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Geographies of climate change opinion

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Abstract

Climate change can only be tackled with public support for sustainable policies. Thus, public attitudes towards climate change matter. More than 3 decades of climate change opinion (CCO) research—conducted by geographers, environmental psychologists, behavioural scientists, sociologists etc.—have provided us with a wealth of information about which predictors shape public CCOs. This review synthesises these findings and highlights the different geographies (the self, the nation, the region, the digital) that emerge within this research. Given the increased importance of social media, virtual geographies of climate change scepticism are increasingly being identified. Our paper argues that new research agendas must be developed to address the meshwork of virtual space and small scale geographies (regions, towns, districts) in which CCOs are formed.

KEYWORDS
climate change awareness, climate change opinion, climate change scepticism, digital geographies, nation state, sub-national

1 | INTRODUCTION

Understanding public climate change opinions (CCOs) is crucial for the sustained fight against global warming. Public attitudes towards climate change have been studied for over 3 decades since the earliest polls in the 1980s (Brulle et al., 2012; Egan & Mullin, 2017). Since these early opinion surveys, CCO research—conducted by geographers, environmental psychologists, behavioural scientists, sociologists and communication scholars etc.—has provided us with a wealth of information about which socio-demographic predictors shape public CCOs (Capstick et al., 2015; Kvaløy et al., 2012; Lee et al., 2015; Patchen, 2010; Poortinga et al., 2019). Despite an overrepresentation of studies that

investigate CCOs in the USA (and to a lesser degree also Europe and Australia) (Kulin & Sevä, 2021; Lee et al., 2015), comparative research has started to broaden our knowledge about the national contexts that shape CCOs. Such research helps in targeting audiences and shaping policy responses (Poortinga et al., 2019). Climate change governance is a multi-scalar effort (Bulkeley et al., 2014) and therefore needs to be sustained through local action. Improving our understanding of geographies of CCOs at various spatial scales including the national, the regional, and the digital level therefore matters for the implementation of climate-related policies.

This review synthesises findings from broad disciplinary backgrounds to focus on which types of geographies of CCOs emerge from the research literature. With the term 'geographies of CCO' we refer both to the scales—most commonly distinguished by borders such as those delineating nation states or counties within nation states—that are used within CCO research, as well as the more complex entanglements of spatial perceptions, practices, encounters, and contestation that affect CCOs, but are not always well developed within CCO research. The review has to grapple with the challenge that terminology in the context of CCOs is not always consistent. The term 'climate scepticism' for example, is frequently used to demarcate a range of critical views on climate change (and also on climate change science) (Capstick & Pidgeon, 2014). Similarly, studies define climate change awareness (CCA) differently, sometimes focussing on the role of human agency; sometimes not.[1] To operationalise CCOs we use the terms CCA (broadly defined as knowledge of climate change and/or acceptance of human agency within it), 'climate change concern' (CCC) (defined here as a form of risk perception) and 'climate change scepticism' (CCS) (defined here as a sceptical perspective on the existence of climate change and/or sceptical attitude towards climate science). We use these admittedly broad definitions of opinions because they are widespread in the literature (Capstick et al., 2015; Hagen et al., 2016; Kvaløy et al., 2012; Lee et al., 2015; Patchen, 2010; Poortinga et al., 2019). In particular, CCA and CCS then signal endpoints on the same spectrum of underlying predictors. Our focus on these categories is not without potential pitfalls as normative labels may enact and enhance difference, as much as represent it (for a critical review on terminology and labels used in CCO research see: Howarth & Sharman, 2015). Moreover, we do not wish to suggest that CCOs are limited to the three positions used here when in fact research on CCOs has tackled various opinions and attitudes ranging from outright climate change rejection to efficacy beliefs (ibid.). However, the three categories help us to manage the wealth of available research literature and reorganise the available knowledge for further *geographic* reflections (e.g. to enrichan implicit topological understanding of space).

Specifically, this paper reviews research on CCOs from the wider social sciences (predominantly sociology, communication studies and psychology) as well as research from human geography. Over 80 articles identified in Google Scholar by the search terms 'climate scepticism', 'public opinion climate change', and 'climate awareness' were analysed. We organised this literature according to the geographic scope of the research and found that literature either had (1) a national focus (employing national surveys; at times using comparative designs across nations), (2) a local focus (e.g. individual case studies on CCOs) or (3) a focus on how the media influences public CCOs. After establishing the core literature for this review comprised of these 80 articles, we used targeted searches to identify additional relevant contributions shedding light on specific aspects of the geography of CCOs such as 'place attachment' or 'NIMBYism'.

This paper is organised around our findings from the literature. In Section 2 we discuss the merits and shortcomings of quantitative surveys that foreground personal predictors and national contexts to explain CCOs. Section 3 explores regional variation and local climate change experiences that shape CCOs, mainly drawing on individual case studies. Section 4 shows how research on CCS is particularly linked to media discourses on climate change. Section 5 concludes the paper. Here, we flesh out a potential research agenda for geographers, arguing that we need to be attentive to the regional variations in CCOs because spatial embeddedness matters for opinion formation. Furthermore, we need to include a critical view on the media discourses that shape such locally formed CCOs and be attentive to the question how they could affect practices.

2 | GEOGRAPHIES OF CCO: PERSONAL PREDICTORS AND NATIONAL CONTEXTS

In most international panels, the CCA items show a highly skewed distribution, as most people report having heard of anthropogenic climate change. In particular, individual predictors (e.g. age, gender, income, education) seem to explain CCOs well. Studies from Europe (Poortinga et al., 2019) and New Zealand (Milfont, 2012; Milfont et al., 2015) confirm the importance of personal attributes like gender (women are more aware of climate change) or age (younger people tend to be more aware of climate change) for CCA. Given the importance of demographics it seems timely to embrace a more gender-sensitive CCA communication to further enhance CCA (Magnusdottir and Kronsell, 2021). Hedenqvist et al. (2021) for example, champion a critical reflection on 'environmental masculinity' that first acknowledges the leadership of women in environmental grassroots movements across the globe and then highlight the lack of male engagement despite men being crucially involved in shaping unjust socio-ecological conditions. Since US studies in particular have foregrounded how 'cool dudes' (McCright & Dunlap, 2011b) (white, male, conservatives) are highly sceptical of climate change and show little risk awareness, a gender-sensitive approach to climate change communication might indeed be needed. Furthermore, this shows that individual predictors for CCA and CCS appear to be the same (gender/race/political affiliation) albeit with opposite specifications.

Meta-reviews by Hornsey et al. (2016) and Greenhill et al. (2014) point out that apart from demographics, personal predictors like beliefs, values and political orientation strongly influence CCOs. In a European sample (Poortinga et al., 2019), people who politically identify as left-wing are more aware of climate change than people leaning towards the right. This is also confirmed in the cross-country study by Kvaløy et al. (2012), who find higher CCA among people who perceive themselves as 'extreme leftist'. Elsewhere, for example, in Eastern Europe, political divisions along a left/right axis have different meanings and a weaker correspondence with political issues such as climate change (Rohrschneider & Miles, 2015). Overall, the influence of political affiliation on CCA is especially pronounced in the United States (Bohr, 2014; Dietz et al., 2007; Egan & Mullin, 2017; Guber, 2013; McCright & Dunlap, 2011a) but less influential in Europe (McCright et al., 2015). Numerous studies have found that the divide between Republicans and Democrats in the United States is important to predict a person's CCO, with Democrats, generally speaking, being more aware and accepting of the anthropogenic causes of climate change than Republicans (Egan & Mullin, 2017; Guber, 2013). It seems that political affiliation as a personal predictor is embedded here within a wider, national context of the political culture of party divides in the US (ibid.). Following Hornsey et al.'s (2016) reasoning, we take heart from the situation that beliefs and values—rather than much harder to change demographics alone—contribute to CCOs. Notwithstanding the challenges to overcoming potential barriers posed by value and belief systems, targeted climate change communication represents an important tool for promoting CCA across the political spectrum (Cooper, 2011; Lutzke et al., 2019).

However, the significance of other individual predictors varies across nations. Lee et al. (2015), for example, find in a large-scale survey conducted in 119 countries that education is the strongest personal predictor for CCA across their sample spanning countries from all continents. Kvaløy et al. (2012) can confirm this finding in a study of over 40 countries. While in Africa and Asia personal experience of weather events like droughts, floods or heatwaves significantly predict a person's CCA, in Europe and Latin America knowledge about the causes of climate change are more influential for a person's CCA (Lee et al., 2015).

Besides the importance of personal predictors, research that finds cross-country variation (Drummond et al., 2018; Lee et al., 2015; Poortinga et al., 2019; Rohrschneider & Miles, 2015; Tjernström & Tietenberg, 2008) also consider contextual factors such as gross domestic product (GDP), education levels, or energy consumption in respondents' socio-cultural environment (usually the country). Such measures are taken as proxies for determining a country's affluence because research on environmental concern has long championed the hypothesis that concern for the environment increases with the wealth of a nation (e.g. Diekmann & Franzen, 1999).

Hence, a frequently used contextual factor in comparative work on CCOs is national GDP. Kim and Wolinsky-Nahmias (2014) and Sandvik (2008) find that higher levels of national affluence positively correlate with national CCA. National education levels, in combination with GDP, are furthermore found to explain cross-country variance in

CCA, confirming that CCA is positively associated with education and the wealth of a nation (Knight, 2016). However, when exploring national CCOs further, and turning towards examining public concern for climate change (CCC), the picture becomes more complicated. Contrary to the expectation that CCA translates into CCC and that both increase with the GDP of a country, Sandvik (2008) found public concern over climate change correlates negatively with national wealth. Climate change awareness and CCC thus behave independently on a collective level, it seems. These rather ambiguous results on the relationship between CCOs and GDP are supported by voices that point to the fundamental influence of climate change on GDP and therefore consider GDP unsuitable as a control variable in climate studies (Burke et al., 2015).

Sandvik hence focused on the per capita emission of carbon dioxide from fossil fuels as an alternative indicator of national wealth (Sandvik, 2008), which also correlates negatively with concern about climate change. Sandvik's (2008) findings thus 'support the [...] hypothesis that public concern is negatively related both to measures of national wealth and to a measure of responsibility for global warming' (p. 338). Knight (2018) extended this research finding that dependence on fossil fuel production was 'significantly associated with lower public awareness' (Knight, 2018, p. 295). This shows that national predictors can help shed further light on particular characteristics of collective CCOs.

In such large scale surveys, two particular geographic scales—the self and the nation—seem to dominate. Climate change opinions appear to be firmly entrenched in the individual beliefs and demographic features of a person who is situated within a national socio-political context. A welcome contribution to this work that engages with the imagined geographies that underpin CCOs are efforts to explore how people's perceptions and attachments to particular places shape CCOs (Devine-Wright, 2009). Place attachment refers to a combination of social and emotional bonds that link people to particular places (Devine-Wright & Batel, 2017). Devine-Wright (2013) and others have shown how crucial it is to include into our research designs a sensitivity to place attachment, as people are likely to reject for example renewable energy projects when they are considered to be unfit for a place (Batel et al., 2015) but might embrace them if their design is perceived to connect well to local histories, landscapes and social relations (Devine-Wright, 2011). Importantly, our spatial attachments can hence serve not only as a source for developing CCOs but also as a source for climate change actions and contestations (e.g. place attachment can help explain 'Not in my backyard' (NIMBY) attitudes (Devine-Wright, 2013)). What is more, the research on place attachment has recently started to explore measures for multiple spatial attachments (from local to global), finding that such wider attachments to various geographies influence how we makes sense of climate change as well as the risks and responsibilities associated with it (Devine-Wright & Batel, 2017). To date, large-scale cross-country surveys are failing to put geographic imaginations and spatial attachments centre stage. Such surveys, however, could help to carefully plan and implement climate change policies and offer further critical insights into which predictors shape public CCOs. Additional cross-country comparative research that considers attachments, imaginations and spatial practices seems necessary to further our understanding of how and where people become aware of climate change.

3 | EXPLORING REGIONAL VARIATION AND LOCAL CLIMATE CHANGE EXPERIENCES

Apart from national surveys on CCOs, research has focused on detailed case studies (using mixed-methods, quantitative and qualitative designs) of specific sub-national regions. Lebel et al. (2015), e.g., have investigated CCA among fish farmers in northern Thailand; Jibrillah et al., 2018 studied the CCA of farming and animal rearing communities in North-Western Nigeria; and Altea (2020) investigated farmers' perspective on climate change in the Amazonas Region of Peru. These papers tend to focus on specific social groups (e.g. farmers, fishers etc.) in selected local contexts. The Greenland Perspectives Survey (Minor et al., 2019) also shows how important such context sensitive research is and highlights that in Greenland only '1% of residents think that climate change is not happening' (Minor et al., 2019, p. 16) and '76% of residents report that they have personally experienced the effects of climate change' (ibid. p. 22). These findings also connect to smaller case study research on CCOs from the Arctic (Bravo, 2009; Cruikshank, 2005; Ignatowski & Rosales, 2013; Marino, 2012; Rattenbury et al., 2009; Sakakibara, 2008) or Small

Developing Island States (Farbotko & Lazrus, 2012; Lazrus, 2012). The case studies reveal that awareness of changing climatic conditions arises from everyday interaction within the surrounding environment. When hunting routes become insecure due to thinner ice sheets, or a rising sea level makes resettlement likely, CCA emerges from embodied, affective and emotional experiences (Rattenbury et al., 2009). Furthermore, local CCOs are shaped by (indigenous) belief systems that highlight the interconnectedness of people-place-nature (Bravo, 2009). Similar case studies from the so-called Global North confirm the importance of approaching CCO through a perspective i.e. attentive to local experiences, weather events and affects (e.g. Roelvink & Zolkos, 2011). These contributions alert us to the need to reconsider the scale of the self within CCO research, as opinion formation is not only shaped by demographics and beliefs but also by personal experiences as well as emotional and affective engagements and interactions with the environment. Within such studies a notion of the self emerges where the boundaries of the body are more fluid and dynamic than a set of personal predictors might suggest (Herod, 2011).

Such local insights hence help us to think more critically about the geographies of CCA since they foreground the need to develop an understanding of space and environment as a co-constructed category that simultaneously shapes our perceptions and opinions as we shape them through our perceptions and opinions. In other words, these case studies have the potential to usefully alert us to the importance of spatialised experiences, embodiments and practices in the context of CCO formation that complicate pre-given notions of space or scales as bounded within territorial units such as municipalities, counties or nation states as used in many representative surveys. Thus, it is not only our spatial embeddedness or geographic location and the administrative territories we reside in, but again, our perceptions and attachments to various (imagined) geographies that shape CCOs.

While we can learn from individual case studies that CCOs are locally embedded and can vary substantially across sub-national regions, a comparative perspective is less common in these detail-rich studies. Notable exceptions are studies on Russia (Lösch et al., 2019) and on the USA by Hamilton and Keim (2009) and Howe et al. (2015), as well as Hamilton et al. (2016) who find ample variation in CCA across metropolitan areas and counties in the USA. However, the papers offer little explanation and contextualisation of their findings and focus on geographically rather large countries. Such initial evidence that regional variations exist in large countries is further supported by Lee et al. (2015) who find that urban living is another salient factor influencing CCA in China. Rural versus metropolitan living thus seems to be a (socio)geographic factor that shapes individuals' CCOs in some, but not all, countries. Such differences might suggest that independent variables will vary from nation to nation and that predictors established in US or Western contexts might fail to uncover differences at other geographic locations. For example, while especially the urban left-leaning population within the USA shows high levels of CCA, in countries such as Poland or in former Eastern Germany other predictors like conservativism or religious attachments might foster CCA, as the left-right binary is less associated with environmental policies here (Rohrschneider & Miles, 2015; see also: McCright et al., 2015). Being sensitive to national and sub-national historical trajectories or path dependencies thus seems important to enhance multi-scalar CCO research that can contribute to enhancing climate governance efforts and tailoring public communication approaches.

4 | MEDIA GEOGRAPHIES OF CCS

Digital space and the affordances of communication tools and platforms can affect CCOs in diverse ways. Climate change activists, for example, harness digital communication sites to enhance deliberation and debate and to promote sustainable action (Hautea et al., 2021). Moreover, the role of images circulating in print media, film and TV for promoting engagement with climate change has also been discussed, confirming that CCOs are shaped by affect and emotions triggered through visual representations (Metag et al., 2015; O'Neill, 2013; O'Neill at al. 2013; O'Neill & Nicholson-Cole, 2009). In this section, however, we focus on the relation between sceptical views and (social) media representations. While scientific consensus on the anthropogenic cause of climate change has long been established, a small and declining (albeit vocal) minority in many Western societies still publicly doubts climate science

(Ballew et al., 2019; Bergquist & Warshaw, 2019). We use the term 'climate scepticism' here to demarcate a range of critical views on climate change (and climate change science), as CCS research tends to conflate various attitudes (Capstick & Pidgeon, 2014).[2]

Climate change scepticism has been repeatedly related to the sphere of science communication and media studies (Bacon, 2011; Capstick et al., 2015; Dispensa & Brulle, 2003; Greenhill et al., 2014; Smith & Leiserowitz, 2012). Early engagement with people holding sceptical views on climate change emerged in the USA during the Bush Senior administration's stand against the Kyoto Protocol. During this period, CCOs became openly political. In particular, research found that news outlets in the USA have tended to overestimate the scientific controversies within climate change science due to corporate and political bias (Dietz et al., 2007; Dispensa & Brulle, 2003; McCright & Dunlap, 2000, 2003). McCright and Dunlap (2003) focused their analysis on national print media reports, identifying them as the chosen weapon of conservative think tanks in fighting the idea that climate change was a dangerous issue for the USA in the late 1990s and early 2000s. They demonstrate that the influence of conservative think tanks and associated media outlets had a direct impact on the decision to withhold the ratification of the Kyoto Protocol under the Clinton and Bush administrations. Climate change scepticism is thus linked to communication practices as much as to politics (Cooper, 2011; Dietz et al., 2007). More recent research confirms that a rejection of climate change occurs together with opposing climate change science and turning to more political sources for information (Jenkins-Smith et al., 2020; Morin-Chassé & Lachapelle, 2020). CCSs views, it seems, are thus shaped (—yet, not determined (Carvalho & Burgess, 2005)) by media representations.

In particular, communication scholars are foregrounding the influence of social media platforms, digital-born news media and online commenting functions in sustaining CCS (Adam and Häussler, 2019; Fownes et al., 2018; Gil de Zúñiga. Jung and Venezuela, 2012; Tschötschel et al., 2020; Vraga et al., 2015; Winter et al., 2015). Da Costa and Cukierman (2019), for example, investigate controversies surrounding the anthropogenic nature of climate change on the Portuguese Wikipedia pages. They highlight that consensus on these pages was only achieved after 2012, long after the scientific community had reached a consensus, due to climate sceptic posts. Similarly, Koteyko et al. (2013) uncover the corrosive effect of peer-to-peer communication between climate change sceptics on UK tabloid sites' online commenting function. Collins and Nerlich (2015) find similar uncivil effects in user comments on articles on climate change from the UK newspaper *The Guardian*. However, they emphasise that these sites facilitate high levels of interaction between opposing views and are championing the idea that interaction across difference is the most promising way forward to combat CCS. Yet, the rise of Fake News and opinion polarisation demand critical scrutiny of the way CCS appears online (Adam and Häussler, 2019; Bessi et al., 2016; Bloomfield & Tillery, 2019; Da Costa & Cukierman, 2019; Fownes et al., 2018; Lutzke et al., 2019; Walter et al., 2018). Moernaut et al. (2020) for example, demonstrate how platforms like Twitter offer a stage for CCS positions and contribute to a polarisation between antagonistic groups of people who are climate aware and people who are sceptical. Adam and Häussler (2019) moreover analysed the hyperlink setting activities of climate sceptics and climate supportive bloggers in Germany and the UK. They highlight that climate sceptics predominantly set links referring to US webpages, revealing their international networks and the link between online and offline worlds in which CCOs are formed (Adam and Häussler, 2019). Their finding is particularly interesting, as research on social networks seems to suggest that online connections are far from transnational. Rather, online contacts often map onto spatially close regions (Lengyel et al., 2015; Sobolevsky et al., 2013). It appears that the geographies of CCS diverge here from other forms of online interaction. Thus, a spatially attuned approach to investigating the online life of CCS seems warranted. Climate change scepticism appears to be linked to transnational networks within the virtual geographies of the Internet. Work on media literacy in the context of climate change thus supports an approach that fosters the skill of individuals to (re)discover and practise their ability to critically question the authorship, intentions and credibility of media sources (Cooper, 2011; Lutzke et al., 2019; Vraga et al., 2015).

Furthermore, there is emerging evidence that individual online practices and uses also have a collective effect on CCOs (Tuitjer & Dirksmeier, 2021). Humprecht et al. (2020) compare 18 countries, finding distinct country groups that differ in their ability to withstand the spread of disinformation online. In Northern European countries, for

instance, disinformation is less prevalent. However, Southern European countries with highly polarised media systems and the United States with an equally polarised media system are places where disinformation spreads more easily. Similarly, Fletcher et al. (2020) find in a European comparison that polarisation in both online and offline news is less evident in countries like Finland, Germany and the Netherlands with large and widely used public media services. In contrast, states like the UK or some Southern European countries (France, Spain, Italy), in which media outlets tend to be more polarised along political views and party lines, are less resilient against disinformation. From these studies, we not only learn that countries with strong centrist media outlets are less prone to fake news and disinformation. What is more, we learn that there is interaction between the behaviour of people in online and offline communities (Bork-Hüffer & Yeoh, 2017). So far, however, little is known about how CCS expressed online actually interacts with daily routines and practices such as recycling, energy saving or switching to alternative forms of transportation or how it shapes voting behaviours in local or national elections. Such insights would be important since opinions can translate into behaviour and online and offline behaviours might show significant disparities.

More systematic research is needed that investigates the precise interactions between online and offline CCO formation and how particular digital practices of for example debate might translate into real-world practices.

5 | CONCLUSION: RESEARCHING GEOGRAPHIES OF CLIMATE CHANGE OPINIONS

Climate change opinions have been researched in various disciplines including geography for several decades now. This review has tried to reorganise the wealth of knowledge on CCOs through a geographic perspective, asking what types of spatial units are used and emerge in CCO research. In sum, research on CCOs identifies particular geographies of CCA. A large body of research reveals systematic cross-country variation in public CCOs while controlling for individual-level factors. Future research could usefully develop further instruments to investigate cross-country variations in multiple attachments to place and scales to shed light on how imagined geographic perceptions and attachments affect CCO formation.

National surveys are complemented by local case studies that highlight how for example local belief systems or personal experiences of climate change shape CCOs. Far fewer studies exist that take a comparative approach to CCOs in national sub-units (exceptions noted in Section 3), with smaller countries being particularly underrepresented within such research designs. This highlights the need for more comparative research on fine-grained geographic scales. This is a substantial research gap, as climate change policies and initiatives are not only designed and implemented at national scales, but crucially involve the smallest geographic scales such as regions, cities, and rural municipalities as key sites for implementation. Within this spatial context, substantial barriers can exist in the local public (Dannevig et al., 2012). Local adaptation and mitigation policies are often hypothesised to depend on the support of local populations (e.g. Egan & Mullin, 2017; Wilbanks & Kates, 1999), systematic evidence at the local scale, however, is still missing. If this hypothesis holds to be true, i.e., if the regional polarisation of CCOs affects the implementation of climate change policies at the local level, this points at an important mechanism contributing to an increased regional divide (e.g., climate change pioneers vs. climate change laggards) that in turn impedes national climate change efforts. In addition, the large body of research on local climate change governance, for example, including research on urban adaption experiments (Broto & Bulkeley, 2013) and regional mitigation and adaptation projects (Landholm et al., 2019) could usefully draw on more localised knowledge on CCOs. Knowing more about local CCOs within a country could for example, contribute to reducing NIMBY effects and local grievances.

Research on CCS in particular reports that (social) media plays a critical role for shaping and spreading sceptical views. Here it is unclear how place-specific CCOs are affected by (a) conventional media reporting about climate change (e.g., in local newspapers) and (b) individuals' online social media usage. Communication networks are transcontinental and more global in reach than for example, conventional media outlets including local newspapers (Comparative research on the spatial networks of CCS online and e.g. anti-vaccination campaigns or other polarising topics seems necessary to confirm or reject our impression of a CCS-specific geographic scope). The interaction

between online and offline views and behaviours thus seems another critical aspect for future research on CCOs. In particular, it would be important to study the configurations of online/offline spaces of climate scepticism in order to overcome polarisation and create open forums for deliberation in the real world and online. It also poses new questions about how virtual and physical lifeworlds overlap and how e.g., embodied experiences and media discourses relate to one another in the process of CCO formation. The interplay of climate change attitudes, social segregation of physical spaces, and cyberspace thus creates complex online and offline spaces of attitude formation that have not yet been explored in depth. Using migration as an example, Bork-Hüffer and Yeoh (2017) examined the differences that can arise at the intersection of digital and offline spaces of encounter for Singapore. Based on an established triangulation of qualitative methods, the authors use both 'classical' techniques, such as various types of interviews and cognitive mapping, as well as content analyses of online forums with accompanying expert interviews. This work gives a first impression of the complexity of possible geographies of physical and virtual intersecting CCOs (e.g. Boulianne et al., 2020).

We conclude that the geographies of CCOs configure in an 'interspace' as an entanglement of virtual and physical spaces. Geographies of CCOs, thus, transcend physical space and involve transnational, virtual platforms and networks as well as lived and embodied place attachments and experiences at various scales. Thus, multi-regional investigations like that by Hamilton and Safford (2015), who investigate coastal communities' perception of environmental change, are particularly noteworthy. Here, the authors systematically test which aspects of place-based cultures matter for the formation of CCOs and systematically compare them across different US coastal regions. While they find that specific, place-based predictors influence environmental perspectives, they point out that 'Political party, however, proves to be the most consistent predictor across issues from local to global in scale' (Hamilton & Safford, 2015, p. 57). Other multi-scalar investigations (e.g. Lee et al., 2015; Marquart-Pyatt et al., 2014) equally confirm the dominance of political identity in shaping CCOs. Such findings confirm the need for place-sensitive research that continues to address specific research questions such as: *What* exactly is it that matters about a place to become significant in CCO formation (physical geographic features, exposure to climate change)? Or, how do aspects of local culture, political, socio-economic or historical trajectories of a region affect or modulate such place-specific aspects of CCO formation? Geographers are particularly well equipped to address such research questions and make lasting and novel contributions to CCO research.

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ENDNOTES

[1] Although there is no 'gold standard' in assessing people's opinion on climate change (Greenhill et al., 2014) in quantitative surveys, like the European Social Survey Round 8, which is frequently used as a source for comparative work (e.g. Fairbrother, Sevä and Kulin, 2019; Kulin & Sevä, 2021; Poortinga et al., 2019), Afrobarometer Round 7, Eurobarometer, or the Yale Program on Climate Change Communication, climate change awareness is perceived as a combination of knowing about climate change and acknowledging human agency for contributing to climate change. Lee et al. (2015), however, relate climate change awareness more to the question whether people have heard of and know about climate change at all. Greenhill et al. (2014) point out that wording matters in such research, as surveys in which respondents can say that they believe in a mix of anthropogenic and natural causes of climate change tend to generate different results: 'The belief that climate change is a mixture of natural and anthropogenic causes ('Mixed group') was chosen by the majority of

respondents, if the question made that response available' (Greenhill et al., 2014, p. 960). The authors explain this finding by respondents' wish to appear neutral on a polarised and highly complex issue and a middling tendency for a topic that is still associated with uncertainties.

[2] Climate change sceptics are critical of the idea that climate change is happening, they doubt climate science and reject that climate change is caused by human activities. Moreover, they often tend to report only little concern about climate change (Hobson & Niemeyer, 2012). Capstick and Pidgeon (2014) thus distinguish between epistemic scepticism, which revolves around aspects of climate change science, and response scepticism, which is rather related to a lack of concern about climate change. As we have shown in Section 2 of this review, personal predictors (e.g. 'cool dudes' in the USA (McCright & Dunlap, 2011b)) are salient for explaining CCS.

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