**Conflict Disruptions of Epistemic Communities:**

**Initial Lessons from the Impact of the Russian Invasion of Ukraine**

**Anna Ivanova**

*Washington State University*

**Paul Thiers**

*Washington State University*

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**DRAFT**

The purpose of this article is to review the impact of conflict disruption on epistemic communities and understand the mechanisms of resilience. We posit that there are at least four different ways of thinking about the impact of conflicts on the functioning of epistemic communities: (1) formal ties cut and sanctions, (2) informal ostracism, (3) self-separation, (4) formal suspension of ties and continued interaction. This is an exploratory study that describes the impact of conflict disruption on ECs and is linked to a qualitative analysis of three ECs in Europe – Arctic Council, European Space Agency, and Intergovernmental Panel on Climate Change.

**Key Words:** epistemic communities, international collaboration, conflict disruption

The modern world is increasingly interrelated, movable, adaptable, and incredibly complex. These contradictory characteristics make the world unpredictable and damaging in terms of the effects it has on society. To sustain the viability of the global epistemic community (EC) and the development of mechanisms of resilience to contemporary conflicts, it may be necessary to update and enhance our understanding of fields that are highly reliant on international cooperation, such as science. The war in Ukraine has shaken the stability of most ECs in Europe. On February 24, the European Space Agency (ESA), which launches at least one mission almost every year, had to permanently suspend one of the most eagerly awaited missions to Mars. The ESA started making plans for potential alternatives for funding, team replacements, and suppliers of essential technologies as soon as official links with Russia were severed. Despite the apparent issues, the conflict disruption of the ESA's EC did not destroy the community or change its primary goals. At the same time, the Arctic Council, which paused Russia's membership immediately following its invasion of Ukraine, as an intergovernmental forum of circumpolar states, ceased to function as a forum it intended to be. The new community that was formed in its place pursues different goals and functions differently. Why did the three European ECs follow such opposite directions? How does conflict disruption affect the functioning of ECs, so that some flourish and others die out or change their identity? What are the mechanisms of resilience? This article seeks to review the impact of conflict disruption on ECs and understand the mechanisms of resilience. What are the possible ways of conceiving the ECs differently than we had in the past because of all the events that happened after the Russian invasion of Ukraine?

We review three case studies of the ECs of the European Space Agency (ESA), Intergovernmental Panel on Climate Change, and the Arctic Council (AC). These communities differ from each other in terms of their structure, the degree of involvement in international processes, internal procedures, the quantity and quality of inner networks, the degree of interdependence between community members, and the specifics of the problems being solved. We examine how each of them is affected by the conflict because they may respond to a disruption differently because of the structural differences. Our approach in examining the impact of conflict disruption on ECs and mechanisms of their resilience involved qualitative analysis of the outcomes of Russian invasion of Ukraine. The data used for the analysis of the ECs of the ESA, the AC, IPCC is retrieved from secondary literature sources; grey literature such as organizations’ reports; official governmental statements; and news.

This is an exploratory study that describes the impact of conflict disruption on ECs and is linked to a qualitative analysis of three ECs in Europe. We aimed to examine the mechanisms of resilience and the factors that caused the ECs to behave differently in times of conflict. We posit that there are at least four different ways of thinking about the impact of conflicts on the functioning of ECs: (1) formal ties cut and sanctions, (2) informal ostracism, (3) self-separation or exclusion, and (4) formal suspension of ties and continued interaction.

**Epistemic communities framework**

Epistemic communities (ECs) have received a lot of attention from scholars since the 1990s; nevertheless, the vast range of activities that such communities engage in, as well as their lack of a permanent structure, make it difficult to organize and study them. As a concept, EC was proposed by B. Holzner, and D.H. Marx in their work *Application of Knowledge* (1979). Later, this concept was developed by Haas (1992). In his work *Do regimes matter?* Haas proposed that ECs are made up of individuals with a shared “set of normative and principled beliefs,” “causal beliefs,” or as Lynch (2013) called it a “sense perception”, “notions of validity,” and “a set of common practices.”

ECs can be thought of as a metacultural community on the one hand, and a unique type of expert community on the other (Lewis, 2004). ECs have arisen historically as a result of the emergence of expert communities. The distinction between them is that the latter is concerned in solving specific issues, whilst the former is self-organized to actively intervene in the process of making decisions that affect mankind as a whole. Their significance stems from their ability to generate knowledge about the problem of interest to decision makers, assisting them in understanding the causes that led to the problem, the consequences, with varying degrees of probability, generated by the problem, possible solutions to the problem, reducing the risk of negative consequences, and complex links between a specific problem and the interests of society and the state (see Haas, 1992; Sebenius, 1992; Meijerink, 2005; Vähämaa, 2013).

The key points that enable us to recognize ECs are outlined by Cross (2015). Indications of an EC include professionalism, a high level of agency, authoritative knowledge, and constant presence (Cross, 2015). Thus, an EC is a group of experts who have formed around a particular issue, have "recognized expertise and competence" (Haas, 1992), share similar values, and who are autonomously producing authoritative knowledge.

ECs can form within international organizations, research institutions, interest groups, professional groups, or bureaucratic agencies. The presence of experts in the institution does not, however, ensure the formation of ECs because a hierarchical framework and strict controls on a group of experts' actions can prevent this. Examples of ECs include the Pugwash Conferences on Science and World Affairs mentioned by Smirnova and Yachin (2015). The Pugwash Conferences on Science and World Affairs was established in 1957 to bring together scholars and public figures to analyze the risks posed by weapons of mass destruction. Haas (1989) cites as an example the group of ecologists and marine scientist from the f the United Nations Environment Programme' secretariat that drove the Mediterranean Action Plan (MedPlan) in 1975. Kyushu Environmental Evaluation Association (KEEA), studied by Mabon et al. (2019) is an example of a part of a bigger EC that shapes Fukuoka’s built environment and greenspace policy in Fukuoka, Japan.

Much of the research on ECs is focused on examining their influence on public opinion and knowledge (Vahamaa, 2013; Maliniak et al., 2021) and their role as local (Shapiro, 2017; Loblova, 2018; Mabon et al., 2019; Luu et al., 2022; Saxonberg et al., 2022) or global influencers (Haas, 1992; Zito, 2001; Galbreath & McEvoy, 2012; Yoon, 2015; Amahazion, 2016; Shawar & Crane, 2017). Some of the research also highlights different types of ECs (Berman & Johnson, 1977; Mcinear et al., 2007; Cooper, 2007). For example, Loblova (2018) explored the reasons why some ECs are more influential than others. Zito (2001) examined how ECs contributed to EU acid rain policies. Galbreath and McEvoy (2012) looked into the role of experts in the EU, the OSCE, and the Council of Europe in protecting minorities' rights in Europe. Shapiro (2017) considers the role of the EC of scientists and engineers in the Northeast Asian Region to address China-based air pollution. The consequences of external impacts on ECs and ECs' resilience, however, have not been the subject of research. In this article, we are interested in studying the impacts of conflict disruption on ECs and understand the mechanisms of resilience. Moreover, we propose four different mechanisms of response of ECs on conflicts.

In the history of ECs, there have been numerous disruptions. For instance, the expulsion of Soviet intellectuals on “philosophers' ships” in 1922 fragmented the Russian EC and forced members to enter and work in the already formed scientific ECs abroad (Gregory, 2009). The number of ECs rapidly increased during the Second World War, especially in the USSR and the USA, working in the domains of physics, electronics, and rocketry. However, the involvement of scientists in other fields decreased sharply along with funding due to requirements imposed by the Second World War (Bullard & Jones, 1975) and following Cold War (Moore, 2008), and *perestroika* policies and the collapse of the Soviet Union (Moody, 1996). The collapse of the Soviet Union also created incentives for scientists to go to the industry and other “available markets,” as well as to emigrate abroad (Moody, 1996). More recent example of an EC disruption is the Iranian EC, which was forced to leave the nation and look for affiliation with overseas universities and businesses due to internal and external sanctions on its ability to function (Tarikhi, 2020).

One of the most recent and significant instances of an international conflict is the war in Ukraine. The impact of this war is already visible in many spheres, including food security (Hassen & Bilali, 2022; Kovács et al., 2022), energy security (Prisecaru, 2022; Korosteleva, 2022), and businesses (Korosteleva, 2022). Paying attention to how ECs response to ongoing conflict will help us understand the phenomenon of ECs better.

**Case of the European Space Agency**

The European Space Agency (ESA) is the largest national space agency in Europe. The organization was established in 1975 and unites more than twenty European countries (European Space Agency, 2022f). Each year, the agency carries out at least one mission, which consists of a dozen scientists and engineers from ECA member countries, and sometimes other countries. For example, the first ESA Cos-B mission involved European scientists from the European scientists from the Laboratory for Space Research, Istituto di Fisica Cosmica e Informatica del CNR, Laboratorio di Fisica Cosmica e Tecnologie Relative del CNR, Max-Planck-Institut für Extraterrestrische Physik, Service d'Electronique Physique, and the Space Science Department of ESA (The European Space Agency, n.d.). In the Planck mission (2019), each participant was a member of one or more Consortia of scientists: the LFI Consortium (Istituto di Astrofisica Spaziale e Fisica), the HFI Consortium (Institut d'Astrophysique Spatiale), the DK-Planck Consortium (Danish National Space Institute), and ESA's Planck Science Office (European Space Agency, 2022a).

The idea of developing a rover and a fixed station on the surface, or the ExoMars mission, was originally developed by ESA and started by three-four young scientists (European Space Agency, 2019), and later transformed into a multi-part European-led program. By early 2022, the EC of ExoMars consists of no less than 40 scientists and engineers from 20 countries, particularly members of ESA, Russia, and Israel (European Space Agency, 2022e). The ExoMars concept started as a part of ESA's Aurora Program in 2001 (Van et al., 2005). Since then, ExoMars has gone through many years of changed partnership and cooperation planning and was pressured by time and money (ex., NASA funding cancellation), as well as Covid pandemic travel restrictions. Those challenges contributed to numerous launch delays and negatively impacted the rest of the scientific activities within ESA (Amos, 2012). However, despite the problems mentioned, the mission has never been at risk of suspension. It was not until March 2022 that ExoMars was permanently suspended (The European Space Agency, 2022c). The restart of the mission launch is expected no earlier than 2028 (Foust, 2022). The war in Ukraine made any further cooperation between ESA and ROSCOSMOS impossible. On February 28, 2022, the ESA published a statement about the severance of official ties with Russia and the impossibility of the ExoMars program to continue due to “the sanctions and the wider context” (The European Space Agency, 2022b).

Despite the suspension of the ExoMars rover mission, ESA members are actively looking for alternatives. However, replacement of critical technologies such as radioisotope heating units (RHUs) or a landing craft and adapting ExoMars for a new launcher will take a lot of efforts. Adapting ExoMars mission to new realities will cost ESA a lot of money (Clery, 2022) and will negatively affect other ESA projects.

Despite the efforts to adopt the ExoMars project to the new realities, there is a very high risk of the ExoMars cancellation. The exclusion of Russia from the mission with further adaptation is an extremely difficult task, if not one that might prove to be impossible to address. An unprecedented complexity of the project resulted into an unusually close cooperation between the two parties and the involvement of Russian scientists in each design step. Back in 2016, Jorge Vago, a scientist from ESA project, mentioned that “there is no clean line” between the two teams’ responsibilities (Gibney, 2022). Thus, the exclusion of Russia means the refusal or impossibility of using most of the components. And, as a result, the mission will be suspended until partners can be found who can provide funding for the ECA, as well as the missing components.

How does the delay of the mission affect the EC? Possible six-ten years of delay will affect the *planetary-science community* (Gibney, 2022) and lead to underfunding of other projects and, conversely, a possible shift in the attention of scientists, especially young scientists, to the study of other topics. Cut of ties also means the end of ESA and ROSCOSMOS collaborations on the lunar missions Luna-25 and Luna-27, and Luna-26 (European Space Agency, 2022d). Excluding Russia from ESA space exploratory studies has raised concerns of a possible division in space between Western countries and China with Russia (Gibney, 2022). However, the published China’s five-year plan for space speaks of the need to “conduct dialogue with Russia, the United States and other countries as well as relevant international organizations on outer space governance” (China National Space Administration, 2022).

The ESA case is an example of formal suspension of ties. ExoMars mission gave the EC a chance to develop studies to complement the bigger ESA planetary science missions. Past close relying on Russian scientists and technologies might affect the success of adapting the mission to new realities. Greatly increased costs of the mission will have an impact on the funding of other ongoing programs and reduce the likelihood of starting new projects in the upcoming years. There will be a delay in Mars exploration, and incomplete data will have an impact on individual scientists' research, but time delays will have the biggest impact on the EC.

**Case of the Arctic Council**

Until recently, the Arctic Council has been the main forum capable of bringing together representatives of scientific, indigenous, and political circles around the table and, without any enforced legislation measures, successfully launched and reproduced hundreds of projects on Arctic environment protection, indigenous people’s rights protection, and emergency response.

The Arctic EC began to form long before the creation of the Arctic Council. Since the late 1980s, the Nordic countries have begun to actively organize into scientific communities to study the Arctic changes. The creation of the International Arctic Science Committee in 1990 and the subsequent establishment of the Northern Forum in 1991 were the first steps towards the development of science-based solutions to the problems of the Arctic. In the same year, the Rovaniemi Declaration was signed in Finland and the Arctic Environment Prevention Strategy was approved. Finally, in 1996, with the signing of the Ottawa Declaration, the Arctic Council was created. The formal formation of the Arctic Council has given scientists more opportunities to really participate in the protection of the natural environment of the Arctic. Further inclusion of indigenous groups on the council fully expanded the council's ability to deal with agenda implementation (Bloom, 1999).

The expansion of the EC in the early years of the Arctic Council has contributed to the wealth of scientifically based information about the Arctic region. More scientists became involved in the studying Arctic pollution, permafrost thawing, Arctic biodiversity, and black carbon and methane emissions. Members of the Council since its inception have been Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States. The close work created international trust among the scholars from member states and created many informal channels of communication that made the work more flexible. Indigenous groups were not only part of the Arctic Council's larger EC, but they also constituted a unique indigenous traditional knowledge holders' EC. However, representatives from countries with observer status were less likely to be involved in the Arctic Council EC (Knecht, 2020).

The spread of informal channels of communication among scholars, policymakers, indigenous representatives, and NGO activists has made trust the main criterion for cooperation in the EC. The number of contributing scholars from observer states is limited and they do not have many chances to go through an existing inside community of national experts (Knecht, 2020). Thus, despite the participation of non-Arctic or observer states in Arctic Council activities, they hold peripheral positions (Spence, 2016).

The whole principle of the work of the Arctic Council from the very moment of its creation was the close cooperation of the representatives of the member countries. The high dependence of the EC in interaction with inside experts undermines the likelihood of continuing not only the implementation of projects, but the very existence of the Arctic Council. The suspension of Russia's participation violates the scientific networks of the Arctic Council EC.

Decades of informal channels for the exchange of knowledge and information have been disrupted. In March 2022, the Arctic Science Summit Week annual meeting was closed to any form of Russian scientists’ participation (The ASSW 2022 Local Organizing Committee, 2022). Already in June, the governments of Canada, Denmark, Finland, Norway, Sweden, Iceland, and the United States published a joint statement on the “limited resumption” of Arctic Council projects without the participation of Russia (U.S. Department of State, 2022).

Why was Russian participation crucial for the Arctic science development? Russian scientists hold a position of environmental monitoring experts in Arctic EC (Witze, 2022). The fact that the biggest part of the world’s permafrost is located in Russia gave Russian scientists an advantage in tracking changes such as permafrost degradation and methane emissions (Havey, 2022; Witze, 2022). About 130 projects on climate change, biodiversity, sustainable development, indigenous populations, Arctic food resources, microplastic pollution, and Arctic shipping were stopped due to the suspension of Russian participation in the Council (YLE News, 2022; Lydon, 2022; Witze, 2022).

Due to Russian exclusion from the AC EC, the Arctic research will be threatened. The consequences of excluding all forms of participation with the Russian EC can currently only be seen in terms of how they affect individual scientists. Because it is not possible to carry out field research on the territory of the Russian Arctic, AC EC can only rely on remote sensing as a means of investigation. There are only a few satellites that can reliably monitor methane emissions in the Arctic, and new satellites are not expected to be launched before 2027 (Witze, 2022).

Why was participation in the work of the Arctic Council important for the Russian EC? First, Arctic research in Russia is seriously underfunded, less than 2% of the total funding of the research work of the Russian Federation goes towards Arctic-related projects (Gogoberidze et al., 2018). The third-party funding played a good role in Russian Arctic science and indigenous activism until the Foreign Agent Law came into being in 2012 (Pettersen, 2016). In 2017 Kola Eco Center, Murmansk regional non-profit organization, was recognized as a “Foreign agent” (Nilsen, 2017). A few years earlier, a couple of other organizations got the same designation. The functioning of such organizations as Northern Environmental Coalition, the Nenets organization of the indigenous peoples Yasavey Manzara, Environmental Right Centre Bellona (ERC Bellona), and Center for Support of Indigenous Peoples and Civic Diplomacy Nuori Karjala has become more complicated (Nilsen, 2015). However, even after implementation of the “Foreign Agent” law, Arctic related Russian organizations were able to find ways to function. International presence in the Arctic Council helped Indigenous people of the Russian North. The Arctic Council has been the main platform for Russian indigenous people to be heard.

The *pause* of the Arctic Council cooperation severed all ties between indigenous ECs in the Arctic. Not only networks of cooperation have been destroyed, but also networks of interpersonal communication between indigenous communities. According to Raspotnik et al. (2022), the rupture of relations between indigenous communities may mean their return to the minimum level of intercommunal contacts before the 1990s. Dialogue with the Russian Association of Indigenous Peoples of the North (RAIPON) has been terminated due to statements of the RAIPON on March 1, 2022 (ICIPR, 2022). Hopefully, the relationships between Russian Indigenous people of the Arctic will be renewed with International Committee of Indigenous Peoples of Russia, a new organization representing them. However, with the Arctic Council's structure and purposes being changed, it is unlikely that this cooperation will be implemented.

The EC of the AC is in danger of perishing due to conflict disruption. The hopelessness of this situation is connected, firstly, with the huge role of Russia in solving the problems of the Arctic, be it the rights of the peoples of the Arctic, or climate change; and second, with the unique structure of the Arctic Council. When addressing climate change, Russia is not a dismissible country. The suspension of ties with Russian affiliates undermines the forum's initial goal of “promoting cooperation among the Arctic States” (Arctic Council Secretariat, 2022).

The Arctic Council serves as a case study for the informal ostracism of Russian EC from a bigger EC of scientists and Arctic Indigenous people from seven states. It also serves as an example of self-separation from Russian EC side, expressed by published letters supporting military actions by some actors. Such reaction is directly related to the structure of the functioning of the Arctic Council, which was created as a forum of eight Arctic countries and did not provide for exit mechanisms from it.

**Case of the Intergovernmental Panel on Climate Change**

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization of the United Nations “to provide governments at all levels with scientific information that they can use to develop climate policies.” (IPCC 2023). The IPCC is simultaneously an international governmental organization and an epistemic community. The 195 member states meet annually to elects a Bureau of Scientists which, in turn, selects experts to prepare IPCC reports. In addition to member states, about 200 observer organization (mostly intergovernmental organizations and non-governmental organization) can nominate scientists. Hundreds of scientists from around the world author a variety of reports, the most important of these being multipart Assessment Reports issued every 5 to 10 years from the First Assessment Report (AR1) in 1990 to the 6th report (AR6) published in 4 part from 2021 to 2023. (IPCC 2023)

A substantial literature has developed identifying the IPCC as a powerful epistemic community (EC) (for a review see Hulme and Muhony 2010). Elzinga (1996) called the IPCC the privileged speaker and discursive leader” on climate knowledge. In 2007, the IPCC was awarded the Nobel Peace Prise specifically for its “efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change" (Nobel 2007) For the purposes of this study, it is important to recognize that the IPCC is integrated into a global community of climate change oriented organizations and stakeholders to a far greater extent than a more conventional EC. Focusing on the ways in which climate science is used and framed, Paglia (2018) argues that climate scientist and non-scientist social actors *together* constitute “an extended epistemic community of climate advocates.” The IPCC itself generates and frames scientific knowledge which is in turn framed by other actors in the worldwide community.

Russian scientific participation in and importance to the IPCC has rarely been studied. Corbera et. al. (2016) used coauthorship analysis to explore the social scientific networks of scientists contributing to the Fifth Assessment Report (AR5). While the centrality of US and UK based authors is not surprising, one striking finding was the marginalization of Russian (and to a lesser extent Chinese) authors in contrast with those from India, Brazil, South Korea and others countries (Corbera et. al. 2016) This indicates that as early as 2014, when AR5 was published, Russian scientists were less likely to collaborate with climate scientists from other nations than were scientists from other scientifically advanced nations.

Following the 2014 Russian annexation of Crimea and incursion into Eastern Ukraine, this margianlization appears to have increased. Buntgen (2016) notes the impact of Russia’s increasing political isolation of the nation’s climate change scientific community. Buntgen identified specific areas of climate science for which Russian participation is significant or essential including international cooperation on tree-ring research, arctic permafrost thawing, and impacts on sub-arctic tundra, concluding that:

(T)he vast expanse of the Russian landscape allows a standardized research protocols to be conducted along extensive latitudinal and longitudinal gradients. Thus any serious assessment at the scale of the northern hemisphere or even globally depends on free data access from Russia. (Buntgen 2016, 97)

Buntgen ends with a direct appeal to the international scientific community to push back against this increasing isolation by proactively and systematically bringing more Russian scientists into climate science research projects.

The direct participation of Russian scientists in IPCC Assessment Report authorship offers an opportunity to measure changes in Russian involvement in the IPCC EC over time. As Corbera et. al.’s (2016) study of coauthorship networks implies, AR authorship has long been dominated by scientists from North America and Western Europe, but participation by scientists from other countries has increased over time. To give just two comparative examples from the Physiac Science Basis Working Group reports (AR-WG1), between AR4 (2007) and AR6 (2022) the percentage of authors from India has increased from 1.7% to 3.4%. The percentage of authors from China has gone from 3.7 to 12.8% over the same period. But Russian participation grew only from 1.7% to 2.6%. In fact, Russian authorship actually *declined* between AR5 (2014) and AR 6 (2022). (IPCC 2023) Given the lag time in academic research and publication, this recent stagnation and decline of Russian participation in the IPCC can not be attributed to the 2022 invasion of Ukraine. But Russia’s 2014 incursion and the subsequent formal and informal sanctions that authors such as Buntgen (2016) cite as a causal factor in the marginalization of Russian scientists by 2016, seem likely to explain some of the decline seen by AR6. In other words, the impact of the conflict on the IPCC EC, like the conflict itself, is probably best assessed over the entire time period from 2014 to the present.

This is not to say that the escalation of the conflict marked by the February 2022 invasion and assault on Kyiv did not see a parallel intensification in the disruption of Russian scientific participation in the IPCC. While it may be too early to measure the impact in publication, there are plenty of examples of disruption of IPCC related research as well as impacts on individual scientists. The termination of projects and funding described in this paper’s section on the Artic Council includes a great deal of research that feeds directly into the IPCC process. It will take years before the full impact of the damage to data collection, sharing and analysis becomes fully apparent.

The impact on individual IPCC scientists, while more anecdotal is happening much more quickly. The adaptation of Hirshman’s classic *exit, voice and loyalty* model to migration decisions (Hoffman 2010) illustrates the choices faced by Russian scientists since the invasion and subsequent repression of opposition to the war within Russia. In the months following the invasion, many Russian scientists were reported to be asking international partners to help them secure temporary or permanent opportunities outside of Russia ([Anna Fazackerley](https://www.theguardian.com/profile/annafazackerley) 2022). Their decision to *exit* will cut them off from data collection within Russia while a decision towards *loyalty* means a diminished opportunity for international collaboration, foreign funding and even the condemnation by foreign colleagues.

The case Russian scientist and long-time IPCC collaborator Oleg Anisimov illustrates the complexities and uncertainties for those who voice opposition to the invasion. Anisimov is an expert in the impacts of global warming on the arctic, focusing primarily on biophysical impacts such as “artic amplification,” but also social and political impacts for people of the region. He was a lead author on the arctic chapters of IPPC assessment reports in AR 3, 4 and 5 (2001, 2007, 2014.) As the head of the Russian delegation to a virtual IPCC meeting on February 27, 2022, Anisimov used his microphone to publicly apologize to the Ukrainian delegation saying, “Let me present an apology on behalf of all Russians who were not able to prevent this conflict… those who know what is happening fail to find any justification for the attack” (Kaplan 2022). While these words are consistent with the global citizen culture characterizing a closed door meeting of an epistemic communities, they obviously came with the risk of domestic consequences. A dissident Russian news blog claimed that a member of the Russian Duma said Anisimov was an enemy of the State who should be destroyed, but this was not confirmed by other news sources. As of this writing, Anisimov’s directory page is still present on the website of the State Hydrological Institution where he is a professor. He is still publishing, and appears to have made no effort to remove his name from controversial statements. An article Anisimov coauthored on Russian climate change policy was published in Climate Policy in the fall of 2022, including the following passage in its abstract: “The isolation of Russia, following the invasion of Ukraine, will make it difficult to influence Russian climate policies.” (Moe et. al. 2022) But, for the first time in more than two decades, Anisimov was not listed as an author in the most recent IPCC Assessment Report. S0 it is unclear if Anisimov will be able to continue to function within the IPCC.

Anisimov’’s case is emblematic of Paglia’s (2018) “extended epistemic community of climate advocates.” Scientists in EC’s such as the IPCC, that generate knowledge of high stakes policy relevance will, intentionally or otherwise, be drawn into political conflicts around issue framing. In future research on the impact of conflict on ECs, it may be useful to look for the impacts of a continuum of conflicts, from political controversy all the way to war.

**Conclusion**

The rise of international cooperation and globalization of science through ECs in recent decades has helped to accelerate the progress and encourage world development toward common goals. This interdependence of international ECs makes them different from those that functioned before the period of globalization. Fully sovereign science is no longer possible. The very essence of international ECs lies in the constant cooperation of experts from different countries. Almost every expert who is involved in the work of the community, and every technology that is used in the implementation of the project, can be replaceable in a matter of few years. However, in the modern world, even a five to ten-year delay in a project implementation, technology development, or investment into the project is critical for science.

The case of the European Space Agency presents a *formal ties cut* *and no continued cooperation* response to the conflict disruption. Russian funding and the provision of unique technologies and materials for particular missions, like ExoMars and Luna-25-27-26, were crucial for the European Space Agency. The involvement of Russian affiliates in the ESA EC, however, was not as critical. The termination of official ties with ROSCOSMOS and the suspension of some projects, along with the ensuing suspension of collaboration with Russian affiliates, had no impact on the operation of the EC within the European Space Agency because Russian experts were only involved in the aforementioned projects. Only a small part of the EC has raised worries about the division of the planetary-science community and the slowing in scientific progress in this field. The severing of official ties with Russian affiliates will inevitably lead to the washing out of Russian personnel from the EC.

For the EC that formed the Arctic Council, the conflict disruption by Russian invasion of Ukraine, on the contrary, has reached a point of no return. The forum's creation was intended to encourage participation from both Russia and the other seven Arctic states. Therefore, the termination of cooperation with Russian affiliates by representatives of the remaining seven states, or its *pause*, as it was called in a statement from the United States, Sweden, Norway, Iceland, Finland, Denmark, and Canada, goes against the idea of the existence of the forum and leads to the termination of its work. The case of the Arctic Council can be considered from two sides. The EC, represented by Russian experts, made up the majority of the wider community of the Arctic Council. Therefore, conflict disruption divided it into two large and in some way equally disharmonized parts. Loss of funds, as well as collaboration and scientific exchanges, hurt the Russian community. Additionally, the loss of a significant portion of the Russian Arctic prevented the remaining members of the group, which included officials from the seven Arctic governments, from conducting field studies and precise modeling.

In the case of the IPCC EC, the impacts are substantial and ongoing but do not fall easily into a single category. As a UN Agency, the IPCC and Russia did not cut formal ties, though at least one scientist may have had his authorship terminated by the Russian side. Russian participation in the IPCC appears to have been in decline since the 2014 conflict, a process that has accelerated since the 2022 invasion. The degree to which IPCC scientists can maintain informal ties is unclear. But, unlike the case of the ESA, there is not possibility that Russian participation can be replaced. The urgency of global climate change, and Russia’s size and geographic placement, not to mention its role as a major produced and exporter of fossil fuels, make international cooperation with Russia absolutely essential. Despite the difficulties created by the war, the IPCC remains the most significant institution for facilitating that cooperation. In the short term, IPCC members will need to maintain whatever level of cooperation they can, with an eye to full reintegration of Russian scientists at some point in the near future.

This exploratory study proposed four conceptual frameworks with which to understand how conflict might impact epistemic communities. The three reviewed cases fit these frameworks to some extent. The ESA as a case of formal ties being cut and the previous contribution being replaced. The Artic Council as an example of informal ostracism, and self-separation. The IPCC illustrates the possibility of formal suspension of many projects and collaborations but the absolute need for continued interaction even if it is less formal. It also shows that, while a specific eruption of conflict (ie. an invasion) can accelerate these disruptions, it may be useful to look for a continuum of on-going disruption. We hope that this exploration will provide a stimulus for further conceptualization, research and generation of testable hypotheses.

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