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Visual Thinking in International Relations: Interactive Digital Maps, Spatial Conflict Dynamics, and Diverse Narratives

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Abstract: Armed conflicts are spatially dynamic, with violence shifting across borders and scales in ways that static, text-based analyses struggle to capture. This article proposes interactive digital maps (IDMs) as epistemological tools that integrate visual thinking into all stages of research on conflict dynamics. IDMs leverage human pattern recognition to reveal relationships, simultaneities, and transformations that remain obscured in linear narratives. Used iteratively, they facilitate participatory and collaborative inquiry by enabling diverse actors to co-produce and interpret spatial data. Drawing on cases from Colombia, the Horn of Africa, Lake Chad, Myanmar, and Syria/Iraq, we show how IDMs generate new insights into conflict processes while exposing the power embedded in cartographic and digital representations. We argue that IDMs, when used reflexively, can democratize and decolonize knowledge production by foregrounding positionality, multiple perspectives, and visual-spatial reasoning. In doing so, they extend the visual turn in international relations and demonstrate how interactivity reshapes epistemological hierarchies rather than merely digitizing existing analytical practices.

Resumen: Les conflits armés se caractérisent par un dynamisme spatial, et les analyses textuelles et statiques peinent à représenter comment la violence se meut entre les frontières et les échelles. Cet article propose que les cartes numériques interactives (CNI) constituent des outils épistémologiques qui intègrent la pensée visuelle à tous les stades de la recherche sur les dynamiques de conflit. Les CNI exploitent la reconnaissance de schémas humains afin de mettre au jour les relations, simultanéités et transformations qui n'apparaissent pas dans les récits linéaires. Employées de façon itérative, elles facilitent les enquêtes participatives et collaboratives en permettant à divers acteurs de co-produire et d'interpréter des données spatiales. Nous fondant sur des cas issus de la Colombie, de la Corne de l'Afrique, du lac Tchad, de la Birmanie et de la Syrie/de l'Irak, nous montrons que les CNI nous apportent de nouveaux renseignements sur les processus conflictuels tout en exposant le pouvoir des représentations cartographiques et numériques. Nous af-

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firmons que les CNI, lorsqu'elles sont employées de manière réflexive, peuvent démocratiser et décoloniser la production de connaissances en plaçant au premier plan la positionnalité, les perspectives multiples et le raisonnement visuo-spatial. Ce faisant, elles prolongent le tournant visuel des relations internationales et démontrent comment l'interactivité refaçonne les hiérarchies épistémologiques au lieu de se contenter de numériser des pratiques analytiques existantes.

Résumé: Los conflictos armados son dinámicos a nivel espacial, dado que la violencia se desplaza a través de fronteras y de escalas de maneras que los análisis estáticos basados en texto tienen dificultades para captar. Este artículo propone los mapas digitales interactivos (MDI) como herramientas epistemológicas que integran el pensamiento visual en todas las etapas de la investigación sobre la dinámica del conflicto. Los MDI recurren al reconocimiento de patrones humanos con el fin de revelar relaciones, simultaneidades y transformaciones que permanecen ocultas en las narrativas lineales. Los MDI, si se utilizan de manera iterativa, facilitan la investigación participativa y colaborativa debido a que permiten que diferentes actores coproduzcan e interpreten datos espaciales. Demostramos, basándonos, para ello, en casos de Colombia, el Cuerno de África, el lago Chad, Myanmar y Siria/Iraq, cómo los MDI generan nuevas perspectivas sobre los procesos de conflicto mientras revelan el poder contenido en las representaciones cartográficas y digitales. Argumentamos que los MDI, cuando se usan de manera reflexiva, pueden democratizar y descolonizar la producción de conocimiento dado que ponen en primer plano la posicionalidad, así como múltiples perspectivas y el razonamiento visual-espacial. De este modo, los MDI amplían el giro visual en el campo de las Relaciones Internacionales y demuestran cómo la interactividad reconfigura las jerarquías epistemológicas en lugar de, simplemente, digitalizar las prácticas analíticas existentes.

Key words: visual international relations, visual thinking, interactive digital maps, spatial conflict dynamics, cross-border armed conflict, epistemology, knowledge production, decolonizing methodologies

Palabras clave: pratique, production de connaissances, relations internationales visuelles, conflit, décolonisation, analyse spatiale

Mots clés: práctica, producción de conocimiento, relaciones internacionales visuales, conflicto, descolonización, análisis espacial

Introduction

In 2014, images of Islamic State (IS) fighters sweeping through Iraqi territory flooded global news. Although IS had signaled its intent to expand into Iraq, the invasion surprised many observers (Ignatius 2015; Abdulrazaq and Stansfield 2016, 525; Broekhof, Kitzen, and Osinga 2019, 96). Focused on Syria's civil war, Western analysts overlooked the conflict's spatially dynamic, cross-border nature. Using interactive digital maps (IDMs), our research reveals patterns of violence that extended across Syria and Iraq, suggesting that the two theaters formed a single conflict zone far earlier than widely recognized (Figure 1) (ICG 2003; ACLED 2021; BBC 2021).

This example illustrates our central claim: IDMs constitute a distinct epistemological approach that generates knowledge unavailable through traditional methods. IDMs visualize conflict differently and reorganize how knowledge about conflict is produced, validated, and contested. Through interactive visual–spatial reasoning, IDMs help users identify relational patterns, temporal simultaneities, and multiscalar dynamics. The interactive process—users manipulating layers,

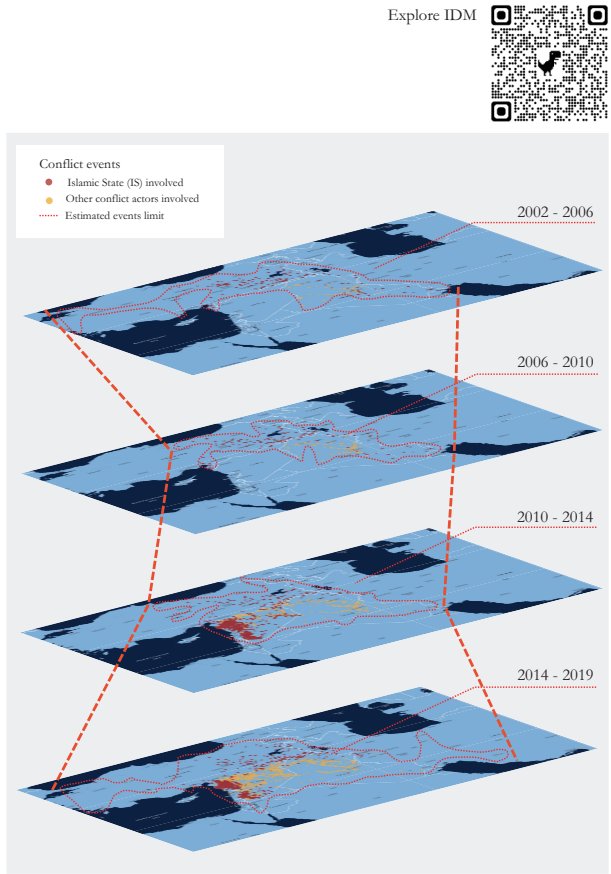

Figure 1. IDM of spatial change of conflict events and the conflict's scope as per estimated events limit in Syria/Iraq. Source: The Changing Character of Conflict Platform. https://www.globalsecurity.pmb.ox.ac.uk/research-and-publications/research/conflict-in-syria-and-iraq. Data: UCDP GED (Sundberg and Melander 2013; Pettersson et al. 2021).

adjusting temporal scales, and juxtaposing spatial data—constitutes a form of analysis that produces unique knowledge claims about a conflict's spatial dynamics.

Yet maps are not neutral. Their design and data carry assumptions that can reinforce colonial hierarchies. Historically, mapping has served as a political technology of empire (Harley 1989, 62; Wood 2010, 31), and today's spatial technologies risk entrenching power asymmetries—especially when data is collected or interpreted remotely. Building on critical cartography and participatory research, and drawing from projects like HarassMap (Grove 2015) and critiques of remote governance (Duffield 2016) as well as more recent digital humanities initiatives such as *Torn Apart/Separados* (Ahmed et al. 2018) and Forensic Architecture's (2024) cartographic investigations of Gaza, we argue that IDMs—when used reflexively and collaboratively—can help decolonize and democratize knowledge production.

Maps construct political meaning. In international relations (IR), maps have long served state-centric agendas, encoding dominant spatial narratives. IDMs offer a visual form that challenges this by inviting users to engage with conflict's shifting geographies. Their interactivity invites interpretation shaped by users' positionalities, transforming maps into participatory tools. This reflects growing recognition in vi-

sual IR that images and spatial artifacts do politics, not just represent them (Callahan 2020, 4–7; Bleiker 2023, 19, 21).

The Syria/Iraq case reflects a broader trend. Across the world, conflict events have historically shifted locations (see, e.g., Elliott and Kreutz 2019), but today, these changes' pace has increased.[1] With globalization enhancing information, communication, and transportation technologies, conflict actors can swiftly expand or shift operations across territories, including across borders.[2] Similar spatial dynamism appears in other social phenomena such as terrorism, crime, and mass protests.

How can international studies researchers enhance understanding of armed conflict's spatial dynamism without reproducing (neo)colonial knowledge structures? We argue that iteratively using IDMs grounded in visual thinking—cognition operating through spatial rather than sequential logic (Arnheim 1980, 490)—at multiple research stages can surface diverse narratives and plural analyses and interpretations of conflict. We examine this potential through case studies from Syria/Iraq, the Horn of Africa, Colombia, Myanmar, and the Lake Chad region.

By spatial dynamics,[3] we mean changes in event locations, including the changes' speed. Research stages include (i) developing an idea, (ii) generating hypotheses and collecting data; (iii) analyzing and interpreting data, and (iv) presenting results and communicating findings. By diverse narratives, we refer to interpretations that reflect different positionalities—especially those of nonstate actors, affected communities, and others often marginalized in mainstream conflict reporting and scholarship.

We conceptualize users broadly—researchers, policymakers, and affected communities—who generate distinct knowledge through IDMs across three epistemological contributions. First, visual–spatial reasoning enables detection of relational patterns: researchers trace cross-border linkages, policymakers recognize territorial shifts, and communities map safety corridors. Second, multiple (spatially) situated knowledges (cf. Haraway 1988) emerge as users from different positionalities interpret identical spatial data, revealing how location shapes analytical insights. A military analyst viewing conflict reductions identifies tactical withdrawal; a local resident recognizes intensified surveillance; a humanitarian policymaker sees access constraints—ontologically different phenomena derived from the same data. Third, participatory co-production involves conflict-affected communities manipulating IDMs directly, challenging expert-controlled knowledge hierarchies as democratization intensifies with user diversity.

IDMs' epistemological contribution lies not in maps as artifacts but in how they reorganize relationships among researcher, participant, and data. Unlike traditional methods where experts interpret for others, IDMs foster simultaneous, multiperspectival knowledge creation through manipulable visual–spatial interfaces.

Spatial Dynamism and Visual Thinking

IDMs enhance understanding of conflict's spatial dynamism by leveraging human pattern recognition to detect changes across time and space. They display layered qualitative and quantitative data, enabling holistic analysis through familiar cognitive models (Dixon 2012, 199).

Traditional social science relies on linear, text-based knowledge production with epistemological limits (Joo and Steinert-Threlkeld 2018, 2; Pfonner and James 2020, 192), prompting alternatives such as participatory action research, which uses visualizations—drawings, paintings, or collages—to engage nonresearchers in data analysis (Literat 2013; D'Amico et al. 2016, 533–4; Ngidi, Moletsane, and Essack 2021), fostering co-created knowledge.

[1] For the conflict event definition, see supplementary material.

[2] For the conflict actor definition, see supplementary material.

[3] We use "dynamic"/"dynamism" and "changing"/"change" interchangeably.

Scholars have long emphasized the visual's importance for understanding international affairs (Stanczak 2007, 4; Mitchell 2011; Pauwels and Mannay 2020, 3, 177). The "visual turn" in IR engages in how visuals (images, symbols, representations, and ways of seeing) are constitutive of international affairs by shaping political understanding and practice (Callahan 2015). Social scientists recognize visual research's methodological and ethical implications (Germano 2014; Yanow 2014). Visual thinking helps investigate security and related phenomena because visuality operates as representation, as a practice of enacting security, and as an investigative method (Vuori and Saugmann 2018, 5–15). Furthermore, visual methods can support ethical fieldwork in insecure settings while illuminating research sites (Chonka, Edle Ali, and Stuvøy 2022).

Most visual IR research relies on preexisting visuals—images, photography, video, social media posts, or video games—as data sources analyzed through textual interpretation (Shim and Nabers 2013; Berents and Duncombe 2020; Crone 2020; Austin 2022; Marlin-Bennett and Jackson 2022),[4] for example, to study visual politics analysing media production (Hansen 2015). Similarly, Robinson and Schulzke (2016) examine militarism through video games and social media. This scholarship also uses maps, including of road infrastructure, to generate hypotheses or analyze data (Hallisey 2005; Branch 2017; Hammond 2018), and it employs graphs and diagrams to describe processes, relationships, and findings—typically to support text-dominant publications (Banks and Zeitlyn 2015, 26–7). While visual scholars consider images integral to research, they usually contextualize them through text (Bleiker 2015; Malmvig 2020, 649).

Despite these advances, many aspects of the visual remain underexplored, including the compatibility of visual artifacts' "deep readings" and "close observation" or how digitalization influences visuality (Bleiker 2023; Austin and Bramsen 2024).

We extend the visual turn by treating IDMs as hermeneutic tools that create dynamic interplay between visual–spatial reasoning and textual interpretation. Following Bleiker (2018, 2023) and Callahan (2020), we argue that visuals do not merely represent but constitute political realities. Maps act as meaning-makers that shape spatial imaginaries and political responses.

Maps have long been constitutive of international affairs, but as interactive digital tools, they now confer meaning to global developments in novel ways. IDMs invite users to reimagine spatial narratives from diverse vantage points, challenging dominant framings and enabling simultaneous multilayered analysis. Their interactivity allows users to construct meaning through manipulation—revealing patterns, relationships, and narratives that emerge through exploration rather than preexisting textual frameworks. Unlike existing visual IR scholarship that uses images as data or illustration, we treat IDMs as co-constitutive analytical tools. Through map engagement, users think *with* and *through* rather than *about* maps.

Building on work recognizing IDMs' relevance for studying conflict's spatial dynamism (Cederman and Vogt 2017), we go further. While few employ IDMs *throughout* the research process (Pauwels 2015, 3), we emphasize them as epistemological tools at every stage: data collection through spatial plotting, analysis through layer manipulation, and interpretation through collaborative visual exploration. This shifts epistemological weight from text-based coding to visual–spatial pattern recognition. Collaborative interpretation of IDMs still generates textual data, yet it serves a different function—documenting rather than determining visual–spatial reasoning. Map interaction remains the core hermeneutic device; text merely traces visual interpretation.

Our epistemological contribution is thus to show how IDMs reorganize relations between visual and textual modes of knowledge production, making the visual the primary site of meaning-making. While interpretation inevitably involves language,

[4] But also note for example filmmaking as visualising IR (Callahan 2015).

the hermeneutic process is restructured around visual–spatial logic. This epistemological shift appears in our Myanmar and Horn of Africa cases, where participants' insights emerged through spatial manipulation—toggling layers to trace temporal patterns, juxtaposing geographies to reveal relationships, and correlating visuals to generate hypotheses—with text articulating rather than generating these understandings. Iterative reasoning is not new—it underpins grounded theory and other interpretive approaches—but IDMs enable users to shape political understanding from multiple angles simultaneously, advancing the visual turn by demonstrating how digital interactivity can transform epistemological practice rather than simply digitize existing methods.

Mapping and Decolonizing Knowledge Production

Unlike traditional maps that often reproduce colonial structures (Henderson and Waterstone 2009), IDMs—used across research stages—support decolonizing and democratizing knowledge production. They enable diverse actors to reframe knowledge hierarchies,[5] while fostering inclusivity and epistemological plurality (Baur 2021; Beaumont and Coning 2022; Eun 2023). Because visual thinking is intuitive, IDMs remain accessible to both experts and nonexperts.

Conflict scholarship has long reflected colonial lenses (Clarke 2024). Western epistemologies have enforced universalist perspectives through a "colonial matrix of power" (Mignolo 2011), affecting political, economic, and academic systems. This manifests in Global North dominance in publishing (Quijano 2007), where Western scholars construct narratives that distort local experiences (Kalyvas 2004; Power, Norman, and Dupré 2014; Harris 2018). Even today, social science remains biased through its reliance on English-language sources (Windsor 2022).

Visual representations embody similar hierarchies. Far from neutral, maps are social constructs reflecting their creators' interests, with different audiences interpreting them based on their positionality (Wood 2010). Historically, they shaped spatial imaginaries (Harley 1989), while erasing Indigenous knowledge. Mapping as a research method can reinforce Western legacies, necessitating decolonized epistemologies (Smith 2021). These knowledge–power relations perpetuate modern–colonial impositions (Walsh 2010). For over five centuries, cartographic mapmaking has displaced populations (Attwood 2004; Bryan and Wood 2015). Until the 1990s, expert-led maps excluded marginalized groups—the less literate, economically deprived, politically excluded, and those marginalized by gender (Kwan 2002; Dunn 2007; Fraley 2011). Conventional social science knowledge production, including mapping, frames neither space nor time neutrally; those in power use it to reproduce existing structures.

Colonial legacies persist in contemporary academia (De Leeuw and Hunt 2018). Geographical knowledge, whether topographic or Geographic Information System (GIS)-based, still reinforces dominant spatial conceptualizations (Hunt and Stevenson 2017). Even technical choices carry politics—the Mercator projection, for instance, enlarges Europe and North America while shrinking Africa, South America, and Asia, visually reinforcing Eurocentrism (Kratimenos 2022).[6]

Recent scholarship seeks alternatives. Peace and conflict studies increasingly foreground everyday, nonelite, embodied, and situated perspectives (Sylvester 2013; Björkdahl et al. 2019). Our IDM approach aligns with this turn while addressing its methodological limitations. Everyday peace research shows that local practices may contradict formal processes (Mac Ginty 2014); IDMs reveal how peace in capitals can manifest as surveillance in borderlands. Yet such work struggles with

[5] For radical views on decolonizing knowledge production through visualization see (Miner, 2022).

[6] We keep the ArcGIS online software's Mercator projection because our IDMs depict regions smaller than continents.

scalability—capturing quotidian experience without losing specificity (Millar 2014). IDMs meet this challenge through multiscalar analysis, revealing how "postconflict" manifests differently across regions and demonstrating peace's contextual variability (Richmond 2012).

IDMs also operationalize critiques that elite-focused data obscures local agency (Firchow 2018). When participants interpret shifting violence through IDMs based on lived experience, they conduct spatial analysis themselves, potentially revealing everyday insecurity (sexual violence, food scarcity) absent from battle-death datasets. This surfaces diverse narratives and localized understandings of conflict, advancing debates on human and everyday security (Martin and Owen 2010; Newman 2010; Mac Ginty 2014) by capturing threats to safety, dignity, and basic needs often overlooked in top-down analyses. IDMs thus meet everyday peace's epistemological challenge: producing knowledge that is both locally grounded and analytically rigorous, where visual–spatial reasoning enables cross-contextual pattern recognition while preserving local particularity.

This participatory ethos extends beyond peace studies. Neogeography similarly emphasizes community control, particularly for marginalized groups (Kar et al. 2016). Neogeography—GIS's expansion beyond traditional "expert" practitioner/academic communities—exemplifies participatory visual methods' potential and limits (Byrne and Pickard 2016), representing what Graham (2010) calls a "democracy of geography"—transferring power to nonexperts through access to mapping tools and satellite imagery (Graham and Hewitt 2013; Rothe 2017).

Yet challenges persist. The digital divide between communities and researchers (Van Deursen and Van Dijk 2011) can introduce bias (Huck et al. 2017), while technological and societal barriers sustain new exclusions (Byrne and Pickard 2016). Power relations among researchers, humanitarian actors, and communities continue shaping participatory visual methods (Chonka, Edle Ali, and Stuvøy 2022). Despite democratizing intentions, these methods can reinforce hierarchies when constrained by institutional or security pressures.

These tensions manifest in participatory mapping. Grove's (2015) analysis of Egypt's HarassMap reveals how crowdmapping, despite empowering intentions, can reproduce securitized logics and hierarchical visual regimes. Duffield (2019) similarly argues that remote digital interventions obscure power asymmetries while enabling governance from a distance. Crawford and Finn (2015) note tensions between geographic knowledge democratization and data ethics and accuracy. Such persistent barriers make knowledge production uneven (Rana and Joliveau 2009; Batty et al. 2010; Leszczynski 2014), requiring methodological transparency and clear workflows for equitable participation (Denwood, Huck, and Lindley 2022). We therefore treat IDMs not as inherently emancipatory but as tools whose democratic potential depends on reflexive, context-sensitive use.

Despite these limitations, maps can subvert power. IR scholars advocate inclusive knowledge spaces (Tickner 2003, 2014; Acharya 2016; Andrews 2022), while crowdsourcing incorporates marginalized groups in data collection (Guldi 2017). Countermapping reveals how cartographic technologies, once instruments of domination, can challenge state and capital authority (Wainwright and Bryan 2009; Bryan and Wood 2015; Rose-Redwood et al. 2020). Critical cartography emphasizes mapping's capacity to reproduce and resist power (Perkins 2017). Interactive and participatory digital maps, including IDMs, provide alternative spatial imaginaries that contest hegemonic narratives (Crampton and Krygier 2005).

Using IDMs throughout the research process advances these debates by serving diverse users: Western researchers challenging disciplinary constraints and amplifying marginalized voices, local populations asserting spatial knowledge, and policymakers seeking non-state-centric framings—each contributing to decolonization at different scales. This aligns with broader trends toward everyday and localized peacebuilding centered on lived experiences. Key positionalities include Indige-

nous communities with territorial knowledge, local peace practitioners, researchers from conflict-affected regions, and critically oriented Western scholars transcending methodological nationalism to engage multiple epistemologies. IDMs facilitate inclusion through visual cognition that bypasses literacy barriers, interactive features that let users manipulate data, and participatory annotation linking quantitative and experiential knowledge—transforming maps from extractive tools into collaborative platforms that enhance, rather than replace, scholarship while challenging Western-centric narratives.

Rather than being inherently decolonizing, IDMs provide frameworks for decolonizing discourse (McGurk and Caquard 2020). Sociotechnological changes have challenged traditional monopolies on map production, prompting calls for democratizing cartography (Wood 2015). Growing media literacy now enables wider engagement with digital visualization as a discursive tool (Shin 2009), facilitating more equal participation in knowledge co-creation. This fosters understanding through place-based knowledge (Turner 2006), unsettling dominant epistemologies and recognizing knowledge's inherent multiplicity.

The following sections examine how visual cognition supports IDMs in tracing spatial dynamics. We then outline our methodology and explore how IDMs illuminate these dynamics in Syria/Iraq, the Horn of Africa, and Colombia—before turning to decolonization through cases from Myanmar and the Lake Chad region.

Concepts and Theory

Following Idler and Tkacova (2024), we conceptualize armed conflict as a spatially dynamic phenomenon involving actors whose activities concern the same contested issue type (or incompatibility). Conflicts often comprise multiple actors entering at different stages and engaging in violence against one another and civilians. Conflict event (e.g., battles) locations can shift over time, including across borders. One actor may expand while another withdraws. Different event types (e.g., battles and terrorist attacks) can evolve simultaneously along distinct trajectories.

Such complexity is difficult to trace through text or traditional maps. We therefore introduce IDMs as a visualization form supporting iterative knowledge production across research stages. Visualization involves a dynamic exchange between vision and cognition, a "seeing-that" and "reasoning-why" cycle (Howard and MacEachren 1996, 366–7). As Crotty (1998) notes, visualization encompasses methods, methodology, theory, and epistemology for answering research questions.

Knigge and Cope (2006, p. 2026) define visualization as methods that generate insight through representing and exploring geographic, nonnumeric, or complex, multivariate datasets. Kapiszewski, MacLean, and Read (2015, 6) define data as contextually processed observations with analytical meaning. We define *nonverbal* data as sensory-based information (e.g., images, patterns, and emotions) (Krishna 2012). Visualization in our approach concerns both preexisting and newly generated data.

IDMs make complex data accessible. Their iterative use mirrors grounded theory fieldwork (Knigge and Cope 2006; Kapiszewski, MacLean, and Read 2015, 2021–2): data generation (e.g., interviews) feeds into analysis, leading to evolving questions and layered interpretation. Visualization activates cognitive pathways for pattern recognition (Pylyshyn 1999). Humans evolved to process the world first through perception, with language emerging later (Arnheim 1980; Tomasello 1999). Pattern recognition supports creativity, adaptability, and inference (Lamme 1995; Tattersall 2010; Mattson 2014), allowing grouping, distinguishing foregrounds, and linking to prior knowledge (Tarr 1998). For example, spatially recognizing borders or proximity to key towns enables contextual interpretation of conflict dynamics.

The claim that IDMs can pluralize conflict interpretations does not assume passive users. Interactivity empowers users to apply their own experiences, positionalities, and questions to spatial data. Visual politics lie in how images enable or con-

strain meaning (Callahan 2020; Bleiker 2023). Co-produced or reflexively designed IDMs invite multiple readings and expose silences, ambiguities, and underrepresented patterns.

Participatory mapping illustrates this dynamic: from Emmel's (2008) visual methods to public GIS projects (Wachowiak et al. 2015), users manipulate map layers to form personal narratives. Positionality—shaped by role, class, gender, race, or literacy—influences but does not determine interpretation. IDMs reveal how actor presence, event clustering, proximity to infrastructure, and spillovers shape spatial conflict patterns. Time sliders further enable tracking change over time.

Despite limitations—digital divides, distortions, and biases—IDMs help decolonize knowledge production. IDMs visualize fluid borders, mobile actors, and contested territorial claims. Their interactivity supports multiple interpretations, participatory counter-mapping, and critical reflection on colonial cartographic traditions—disrupting hegemonic narratives and fostering inclusive, user-driven engagement.

Our approach extends the visual turn in IR by applying it to IDMs. Like Bleiker (2018) and Callahan (2020), we treat visuals as constitutive of political meaning: maps shape world orders through spatial and sensory registers (Callahan 2020). Used reflexively across research stages, IDMs answer calls for visual methodologies foregrounding power, positionality, and epistemological plurality in conflict studies.

More broadly, we contribute to IR epistemological debates by demonstrating how visual–spatial reasoning generates knowledge distinct from textual analysis. Beyond critiques of expert authority, we examine how reasoning modes shape what can be known. While everyday peacebuilding scholarship highlights marginalized voices (Mac Ginty 2014; Björkdahl et al. 2019), our approach reveals how interactive spatial engagement creates emergent knowledge—patterns and relationships absent from both raw data and individual interpretation. This challenges IR's linear reasoning by showing how simultaneous, relational analysis generates knowledge unavailable through narrative approaches.

Our framework extends visual IR scholarship (Hansen 2015; Malmvig 2020) by positioning interactivity as constitutive of knowledge, demonstrating how spatial–temporal simultaneity reveals conflict patterns sequential analysis cannot. It also contributes to broader debates about knowledge production (Tickner 2003; Eun 2023), illustrating how technological mediation can transform epistemological processes rather than merely democratizing access to existing frameworks.

IDMs' epistemological significance thus extends beyond visualization. They transform knowledge production in three ways:

First, IDMs enable relational pattern recognition through spatial manipulation. When Myanmar forum participants toggled temporal layers for Karen State, they found reduced conflict events coinciding with increased checkpoints—a correlation invisible in statistics but apparent through visual–spatial juxtaposition. This knowledge emerged not from the map itself but from simultaneously holding multiple temporal states in visual memory while applying experiential knowledge.

Second, IDMs produce situated knowledge (Haraway 1988)—truths tied to scale and perspective. As shown below, the Lake Chad conflict appears as a state failure from Abuja, a regional crisis from N'Djamena, and a community survival strategy from border villages. These are distinct claims emerging from different spatial vantage points within the same dataset.

Third, IDMs enable participatory analysis, potentially collapsing boundaries between data collection, analysis, and interpretation. Users simultaneously generate data (through annotation), analyze it (through layer manipulation), and interpret it (through collaborative discussion). This epistemological flattening creates conditions for challenging hierarchical knowledge production where experts interpret for others.

Methodology and Data[7]

Our methodological approach centers on interactive engagement with spatial data rather than static visualization. IDMs function as analytical platforms where users actively manipulate layers, explore temporal changes, and collectively interpret patterns, generating knowledge through spatial exploration.

IDM Process

In general, the IDM process begins with collecting diverse data sources—textual (e.g., reports, policy documents, news articles) and nontextual (e.g., satellite imagery, geospatial data, oral histories, audiovisual content)—ensuring a multiperspective foundation. By discouraging reliance on single narratives, it enables multiple interpretations through disaggregated and aggregated formats. Findings are analyzed and presented through interactive maps, timelines, layered spatial data, and comparative charts to accommodate varied users. Temporal layers allow users to observe changes over time, encouraging dynamic engagement.

IDMs support researchers, policymakers, activists, and local communities in exploring data at their own pace and constructing counter-narratives by selecting specific sources or timeframes. Feedback from these stakeholders informs IDM refinement, allowing continuous improvement.

Case Selection

We selected diverse, contemporary armed conflicts to demonstrate IDMs' utility in analyzing spatial dynamism and fostering decolonized knowledge production. All cases are multiactor and cross-border. While Colombia, Lake Chad, and Myanmar involve fewer conflict actors ($\leq$20), Syria/Iraq and the Horn of Africa feature extensive conflict actor networks (122 and >100, respectively). The Horn of Africa spans Somalia, Ethiopia, and Kenya; the Lake Chad insurgency affects Nigeria, Chad, Cameroon, and Niger; and Colombia and Myanmar's conflicts extend into Ecuador/Venezuela and China/India. Each has persisted for over a decade, supporting analysis of long-term spatial change.

Cross-Stakeholder Fora

To examine IDMs' democratizing and decolonizing potential, we applied a cross-stakeholder forum methodology to two cases: Myanmar and the Horn of Africa. In 2022, two of the three authors co-organized virtual cross-stakeholder fora with two international peacebuilding nongovernmental organizations, using IDMs to support discussion. The Myanmar forum discussed how communities in Shan, Karen, and Kachin States experienced conflict changes and related uncertainties. The Horn of Africa forum discussed security challenges arising from the conflict's spatial dynamism, identified opportunities for cross-stakeholder collaboration, and shared good practices conducive to mitigating negative conflict impact on communities. The cross-stakeholder methodology brought together perspectives of representatives of civil society (e.g., elders and nongovernmental organization staff), the international community, and academia from Myanmar's Shan, Karen, and Kachin States and the Horn of Africa, respectively.

We recognize concerns about participatory approaches in conflicts, particularly involving humanitarian and development actors, which carry histories of inequality in knowledge production (Duffield 2019; Chonka, Edle Ali, and Stuvøy2022). We worked with representatives of the communities in Myanmar and Somalia, bringing

[7]See supplementary files for details.

grounded insights to the mapping. While no partnership is free from power asymmetries, this approach helped mitigate distance characterizing externally driven participatory processes and contributed to situated and locally informed IDM use.

Limitations and Access Considerations

IDMs face limitations from their digital format, data structure and gaps, distribution constraints, and limited user feedback. Digital divides from technology access, language limitations, and infrastructure disparities remain significant (Denwood, Huck, and Lindley 2022, 2324). While interactive formats are common in developed countries, their global distribution remains uneven, potentially reinforcing spatio-social orders and neocolonial structures (Bittner 2017). Technology can exacerbate inequalities in individuals' resources, often shaped by their social status, education, and access (Denwood, Huck, and Lindley 2023, 39). The digital divide has narrowed—Internet access increased from approximately 2.3 billion people (32 percent of the global population) in 2011 to approximately 4.9 billion people (63.2 percent) in 2021 (ITU 2021). Still, access inequalities persist, making careful curation of participatory research essential.

Data incompleteness presents another challenge: violence in remote areas or against marginalized groups often goes unreported, leaving gaps in datasets. While IDMs target broad audiences, technological and power dynamics persist that can unintentionally reinforce colonial narratives. Nonetheless, their ability to represent conflict through multiple narratives remains a strength.

Some may worry that IDMs risk narrowing conflict analysis to a single digital source. Yet we show that IDMs function as integrative platforms—merging multiple data types and perspectives. Unlike static visuals with fixed interpretations, IDMs allow users to combine conflict data, interviews, and ethnography; shift scales and timeframes; annotate maps with local knowledge; and generate alternative, positionality-shaped interpretations, expanding rather than constraining analytical possibilities. In our Syria/Iraq case, the IDM combined UCDP event data, interviews, and secondary literature, revealing cross-border patterns easily missed in isolated text-based analysis.

However, academic publication formats can limit IDMs' effectiveness. Static reproductions—whether PDF, print, or EPUB—capture one moment and miss evolving conflict dynamics. These snapshots may obscure nuance or be misused in policymaking if stripped of context. Embedding URLs or QR codes can mitigate this, offering readers direct access to full interactive maps. This also enhances inclusivity, giving readers more direct agency in exploring the maps. Some digital humanities journals, for instance, embed HTML-based IDMs to preserve interactivity.

The QR codes in this article link to the full IDMs. Static images present select snapshots, but for full engagement—including pop-ups, layers, and temporal shifts—we invite readers to scan the codes, complementing the text with dynamic spatial experience. Beyond a technical function, this practice reflects our commitment to democratizing and decolonizing knowledge production: it allows readers to engage directly with the maps, explore alternative narratives, and bring their own positionalities into the interpretation process, rather than relying solely on our textual framing. The QR codes are therefore not random add-ons but integral tools that extend access and enable plural, participatory readings of conflict dynamics.

Empirics and Discussion

Applying IDMS throughout the Research Process

Developing an idea (i): spatial dynamism in the armed conflict in Syria/Iraq

To identify conflict actors and scope in Syria/Iraq (developing the research idea), we iteratively combined IDMs with other interactive digital visualizations (IDVs) (e.g., network graphs)[8] and literature reviews (Idler and Tkacova 2024). Following approaches from other scientific fields,[9] and using the methodology outlined above, we mapped the conflict events of relevant actors and repeatedly reviewed and adjusted event and actor mapping, enhancing analytical precision (Longley et al. 2001, 264). Through iterative layer manipulation, we discovered that seemingly discrete Syrian and Iraqi conflicts formed an interconnected system—a spatial pattern invisible in dyadic datasets but emergent through visual juxtaposition, i.e., a different epistemological process. This demonstrates how IDMs generate relational knowledge through visual–spatial reasoning rather than categorical analysis. Using IDMs in analysis and interpretation facilitated tracing conflict events that shifted across borders. In 2012 and 2013, Syrian battles moved toward Iraqi borders; merging into a cross-border conflict zone by 2014 (Figure 1). Also later, IS disregarded borders.

This approach using IDMs throughout the research process contrasts with approaches where datasets like the Armed Conflict Location & Event Data Project (ACLED) (Raleigh et al. 2010, 2023), UCDP (Sundberg and Melander 2013; Davies, Pettersson, and Öberg 2022), or the Global Terrorism Database by the National Consortium for the Study of Terrorism and Responses to Terrorism (2020) integrate visualization mainly for data interpretation and presentation. In the initial research stages, it appears they typically employ linear processes, using visualization for "translation" rather than discovery. Contrary to the IDM-rooted approach of identifying actors and event locations based on proximity and violent engagement, UCDP for example seems to conceptualize conflict through verbal definitions and dyadic incompatibilities before visualization, resulting in over 117 conflicts for Syria or Iraq or both since 2003. This obscures how actors in both countries engage in the same contested issues transnationally.

Generating hypotheses (ii) and analyzing data (iii): changing pace of spatial conflict dynamics in the Horn of Africa

IDMs show how the pace of spatial change varies over time and space, affecting populations differently. Somalia's conflict evolved through multiple phases: Siad Barre's rule (1969–1991), the Islamic Courts Union's formation and disintegration, largely due to the US backed Ethiopian invasion of Somalia (2004–2006), and al-Shabaab's emergence and expansion into Ethiopia and Kenya (Shay 2008, 6; Hansen 2013; Woldemariam 2018, 217, 224–6). Around 2011, territorial shifts accelerated. Against the backdrop of Kenya's and Ethiopia's military intervention in Somalia (Yigzaw and Mengisteab 2024), military pressure from Somalia's government and the African Union Mission to Somalia (AMISOM), and al-Shabaab's internal ideological struggles, the Islamist group lost ground in southern/central Somalia (Williams 2014). Promoted by its new leadership (CNN Wire 2011), it transformed from a territorial force to a dispersed group using asymmetric tactics. The IDM's time slider accessible through the QR code (Figure 2) demonstrates accelerated spatial change around 2011, with territorially expanded attacks across Kenya, Ethiopia's borders, and northern Somalia. This resonates with historical patterns of Somali mobility and belonging that challenge state-centric border logics (Weitzberg 2017).

IDMs facilitate hypothesis generation and data analysis about geographical patterns. While text-based descriptions may generate hypotheses around the conflict's territorial expansion, IDMs reveal pace variations, yielding hypotheses about differ-

[8] See supplementary files.

[9] See, e.g., Wegener (1966, 1) or Giaquinto (2007, 3).

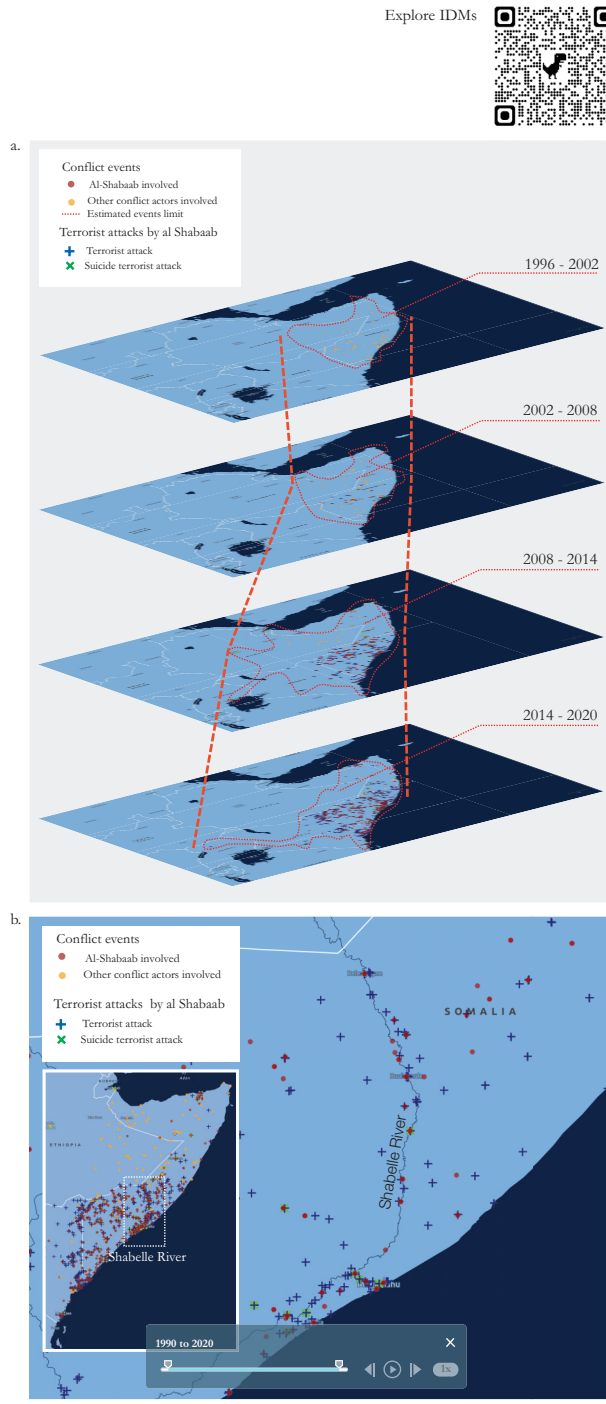

Figure 2. IDMs of conflict dynamics in the Horn of Africa. a. Spatial change of conflict events, terrorist attacks, and the conflict's scope as per estimated events limit. b. Conflict dynamics in 2013 and 2014, zoomed in on the Shabelle River. Source: The Changing Character of Conflict Platform. https://www.globalsecurity.pmb.ox.ac.uk/research-and-publications/research/conflict-in-the-horn-of-africa. Data: UCDP GED (Sundberg and Melander 2013; Pettersson et al. 2021).

ential impacts—populations experiencing rapid spatial changes face greater challenges in adapting for safety than those in stable conflict zones.

During 2013–2014, al-Shabaab lost strongholds to AMISOM/Somali offensives. The IDM reveals concentrated battles near the Shabelle River, Somalia's agricultural lifeline (Michalscheck, Petersen, and Gadain 2016) (Figure 2b). Pop-ups provide event details missing from textual narratives, whose readers cannot investigate individual data points without consulting other sources, enabling exploration of patterns like river proximity, attack types, and temporal shifts to generate hypotheses on conflict dynamics. IDMs excel at displaying complex data relationships. Patterns emerge through layered visualization—violence clustering near Somali waterways or Syrian–Iraqi conflicts linking through Kurdish territories and the Euphrates basin post-2012. Text requires extensive space to convey such spatial–temporal dynamics and risks omitting patterns deemed unimportant. IDMs empower users to explore data actively, creating their own narratives. However, they complement rather than replace broader contextual understanding of conflict history, actors, and geopolitics.

Presenting results and communicating findings (iv): regional variations in war-peace dynamics in Colombia

IDMs illuminate regional variations in conflict intensity and actor involvement before and after the peace agreement between the Revolutionary Armed Forces (FARC) and Colombia's government. Colombia's conflict originated in interparty disputes in the 1940s and 1950s. Left-wing guerrillas, including the FARC and the National Liberation Army (ELN), formed in the 1960s; in the 1980s, paramilitary groups formed to fight the insurgencies. As Colombia became the world's largest cocaine producer in the 1970s (UNODC 2020), drug trafficking intensified violence. Despite the 2016 FARC demobilization, violence persists through various armed nonstate groups (Idler 2019).

IDMs visualize how war-peace-transitions unfolded nonlinearly across regions (see also Samper 2017). In Colombia's Catatumbo region, the frequency of conflict events and the actors involved in them fluctuated considerably (see Figure 3): after 2000, fighting between state forces and the ELN as well as the FARC intensified, especially in 2005; conflict events became more sporadic in 2006. After 2011, the guerrillas fought intermittently. In some years, either the ELN or the FARC challenged the state's forces. In 2015, the FARC reduced fighting (Human Rights Watch 2019). Simultaneously, violence between the ELN, the Popular Liberation Army (EPL), and the government surged, followed by a decline in conflict events in 2016. After the FARC peace deal, ELN and other conflict actors became more prominent in the Catatumbo region (see Figure 3). The period 2019–2021 saw contestation between the ELN and other conflict actors. By 2021–2022, the ELN dominated. This contrasts with other regions: in the Putumayo department (FARC stronghold and coca hub), dynamics were steadier (Idler 2019); in Arauca (long-held ELN territory), violence remained relatively constant. IDMs enable simultaneous regional comparisons, showing differentiated territorial dynamics more vividly than text, which can inform new research directions, for example, about the role of geography in conflict (Idler 2020). They also communicate civilian experience. In Catatumbo, rapid spatial shifts eroded behavioral rules that enabled safety adaptation. People did not know what to expect from newly arrived armed groups, or whether the previously dominant armed actor would target civilians to maintain control. In more stable situations, even in the presence of armed groups, at least the front lines were clear, allowing for "rules of the game" that helped reduce people's insecurity because adapting their behavior minimized insecurity. When adaptation is impossible, civilians become "potential victims" (Rotker 2002, 15, 16); their lives are threatened more directly than under circumstances of slow pace where they have time to adapt. While IDMs cannot demonstrate threats directly, visualizing pace variations identifies when such circumstances emerge.

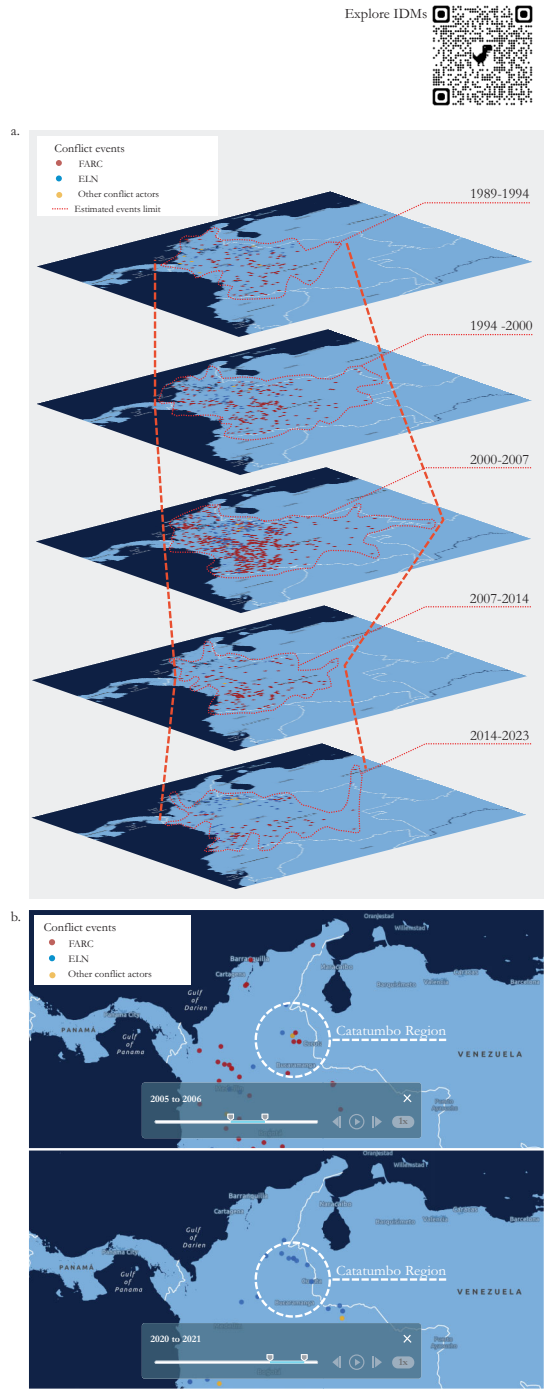

Figure 3. IDMs of conflict dynamics in Colombia. a. Spatial change of conflict events and the conflict's scope as per estimated events limit. b. Spatial change of conflict events (2005–2006; 2020–2021). Source: The Changing Character of Conflict Platform. https://www.globalsecurity.pmb.ox.ac.uk/research-and-publications/research/conflict-in-colombia. Data: UCDP GED (Sundberg and Melander 2013; Pettersson et al. 2021).

Consider Catatumbo's realities beyond textual summaries like "violence fluctuated 2005–2022 with competing groups." This accurate summary flattens lived complexity. Through IDMs, users can observe how conflict events in 2015 clustered differently than in 2019—the former showing confrontation lines between the FARC and state forces, the latter revealing a mosaic of the ELN, the EPL, and other actors. Users can zoom to specific communities, seeing how these macro-patterns translated into micro-geographies of violence that shaped daily life. A resident of Tibú versus El Tarra would see fundamentally different conflict dynamics, as confirmed in interviews that one of the authors conducted in both locations. IDMs thus help generate distinct narratives from the same dataset.

Democratizing and Decolonizing Knowledge Production

Armed conflicts in Myanmar

Our Myanmar research shows how IDMs enhance pluralistic data analysis and interpretation, blur researcher–user boundaries, and extend iterative research processes—similar to participatory action research using visualizations such as drawings or collages to engage nonresearchers (Literat 2013; D'Amico et al. 2016; Ngidi, Moletsane, and Essack 2021). This approach democratizes knowledge despite persistent global digital divides.

Myanmar's conflicts became violent after the ethnically and religiously diverse country's independence in 1948. They concern long-rooted issues such as ethnic self-determination and autonomy struggles, and factors such as the illegal exploitation of natural resources. Actors include the Burmese military (ruling until 2011 and again since 2021), ethnic armed organizations, border guard forces, militias, and criminal groups. After a period of civilian government that led to the National Ceasefire Agreement signed by some armed groups in 2015, the military's February 2021 coup and their declaration of a state of emergency deteriorated conditions.

We co-hosted a virtual cross-stakeholder forum in late 2022 in Myanmar, engaging civil society, the international community, and academic representatives.[10] We applied visual thinking to overcome biases and understand community experiences in changing conflict situations. For example, the dominant narrative around conflict in Myanmar until 2022, especially in Western analyses, excessively emphasized the Rohingya crisis—often presented as Myanmar's central conflict—and postcoup protests in central regions. This framing sidelined other longstanding regional conflicts, minimizing how diverse communities across Myanmar uniquely perceived and experienced violence due to distinct local histories and conditions. Using IDMs, participants embraced multiple narratives by co-analyzing regional conflict dynamics, including the co-evolution of subconflicts across regions. For example, participants analyzed specific periods by moving the IDMs' time sliders, and specific regions by zooming in on them. When viewing the same conflict events through the IDM, participants from different regions offered contrasting interpretations. For instance, some participants initially interpreted reduced conflict events in certain regions in 2020–2021 as stabilization. Yet those from Karen State revealed these represented heightened surveillance and suppression rather than peace—perspectives invisible in aggregated statistics but revealed through interactive exploration combining spatial data and lived experience. Such knowledge only emerged through the simultaneous visual–spatial manipulation and collaborative interpretation that IDMs enable.

Our approach democratized knowledge production through three mechanisms. First, all participants engaged the same IDM regardless of English proficiency, minimizing reliance on text instructions in Burmese and on interpreters (to translate legends) (Figure 4). Second, despite varied subject knowledge, all contributed by

[10] See supplementary files for forum methodology.

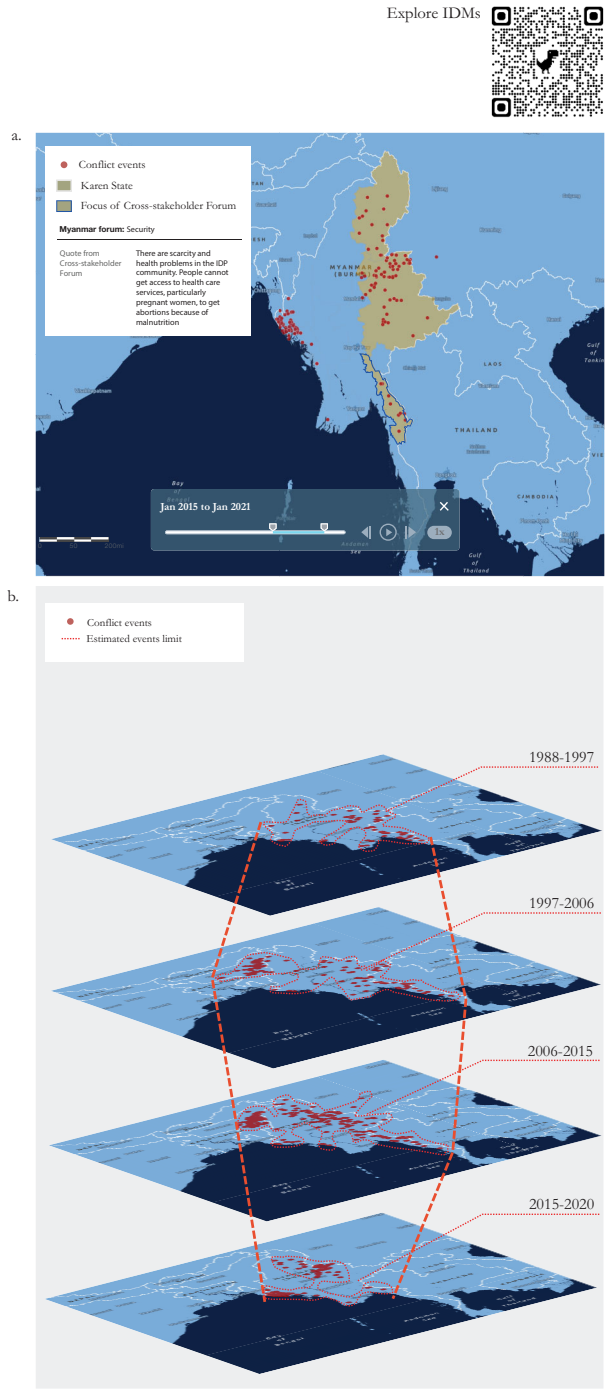

Figure 4. IDMs of conflict dynamics in Myanmar. a. Conflict events and narratives from the Myanmar forum. b. Spatial change of conflict events and the conflict's scope as per estimated events limit. Source: The Changing Character of Conflict Platform. https://www.globalsecurity.pmb.ox.ac.uk/research-and-publications/research/conflict-in-myanmar. Data: UCDP GED (Sundberg and Melander 2013; Pettersson et al. 2021).

recognizing visual patterns and forming experience-based associations, producing knowledge collectively. Third, participants from diverse ethnic, religious, and gender backgrounds contributed to analyzing, interpreting, and refining the IDMs addressing calls for reduced injustices in research (Wilmer 2016; Phelps and Hamilton 2021).[11] This yielded multiple narratives linking spatial dynamism to uncertainty, uncovering violence patterns unique to the participants' states of origin.

We acknowledge limitations in influencing all research stages. Participants could not determine presentation formats, actor labels, or initial data collection.[12] Also, the UCDP dataset we used carries biases,[13] though we mitigated these by adding interviews to accurately construct armed conflicts from conflict dyads, ensuring they reflect their cross-border nature (Idler and Tkacova 2024).

Traditional datasets like UCDP and ACLED predominantly rely on public, country-specific media sources, reflecting what Wimmer and Glick Schiller (2002) term methodological nationalism—treating states as primary analytical units (see also Amelina 2012, 58). This creates blind spots in understanding transnational phenomena. While policymakers may favor maps, the underlying data collection methods often reinforce state-centric frameworks that obscure cross-border dynamics, including events occurring across or near borders. This is both a technical limitation and an epistemological constraint, shaping which violence is visible and whose experiences count as data. Such underreporting can systematically exclude certain violence types and communities, distorting understanding of conflict.

Our iterative mapping approach reduces the impact of methodological nationalism. Forum participants critically assessed whether visualizations captured their experiences, creating a new perception-based dataset. We incorporated this into the IDM as tagged location quotes that represent diverse viewpoints (Figure 4), adding a toggleable layer contextualizing quantitative data with lived experiences. For instance, Karen State's fewer pre-2021 conflict events might suggest relative security, but participants highlighted food insecurity, the conditions of internally displaced people camps, and gender-based violence—shifting focus beyond conflict-related violence. Despite participatory additions, IDMs cannot capture violence unreported in the underlying datasets. Participants frequently mentioned state surveillance, intimidation, and structural violence absent from databases, revealing fundamental measurement limitations.

Figure 5 demonstrates how IDMs facilitate multiple narratives through participatory annotation rather than technical features alone. The UCDP base layer appears objective, but interactive pop-ups reframe events through local perspectives—battles become displacement stories, resource extraction, or community resilience narratives. Users toggle between quantitative and qualitative layers, constructing varied interpretations: Military strategists might focus on territorial control, humanitarian workers on civilian impacts, and community members on disrupted kinship networks.

This approach justifies epistemological renewal through participatory mapping, producing nuanced narratives beyond quantitative interpretation. By providing multiperspective context and amplifying the voices of those affected by conflict, it reduces biases present in quantitative data while enabling users to independently form their own interpretations.

IDM interactivity also addresses cognitive biases, including availability and confirmation biases (see, e.g., Tversky and Kahneman 1992), which interact with individuals' prior knowledge and persuasions (Ellis 2018). Depending on one's prior experiences, certain visual patterns trigger associations with known events; for example, conflict event increase in Shan State with suffering experiences. However, zoom-

[11] See supplementary files for demographics.

[12] Crowdsourcing for data collection somewhat democratizes it, but data collection protocols can become co-opted (Hirblinger et al. 2022).

[13] For a discussion of these biases see Ellis (2018).

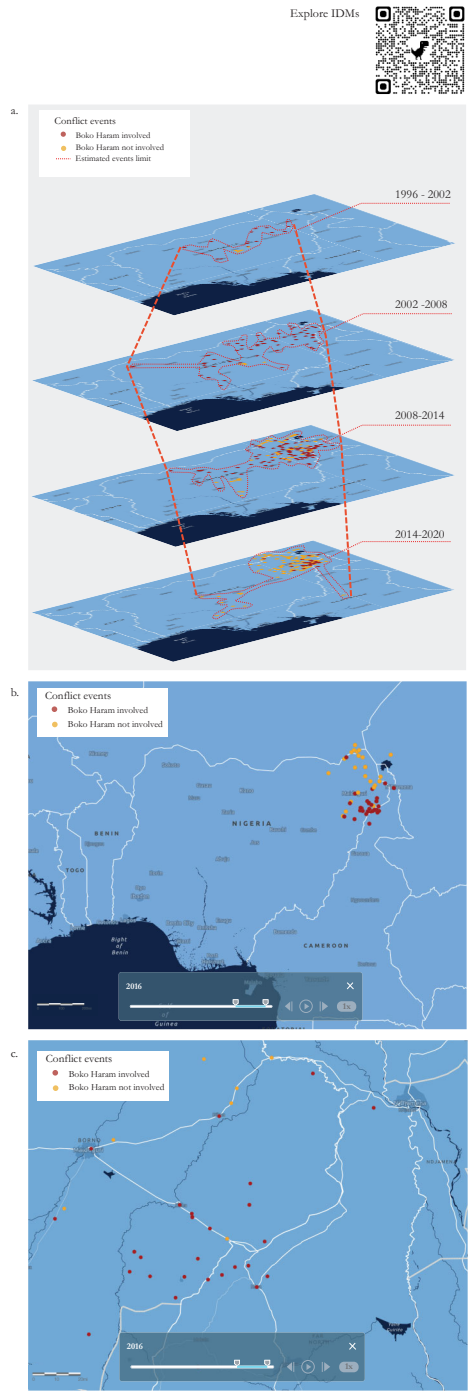

Figure 5. IDMs of conflict dynamics in the Lake Chad region. a. Spatial change of conflict events and the conflict's scope as per estimated events limit. b. Conflict events in 2016. c. Zoomed view of the region near Maiduguri. Source: The Changing Character of Conflict Platform. https://www.globalsecurity.pmb.ox.ac.uk/research-and-publications/research/boko-haram-islamist-insurgency. Data: UCDP GED (Sundberg and Melander 2013; Pettersson et al. 2021).

ing and temporal manipulation mitigate biases: Shan State participants discovered other regions' violence levels, prompting reflection on past experiences.

Overall, the Myanmar forum revealed how IDMs generate experientially validated spatial knowledge. Participants from different regions, viewing identical conflict data, produced distinct knowledge claims—positionally specific rather than interpretively divergent. These emerged through the interaction between visual pattern recognition and embodied experience—neither map nor experience alone could produce these insights. The epistemological significance lies in how IDMs transform lived experience into systematic knowledge through spatial manipulation.

We hosted a similar event on the Horn of Africa's conflict, also using IDMs as research tool. It similarly revealed how visual thinking generates insights beyond text-based analysis.

Despite persistent challenges—digital divides, technological barriers, and power asymmetries—the Myanmar case shows IDMs' potential when paired with mitigation strategies. Democratization depends on IDM accessibility.[14] Our forums addressed this through collective online safe spaces with shared technology and interpretation (Lythreatis, Singh, and El-Kassar 2022).[15] This, together with local partnerships and participatory annotation points to more inclusive conflict analysis.

IDMs on armed conflict in the Lake Chad Region

IDMs challenge singular narratives by promoting multiple interpretations, helping reduce bias in conflict analysis. They allow broad audiences to engage with data through accessible visual formats, improving transparency—especially when shared via public online platforms. This enhances dissemination and accessibility for those unfamiliar with datasets or quantitative methods.

Consider conflicts spilling into neighboring territory (Figure 5) or becoming bidirectional, as states may shelter armed actors (Salehyan 2007). These states prefer to be seen as neutral neighbors rather than conflicting parties (Idler 2019). Visualizing shifting conflict event locations helps view conflict from the margins to assess impacts on transnational communities, not just capitals.

Figure 5 illustrates this. Around 2002, an Islamist movement formed in northeastern Nigeria, later known as Boko Haram, with operations extending into neighboring countries (Weeraratne 2017). From 2009, the group adopted violent tactics; in 2015, it pledged allegiance to IS (Pham 2016).

Leadership disputes split the group into Boko Haram and IS (UCDP 2020). Increasing pressure from Nigerian forces and local militia Yan Gora pushed both groups toward Lake Chad—bordering Chad, Cameroon, and Niger (Agbiboa 2015). IS' international agenda and ethnic cross-border ties in Chad, Cameroon, and Niger (Osumah 2013) catalyzed the conflict's cross-border spread.

Figure 5 demonstrates how conflict events linked to those who fought under the IS banner and those who revived Boko Haram clustered in northeastern Nigeria and spread into Chad, Cameroon, and Niger between 2012 and 2016. IS's involvement internationalized the conflict as IS fighters expanded their activities to the neighboring countries (Weeraratne 2017). Over time, the conflict between local Islamists and Nigeria's government became a multiactor conflict involving state forces from Nigeria, Niger, Cameroon, and Chad as well as Boko Haram, IS, and militias. By 2016, conflict events concentrated in the Lake Chad region (Figure 5).

These insights inform *various* narratives. From Chad, violence appears to spill over. From Nigeria's capital, the insurgency seems weakened and geographically

[14] Visual impairments and mobility challenges also limit IDMs' usability and accessibility.

[15] In addition to these barriers, researchers often engage vulnerable populations facing risks or repercussions if identified, making safe, inclusive participation challenging.

contained. From border areas, violence from all directions threatens local communities. Visualizing shifting conflict locations across the Lake Chad region thus reveals Boko Haram as a localized, cross-border—rather than Nigerian—phenomenon. Certainly, IDMs are not neutral. They may contain (colonial) contested borderlines. Yet, by mapping cross-border spaces instead of fixed state boundaries, they decouple events from colonial cartographic legacies and expose transnational conflict patterns that reflect lived realities.

IDMs—when used ethically and with awareness of their limits—can help democratize and decolonize knowledge production while enhancing understanding of dynamically changing social phenomena.

Conclusion

This article demonstrates that IDMs constitute more than methodological innovation—they represent an epistemological intervention in how IR produces knowledge about conflict: through visual–spatial pattern recognition, situated knowledge, and participatory analysis. Treating interactive visualization as epistemology rather than illustration reveals how different cognitive modes produce distinct knowledge about international phenomena.

Our findings challenge textual reasoning's assumed superiority in IR. IDMs demonstrate that knowledge of spatial and temporal dynamics emerges through visual–spatial cognition, not by making data "easier to see" but by enabling alternative cognitive processes. Manipulating IDM layers engages pattern recognition that bypasses linguistic categorization—visual thinking. IR's text-centrism may thus exclude knowledge types about international phenomena.

This epistemological engagement opens three future research directions. First, IDMs' utility across research stages remains underexplored. We demonstrate their value in multiple phases; future work could further explore their role in each. Second, we focus on armed conflict; IDMs could be applied to other dynamic social phenomena. Third, beyond maps, our research has used other IDVs such as network graphs. Future studies might assess different IDV types' democratizing (or limiting) potential.

These findings hold policy relevance. Recognizing spatial dynamism improves conflict anticipation, as illustrated by the Western surprise at IS's advance into Iraq. Overlooking such dynamism hampers effective responses. Visual thinking can inform more inclusive strategies by democratizing decision-making and helping avoid binary foreign–local peacebuilding approaches (Mac Ginty 2015). Embedding IDMs across research stages strengthens responsiveness to lived realities of conflict-affected people.

However, using IDMs is inherently political. Maps shape spatial imaginaries and responses to political issues (Bleiker 2018; Callahan 2020). The IDMs presented here—even in their static, printed form—carry assumptions about what constitutes legitimate knowledge, whose perspectives matter, and how conflict should be visualized. QR codes linking to interactive versions underscore this tension: aiming for broader access while constrained by academic publishing formats—static images—that freeze time and perspective, potentially reinforcing hierarchies. At the same time, QR codes themselves are deliberate decolonial and democratizing interventions, offering readers agency in how they engage with the maps.

This political dimension reflects deeper epistemological challenges. IDMs construct and invite narratives through design choices—from base layers to data sources—that reflect specific framings. While we supplemented UCDP data with local knowledge, this still privileges particular conflict definitions. We treat maps as co-constitutive tools, not illustrations. Yet, linear academic formats subordinate visuals, suggesting future work should experiment with platforms that foreground visual interfaces and minimize textual authority.

Despite these limitations, IDMs offer significant potential. They enable iterative research by revealing patterns that refine questions during hypothesis generation, support relationship testing during analysis, and offer accessible formats for presenting findings. Interactive features invite alternative interpretations and user feedback, challenging Western-centric epistemologies through participatory knowledge production. Critical engagement remains essential. Visual thinking feels intuitive, but complex visuals can mislead, and pattern recognition may reinforce bias. Mitigating these risks requires blending computational tools, qualitative insights, and participatory methods through reflexive, collaborative use.

Ultimately, we invite continued dialogue on visual approaches in researching dynamic social phenomena. Visual thinking can foster more inclusive, reflexive, and epistemologically diverse international studies.

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Supplementary Material

Supplementary material is available at *International Studies Perspectives* online.

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Data Availability

The data underlying this article are available in Zenodo, at https://zenodo.org/records/18803832.

References

ABDULRAZAQ, T., AND G. STANSFIELD, 2016. "The Enemy Within: ISIS and the Conquest of Mosul." *Middle East Journal* 70: 525–42. https://doi.org/10.3751/70.4.11.

ACHARYA, A. 2014. "Global International Relations (IR) and Regional Worlds: A New Agenda for International Studies." *International Studies Quarterly* 58: 647–59. https://doi.org/10.1111/isqu.12171.

ACHARYA, A. 2016. "Advancing Global IR: Challenges, Contentions, and Contributions." *International Studies Review* 18: 4–15. https://doi.org/10.1093/isr/viv016.

ACLED. 2021. "Mapping Territorial Control in Syria." The Armed Conflict Location & Event Data Project (ACLED). https://acleddata.com/mapping-territorial-control-in-syria/. Date accessed 20 February 2023.

Agbiboa, D. 2015. "Resistance to Boko Haram: Civilian Joint Task Forces in North-Eastern Nigeria." *Conflict Studies Quarterly* 3–22.

Ahmed, M., Maira E. Álvarez, Sylvia A. Fernández, Alex Gil, Merisa Martinez, Moacir P. de Sá Pereira, and Linda Rodriguez et al. 2018. "Torn Apart/Separados, Volume Two." Visualization, June 25. https://xpmethod.columbia.edu/torn-apart/credits.html.

Amelina, A. 2012. *Beyond Methodological Nationalism: Research Methodologies for Cross-Border Studies*. London: Routledge. https://doi.org/10.4324/9780203121597.

Andrews, N. 2022. "The Persistent Poverty of Diversity in International Relations and the Emergence of a Critical Canon." *International Studies Perspectives* 23: 425–49. https://doi.org/10.1093/isp/ekac004.

Arnheim, R. 1980. "A Plea for Visual Thinking." *Critical Inquiry* 6: 489–97. https://doi.org/10.1086/448061.

Attwood, B. 2004. "The Law of the Land or the Law of the Land?: History, Law and Narrative in a Settler Society." *History Compass* 2: 1–30. https://doi.org/10.1111/j.1478-0542.00082.

Austin, J. L. 2022. "Seeing all Evil: The Global Cruelty of Digital Visibility." *Global Studies Quarterly* 2: ksac001. https://doi.org/10.1093/isagsq/ksac001.

Austin, J. L., and I. Bramsen. 2024. "Visual (Data) Observation in International Relations: Attentiveness, Close Description, and the Politics of Seeing Differently." *Review of International Studies* 50: 965–86. https://doi.org/10.1017/S0260210523000426.

Banks, M., and D. Zeitlyn, 2015. *Visual Methods in Social Research*. Thousand Oaks, CA: Sage. https://doi.org/10.4135/9781473921702.

Batty, M., A. Hudson-Smith, R. Milton, and A. Crooks. 2010. "Map Mashups, Web 2.0 and the GIS Revolution." *Annals of GIS* 16: 1–13. https://doi.org/10.1080/19475681003700831.

Baur, N. 2021. "Decolonizing Social Science Methodology. Positionality in the German-Language Debate." *Historische Sozialforschung* 46: 205–43.

BBC. 2021. "Why Has the Syrian War Lasted 10 Years?" . *BBC News* https://www.bbc.com/news/world-middle-east-35806229. Date accessed 27 February 2026.

Beaumont, P., and C. de Coning. 2022. "Coping with Complexity: Toward Epistemological Pluralism in Climate–Conflict Scholarship." *International Studies Review* 24, viac055. https://doi.org/10.1093/isr/viac055.

Berents, H., and C. Duncombe. 2020. "Introduction: Violence, Visuality and World Politics." *International Affairs* 96: 567–71. https://doi.org/10.1093/ia/iiaa058.

Bittner, C. 2017. "OpenStreetMap in Israel and Palestine–'Game Changer' or Reproducer of Contested Cartographies?" *Political Geography* 57: 34–48. https://doi.org/10.1016/j.polgeo.2016.11.010.

Björkdahl, A., M. Hall, and T. Svensson. 2019. "Everyday International Relations: Editors' Introduction." *Cooperation and Conflict* 54: 123–30. https://doi.org/10.1177/0010836719845834.

Bleiker, R. 2015. "Pluralist Methods for Visual Global Politics." *Millennium* 43: 872–90. https://doi.org/10.1177/0305829815583084.

Bleiker, R. 2018. "Mapping Visual Global Politics." In *Visual Global Politics*, edited by Roland Bleiker. London: Routledge. https://doi.org/10.4324/9781315856506.

Bleiker, R. 2023. "Visualizing International Relations: Challenges and Opportunities in an Emerging Research Field." *Journal of Visual Political Communication* 10: 17–25. https://doi.org/10.1386/jvpc_00022_1.

Branch, J. 2017. "Territorial Conflict in the Digital Age: Mapping Technologies and Negotiation." *International Studies Quarterly* 61: 557–69. https://doi.org/10.1093/isq/sqx046.

Broekhof, M. P., M. W. M. Kitzen, and F. P. B. Osinga. 2019. "A Tale of Two Mosuls, the Resurrection of the Iraqi Armed Forces and the Military Defeat of ISIS." *Journal of Strategic Studies* 45: 96–118. https://doi.org/10.1080/01402390.2019.1694912.

Bryan, J., and D. Wood. 2015. *Weaponizing Maps: Indigenous Peoples and Counterinsurgency in the Americas*. New York, NY: Guilford Publications.

Byrne, D., and A. J. Pickard. 2016. "Neogeography and the Democratization of GIS: A Metasynthesis of Qualitative Research." *Information, Communication & Society* 19: 1505–22. https://doi.org/10.1080/1369118X.2015.1125936.

Callahan, W. A. 2020. *Sensible Politics: Visualizing International Relations*. New York, NY: Oxford University Press. https://doi.org/10.1093/oso/9780190071738.001.0001.

CALLAHAN, W. A. 2015. "The Visual Turn in IR: Documentary Filmmaking as a Critical Method." *Millennium: Journal of International Studies* 43: 891–910. https://doi.org/10.1177/0305829815578767.

CEDERMAN, L.-E., AND M. VOGT. 2017. "Dynamics and Logics of Civil War." *Journal of Conflict Resolution* 61: 1992–2016. https://doi.org/10.1177/0022002717721385.

CHONKA, P., A. EDLE ALI, AND K. STUVØY. 2022. "Eyes on the Ground and Eyes in the Sky: Security Narratives, Participatory Visual Methods and Knowledge Production in 'Danger Zones." *Security Dialogue* 53: 567–88. https://doi.org/10.1177/09670106221111620.

CLARKE, H. 2024. "Toward Pedagogies of Decoloniality: Evaluating Teaching Practice and Syllabus Design in IR Undergraduate Modules." *International Studies Perspectives* 26: 1–19.

CNN WIRE. 2011. "Al-Shabaab Changes Tactics, Withdraws from Somali Capital." http://www.cnn.com/2011/WORLD/africa/08/06/somalia.forces.rebels/index.html?eref=rss_topstories&utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+rss%2Fcnn_topstories+%28RSS%3A+Top+Stories%29

CRAMPTON, J. W., AND J. KRYGIER. 2005. "An Introduction to Critical Cartography." *ACME: An International Journal for Critical Geographies* 4: 11–33.

CRAWFORD, K., AND M. FINN. 2015. "The Limits of Crisis Data: Analytical and Ethical Challenges of Using Social and Mobile Data to Understand Disasters." *GeoJournal* 80: 491–502. https://doi.org/10.1007/s10708-014-9597-z.

CRONE, M. 2020. "It's a Man's World: Carnal Spectatorship and Dissonant Masculinities in Islamic State Videos." *International Affairs* 96: 573–91. https://doi.org/10.1093/ia/iiaa047.

CROTTY, M. 1998. *The Foundations of Social Research: Meaning and Perspective in the Research Process*. St. Leonards: Allen & Unwin.

D'AMICO, M., M. DENOV, F. KHAN, W. LINDS, AND B. AKESSON. 2016. "Research as Intervention? Exploring the Health and Well-Being of Children and Youth Facing Global Adversity through Participatory Visual Methods." *Global Public Health* 11: 528–45.

DAVIES, S., T. PETTERSSON, AND M. ÖBERG. 2022. "Organized Violence 1989–2021 and Drone Warfare." *Journal of Peace Research* 59: 593–610. https://doi.org/10.1177/00223433221108428.

DE LEEUW, S., AND S. HUNT. 2018. "Unsettling Decolonizing Geographies." *Geography Compass* 12: e12376. https://doi.org/10.1111/gec3.12376.

DENWOOD, T., J. J. HUCK, AND S. LINDLEY. 2022. "Participatory Mapping: A Systematic Review and Open Science Framework for Future Research." *Annals of the American Association of Geographers* 112: 2324–43. https://doi.org/10.1080/24694452.2022.2065964.

DENWOOD, T., J. J. HUCK, AND S. LINDLEY. 2023. "Paper2GIS: Improving Accessibility without Limiting Analytical Potential in Participatory Mapping." *Journal of Geographical Systems* 25: 37–57. https://doi.org/10.1007/s10109-022-00386-6.

DIXON, D. 2012. "Analysis Tool or Research Methodology: Is There an Epistemology for Patterns?" In *Understanding Digital Humanities*, edited by D.M. Berry, 191–209. London: Palgrave Macmillan. https://doi.org/10.1057/9780230371934.

DUFFIELD, M. R. 2019. *Post-Humanitarianism: Governing Precarity in the Digital World*. Cambridge: Polity. https://doi.org/10.7227/JHA.003.

DUFFIELD, MARK. 2016. "'The Resilience of the Ruins: Towards a Critique of Digital Humanitarianism'." *Resilience 4 (3)*: 147–65. https://doi.org/10.1080/21693293.2016.1153772

DUNN, C. E. 2007. "Participatory GIS—a People's GIS?" *Progress in Human Geography* 31: 616–37. https://doi.org/10.1177/0309132507081493.

ELLIOTT, K. H., AND J. KREUTZ. 2019. "Natural Resource Wars in the Shadow of the Future: Explaining Spatial Dynamics of Violence during Civil War." *Journal of Peace Research* 56, 499–513. https://doi.org/10.1177/0022343318821174.

ELLIS, G. 2018. "So, What Are Cognitive Biases?," In *Cognitive Biases in Visualizations*, edited by G. Ellis, 1–10. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-95831-6.

EMMEL, N. ESRC National Centre for Research Methods *Real Life Methods* 1–8 2008. "Participatory Mapping: An Innovative Sociological Method."https://eprints.ncrm.ac.uk/id/eprint/540/

EUN, Y.-S. 2023. "Knowledge Production beyond West-Centrism in IR: Toward Global IR 2.0." *International Studies Review* 25: viad015. https://doi.org/10.1093/isr/viad015.

FIRCHOW, P. 2018. *Reclaiming Everyday Peace: Local Voices in Measurement and Evaluation after War*. Cambridge: Cambridge University Press. https://doi.org/10.1017/9781108236140.

FORENSIC ARCHITECTURE. 2024. "A Cartography of Genocide: Israel's Conduct in Gaza since October 2023." https://forensic-architecture.org/investigation/a-cartography-of-genocide. Date accessed 20 October 2024.

Fraley, J. M. 2011. "Images of Force: The Power of Maps in Community Development." *Community Development Journal* 46: 421–35. https://doi.org/10.1093/cdj/bsq011.
Germano, R. 2014. "Analytic Filmmaking: A New Approach to Research and Publication in the Social Sciences." *Perspectives on Politics* 12: 663–76. https://doi.org/10.1017/S1537592714001649.
Giaquinto, M. 2007. *Visual Thinking in Mathematics, Visual Thinking in Mathematics*. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199285945.001.0001.
Graham, M. 2010. "Neogeography and the Palimpsests of Place: Web 2.0 and the Construction of a Virtual Earth." *Tijdschrift voor Economische en Sociale Geografie* 101: 422–36. https://doi.org/10.1111/j.1467-9663.2009.00563.x.
Graham, S., and L. Hewitt. 2013. "Getting off the Ground: On the Politics of Urban Verticality." *Progress in Human Geography* 37: 72–92. https://doi.org/10.1177/0309132512443147.
Grove, N. S. 2015. "The Cartographic Ambiguities of HarassMap: Crowdmapping Security and Sexual Violence in Egypt." *Security Dialogue* 46: 345–64. https://doi.org/10.1177/0967010615583039.
Guldi, J. 2017. A History of the Participatory Map *Public Culture* 29: 79–112. https://doi.org/10.1215/08992363-3644409.
Hallisey, E. J. 2005. "Cartographic Visualization: An Assessment and Epistemological Review." *The Professional Geographer* 57: 350–64. https://doi.org/10.1111/j.0033-0124.2005.00483.x.
Hammond, J. 2018. "Maps of Mayhem: Strategic Location and Deadly Violence in Civil War." *Journal of Peace Research* 55: 32–46. https://doi.org/10.1177/0022343317702956.
Hansen, L. 2015. "How Images Make World Politics: International Icons and the Case of Abu Ghraib." *Review of International Studies* 41: 263–88. https://doi.org/10.1017/S0260210514000199.
Hansen, S. J. 2013. *Al-Shabaab in Somalia: The History and Ideology of a Militant Islamist Group, 2005–2012*. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199327874.001.0001.
Haraway, D. 1988. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies* 14: 575–99. https://doi.org/10.2307/3178066.
Harley, J. B. 1989. "Deconstructing the Map." *Cartographica* 26: 1–20. https://doi.org/10.3138/E635-7827-1757-9T53.
Harris, J. C. 2018. "Vulnerable Youth's Perspectives and Priorities for Informal Settlements: Photovoice Evidence from Lusaka, Zambia." *Journal of Planning Education and Research* 38: 398–412. https://doi.org/10.1177/0739456X17709914.
Henderson, G. L., and M. Waterstone. 2009. "Introduction: Why Is Geographic Thought Always Political?" In: *Geographic Thought: A Praxis Perspective*, edited by G. L. Henderson and M. Waterstone, 3–11. London: Routledge.
Hirblinger, A. T., J. M. Hansen, K. Hoelscher, Å. Kolås, K. Lidén, and B. O. Martins. 2022. "Digital Peacebuilding: A Framework for Critical–Reflexive Engagement." *International Studies Perspectives* 24: 265–84.
Howard, D., and A. M. MacEachren. 1996. "Interface Design for Geographic Visualization: Tools for Representing Reliability." *Cartography and Geographic Information Systems* 23: 59–77. https://doi.org/10.1559/152304096782562109.
Huck, J., I. Dunning, P. Lee, T. Lowe, E. Quek, S. Weerasinghe, and D. Wintie. 2017. "Paper2GIS: A Self-Digitising, Paper-Based PPGIS." In *Geocomp 2017: Proceedings of the 14th International Conference on Geocomputation*.
Human Rights Watch. 2019. *The War in Catatumbo: Abuses by Armed Groups against Civilians Including Venezuelan Exiles in Northeastern Colombia*. New York, NY: Human Rights Watch.
Hunt, D., and S. A. Stevenson. 2017. "Decolonizing Geographies of Power: Indigenous Digital Counter-mapping Practices on Turtle Island." *Settler Colonial Studies* 7: 372–92. https://doi.org/10.1080/2201473X.2016.1186311.
ICG. Middle East Report N°11 International Crisis Group 2003. "War in Iraq: Political Challenges after the Conflict." https://www.crisisgroup.org/sites/default/files/11-war-in-iraq-political-challenges-after-the-conflict.pdf
Idler, A. 2019. *Borderland Battles: Violence, Crime, and Governance at the Edges of Colombia's War*. Oxford University Press. https://doi.org/10.1093/oso/9780190849146.001.0001.
Idler, A. 2020. "The Logic of Illicit Flows in Armed Conflict: Explaining Variation in Violent Nonstate Group Interactions in Colombia." *World Politics* 72: 335–76. https://doi.org/10.1017/S0043887120000040.
Idler, A., and K. Tkacova. 2024. "Conflict Shapes in Flux: Explaining Spatial Shift in Conflict-Related Violence." *International Political Science Review* 45: 31–52. https://doi.org/10.1177/01925121231177445.
Ignatius, D. 2015. *How ISIS Spread in the Middle East*. Washington, DC: The Atlantic.
ITU. 2021. "Facts and Figures 2021." https://www.itu.int/itu-d/reports/statistics/facts-figures-2021. Date accessed 14 October 2023.

JOO, J., AND Z. C. STEINERT-THRELKELD. 2018. "Image as Data: Automated Visual Content Analysis for Political Science." [https://doi.org/10.48550/arXiv.1810.01544, arXiv, cs, stat].

KALYVAS, S. N. 2004. "The Urban Bias in Research on Civil Wars." *Security Studies* 13: 160–90. https://doi.org/10.1080/09636410490914022.

KAPISZEWSKI, D., L. M. MACLEAN, AND B. L. READ. 2015. *Field Research in Political Science: Practices and Principles, Strategies for Social Inquiry*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511794551.

KAR, B., R. SIEBER, M. HAKLAY, AND R. GHOSE. 2016. "Public Participation GIS and Participatory GIS in the Era of GeoWeb." *The Cartographic Journal* 53: 296–9. https://doi.org/10.1080/00087041.2016.1256963.

KNIGGE, L., AND M. COPE. 2006. "Grounded Visualization: Integrating the Analysis of Qualitative and Quantitative Data through Grounded Theory and Visualization." *Environment and Planning A* 38: 2021–37. https://doi.org/10.1068/a37327.

KRATIMENOS, P. 2022. "North Isn't Necessarily Up: Map Projections, the Politics of Cartography and Their Relevance to Archaeology." *Archaeology International* 25: 78–88. https://doi.org/10.14324/111.444.ai.2022.06.

KRISHNA, A. 2012. "An Integrative Review of Sensory Marketing: Engaging the Senses to Affect Perception, Judgment and Behavior." *Journal of Consumer Psychology* 22: 332–51. https://doi.org/10.1016/j.jcps.2011.08.003.

KWAN, M.-P. 2002. "Feminist Visualization: Re-Envisioning GIS as a Method in Feminist Geographic Research." *Annals of the Association of American Geographers* 92, 645–61. https://doi.org/10.1111/1467-8306.00309.

LAMME, V. A. 1995. "The Neurophysiology of Figure-Ground Segregation in Primary Visual Cortex." *Journal of Neuroscience* 15: 1605–15. https://doi.org/10.1523/JNEUROSCI.15-02-01605.1995.

LESZCZYNSKI, A. 2014. "On the Neo in Neogeography." *Annals of the Association of American Geographers* 104: 60–79. https://doi.org/10.1080/00045608.2013.846159.

LITERAT, I. 2013. "'A Pencil for Your Thoughts': Participatory Drawing as a Visual Research Method with Children and Youth." *International Journal of Qualitative Methods* 12: 84–98. https://doi.org/10.1177/160940691301200143.

LONGLEY, P. A., M. F. GOODCHILD, D. J. MAGUIRE, AND D. W. RHIND. 2001. *Geographic Information Systems and Science*. Hoboken, NJ: Wiley.

LYTHREATIS, S., S. K. SINGH, AND A.-N. EL-KASSAR. 2022. "The Digital Divide: A Review and Future Research Agenda." *Technological Forecasting and Social Change* 175: 121359. https://doi.org/10.1016/j.techfore.2021.121359.

MAC GINTY, R. 2014. "Everyday Peace: Bottom-Up and Local Agency in Conflict-Affected Societies." *Security Dialogue* 45: 548–64. https://doi.org/10.1177/0967010614550899.

MAC GINTY, R. 2015. "Where Is the Local? Critical Localism and Peacebuilding." *Third World Quarterly* 36: 840–56. https://doi.org/10.1080/01436597.2015.1045482.

MALMVIG, H. 2020. "Soundscapes of War: The Audio-Visual Performance of War by Shi'a Militias in Iraq and Syria." *International Affairs* 96: 649–66. https://doi.org/10.1093/ia/iiaa057.

MARLIN-BENNETT, R., AND S. T. JACKSON. 2022. "DIY Cruelty: the Global Political Micro-Practices of Hateful Memes." *Global Studies Quarterly* 2: ksac002. https://doi.org/10.1093/isagsq/ksac002.

MARTIN, M., AND T. OWEN. 2010. "The Second Generation of Human Security: Lessons from the UN and EU Experience." *International Affairs* 86: 211–24.

MATTSON, M. P. 2014. "Superior Pattern Processing Is the Essence of the Evolved human Brain." *Frontiers in neuroscience* 8, 265. https://doi.org/10.3389/fnins.2014.00265.

MCGURK, T. J., AND S. CAQUARD. 2020. "To What Extent Can Online Mapping be Decolonial? A Journey throughout Indigenous Cartography in Canada." *The Canadian Geographer/Le Géographe Canadien* 64: 49–64. https://doi.org/10.1111/cag.12602.

MICHALSCHECK, M., G. PETERSEN, AND H. GADAIN. 2016. "Impacts of Rising Water Demands in the Juba and Shabelle River Basins on Water Availability in South Somalia." *Hydrological Sciences Journal* 61: 1877–89. https://doi.org/10.1080/02626667.2015.1058944.

MIGNOLO, W. 2011. *The Darker Side of Western Modernity: Global Futures, Decolonial Options*. Durham, NC: Duke University Press.

MILLAR, GEAROID. 2014. "Disaggregating hybridity: Why hybrid institutions do not produce predictable experiences of peace." *Journal of Peace Research* 51: 501-514. https://doi.org/10.1177/0022343313519465.

MINER, J. D. 2022. "Informatic tactics: Indigenous activism and digital cartographies of gender-based violence." *Information, Communication & Society* 25: 431–448. https://doi.org/10.1080/1369118X.2020.1797851.

Mitchell, C. 2011. *Doing Visual Research*. Thousand Oaks, CA: Sage.
National Consortium for the Study of Terrorism and Responses to Terrorism. 2020. "Global Terrorism Database." https://www.start.umd.edu/gtd/. Date accessed 14 October 2021.
Newman, E. 2010. "Critical Human Security Studies." *Review of International Studies* 36: 77–94. https://doi.org/10.1017/S0260210509990519.
Ngidi, N. D., R. Moletsane, and Z. Essack. 2021. "'They Abduct Us and Rape Us': Adolescents' Participatory Visual Reflections of Their Vulnerability to Sexual Violence in South African Townships." *Social Science & Medicine* 287: 114401. https://doi.org/10.1016/j.socscimed.2021.114401.
Osumah, O. 2013. "Boko Haram Insurgency in Northern Nigeria and the Vicious Cycle of Internal Insecurity." *Small Wars and Insurgencies* 24: 536–60. https://doi.org/10.1080/09592318.2013.802605.
Pauwels, L. 2015. *Reframing Visual Social Science: Towards a More Visual Sociology and Anthropology*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9781139017633.
Pauwels, L., and D. Mannay. 2020. *Visual Dialogues across Different Schools of Thought*, 1–11. Thousand Oaks, CA: Sage Publications.
Perkins, C. 2017. "Critical Cartography," In *The Routledge Handbook of Mapping and Cartography*, edited by Alexander Kent and Peter Vujakovic, 80–89. London: Routledge. https://doi.org/10.4324/9781315736822.
Pettersson, T., S. Davies, A. Deniz, G. Engström, N. Hawach, S. Högbladh, and M. S. M. Öberg. 2021. "Organized Violence 1989–2020, with a Special Emphasis on Syria." *Journal of Peace Research* 58: 809–25. https://doi.org/10.1177/00223433211026126.
Pfonner, M. R., and P. James. 2020. "The Visual International Relations Project." *International Studies Review* 22: 192–213. https://doi.org/10.1093/isr/viaa014.
Pham, J. P. 2016. "Boko Haram: The Strategic Evolution of the Islamic State's West Africa Province." *The Journal of the Middle East and Africa* 7: 1–18. https://doi.org/10.1080/21520844.2016.1152571.
Phelps, M. S., and A. M. Hamilton. 2021. "Visualizing Injustice or Reifying Racism? Images in the Digital Media Coverage of the Killing of Michael Brown." *Sociology of Race and Ethnicity* 8: 160–75.
Power, N. G., M. E. Norman, and K. Dupré. 2014. "Rural Youth and Emotional Geographies: How Photovoice and Words-Alone Methods Tell Different Stories of Place." *Journal of Youth Studies* 17: 1114–29. https://doi.org/10.1080/13676261.2014.881983.
Pylyshyn, Z. 1999. "Vision and Cognition: How Do They Connect?" *Behavioral and Brain Sciences* 22: 401–14. https://doi.org/10.1017/S0140525X99622026.
Quijano, A. 2007. "Coloniality and Modernity/Rationality." *Cultural Studies* 21: 168–78. https://doi.org/10.1080/09502380601164353.
Raleigh, C., R. Kishi, and A. Linke. 2023. "Political Instability Patterns Are Obscured by Conflict Dataset Scope Conditions, Sources, and Coding Choices." *Humanities and Social Sciences Communications* 10: 74. https://doi.org/10.1057/s41599-023-01559-4.
Raleigh, C., A. Linke, H. Hegre, and J. Karlsen. 2010. "Introducing ACLED: An Armed Conflict Location and Event Dataset: Special Data Feature." *Journal of Peace Research* 47: 651–60. https://doi.org/10.1177/0022343310378914.
Rana, S., and T. Joliveau. 2009. "NeoGeography: An Extension of Mainstream Geography for Everyone Made by Everyone?" *Journal of Location Based Services* 3: 75–81. https://doi.org/10.1080/17489720903146824.
Richmond, O. 2012. *A Post-Liberal Peace*. Routledge. https://doi.org/10.4324/9780203810262.
Robinson, N., and M. Schulzke. 2016. "Visualizing War? Towards a Visual Analysis of Videogames and Social Media." *Perspectives on Politics* 14: 995–1010. https://doi.org/10.1017/S1537592716002887.
Rose-Redwood, R., N. Blu Barnd, A.H. Lucchesi, S. Dias, and W. Patrick. 2020. "Decolonizing the Map: Recentering Indigenous Mappings." *Cartographica: The International Journal for Geographic Information and Geovisualization* 55: 151–62. https://doi.org/10.3138/cart.53.3.intro.
Rothe, D. 2017. "Seeing like a Satellite: Remote Sensing and the Ontological Politics of Environmental Security." *Security Dialogue* 48; 334–53. https://doi.org/10.1177/0967010617709399.
Rotker, S. 2002. *Citizens of Fear: Urban Violence in Latin America*. New Brunswick, NJ: Rutgers University Press.
Salehyan, I. 2007. "Transnational Rebels: Neighboring States as Sanctuary for Rebel Groups." *World Politics* 59: 217–42. https://doi.org/10.1353/wp.2007.0024.
Samper, J. 2017. "Eroded Resilience, Informal Settlements Predictable Urban Growth Implications for Self-Governance in the Context of Urban Violence in Medellin, Colombia." *UPLanD* 2: 183–206.
Shay, S. 2008. *Somalia between Jihad and Restoration*. Piscataway, NJ: Transaction Publishers.

SHIM, D., AND D. NABERS. 2013. "Imaging North Korea: Exploring Its Visual Representations in International Politics." *International Studies Perspectives* 14: 289–306. https://doi.org/10.1111/j.1528-3585.2012.00493.x.

SHIN, M. E. 2009. "Democratizing Electoral Geography: Visualizing Votes and Political Neogeography." *Political Geography* 28: 149–52. https://doi.org/10.1016/j.polgeo.2009.03.001.

SMITH, L. T. 2021. *Decolonizing Methodologies: Research and Indigenous Peoples*. London: Bloomsbury Publishing. https://doi.org/10.5040/9781350225282.

STANCZAK, G. C. 2007. *Visual Research Methods: Image, Society, and Representation*. Thousand Oaks, CA: Sage Publications. https://doi.org/10.4135/9781412986502.

SUNDBERG, R., AND E. MELANDER. 2013. "Introducing the UCDP Georeferenced Event Dataset." *Journal of Peace Research* 50: 523–32. https://doi.org/10.1177/0022343313484347.

SYLVESTER, C. 2013. "War as Experience: Contributions from International Relations and Feminist Analysis." 1st ed. *War, Politics and Experience*. Abingdon: Routledge. https://doi.org/10.4324/9780203100943.

TARR, M. 1998. "Visual Pattern Recognition," In *Encyclopedia of Psychology*, edited by A. E. Kazdin, 1–4. Washington, DC: American Psychological Association.

TATTERSALL, I. 2010. "Human Evolution and Cognition." *Theory in Biosciences* 129: 193–201. https://doi.org/10.1007/s12064-010-0093-9.

TICKNER, A. 2003. "Seeing IR Differently: Notes from the Third World." *Millennium* 32: 295–324. https://doi.org/10.1177/03058298030320020301.

TOMASELLO, M. 1999. "The human Adaptation for Culture." *Annual Review of Anthropology* 28: 509–29. https://doi.org/10.1146/annurev.anthro.28.1.509.

TURNER, A. 2006. *Introduction to Neogeography*. Newton, MA: O'Reilly Media, Inc.

TVERSKY, A., AND D. KAHNEMAN. 1992. "Advances in Prospect Theory: Cumulative Representation of Uncertainty." *Journal of Risk & Uncertainty* 5: 297–323. https://doi.org/10.1007/BF00122574.

UNITED NATIONS OFFICE ON DRUGS AND CRIME. 2020. "World Drug Report 2020." https://wdr.unodc.org/wdr2020/en/index2020.html. Date accessed 07 June 2024.

UPPSALA CONFLICT DATA PROGRAM (UCDP). 2020. "Department of Peace and Conflict Research." https://ucdp.uu.se/. Date accessed 08 July 2022.

VAN DEURSEN, A., AND J. VAN DIJK. 2011. "Internet Skills and the Digital Divide." *New Media & Society* 13: 893–911. https://doi.org/10.1177/1461444810386774.

VUORI, J.A., AND R. SAUGMANN. 2018. *Visual Security Studies: Sights and Spectacles of Insecurity and War*, Routledge New Security Studies, 1st ed. London: Routledge. https://doi.org/10.4324/9781315387581.

WACHOWIAK, M.P., R. WACHOWIAK-SMOLÍKOVÁ, B.T. DOBBS, J. ABBOTT, AND D. WALTERS. 2015. "Interactive Web-Based Visualization for Lake Monitoring in Community-Based Participatory Research." *Nipissing. Environment and Pollution* 4: 42.

WAINWRIGHT, J., AND J. BRYAN. 2009. "Cartography, Territory, Property: Postcolonial Reflections on Indigenous Counter-Mapping in Nicaragua and Belize." *Cultural Geographies* 16, 153–78. https://doi.org/10.1177/1474474008101515.

WALSH, C. 2010. "Development as Buen Vivir: Institutional Arrangements and (De) Colonial Entanglements." *Development* 53: 15–21. https://doi.org/10.1057/dev.2009.93.

WEERARATNE, S. 2017. "Theorizing the Expansion of the Boko Haram Insurgency in Nigeria." *Terrorism and Political Violence* 29: 610–34. https://doi.org/10.1080/09546553.2015.1005742.

WEGENER, A. 1966. *The Origin of Continents and Oceans*. North Chelmsford, MA: Courier Corporation.

WEITZBERG, K. 2017. *We Do Not Have Borders: Greater Somalia and the Predicaments of Belonging in Kenya. New African Histories*. Athens, OH: Ohio University Press. https://doi.org/10.2307/j.ctv224txv2.

WILLIAMS, P. D., 2014. "After Westgate: Opportunities and Challenges in the War against Al-Shabaab." *International Affairs* 90: 907–23. https://doi.org/10.1111/1468-2346.12147.

WILMER, F., 2016. "Indigenizing Political Science or Decolonizing Political Scientists?" *Perspectives on Politics* 14: 1050–1. https://doi.org/10.1017/S1537592716002966.

WIMMER, A., AND N. G. SCHILLER. 2002. "Methodological Nationalism and the Study of Migration." *European Journal of Sociology /Archives Européennes de Sociologie / Europäisches Archiv für Soziologie* 43: 217–40. https://doi.org/10.1017/S000397560200108X.

WINDSOR, L. C. 2022. "Bias in Text Analysis for International Relations Research." *Global Studies Quarterly* 2: ksac021. https://doi.org/10.1093/isagsq/ksac021.

WOLDEMARIAM, M. 2018. *Insurgent Fragmentation in the Horn of Africa: Rebellion and Its Discontents*. Cambridge: Cambridge University Press. https://doi.org/10.1017/9781108525657.

WOOD, D. 2010. *Rethinking the Power of Maps*. New York, NY: Guilford Press.

WOOD, M. 2015. "The Society of University Cartographers–Its Growth and International Status." *The Cartographic Journal* 52: 224–7. https://doi.org/10.1080/00087041.2015.1119941.

YANOW, D. 2014. "I Am Not a Camera: On Visual Politics and Method. A Response to Roy Germano." *Perspectives on Politics* 12: 680–3. https://doi.org/10.1017/S1537592714001662.

YIGZAW, T. D., AND K. MENGISTEAB. 2024. "Exploring the Repercussions of Bilateral Military Intrusions in the Horn of Africa: Ethiopia and Kenya's Invasion of Somalia." *Journal of Asian and African Studies* 60: 3105–3120.

Idler, Annette et al. (2026) Visual Thinking in International Relations: Interactive Digital Maps, Spatial Conflict Dynamics, and Diverse Narratives. *International Studies Perspectives*, https://doi.org/10.1093/isp/ekag004