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The C-word: how critical cartography, critical GIS and critical data studies can repoliticise disaster-related maps

Critical
mapping for
disaster studies

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Abstract

Purpose – Mapping and Geographic Information Systems (GIS) are widely used in disaster research and practice. While, in some cases, these practices incorporate methods inspired by critical cartography and critical GIS, they rarely engage with the theoretical discussions that animate those fields.

Design/methodology/approach – In this commentary, the author considers three such discussions, and draws out their relevance for disaster studies: the turn towards processual cartographies, political economy analysis of datafication and calls for theorising computing of and from the South.

Findings – The review highlights how these discussions can contribute to the work of scholars engaged in mapping for disaster risk management and research. First, it can counter the taken-for-granted nature of disaster-related maps, and encourage debate about how such maps are produced, used and circulated. Second, it can foster a reflexive attitude towards the urge to quantify and map disasters. Third, it can help to rethink the role of digital technologies with respect to ongoing conversations on the need to decolonise disaster studies.

Originality/value – The paper aims to familiarise disaster studies scholars with literature that has received relatively little attention in this field and, by doing so, contribute to a repoliticisation of disaster-related maps.

Keywords Mapping, Critique, ICT for disasters, Disaster studies, Critical GIS, Digital humanitarianism

Paper type Literature review

Maps and geospatial analysis have become increasingly important to the ways we study and manage disasters, with examples ranging from quantitative risk assessment to the coordination of relief efforts during emergencies. These tools and practices are part of a broader trend towards the datafication of humanitarian response and development (Read *et al.*, 2016), explicitly endorsed by national governments and non-governmental institutions (see, for example, United Nations, 2015, p. 15). By and large, mapping for disaster management and research relies on what is sometimes termed “traditional GIS”, rooted in a positivist paradigm. The aim of this article is to suggest how insights from critical cartography, critical GIS and critical data studies could enrich this work.

I come to this topic as a geographer with training in critical cartography and critical GIS, who spent three years (between 2019 and 2021) working in a centre for disaster risk management (DRM). In this position I was able to collaborate with many scientists using GIS tools for disaster-related research, and to familiarise myself with the related literature. I noticed that, while many DRM scholars draw inspiration from critical cartography and critical GIS, they mostly refrain



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from engaging with associated debates about theory and epistemology (but see [Cadag and Gaillard, 2011](#); [Camacho et al., 2018](#); [Mendes Barbosa and Walker, 2020](#)). I also became aware that many DRM researchers are tired of seeing their work “deconstructed” by critical scholars, and are committed to producing insight that can improve the lives of people, ameliorating risks and distributing resources where they are most needed. With these considerations in mind, I refrain from offering methodological suggestions or finding faults in existing maps. Rather, I discuss selected critical approaches to mapping and draw out their relevance for disaster studies and DRM. These insights are particularly relevant for researchers and practitioners engaged in map-making but, given the growing importance of maps and geospatial data in the field, they will be of interest for disaster studies scholars more generally.

I start by clarifying what I mean by “critical”, and consider the extent to which critical approaches to mapping have found application in disaster research ([section 2](#)), taking participatory mapping and social vulnerability indexes as examples. I contend that, with few exceptions, disaster researchers employ methods inspired by critical mapping traditions without meaningfully engaging with the theories that underpin them. The following three sections review areas of scholarly debate and inquiry with relevance for disaster-related mapping, namely, the processual turn in cartographic theory ([section 3](#)), analysis of the relation between datafication and philanthrocapitalism ([section 4](#)) and calls for theorising computing of and from the South in critical data studies ([section 5](#)). Importantly, these sections are not meant as a comprehensive review, but merely highlight some recent trends and discussions that, in my view, are especially relevant for the field. In the conclusion ([section 6](#)), I consider how this work can contribute to the work of disaster researchers, including those using traditional GIS, and support a more political approach to map-making.

Critical mapping and disaster studies

This intervention aims to encourage critical mapping practices in disaster research. The qualifier “critical” could generate feelings of irritation in some readers, due to the implication that existing research is in some way sycophantic, gullible or straight-up dumb. With Francis [Harvey \(2018\)](#), I believe that good GIS analysis always entails critical thinking; DRM scholars working on increasingly sophisticated models to predict the consequences of seismic activity or estimate flood risk are critical in this sense of the word. Here, however, I use “critical” with specific reference to mapping practices rooted in critical social theory, broadly defined. This approach is often traced back to the 1980s and the work of (white, male, Anglophone) scholars such as Brian Harley, John Pickles and Denis Wood but, as Jeremy [Crampton \(2011, p. 40\)](#) points out in his widely cited introduction to critical cartography, its origins are much older and more culturally diverse. For Crampton, the most distinctive feature of critical mapping is that “it calls things into question”. First and foremost, it calls into question cartography’s claims to objectivity and rationality, interrogating the relation between (cartographic) knowledge and power.

A recent contribution by Taylor [Shelton \(2021\)](#) usefully rephrases the question of what critical mapping *is* into “how do we *do* critique through the practice of mapping?”. For Shelton, most critical mapping falls into one of two camps, which he describes as “subverting the God Trick” and “practicing strategic positivism”. The first group takes its name from Donna Haraway’s critique of scientific knowledge (1988), and its purported ability to see everything from nowhere. The “god-trick” is the illusion that scientific tools and techniques afford a universal view, free from perspective distortions. The trick conceals the social positioning and subjectivity of the viewer – the cartographer, the scientist, Man – making it seem as if *his* perspective was not a perspective at all, but indeed “life itself” ([Haraway, 1997](#)), that is, the world as it *really* is. To subvert the trick, map-makers in this first group rely on other forms of knowledge to refract, expand and complicate existing accounts of a given phenomenon. They emphasise that all knowledge is situated, embodied and partial, and that

these qualities do not make it any less useful or truthful. Their maps typically draw on qualitative and/or participatory methodologies; they also often borrow representation techniques from the visual arts, intentionally deviating from traditional cartographic standards. The second group seeks to exploit the authority of science and cartography to advocate for social justice and equality. This line of thinking, explored recently by Elvin Wyly (2009), underscores that there is no fixed relation between epistemologies, methodologies and political agendas. These scholars (besides Wyly, important contributions include Kwan and Schwanen, 2009a, 2009b; O'Sullivan *et al.*, 2018; Thatcher *et al.*, 2018) readily acknowledge that constructionist critiques (such as the one put forward by Haraway) were extremely timely and necessary when they emerged in 1970s and 1980s. Today, however, constructionist epistemologies are by no means a guarantee, or even a sign, of a progressive political stance. On the contrary, they are frequently co-opted by right-wing politicians that use them, for example, to deny climate change science, or mandate “balanced” curricula in which Bible doctrine is given the same legitimacy as evolutionary biology. In this context, scholars in this second group embrace forms of “strategic positivism” (Wyly, 2009), insisting that some knowledge-claims are factual and can be best supported through numbers and statistical analysis. They recognise such data and methods are social construction, but reclaim them as useful tools to shape the world (or, more modestly, public policy) in progressive ways.

Disaster studies scholars have drawn on both approaches and, in the remaining part of this section, I discuss two examples: participatory and/or community mapping of disaster risk, and quantitative social vulnerability indexes. I read the first line of work as an attempt to “subvert the God trick”; the latter as an example of strategic positivism. My argument, however, is that when these methodologies become techniques “without theory”, as it often happens in disaster studies, they lose much of their political potential.

Participatory mapping is widely used in disaster research, especially in projects that adopt participatory (Mercer *et al.*, 2008), community-based (Maskrey, 2011) or local (Lavell, 2002) approaches to DRM. Broadly speaking, participatory mapping is a process in which “community members, writ large, contribute their own experiences, relationships, information, and ideas about a place to the creation of a map” (Cochrane and Corbett, 2020, p. 707). The participatory mapping tradition understands this process as a means to support positive social change, legitimising knowledge by historically marginalised groups (Elwood, 2006). At its best, this approach can help to subvert the God trick of disaster science by contributing to historicise and politicise knowledge about disasters (Carraro *et al.*, 2022), diffracting official risk maps through indigenous knowledge (Camacho and Matus, 2021) and providing a much needed “trusted ground” for dialogue collaboration between actors (Gaillard and Mercer, 2013). In practice, however, the emphasis of participatory mapping exercises tends to be less on questioning or reframing existing knowledge, and more on tangible results. Such results include, for example, the cost-effective generation of information in contexts of data scarcity (Brandt *et al.*, 2020), and increased levels of disaster risk awareness and preparedness among “stakeholders” (Haworth *et al.*, 2016). Where Haraway views both scientific and non-scientific knowledge as partial and situated (see also Verran and Turnbull, 1995), disaster researchers uphold a clear distinction between geostatistical data on the one hand, and local or indigenous knowledge on the other. To facilitate the integration between the two, mapping participants are often required to fit their knowledge to relatively fixed standards and procedures, such as using pre-prepared survey or base map (e.g. Canevari-Luzardo *et al.*, 2017; Hung and Chen, 2013), reducing the room for “subversion”. To be clear, these are scientifically sound procedures with worthy goals; they do not, however, fulfil the definition of the aforementioned critical mapping.

Disaster researchers have also attempted to translate ideas from the (critical) social sciences into numbers that “speak truth to power” and guide decision-making. Among these attempts,

social vulnerability indexes are arguably the most successful. Vulnerability is a notoriously “fuzzy” concept, alternatively defined as the “potential for loss” (Cutter *et al.*, 2003) arising from environmental hazards, “the degree to which a system . . . is likely to experience harm due to exposure to a hazard” (Turner, Kasperson, Matson, McCarthy, Corell, Christensen, Eckley, Kasperson, Luers, Martello, Polsky, Pulsipher and Schiller, 2003, p. 8074) or a means to “[express] the multidimensionality of disasters” (Oliver-Smith, 2013, p. 11), and the uneven distribution of their effects in society. Notwithstanding their fundamental differences, these perspectives converge on the understanding of vulnerability as an “internal side of risk” (Birkmann and Wisner, 2006, p. 10), that is, the component of risk that arises from conditions within a system, as opposed to external threats. Such dry and relatively technical terms conceal the political import of a vulnerability framework: if risk depends not only on hazards, but also on how we arrange our society and built environments, then we can largely prevent disasters by doing things differently.

Turning this insight into numbers is challenging, but it is also, increasingly, a political priority, as international institutions and policymakers (Assa and Meddeb, 2021) more and more often demand precise measures of vulnerability, usually in the form of indexes (see also section 4). On the one hand, models to explain the causes of vulnerability are diverse and complex (for a comprehensive review, see Wisner, 2016), and thus difficult to summarise in one number; on the other hand, as noted in a report by the United Nation University (Birkmann and Wisner, 2006, p. 14), “decision-makers want clear options, not nuanced understandings”. In their attempts to balance complexity and simplicity, vulnerability indexes risk failing on both fronts: they are criticised for being excessively technocratic (Pronk *et al.*, 2017), but also scientifically and logically weak (Böhlinger and Jochem, 2007; Hinkel, 2011). Also in this case, disaster researchers are under pressure to produce usable tools, such as maps to guide budgeting and resource allocation. Such maps may be useful, but hardly fit Crampton and Shelton’s definitions of critical mapping.

To sum up, participatory mapping and vulnerability indexes are two examples of mapping practices largely inspired by critical social theory. As methods, both can support the practice of critique, calling into question existing knowledge about disasters; yet, in practice, they are often used in pragmatic but de-politicised ways. In the next sections, I present insights from critical cartography and GIS, and critical data studies, which invite disaster researchers to reconsider the ontologies, epistemologies and politics of mapping. To be clear, the following sections should not be understood as a comprehensive review, much less a blueprint for how to do critical mapping. Less ambitiously, my aim is to discuss selected ideas and their possible implications for disaster research and practice.

Maps as processes

Cartographic practices foreground truthful representation as a basis for epistemological validity. The two examples discussed previously illustrate this point. In the case of social vulnerability indexes, scholars proceed from the understanding that the numbers represented on the map through different colour shades capture the extent of vulnerability “on the ground”. As Spivak would put it (2015), the map works as a something between “a proxy and a portrait”: the closer the match with the represented object, the better the map. Even critics largely adhere to the same logic, as discussed: vulnerability indexes are flawed because they are inaccurate or incomplete. Participatory mapping methodologies rely on the other form of representation, the “speaking for other” (Spivak, 2015), that underpins liberal ideals of democratic inclusion. The map is legitimate and truthful in as far as it can be said to *represent* the views of residents or stakeholders, particularly those belonging to historically marginalised groups. The higher the level of participation (Arnstein, 1969), the better the map.

This way of conceptualising and evaluating maps is at odds with the recent “processual turn” in cartographic theory (Caquard, 2015; Dora, 2009; Hazen and Harris, 2006; Kitchin and Dodge,

2007). This shift builds on non-representational thinking, with an emphasis on material semiotics (Deleuze, 1994; Haraway, 2018; Latour, 1987). Such perspectives reject the modern ontology that assumes a division between object and subject, reality and representation, instead conceiving of phenomena as emergent assemblages constantly remade through practice. This has led scholars to question the ontological foundations of cartography, moving from viewing maps as “images of power” (Harley, 1989) to conceptualising them as ongoing processes, that is, mappings (Kitchin *et al.*, 2013), in a constant state of becoming (Del Casino and Hanna, 2005), “brought into being through specific context-dependent practices and relations” (Harris and Hazen, 2011, p. 50). This approach underscores that cartographic analysis must take into account the processes through which maps are produced, circulated and consumed – indeed, it suggests that production, circulation and consumption are not distinct moments, since they are all part of mapping.

Such ideas could seem rather abstract, or only relevant for the small community of cartographic theorists. On the contrary, they have resonated with scholars from many geographic sub-disciplines (Davis, 2021; Sletto *et al.*, 2021), and even beyond the field (Hacigüzeller, 2012; Vigil Fonseca, 2012). Processual approaches underscore how map-makers are neither neutral data crunchers nor simply facilitators of participatory processes; rather, they too belong to the worlds they map. This, in turn, highlights that maps do not exist independently from the ideas, procedures, technologies and contexts used to produce them, visualise them and disseminate them. They are inherently normative and political, expressing judgements about how disasters should be defined, prevented and dealt with. Such judgements are not representational biases that could, at least in theory, be avoided through perfect algorithms and ideal speech situations. Rather, they are inherent features of mapping, and as such can be usefully examined and made explicit.

In practical terms, a processual approach invites disaster scholars to carefully consider the full range of actors involved in making disaster-related maps. *Who has commissioned the map? Who is it funding it? What software and/or techniques have been used to draw it? Which understandings of space does the map imply? How was the map designed and circulated? Through which media? Which audiences have been addressed? Which policies, if any, is the map meant to influence?* From a processual perspective, these questions are not “context”, but essential to the process of cartographic meaning-making. They can help re-politicise disaster maps, without falling into the “I gotcha” attitude of earlier strands of deconstructive critique, which tended to equate the politics of maps with sinister hidden agendas and, by doing so, alienate mapping practitioners committed to valuable professional and deontological standards (Schuurman, 2000). On a conceptual level, this line of inquiry can open the way to innovative mapping practices that break with norms and habits so entrenched in the field to become invisible. Practitioners and applied researchers could also benefit from such an expanded scope. An example would be the choice of mapping software used in disaster research. At present, the use of ESRI ArcGIS is often taken for granted, at least for researchers working in institutions with access to ESRI’s expensive licences. Participatory mapping practitioners stand out as exceptions in this case, as they must consider whether the software is accessible for participants in terms of costs and ease of use, leading them to favour alternatives such as QGIS or Google Map Maker (Falco *et al.*, 2019; Panek, 2015). A processual approach would underscore the importance of additional criteria: future uses and sustainability, societal ideas embedded in the software, licensing of data and final products, as well as possibilities for other researchers, practitioners and activist groups to build on and expand the project (see also Gahegan, 2018).

Datafication and philanthrocapitalism

Several recent contributions (Bittner *et al.*, 2016; Burns, 2018; Givoni, 2016; Magalhães and Couldry, 2021; Roth and Luczak-Roesch, 2020) have examined the growing emphasis on

geospatial data and analysis a part of a broader “computation turn” (Duffield, 2016, p. 147) in the field of disaster management. These publications build on earlier work (Leszczynski, 2012; Pickles, 1995) on the politics of GIS, which underscores how mapping software and practices are shaped by the historical-material context in which they are produced. The starting premise here is that changes in how geographic information is produced, analysed and institutionalised are not driven (only) by technical advancements; rather, they are the result of shifting power relations, and, as such, necessarily political.

This scholarship illuminates the relation between datafication – that is, the transformation of social action into quantified data (see van Dijck, 2014, p. 198) – and emerging regimes of philanthrocapitalism, characterised by the convergence of capitalist enterprises and philanthropy (Burns, 2019, p. 1102). Recent years have seen the growing involvement of private, for-profit businesses in disaster management projects. These companies often partner with public bodies and non-profits to deliver goods and services on a charitable basis, arguably with a view of securing an advantageous position in future markets and gather data on potential customers and their consumption patterns (see, for example, the case discussed by van Doorn *et al.*, 2021). Firms producing mapping software are a case in point, with examples including ESRI’s collaboration with the intergovernmental Group on Earth Observations (GEO); Google’s agreement with the World Bank to make the Google Map Maker database available to UN Institutions; and MicroMappers, a crowdsourcing platform developed with support from the Qatar Computing Research Institute (QCRI), in partnership with the digital volunteer network, The Standby Task Force and UN OCHA [1].

Such involvement grants business leaders growing influence on resource allocation and policymaking. Decisions about how much is spent on what are largely taken out of the hands of democratic institutions and trusted to tycoons and foundation boards, who may or may not be knowledgeable about the issues at stake, and may or may not have the public interest at heart (Edwards, 2008). Local organisations find themselves competing to attract funding in a highly skewed market, where services providers vastly outnumber funders (see Hayes *et al.*, 2018, for a discussion of these dynamics in the development sector). To “win”, practitioners must frame their interventions through market logics that prioritise cost-effectiveness, entrepreneurship and efficiency (Duffield, 2016). They also need to prove their achievements through calculative practices borrowed from the business sector, including measures of investment/returns for key stakeholders, monitor and evaluation metrics and risk assessment (for an example, see the methodology outlined in Steinfort, 2017).

In this context, geospatial technologies such as remote sensing and crowdsourcing software become especially appealing as a cost-effective way to produce accurate data. The development of user-friendly GIS programmes also allows affected communities and amateur “micro-mappers” (Bittner *et al.*, 2016) to take on many of the tasks traditionally carried out by experts on site, further lowering costs and risks for donors (Read *et al.*, 2016). These solutions are then alternatively promoted as empowering and anti-technocratic, or as the last line of defence given the increased frequency of disasters (Duffield, 2016). Data become proof that something has been done, regardless of whether the information was needed in the first place.

Admittedly, these critiques tend to flatten the significant differences among projects, institutions and mapping platforms. Philanthrocapitalism may well dominate disaster mapping, but it does not determine all the outcomes completely. Project participants bring their own agendas, expertise, and disciplinary and cultural norms to mapping; the friction between such competing drives can be productive, pushing knowledge and action forward. With their relentless criticism, these analyses also risk alienating disaster practitioners and map-makers who are all too aware of the impact of neoliberalisation on their profession, and still make meaningful work in such challenging circumstances. Nevertheless, the overall account they build is extremely compelling. These insights can help disaster researchers to

see how their work fits into this bigger picture, and push back against datafication for datafication's sake.

Computing in/from the South

The two strands of literature presented are both rooted in European social theory. Processual thinking calls into question the modern division of the world into nature/culture, reality/representation, building on the philosophy of Deleuze and Whitehead. Critical GIS draws on Marx and Foucault's work to challenge the political economy of (late) capitalism, and its associated ideology. Whilst extremely influential and insightful, they should not be mistaken for the only paradigms that enable the practice of critique (Grosfoguel, 2007; Mignolo, 2009). Influenced by this line of thinking – which has been termed “epistemic decolonial turn” – scholars have recently attempted to provincialise existing accounts of datafication and computing, developing a critical data studies “in/from the South” (Amrute and Murillo, 2020; see also Milan and Treré, 2019).

As Amrute and Murillo (2020, pp. 4–5) note, the dominant narrative – among techno-enthusiasts and sceptics alike – depicts computing as a Western project, tied to European ways of knowing, that are then imported, imposed or adopted by the South. In this context, the South refers not to a geographical location as much as a proxy for marginalised and devalued people and ways of knowing, acknowledging that there are many Souths, some of which are within the Global North. The effects of this technological transfer are alternatively characterised as transformative (i.e. as drivers of development) or as tragic (i.e. as means for intensified exploitation and surveillance). In both interpretations, the future brought about by digital technologies is pre-determined, seemingly a-geographic, whilst also being profoundly Eurocentric. The problem with these accounts is that they erase the computing histories of the South and the contributions to knowledge made by its population, as well as the multiple, creative ways in which people engage with technologies today. Shifting the focus of inquiry to the so-called peripheries of digital innovation can counter this tendency, and reveal the plurality of digital futures. For example, in her analysis of ICT experiments in Peru, Anita Chan (2013) explores how the country appropriates and reworks tropes from the Western discourse on digitality, such as the celebration of hacking and local entrepreneurship. These reworkings exceed the dominant framework, incorporating historically marginalised actors and ways of thinking. The results, however, are not necessarily virtuous: much like the networks emanating from the centre, digitalisation in the South generates possibilities for control as well as emancipation. Importantly, the point is not just to pay more attention to digital practices and innovation developed in the geographical Global South, but also to take the epistemic South as a starting point to theorise digitality and datafication (Milan and Treré, 2019). A Southern epistemology thus actively works against inequality and injustice, valuing alternative ways of knowing and technological imaginaries without essentialising or romanticising them.

Many readers of this journal will notice the clear parallels between these ideas and the emerging debates about the need to transform the field of disaster studies. Here, too, there have been calls to decolonise the field (Rivera, 2022; Veland *et al.*, 2013), both on a structural level (e.g. through changes in funding models) and an epistemic one (e.g. through the formulation of new research framings and methodologies). Such debates have culminated in the disaster studies manifesto (“Power, Prestige and Forgotten Values: A Disaster Studies Manifesto”, 2021), which urges researchers to reconsider how disaster research is conducted, and by whom. Insight from critical data studies can make a distinctive contribution to these internal debates, bringing a more nuanced understanding of the relation between digital technologies and epistemic Eurocentrism. This insight offers a helpful counter-point to the techno-pessimism of political economy accounts, whilst challenging the celebratory rhetoric

around mapping technologies. It also counters well-intentioned but dangerous understandings of local and indigenous knowledge as static and intrinsically incompatible with quantification and large-scale analysis.

Conclusion

In this review, I have considered three areas of scholarly inquiry and debate related to contemporary mapping, and drawn out their implications for disaster studies and DRM. I have focused on the processual turn in cartographic theory, critiques of datafication informed by political economy and calls for “theorising from the South” in critical data studies. My argument is that engagement with these theoretical discussions can nurture critical mapping practices that call into question accepted knowledge about disasters, regardless of specific choices of methods. I highlight three distinct contributions. First, thinking of maps as processes foregrounds how the meaning and effects of maps are defined through practice, encouraging scholars to consider (and take more responsibility for) the ways disaster-related maps are produced, used and circulated. Second, critiques of datafication help to contextualise the expansion of disaster-related mappings, fostering a reflexive attitude towards the urgency to quantify and georeference disaster knowledge and practice. Third, theorisations of data from the South connect ongoing discussions about the need to decolonise disaster studies with methodological issues, and provide nuanced ways to think about the role of digital technologies in DRM.

My contribution aimed to familiarise disaster studies scholars with theoretical discussions that have received relatively little attention in this field and, by doing so, to contribute to a re-politicisation of disaster-related maps. Discussions about the relative merits of political principledness vis-a-vis pragmatic engagement with policy matters tend to associate theory, and especially critical theory, with the former (Baird, 2014; Blaikie, 2012; Walker, 2007). The assumption is that lofty ideas about politics and epistemology are a luxury that cannot be afforded by researchers wishing to have an impact “on the real world”. Yet, we know that all research (and all map-making) is theory-informed, in ways that often remain implicit, and even unconscious. This leads to what Donna Haraway (1997) has termed map fetishism – the mistaking of specific ways of knowing with “life itself” (see Carraro, forthcoming). Engagements with the ideas I have discussed here can hopefully help disaster researchers and map-makers to avoid this mistake.

Notes

1. More information on ESRI and GEO is available on the ESRI website, e.g. Baumann (2022); on the partnership between Google and the World Bank, and its dissolution, see Heller (2012); an insightful analysis of MicroMappers can be found in Givoni (2016).

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