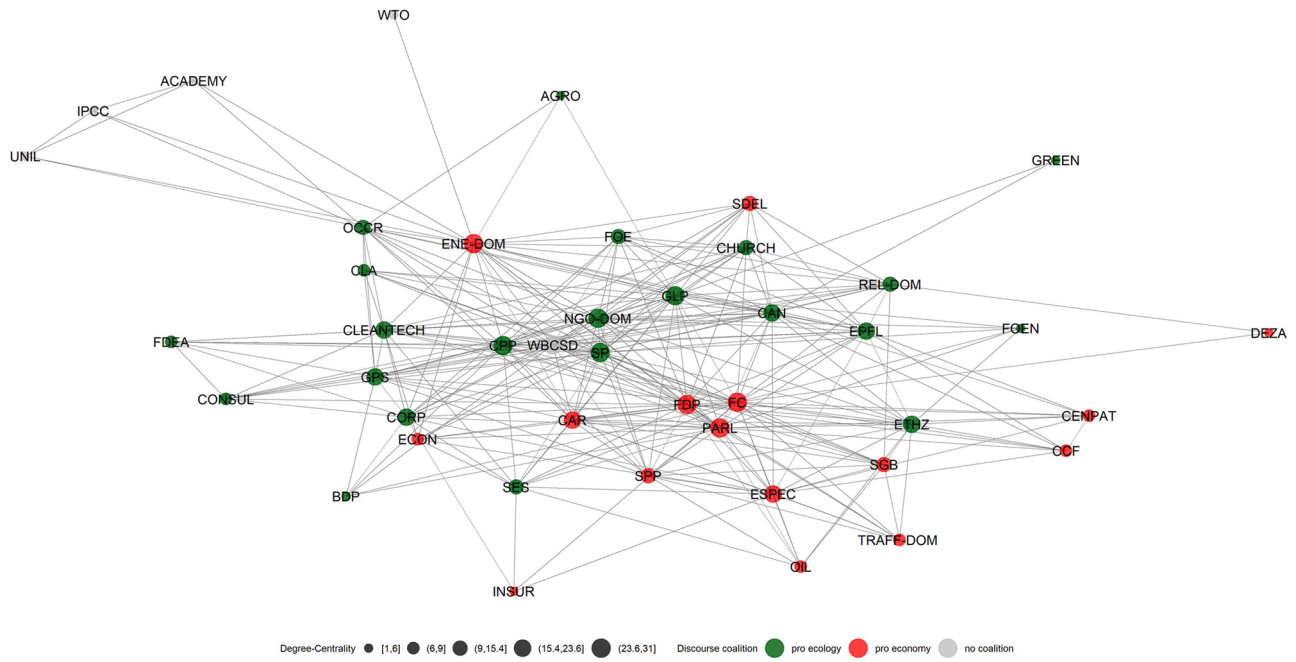

Fig. 3. One-mode network with discourse coalitions, 2009–10 (degree of centrality > 1, algorithm layout: Fruchterman-Reingold).

and some governmental actors are in the pro-ecology coalition, whereas business actors and right-wing parties belong to the pro-economy coalition. In terms of their preferred policy issues, the pro-ecology coalition is united by a widespread agreement on strong emissions reduction targets and ambitious climate action. Hence, many actors demand a "drastic reduction in energy consumption" and bold emissions reduction targets higher than the 20 % national reduction target. Similar to the previous period, another uniting policy issue is the support of the introduction of a carbon tax on motor fuels ("carbon tax on fuels"). The pro-economy coalition is united by three key policy issues: Firstly, many actors support the idea of coordinating Switzerland's climate policy with EU ambitions ("coordination with EU target") to avoid competitive disadvantages. Secondly, and in contrast to the pro-ecology coalition, many actors support the national reduction target of 20 % with only few hardliners (like the Swiss People's Party) rejecting it for being too ambitious. Lastly, once again in this second period, the pro-economy coalition is united by supporting the concept of flexibility in order to achieve the reduction of carbon emissions ("flexible carbon offsetting abroad"). Overall, it must be highlighted that the discourse in 2009–2010 much more clearly reveals a conflict line between the two opposing coalitions, and that there is no longer an intermediate coalition. See Appendix 5, Figure E, for a heat map of the policy discourse in 2009–2010 that shows which policy issues are most commonly are shared among the members of a discourse coalition.

Lastly, the results of the cluster analysis of the discourse network in 2016–2017 (see Figure C and F in Appendix 5) reveal a very different picture compared to the two previous periods. The cluster algorithm identified 15 clusters, with many very small clusters of one to four actors that cannot be clearly assigned to any one coalition. The only meaningful discourse coalition we were able to determine is a comparably large pro-ecology coalition comprised of 19 actors from science, civil society, green and left-wing political parties, and governmental actors. Interestingly, the Federal Council is now part of the pro-ecology coalition in contrast to the other two periods, where it was more in line with pro-economy or intermediate positions. As in previous periods, the most important policy issue uniting the pro-ecology coalition was support for an "ambitious reduction target". Furthermore, this coalition was rather critical about the effectiveness of the Swiss emissions trading system and supported the adoption of a new energy law focussing on the transition to sustainable energy production. Interestingly, the pro-economy coalition is non-existent in the discourse at this time, but seems to be splintered into to several smaller subgroups. Specifically, we can identify three different groups that formerly comprised the pro-economy coalitions: a small group of hardliners like economiesuisse, the Swiss People's Party, or the oil industry; a group of six moderate pro-economy actors from industry and the government; and a group of economic actors that commonly support green investments and climate risk prevention. Nevertheless, these groups are not linked by many shared co-supported or co-rejected policy issues, which does not allow for clear-cut assignment to a specific discourse coalition (see the heat map in Appendix 5, Figure F). Hence, as shown in Fig. 4, the only coalition identified in Period 3 was the pro-ecology (dark green nodes).

In sum, we observed considerable change in the policy discourse with respect to the discourse coalitions. While the first period (2007–2008) revealed three coalitions (pro-ecology, pro-economy, and intermediate) as expected, the policy discourse in the second period (2009–2010) was more polarised, with two rather clear opposing coalitions. The third period (2016–2017) then shows a completely different picture, with only one obvious coalition: the pro-ecology coalition. In terms of the uniting policy issues, however, we observed some stability: The pro-ecology actors tend to support ambitious targets (greater than 20 % reduction in emissions), Switzerland's leading role in the international climate policies, and stricter policies (e.g., a carbon tax on fuels or measures in the aviation sector). In contrast, although they are less united than in earlier periods, pro-economy actors are still in favour a less ambitious climate policy with greater flexibility in terms of how to implement respective measures. Nevertheless, the results of our analysis do not allow us to confirm Expectation 3, since neither the number of coalitions, nor their uniting policy instruments, overwhelmingly remained the same.

Discussion and concluding remarks

In this article, we analysed the Swiss climate policy discourse and showed how the actors, issues and coalitions therein evolved over time. We used discourse network analysis to test our expectations about stability and change in a mature policy discourse, building our theoretical argumentation on theories of the policy process.

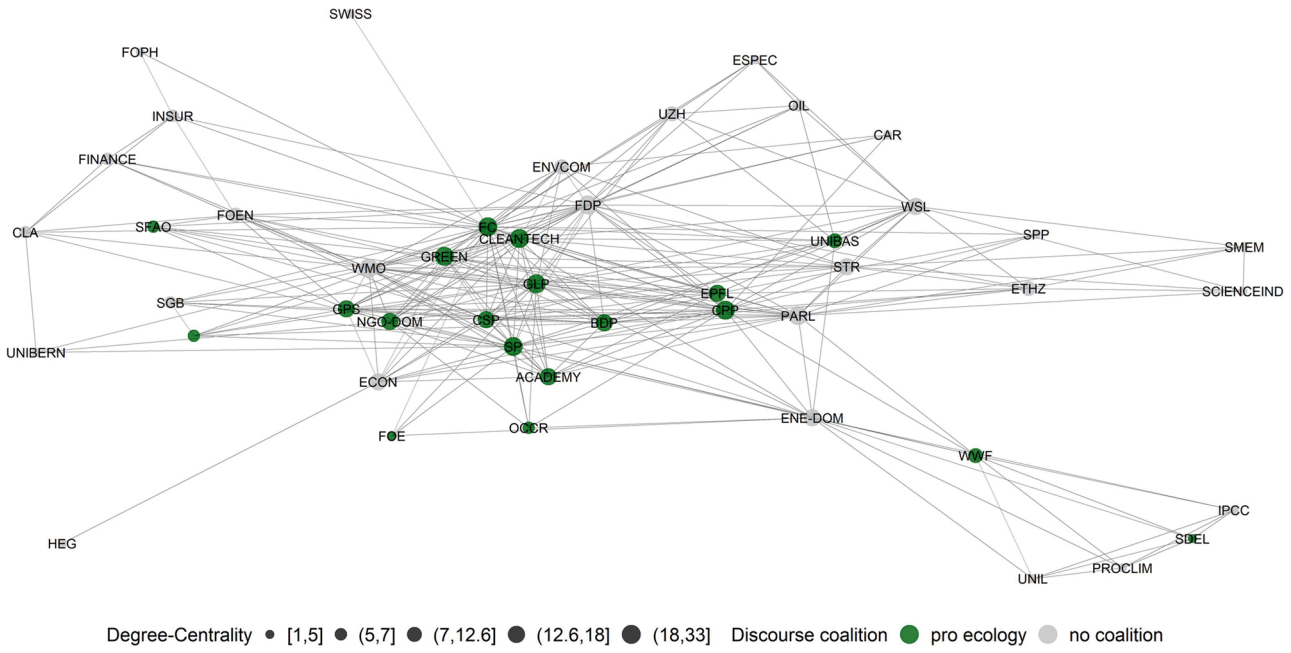

Fig. 4. One-mode network with discourse coalitions, 2016–17 (degree of centrality > 1; algorithm layout: Fruchterman-Reingold).

In general, our results provided mixed evidence in terms of our expectation that change is rare in a mature policy discourse and that stability is the rule. Rather, we observed more change than expected with regard to the policy actors, issues, and, in particular, the coalitions. So, while many salient issues and the majority of key policy actors indeed remained the same and have been present in the Swiss climate policy discourse over the past 15 years, almost exactly the contrary is true as well: often more than half of the issues and actors disappeared and new topics and issues emerged between the periods observed. As a result, we cannot fully support or reject Expectations 1 and 2.

As we dig deeper, however, we get closer to the confirmation of our first and second expectations. The protagonists and most central actors within the discourse, such as the political parties represented in parliament, the top associations of the Swiss industry, and the largest green NGOs, largely stayed the same over time and remained active in the discourse (see also Ingold et al., 2021). Furthermore, when the issues changed, they did so rather iteratively, i.e., in a way that was linked to existing topics and in line with the political agenda. Moreover, we observed that policy discourses often take up new policy instruments or targets that are part of a new policy proposal or that are related to the current international developments. Further, we have observed that the international policy agenda is also reflected in the discourse within Switzerland. Thus, an interesting observation is that the domestic media reports on policies and policy issues not only on the domestic level, but also on the international level as well.

When looking at discourse coalitions, the picture is an interesting one. Coalition structure is clearer cut in the first two periods, but becomes more fragmented over time. This finding is different than expected and related to several perspectives: First, the analysis of advocacy coalitions in the Swiss policy process almost always reflects stability and a clear differentiation between the two main pro-ecology and pro-economy coalitions (Ingold, 2008; Ingold and Fischer, 2014). However, these findings are based on elite studies with a smaller set of policy actors that closely aligns with the top 20 key actors that we present in Table 5. As a result, the political discourse, and therefore also the discourse coalitions, might be more inclusive than advocacy coalitions. When comparing discourse and advocacy coalitions in the German Water Policy subsystem, Schaub and Metz (2020) come to the conclusion that media emphasises one type of actor (e.g., expanders). We add to this result by suggesting that advocacy coalitions based on elite surveys might be more restrictive than media in terms of their definition of actors. Accordingly, the actor "identification" of both those "methods" or "outlets" differs to some extent, which obviously leads to a difference in the identified coalition structures as well (see also Vesa et al., 2020 for a discussion about "media visibility"). To see if this holds true in the context of Swiss climate policy, a comparison of advocacy coalitions based on elite surveys, and of discourse coalitions based on media data, would be necessary and should be part of a future research agenda. Second, policy process theories often discuss the evolution of a policy subsystem from nascent to mature (Stritch, 2015). They thereby relate this maturation to the fact that coalitions of convenience or epistemic communities turn into more organised and coherent groups of actors over time. Here, we almost observe the contrary: Over time, the pro-economy coalition gets fragmented and splits into diverse subgroups that prefer different policy measures and different beliefs related to Swiss climate policy. More comparative research is needed to find evidence as to whether this difference between policy discourses and processes can be systematically observed, or if this is a unique observation of the case studied here. Nevertheless, it is true that the policy discourse on climate policy, at least in Switzerland, has become highly complex due to the growing portfolio of policy measures that have been discussed and adopted in the past 15 years. Apparently, more nuanced policy portfolios seem to split established coalitions and increase fragmentation over time, at least in the media discourse. However, again, further research would be needed to understand if this this a phenomenon specific to Switzerland or if this observation can be applied more generally. For this purpose, we need more studies that do not solely observe policy discourses one period at a time, but rather compare developments across periods, as well as studies that include varying degrees of complexity and also potentially cover different countries and policy areas.

This research is confronted with three key methodological limitations. To begin with, assessing stability and change in discourse greatly depends upon the consistency of coding over time on the one hand, and on the coding scheme's flexibility in terms of change on the other. Therefore, it is important to ensure that the same issues or actors can be identified over time. However, at the same time, new issues and actors are allowed to enter the discourse. In this context, it is not always clear which new issues and actors are worth including in the coding process and which are not. In this regard, we found it very helpful to triangulate

our DNA data set with relevant official policy documents that appeared before or during the selected periods, such as policy drafts or new international agreements, in order to consider new issue and actors. Second, while media data have clear advantages, i.e., they are a reliable source to observe the development of a policy discourse over time, it must be stressed that the media acts as a filter. Media contributions are created by humans, who are themselves "subject to their cultural background, their opinions, and their emotions" (Kammerer, 2018, p. 35). In addition, newspapers are also embedded in a socio-political context that can vary over time. Thus, a policy discourse based on media data is certainly dependent on the priorities of the journalists and the media companies involved, as well as the respective zeitgeist of a media outlet. In this research, we have therefore tried to select newspapers that cover the most important societal cleavages; in particular, we covered the two largest language regions in Switzerland (German and French) and the divide between left and right values. Further data collection should ideally also cover the third-largest language group in Switzerland, Italian, and potentially also include tabloid media to cover more diverse opinions from across educational levels. Covering more newspapers, however, means assessing more articles, which brings us to the final key limitation of this research. Manual coding is very labour-intensive and therefore costly to replicate. For this reason, it is important to find suitable ways to limit the selection of articles, for example by only coding a random subset of articles. However, this approach could accidentally lead to biased results. We pursued a different approach by narrowing down our search results to the most substantive articles, i.e., the longer ones and the ones with more relevant keywords. Of course these thresholds are somewhat arbitrary assumptions that a DNA researcher needs to make in order to limit the workload. One option to solve this problem could be to at least semi-automate the data collection process. Some inspiration to this end can be found in the promising work of Haunss et al. (2020).

Lastly, our results also have some practical relevance: As new actors seem to have a hard time entering the political discourse and ultimately the political system, if one's aim is to radically change (Swiss) climate policy, as is the stated objective of the Fridays for Future movement, for example, the preferences of the well-established political elite are what need to be changed. Furthermore, over time, incremental changes can lead to substantial policy outcomes: Rather than being strongly impacted by international negotiations, the Swiss domestic climate policy discourse is an example of steady, evidence-based policy learning. This speaks for greater inclusion of younger generations as well as scientists and experts in climate-related decision-making.

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Appendix A

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