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Remembering and Forgetting Fukushima: Where Citizen Science Meets Populism in Japan

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This article investigates how Japanese citizen science practitioners of the Minna-no Data Site (Collective Database of Citizens' Radioactivity Measuring Labs) engaged in memory-making practices by using digital media to counter a populist discourse following the Fukushima Daiichi nuclear disaster. Adopting Rose's discourse analysis I, this study examines various websites and documents related to post-Fukushima citizen science initiatives and illuminates how the data site developed its citizen-science-based memory practices. This research shows how the site provided a specific way of remembering the Fukushima disaster, which pushed against the notion of the Recovery Olympics. Also, it demonstrates that an important element in digital memory practices was using the Chernobyl nuclear disaster to help remember the past and mold the present.

Keywords: citizen science, populism, digital memory, Fukushima Daiichi nuclear disaster, Japan

2021 was special for Japan. Not only was it the year that the 2020 Tokyo Olympics and Paralympics (the 2020 Tokyo Olympics) were held (having been postponed a year because of the coronavirus disease COVID-19 pandemic) but also it marked the 10th anniversary of the Great East Japan Earthquake and Tsunami and the Fukushima Daiichi Nuclear Disaster. This article sheds light on the link between the international sports event and the unprecedented triple disaster in 2011 from a memory perspective and examines how various citizens engage in science-based memory practices about the latter against an officially endorsed populist discourse involving the former. By seeing memory practice as an act of remembering, an active engagement with a particular past performatively, this article illuminates how Japanese citizens enacted and developed a counter-performance against the Japanese state's radiation discourse through the lens of populism.

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The notion of populism has been discussed from multiple perspectives (e.g., Laclau, 2005; Mudde, 2017; Müller, 2016). Mudde and Rovira Kaltwasser (2017) succinctly defined populism as a "thin-centered ideology" (p. 6) in that it appears to be linked to other ideological elements, producing and reproducing the divide between people and their enemies, including the corrupted elite, in a society. In doing so, the notion of populism foregrounds the idea that the general will of the people should be at the center of politics. More relevant to this study, Moffitt (2016) defined populism as a political style and discussed how populist actors used crises for mobilizing populism in symbolic practices, noting that "the performance of crisis offers populist actors a seemingly 'objective' rationale for targeting their enemies" (p. 125). Therefore, this study loosely characterizes a populist discourse as a discourse that allows political actors, such as the Japanese state and citizens, to set their goals as legitimate for "people" against "others" through memory practices. To conceptualize the state and citizens as political actors in Japanese society, it is important to note that the term citizen is politically loaded into postwar Japanese history (e.g., Avenell, 2010). For example, Avenell (2010) discussed the Japanese term shimin, which can be translated as "citizens" in English, and noted that "*shimin* encapsulated a vision of individual autonomy beyond the outright control of the state or the established left and within an idealized sphere of human activity they called civil society (*shimin shakai*)" (p. 2). This study draws on his conceptualization of shimin to define citizens as independent civic actors, including scientists and nonscientists, against the state's radiation discourse.

While there appears to be little common between the Japanese state and its citizens, a common element is given by an appeal to what is perceived as "the people" for it to involve a populist connotation. As will be illuminated, the Japanese state used the notion of recovery to symbolize the will of the Japanese society by forging its memory of the triple disaster. Citizens, on the other hand, used scientific data on radiation to symbolize an alternative memory of the disaster for "people" against the Japanese state's discourse. Thus, with their focus on symbolic performance for appealing to "the people" versus others, it is clear that the concept of populism would be useful for analyzing the different framings of the state and citizens. This approach does not explicitly underscore the binary between "the people" and "the elite," which is acknowledged in most literature on populism; however, it will reveal how their political performances or logic are constructed and how the post-Fukushima Japanese society was constituted through their performances. This article does not reduce the notion of populism to radical right or left movements; rather, this study enriches it to better understand the state and citizens from a memory perspective regarding the Fukushima radiation discourse.

The state's populist discourse centered on Fukkō Gorin or the Olympics of Recovery from the triple disaster. Initially, the Recovery Olympics emerged as an idea to promote and justify the bid for the 2020 Summer Olympics, to recover from the 2011 tragedies of the Great East Japan Earthquake and Tsunami and the Fukushima Daiichi Nuclear Disaster. Within three weeks of the triple disaster, Shintarō Ishihara, the incumbent governor of Tokyo, appealed to voters during the 2011 Tokyo gubernatorial election that he would bid for the 2020 Summer Olympics by referring to it as the Recovery Olympics (Asahi Shimbun, 2011a). As Yoshimi (2020) pointed out, the Recovery Olympics is a historically loaded term in modern Japanese history. For example, the 1964 Tokyo Olympics was framed and ultimately memorized as the Olympics of Recovery from the devastation of World War II, transforming the urban landscape of Tokyo and marginalizing the collective memory of wartime Japan in the name of recovery. Following the triple disaster, the state used the Recovery Olympics discourse to forge collective memory.

However, Ishihara did not know how much Japan would need to recover from in Tokyo, over 220 km from the wrecked Fukushima Daiichi nuclear power plant. The levels of radioactive contamination were not sufficiently known in Tokyo when Ishihara proudly proposed the notion of the Recovery Olympics (e.g., Asahi Shimbun, 2011b). Although a few monitoring posts existed before the disaster, many people collaborated to measure ambient radiation and food contamination in Tokyo after the disaster (Abe, 2015; Kimura, 2016; Sternsdorff-Cisterna, 2019). For example, Sternsdorff-Cisterna (2019) illuminated how Tokyo-based women, particularly mothers, developed the notion of food safety through measurement practices, while Kimura (2016) illuminated the role of neoliberal and traditional gender ideologies in constraining concerned Japanese women after Fukushima and discussed why they did not have a significant political impact through measurement practices. As such, there has been much scholarly debate on the role of citizens in post-Fukushima Japanese society (e.g., Polleri, 2021).

More importantly, these citizens shared the resulting data using digital media to ensure their health and safety. Multiple scholars have investigated the diverse roles of citizens (or nonexperts) in such digital data production practices under the label of citizen science (e.g., Abe, 2014, 2019; Hemmi & Graham, 2013; Kuchinskaya, 2019; Plantin, 2015). In response to this trend, *Nature* featured post-Fukushima citizen science initiatives under the title "Citizen Science Comes of Age" (Irwin, 2018). Citizen science, roughly defined as "scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions" (Citizen Science, n.d.), thus gained traction in Japan after Fukushima. By engaging with digital media practices, citizen science practitioners recorded traces of the Fukushima disaster through making imperceptible radioactive materials visible in the digital form of grassroots data.

This article takes these observations as entry points to consider how citizen science practitioners used digital media to participate in mediated discourse about the Fukushima disaster against the Recovery Olympics discourse. Whereas much scholarly attention has recently been paid to digital memory studies (Hoskins, 2018), social movements and memory practices in general (e.g., Berger, Scalmer, & Wicke, 2021; Merrill, Keightley, & Daphi, 2020), and memory activism in particular (e.g., Gutman, 2017; Katriel, 2016; Smit, Heinrich, & Broersma, 2018), little is known about the nexus among citizen science, digital media, and memory practices.

In analyzing digital memory practices, Kaun and Stiernstedt (2014), for example, discussed and demonstrated how the technological infrastructures of Facebook combined liveness and storage in memory work. In response, this study shows that citizen science practitioners do not necessarily continually update digital information on radioactive contamination. Although they initially focused on sufficiently informing their audience of the levels of radioactive contamination, they shifted the goal of their resulting digital practices to the remembrance and preservation of radioactive contamination through their collected data and digital media. While different memory practices after the Fukushima disaster have been documented (e.g., Geilhorn & Iwata-Weickgenannt, 2016), this article takes measuring readings as the primary media for representing a particular piece of the past and examines how citizens process and re-present their collected data by using digital media as their secondary media for rethinking the present.

This study investigates the Minna-no Data Site (Everyone's Data Site) or the Collective Database of Citizens' Radioactivity Measuring Labs (MDS, hereafter). As one of the most prominent post-Fukushima citizen science projects in Japan, MDS was engaged in measuring radiation as fundamental traces of the Fukushima disaster and presenting the resulting data promptly in a map for mnemonic purposes. While multiple antinuclear activists were initially engaged with measurement practices in the wake of the disaster (e.g., Abe, 2020a), a key member of MDS delinked it from antinuclear movements and identified it as a group of citizen science practitioners who made a data-based intervention (Oyama, n.d.). While Kimura (2016) illuminated how Japanese citizen science practitioners were unlikely to make political statements regarding the health effects of radiation, MDS collected data on its own and offered interpretations of radiation *based on the data*. As will be seen, MDS tactically used the data collected through September 2017, taking advantage of the 2020 Tokyo Olympics as a platform. In doing so, it made a mnemonic claim on the Fukushima disaster. Accordingly, focusing on MDS will illuminate a unique case in which citizen science, digital media, and memory practices converged against the Recovery Olympics discourse.

This study begins by further investigating the notion of the Recovery Olympics from a critical perspective, defining it as a populist discourse against which MDS engaged with mediated memory practices. The second section of this study provides theoretical frameworks and refers to its research method for analyzing MDS. The third and fourth sections describe and analyze how MDS developed its citizen science and mediated memory practices. The conclusion summarizes the key findings of this research and indicates their implications.

Rethinking the Recovery Olympics as a Populist Discourse

The concept of Recovery Olympics was initially used and promoted for domestic use, but there was a case of linking the Olympic bid with the recovery from the triple disaster for international audiences (e.g., Yoshimi, 2020). In the candidature file for the 2020 Summer Olympics, for example, the Tokyo Metropolitan Government and Japan Olympic Committee (JOC) did not mention the term Recovery Olympics, nor did they frame the Olympics as a means to recover from the disaster (Tokyo2020 Olympics/Paralympics shōchi iinkai, 2014). However, they strategically referred to the earthquake and tsunami as rhetorical resources for demonstrating the Japanese values and qualities that the Olympic Movement respects. What is notably missing here is any reference to the Fukushima Daiichi nuclear disaster. The Tokyo Metropolitan Government and JOC foregrounded memories of the earthquake and tsunami, leaving memories of the Fukushima disaster for the International Olympic Committee (IOC). Apparently, memories of the Fukushima disaster were a sensitive issue for the bid for the 2020 Summer Olympics. Indeed, in September 2013, the then Prime Minister, Shinzō Abe, asserted in his successful pitch to the IOC that the Fukushima situation was under control, precluding any reference to the Fukushima disaster *per se* (e.g., McCurry, 2016). The question then is how memories of the Fukushima disaster were embedded in the Recovery Olympics.

Many scholars have critiqued the notion of the Recovery Olympics by shedding light upon for whom and what the Recovery Olympics would be (e.g., Abe, 2020; Ogasawara & Yamamoto, 2019; Yoshimi, 2020). While such an approach is useful for better understanding the notion from a sociological perspective, this section takes a historical perspective and starts by briefly discussing a significant cause of the triple disaster (rather than taking recovery from the disaster as a starting point for the analysis of the Recovery Olympics).

Doing so would reveal how the Recovery Olympics notion preserves the prehistory of the disaster as a thing of the past or, more directly, as irrelevant to the 2020 Tokyo Olympics.

Undoubtedly, the earthquake and the resulting tsunami triggered the meltdown of the Fukushima Daiichi nuclear power plant. However, the disaster was also man-made. The Japanese state and Tokyo Electric Power Company Holdings, Incorporated (TEPCO), the owner and operator of the Fukushima Daiichi nuclear power plant, did not take sufficient measures to prevent the nuclear disaster (e.g., The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, 2012). Despite, or perhaps because of, the historical background, the Japanese state promoted the notion of recovery to the fullest extent by marginalizing the prehistory of the Fukushima Daiichi nuclear disaster from the public sphere, while refocusing its public's attention on the future. In doing so, the state apparently used the Recovery Olympics to distract people from, if not forget, the past, that is, that the Japanese state and TEPCO failed to sufficiently prepare for the disaster. As such, the future-oriented notion of the Recovery Olympics should be understood performatively as the creation of forgetting a particular piece of the triple disaster in the public sphere for political purposes at present.

The question then is what parts of the Fukushima disaster history did the Recovery Olympics discourse render distant or unknown while making others vivid and visible for molding the present? First, the discourse involved forgetting that the nuclear emergency, which was declared on March 11, 2011, concerning the Fukushima disaster had not yet been lifted (Koide, 2019). While the Recovery Olympics discourse was being advocated in Japan, the country was under a state of a nuclear emergency, and there were (and still are) hard-to-return zones in Fukushima Prefecture (Ogawa, 2021). Therefore, the future-oriented discourse of the Recovery Olympics involved forgetting the past (and the present) related to the state of a nuclear emergency and simply celebrating the international sports event. The Recovery Olympics discourse did not reflect the personal memories of the numerous people left behind in the name of recovery, including those who voluntarily evacuated their hometowns because of the Fukushima disaster (e.g., Yoshida, 2018). While the Japanese state gradually lifted evacuation orders in Fukushima Prefecture and increased the number of areas residents could return to, they had their public support cut off and suffered economic hardship (Hamada, 2021). The Recovery Olympics discourse contributed to rendering memories of the disaster distant in the public sphere (e.g., Yoshida, 2018).

On the other hand, the Recovery Olympics discourse foregrounded and institutionalized the memory of the recovery process. Many scholars have pointed out that the discourse was mobilized to support what Boykoff (2014) calls celebration capitalism (e.g., Ogasawara & Yamamoto, 2019). According to Boykoff (2014), celebration capitalism thrives on celebratory spectacle and collective euphoria, foregrounding the dynamism of capitalism rather than neoliberalism. In doing so, celebration capitalism uses "the state of exception as an alibi to justify sidestepping normal democratic processes in the name of expediency, exigency, and urgency" (p. 4). Indeed, the Recovery Olympics discourse was not merely used to urge the Japanese to show the world Japan's recovery "by 2020" or the year of the 2020 Olympics (e.g., Abe, 2020); it was also mobilized to remember memories of the recovery and forget unresolved issues related to the Fukushima disaster. Ultimately, it was also used to remove the communication space for democratic discussions on how to rebuild the nation (e.g., Ogasawara & Yamamoto, 2019).

Accordingly, the triple disaster gave great impetus to the Recovery Olympics discourse, contributing to the emergence of the populist discourse in the public sphere. In doing so, the Recovery Olympics discourse enacted a specific "political logic" (Laclau, 2005, p. 117) or articulation, which enhanced the nationalization of collective memories with a strong identity ("Japanese"), a useful symbolic resource for making homogeneous subcategories like "(future-oriented) Japanese" or "the Others" (Said, 1978). The Recovery Olympics presupposed that the future-oriented Japanese, as a homogeneous category, came from the same group as "the people," advancing its agenda in the public sphere by managing collective memories of the Fukushima disaster. In doing so, the state used the Recovery Olympics discourse to drive wedges between those hoping to see a recovery ("the people") and the Others, including those obsessed with unresolved issues related to the disaster.

However, a survey conducted by the NHK Broadcasting Culture Research Institute from 2016 to 2019 indicates that the Japanese people had mixed feelings about the notion. When asked if the 2020 Tokyo Olympics and Paralympics had great significance in demonstrating to the world the recovery from the Great East Japan Earthquake, the answers of respondents were split down the middle over the periods (Saitō, 2020). The survey results did not suggest that many people supported the notion of the Recovery Olympics. As will be seen, MDS used the collected data and the resulting radiation maps for concerned people ("the people") against the state and its radiation discourse that fits the notion of the Recovery Olympics.

This section indicates that the Recovery Olympics discourse involved a populist connotation for representing the general will of future-oriented "Japanese" as "people" against those concerned about radiation in post-Fukushima Japanese society. The notion of recovery functioned as a symbolic resource for the promotion of the Olympics and the celebration capitalism through the management of the collective memory of the triple disaster. In doing so, the Recovery Olympics allowed the Japanese state and the JOC to perform a discourse suited to their politics of recovery.

Theoretical Frameworks and Method

To explore MDS's science-based memory practices through the use of digital media, this study draws on three theoretical frameworks. In *Memory Practices in the Sciences*, Bowker (2005) discusses the relations between scientists and their conceptualization of the past in multiple fields of science, referring to memory practices as follows:

> Acts of committing to record … do not occur in isolation; they are embedded within a range of practices (technical, formal, social) …Taken as a loosely articulated whole, these practices allow (to some extent) useful/interesting descriptions of the past to be carried forward into the future. (p. 7)

For Bowker (2005), memory practices are significant because they shape our sense of reality and allow us to perpetuate the myth that our future will be measurable (and therefore controllable). Thus, Bowker (2005) shows that recoding the past's traces involves "a tacit negotiation between ourselves and our imagined auditors" (pp. 6–7). While his book focuses on professional scientists' memory practices in general, this study draws on his view of memory practices to consider how citizen science practices, which

involve recording levels of radiation contamination, were embedded in technical, formal, and social practices in post-Fukushima Japanese society and how their description of the past matters for molding the present and the future.

In addition to Bowker's (2005) memory practices, this study further refers to Hoskins' (2012) notion of digital network memory to consider the relationship between memory practices and media. Hoskins (2012) referred to digital network memory as "the dynamics of mediated memory as something created when needed, driven by the connectivities of digital technologies and media, and inextricably forged through and constitutive of digital social networks" (p. 92). Notably, the notion of digital network memory is based on the assumption that in digital media ecology, contemporary memory should be reconsidered as being "readily and dynamically configured through our digital practices and the connectivity of digital networks" (Hoskins, 2012, p. 96). Hoskins's view of a changing media-memory relationship based on the powerful role of digital media in reconfiguring memory can be seen as more or less technologically deterministic or media-centric. However, there are other kinds of memory practices conjoined with mass media (and broadcast media in particular) in tandem with digital memory practices (e.g., Merrill et al., 2020). Simply put, the traditional modes of remembering never fade away in the era of hyperconnectivity.

That being said, Hoskins' (2012) notion of digital network memory is useful for explaining the dynamics of everyday memory practices. Hoskins (2018) rightly pointed out that both humans and digital technologies should be understood as "memory's constituting agency" in the digital media ecology (p. 90). In doing so, Hoskins (2018) foregrounded the role of participation in shaping memory practices in digital media ecology in the name of the memory of the multitude, simultaneously consigning the issues of spectatorship and representation to the past of the broadcasting era.

To analyze MDS's contemporary memory practices, this article thus uses Hoskins's digital network memory in a more nuanced and contextualized way. Rather than dismiss spectatorship/representation as a thing of the past, this article considers both participation and spectatorship/representation to analyze MDS's memory practices. In doing so, this article discusses the role of digital practices and the networks of digital connectivity in mediated memory after the Fukushima disaster.

To further understand the combination of memory and digital practices in communication, this article turns to Carey's ritual model of communication. Carey (2008) referred to communication as "a symbolic process whereby reality is produced, maintained, repaired, and transformed" (p. 19) and famously differentiated a ritual view of communication from a transmission view of communication, characterizing the former as follows:

> A ritual view of communication is directed not toward the extension of messages in space but toward the maintenance of society in time; not the act of imparting information but the representation of shared beliefs…the archetypal case under a ritual view is the sacred ceremony that draws persons together in fellowship and commonality. (p. 15)

Therefore, the ritual view of communication is concerned with *both* representation and participation; ritual communication foregrounds the communication process by which people participate in

representing society. Combining Hoskins' digital network memory with the ritual view of communication thus sheds light on the mediated memory practices of the post-Fukushima citizen science initiative.

Given the combined theoretical frameworks, the research question of this study is, therefore, how MDS engaged with scientific practices and made mnemonic claims against the populist notion of a Recovery Olympics through the participatory act of representing the Fukushima disaster's traces in the era of digital media. While many citizen science scholars have examined MDS as a Japanese citizen science project (e.g., Abe, 2017, 2020b; Kenens, Van Oudheusden, Yoshizawa, & Van Hoyweghen, 2020), this study views MDS as a kind of activism for promoting specific memories or memory activism (e.g., Gutman, 2017). In doing so, this article expands the notions of memory practices, digital network memories, and ritual views of communication into the field of citizen science after Fukushima.

This article uses Rose's (2016) discourse analysis I to address the research question. By discourse analysis I, Rose (2016) refers to the concept of discourse as "articulated through various kinds of visual images and verbal texts" (p. 192). Differentiating discourse analysis I from discourse analysis II (the latter focuses on the material practices of institutions, such as museums and galleries), Rose (2016) highlighted images and texts themselves, their social production, and their effects as research objects for addressing power/knowledge. Drawing on discourse analysis I, this study examines how a particular discourse of remembering the Fukushima disaster articulated through MDS was organized and structured and discusses how it produced a scientific discourse as a rhetorical resource against the Recovery Olympics discourse. This research investigates MDS's websites, various documents on MDS, and other citizen science initiatives from 2011 to 2022. To examine the social production of discourse, this study starts by investigating how MDS developed its citizen science practices. Then, it focuses on examining MDS's radiation map as the resulting product of its participatory citizen science practices through the use of digital media against the state's radiation discourse. In doing so, this study illuminates how MDS engaged with science-based memory practices through the re-presentation of the disaster.

From Citizen Science to Memory Practice: A Trajectory of MDS

While the Japanese state's information infrastructures, such as monitoring posts, were severely damaged following the earthquake and tsunami, various citizens desperately sought to ensure their health and safety by measuring radiation in the air and food. They may not have been aware that they were creating a scientific resource for memory practices; in retrospect, they recorded traces of past radioactive contamination, creating a rich resource for remembering the Fukushima disaster. More importantly, they tactically used digital media and processed the resulting measurement readings as digital data, distributing the processed data to their intended audiences (e.g., Wynn, 2017). Digital media allowed citizens to process the originally quantified readings as a vital resource for recording and representing the disaster more widely and vividly. The connectivity of digital networks allowed them to participate in memory practices more than ever before (Hoskins, 2018), diminishing the authority of the former gatekeeper of memory in terms of scientific data: the Japanese state. Before the Fukushima disaster, the Japanese state engaged in dominant risk assessment by making various nuclear accidents of the past irrelevant to the present (e.g., Yoshioka, 2011). After the Fukushima disaster, citizens used digital media to effectively enact a counter-performance against the Japanese state through citizen science practices. This section takes these observations as an

entry point to illuminate how MDS developed citizen science practices to generate its way of remembering the Fukushima disaster.

2011–2012 was significant in the history of citizen science practices of radiation-measuring citizen science initiatives, with the intensification of concerns about the standardization of data production practices. In July 2011, numerous citizens, including those affiliated with grassroots radiation-measuring stations around the country, came together in Tokyo and established the Network of Parents to Protect Children from Radiation (e.g., Kimura, 2016; Löschke, 2018; Sternsdorff-Cisterna, 2019). The nationwide network appealed to "the people," including concerned parents, against the state and successfully created more grassroots radiation-measuring stations focusing on food safety to ensure the health and safety of children. However, their data collection methods and measurement devices varied significantly. As such, the validity and reliability of the resulting data were more or less uncertain from a scientific perspective because their data collection methods were not sufficiently standardized (e.g., Reiher, 2017).

To address this issue, MDS emerged. In November and December 2011, many grassroots radiation-measuring stations applied for grants from the Takagi Fund for Citizen Science, a certified Japanese nonprofit organization (NPO) promoting citizen science in Japan and other Asian countries. In response, the fund held several training sessions on radiation-measurement techniques and contributed to standardizing measurement methods among different grassroots radiation-measuring stations, ultimately leading to the idea of creating a single and comprehensive database of radiation data using a standardized data production method (Ōnuma, 2018; Takagi Jinzaburō shimin kagaku kikin, n.d). In January 2013, the first MDS meeting was held, officially establishing MDS (Takagi Jinzaburō shimin kagaku kikin, n.d.). Funded by Takagi Fund and other organizations such as LUSH JAPAN, MDS ultimately became a network of approximately 30 grassroots radiation-measuring stations across the country, some of which had been actively involved with the Network of Parents to Protect Children from Radiation (Abe, 2015; Minna-no Data Site, 2019).

To make individual data production practices standardized, an MDS-affiliated and Nagoya-based grassroots radiation-measuring station led by scientists took the lead in managing the validity of data; it combined uncontaminated and contaminated brown rice and developed the combined brown rice to ensure the quality control of the measurement devices of each radiation-measuring station affiliated with MDS around the country (Minna-no Data Site, 2019). Every year, each station confirms whether its measurement device works adequately to measure four different samples of standardized brown rice with different degrees of contamination. Indeed, MDS did not merely standardize data production practices by creating its sample tactically, it also made the method open to the public on its website, carefully describing how it generated its data for its intended audiences, including its skeptics. The practice of describing the process and making it public is important in terms of citizen science practices precisely because the validity of citizen science practices depends on the accuracy of scientific data and data collection methods (Abe, 2015). As such, MDS was born as a network of networks. However, unlike the Network of Parents to Protect Children from Radiation, MDS was mainly concerned with standardizing data production methods among different radiation-measuring stations; its primary goal was not to collect data for protecting the health of children from unnecessary radiation exposure (Ōnuma, 2018).

Meanwhile, an Iwate-based radiation-measuring station affiliated with MDS launched its citizen science practice by collecting and measuring soil samples from over 300 locations in Iwate Prefecture from 2012 to 2013 (Minna-no Data Site, 2019). Following its footsteps, MDS launched the Higashi Nihon Dojō Becquerel Sokutei Project, or the East Japan Soil Becquerel Measurement Project, targeting 17 prefectures in East Japan, a region estimated to be affected by radioactive contamination. While the Japanese state had initially collected data on soil contamination by using the airborne survey and provided data on the estimated levels of soil contamination, this project expanded the idea of the Iwate-based organization. That is, various volunteering citizens of MDS did not merely collect soil samples in 17 prefectures in East Japan but also measured the levels of radiation in the collected soil for their analysis. In doing so, MDS standardized the data collection method, a way in which each volunteer collected a soil sample to ensure that the resulting data could be "compared with the data collected by the MEXT (Japanese Minatory of Education, Culture, Sports, Science, and Technology) or data which had been collected after the Chernobyl nuclear accident" (Minna-no Data Site, 2019, p. 4). MDS needed to ensure the validity and reliability of the resulting data as a fundamental resource for citizen science practices; therefore, MDS devised various ways for each volunteer to obtain appropriate soil samples (Abe, 2017). According to MDS, more than 4,000 volunteering citizens, including those affiliated with each radiation-measuring station, participated in the project, collecting 3,400 soil samples in 17 prefectures from October 2014 to September 2017 (Minna-no Data Site, 2019). No data are available on which citizens collected soil samples, but as of 2017, the largest number of samples was collected by those affiliated with the Nagoya-based radiation-measuring station (Ōnuma, 2017).

Ultimately, MDS created a comprehensive food and soil contamination database and made it open to the public for free. Manovich (2009) pointed out that "as a cultural form, database represents the world as a list of items which it refuses to order. In contrast, a narrative creates a cause-and-effect trajectory of seemingly unordered items (events)" (p. 85). MDS supplemented its database with its narratives using various media, including its weblog. Put differently, MDS is not just a citizen-created database. As will be illuminated, MDS used its data to construct a narrative through which it made a mnemonic intervention against the institutionalized memories of the Fukushima disaster that accompanied the Recovery Olympics. In doing so, MDS used its data as a cultural resource for reconfiguring new ways to remember the Fukushima disaster. It took advantage of the resulting data on soil contamination and published radioactivity maps on its website, allowing its audience to grasp the levels of soil contamination in the 17 prefectures in East Japan. Based on the online maps and the data, MDS further published two map books for those who did not use the Internet: *Illustration 17 Prefectures Radiation Measurement Map Plus Commentary* (Minna-no Data Site, 2018) in Japanese and *Citizens' Radiation Data Map of Japan* (Minna-no Data Site, 2019) as its digest version in English. They were "the culmination of the project" (Minna-no Data Site, 2018, p. 2) in terms of the measurement of soil contamination. As of this writing in 2022, MDS no longer measures soil samples. However, some grassroots radiation-measuring stations affiliated with MDS have been involved in measuring radioactive contamination in mushrooms available in the 17 prefectures (Minna-no Data Site, 2022). The following section investigates how a particular discourse on remembering the Fukushima disaster articulated through MDS's map was structured against the state's radiation discourse.

Making Citizen Science-Based Memory Practices

MDS did not collect soil samples exclusively for citizen science practices; it also tactically used the collected data on soil contamination to create multiple radioactivity maps for remembering the Fukushima disaster. For example, MDS calculated the combined value of cesium-134 and cesium-137 isotopes in March 2011 and created the 2011 Radioactivity Map of 17 Prefectures in Eastern Japan. The map vividly showed the relatively high levels of soil contamination in areas far from the wrecked Fukushima Daiichi nuclear power plant, such as the western part of Kanagawa Prefecture, adjacent to the west of Tokyo. More importantly, it provided a valuable resource for its users to reshape and reconsider their perceptions of the past.

This section investigates the 2020 Eastern Japan 17 Prefecture Radioactivity Measurement Map as a key resource for a citizen science-based memory practice against the Recovery Olympics discourse (Figure 1). According to MDS, this map was created in response to "many inquiries from overseas about radioactive contamination at the time of the 2020 Olympics" (Minna-no Data Site, 2019, p. 8). It is thus essential to note that unless MDS's citizen science practice had attracted sufficient attention from overseas before the Olympics, the map might not have been produced. In response, MDS capitalized on the Olympics as a platform for making a mnemonic claim on the Fukushima disaster against the state's radiation discourse that fit the Recovery Olympics. Using the estimated amount of cesium-134 and cesium-137 isotopes in March 2011, this map was based on the attenuation calculation of the estimated value of cesium 137 in July 2020, when the opening ceremony of the Tokyo Olympics was originally planned. MDS explains the map thus:

> There is *particular cause for concern* about nearby soil contamination at a soccer venue in Miyagi, at baseball and softball venues in Fukushima, and at the torch relay which will commence from the J-Village Stadium which is located in the vicinity of the Fukushima Daiichi Nuclear Power Plant and was used as an accident response base at the time of the accident. (Minna-no Data Site, 2019, p. 8; emphasis added)

As such, MDS did not directly refer to the Recovery Olympics as associated with forgetting the Fukushima disaster, but it certainly spoke to the notion that Japan would not recover from the disaster even at the planned time of the 2020 Tokyo Olympics because radioactive contamination had not disappeared. Therefore, it is important to keep the memory of the disaster alive (Minna-no Data Site, 2020a). Given that the half-life of cesium-134 is approximately two years, much shorter than cesium-137 with 30 years as its half-life, MDS focused on visualizing how cesium-137 would decay in July 2020 through the effective use of digital media.

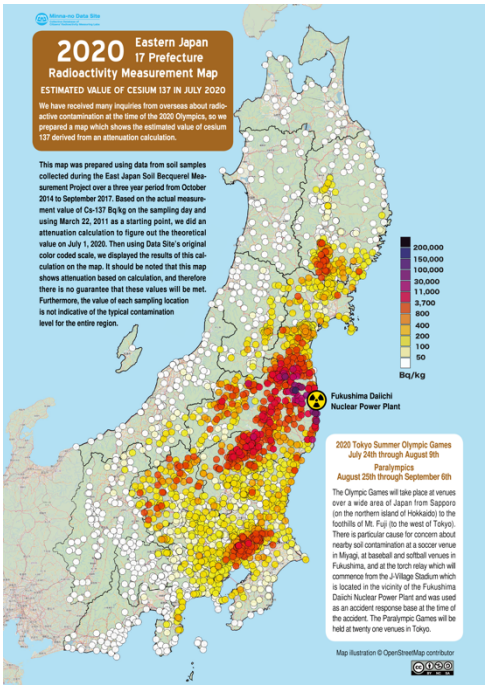

Figure 1. The 2020 Eastern Japan 17 prefecture radioactivity measurement map estimated value of cesium 137 in July 2020.

Note. From 2020 Eastern Japan 17 Prefecture Radioactivity Measurement Map Estimated Value of Cesium 137 in July 2020 (Minna-no Data Site, 2020b). CC By-NC-SA.

Notably, MDS shows traces of the past using its colored scale (Abe, 2017). MDS's colored scale reflects its view of radiation, partly based on the risk assessment of the Chernobyl nuclear disaster by the Russian Federation and the Belarus Ministry for Chernobyl Affairs (Minna-no Data Site, 2019). For example, MDS colored the level of contamination of more than 600 Becquerel per kilogram and below 1 mSv/year orange by referring to the risk assessment of the Chernobyl Law, a law enacted by Russia, Ukraine, and Belarus for reducing human exposure to radiation after the Chernobyl nuclear disaster (e.g., Baba & Omatsu, 2016). In doing so, MDS notes that the level corresponds to that of "a residential zone [where residents are] granted with some kind of social security or benefit under the Chernobyl Law" (Minna-no Data Site, 2018, p. 8), providing an alternative way of representing the Fukushima disaster for its audiences, including those without knowledge about radiation and a history of the Chernobyl disaster.

MDS's memory practices could be clarified by distinguishing them from those of the Japanese state in terms of its view on radioactive contamination. The Japanese state set the annual radiation dose limit for the general public under normal circumstances as 1 mSv/year, but after the Fukushima nuclear disaster, the Japanese state imposed a standard of 20 mSv/year as a threshold below which residents could return home. With its view on radiation contamination, the Japanese state's radioactive maps colored the level of 1 mSv/year as light blue (Mombu kagakushō, n.d.). MDS and the Japanese state thus gave a different meaning to the same radiation level by using different colors: orange and light blue. Notably, MDS did not

intend to overemphasize the health risks of soil contamination through its map; instead, it demonstrated an alternative way of representing (and remembering) the Fukushima disaster.

As of 2016, a former coexecutive director of MDS and a director of a Tokyo-based radiation-measuring station stated that by referring to the risk assessment of the Chernobyl Law, MDS aims to demand that the Japanese state not merely measure the soil but also compensate those who suffered from the disaster (Ishimaru, 2016). Just like the Network to Protect Children from Radiation, the former coexecutive director thus not merely used the data and database for those who suffered from the disaster but also differentiated citizens as "people" from the irresponsible, if not corrupted, state. In doing so, MDS used its representation of the past as a fundamental resource for creating a scientifically "objective" rationale for remembering the past and molding the present against the state's discourse promptly.

As Hoskins (2018) indicated, both MDS and digital media played a role in constituting an alternative memory of the Fukushima disaster through the map. While the Japanese state (and JOC) further rendered the past of the Fukushima disaster distant in the name of the Recovery Olympics, MDS tactically used digital media to mediatize memories of the past and demonstrated that the Fukushima disaster was not a thing of the past, at least in terms of the risk assessment related to the past of the Chernobyl accident. By recording and representing the traces of the Fukushima disaster in East Japan, MDS demonstrated that the Fukushima disaster was not a matter of Fukushima Prefecture or Tōhoku Region alone and made a mnemonic claim against the institutionalized memories of the Fukushima disaster that accompanied the Recovery Olympics: remember the Fukushima disaster and keep it living

In response, the connectivity of digital networks also allowed people to remember the Fukushima disaster anytime and anywhere in an era of hyperconnectivity. Undoubtedly, our memories are increasingly mediatized and negotiated in digital media contexts (Hepp, 2013; Kalinina & Menke, 2016). The network's connectivity could contribute to rendering the way of remembering the disaster normal or uncontrollable, perpetually forming and reforming the memories of Fukushima in our everyday lives in relation to the past of the Chernobyl disaster. Remembering (and forgetting) the Fukushima disaster will thus have no limit in the era of hyperconnectivity.

Conclusion

This study indicates that both the state and citizen science practitioners constitute the categorization of "the people" by their performances. While the Japanese state used the Recovery Olympics discourse to represent "the people," this article refers to the connection between citizen science and populism, suggesting that MDS's memory practice aligned with "the people," including those concerned about radioactive contamination, against the state's radiation discourse that fits the Recovery Olympics. This does not mean that MDS or Everyone's Data Site was against the recovery *per se*. However, MDS resisted the normalization of the post-Fukushima nuclear emergency through memory practices as a timely act of remembering the Fukushima disaster performatively and remolding the present for "everyone." This study indicates two key findings.

First, this study indicates the opportunities and challenges facing citizen science-based memory practices. Just as Bowker (2005) elaborated on scientists' memory practices, citizen science practitioners similarly engaged with memory practices so that their citizen science practices were embedded in sociotechnical

and formal practices. Citizen science-based memory practices can therefore be double-edged. On the one hand, citizen science practitioners, unlike other memory practitioners, creatively made a mnemonic claim for remembering the past and molding the present (and the future) through the use of empirical data; on the other hand, citizen scientists might need to make an extraordinary effort to explain and demonstrate to their intended audience that they collected accurate data to effectively use the resulting scientific data for memory practices. Like many scientific practices, their data must be presented as valid and reliable, at least rhetorically, for their intended audiences. This finding suggests that it is essential to consider the kind of information citizen scientists make public for remembering a specific past through the use of their scientific data.

Second, this study shows that MDS used digital media to mediatize the Chernobyl disaster as a resource for molding the present, countering the populist discourse associated with the forgetting of the Fukushima disaster. While MDS was initially established to generate and transmit comprehensive data on radioactive contamination to its audiences, it used the resulting data to represent its shared beliefs about the disaster, as embodied in a ritual view of communication. The network's digital connectivity also allows people to share an alternative representation of the disaster, perpetually facilitating the emergence of mnemonic discourse. This finding suggests that it may be useful to reconceptualize digital network memory as a matter of both representation/spectatorship and participation.

This study does not sufficiently show the effects of MDS's memory practices by investigating how audience members read the map book. However, this study is among the first to link citizen science practices with memory practices. Its findings provide invaluable resources for memory practitioners to address more familiar environmental issues, such as air pollution (Van Oudheusden & Abe, 2021), in an era of digital media.

References

Abe, K. (2020). *Tokyo Orimpikku no shakaigaku: Kiki to shukusai no 2020 Japan* [Sociology of the Tokyo Olympics: Japan in 2020 during the crisis and celebration]. Tokyo, Japan: Komonzu.

Abe, Y. (2014). Safecast or the production of collective intelligence on radiation risks after 3.11. *Japan Focus, 12*(7,5). Retrieved from https://apjjf.org/-Yasuhito--Abe-/4077/article.pdf

Abe, Y. (2015). *Measuring for what: Networked citizen science movements after the Fukushima nuclear accident* (Doctoral dissertation). University of Southern California, Los Angeles, California. Retrieved from https://digitallibrary.usc.edu/CS.aspx?VP3=DamView&VBID=2A3BXZSX5511P&SMLS=1&RW=1280&RH=634

Abe, Y. (2017). Mina no Data Site (MDS) and the culture of measurement after Fukushima. *Unmediated: Politics and Communication,* (1), 68–72.

Abe, Y. (2019). Making civic media in the post-Fukushima Japanese media ecology. In J. Hunsinger & A. Schrock (Eds.), *Making our world: The hacker and maker movements in context* (pp. 37–53). New York, NY: Peter Lang.

Abe, Y. (2020a). Citizen before science: R-DAN and its monitorial ethic after Chernobyl. In M. Fathisalout-Bollon & A. Berti-Suman (Eds.), *Legal, social and ethical perspectives on health & technology* (pp. 65–90). Chambéry, France: Sovoie Mont Blanc University Press.

Abe, Y. (2020b). Argumentative mapmaking. In A. Feigenbaum & A. Alamalhodaei (Eds.), *The data storytelling workbook* (pp. 185–186). New York, NY: Routledge.

Asahi Shimbun. (2011a, March 30). Gorin shōchi: Sampi wareru [Divided over the Olympic bid]. *Asahi Shimbun* (Morning ed.), p. 24.

Asahi Shimbun. (2011b, June 9). Hōshasen sokutei o 100 kasho de jisshi e: To, chihyō to chijō 1 mētoru de Tōkyō to [Tokyo will conduct radiation dosimetry at 100 locations, one meter above ground and on the ground]. *Asahi Shimbun* (Morning ed.), p. 29.

Avenell, S. (2010). *Making Japanese citizens: Civil society and the mythology of the shimin in postwar Japan*. Berkeley: University of California Press.

Baba, T., & Omatsu, R. (2016). *Gempatsu jiko kokka wa dō sekinin o tottaka: Ukuraina to Cherunobuiri hō* [How did the state take responsibility for the nuclear accident: Ukraine and Chornobyl Law]. Tokyo, Japan: Tōyō Shoten Shinsha.

Berger, S., Scalmer, S., & Wicke, C. (2021). Memory and social movements: An introduction. In S. Berger, S. Scalmer, & C. Wicke (Eds.), *Remembering social movements: Activism and memory* (pp. 1–25). New York, NY: Routledge.

Bowker, G. C. (2005). *Memory practices in the sciences*. Cambridge: The MIT Press.

Boykoff, J. (2014). *Celebration capitalism and the Olympic games*. New York, NY: Routledge.

Carey, J. (2008). *Communication as culture: Essays on media and society* (Revised ed.). New York, NY: Routledge.

Citizen science. (n.d.). *Oxford English dictionary online*. Retrieved from https://www.oed.com/view/Entry/33513?redirectedFrom=citizen+science#eid316619123

Geilhorn, B., & Iwata-Weickgenannt, K. (Eds.). (2016). *Fukushima and the arts: Negotiating nuclear disaster*. New York, NY: Routledge.

Gutman, Y. (2017). *Memory activism: Reimagining the past for the future in Israel-Palestine*. Nashville: Vanderbilt University Press.

Hamada, N. (2021, March 30). Jūkyo owareru gempatsu hinansha shien shūryō: Taikyo semari shinzoku ni bunsho [Evacuees from the Fukushima disaster were forced to leave their homes with the end of the public support: Their relatives received a document urging them to leave the home]. *Asahi Shimbun*. Retrieved from https://www.asahi.com/articles/ASP3Y4108P3SUTIL04X.html

Hemmi, A., & Graham, I. (2013). Hacker science versus closed science: Building environmental monitoring infrastructure. *Information, Communication & Society, 17*(7), 1–13. doi:10.1080/1369118X.2013.848918

Hepp, A. (2013). The communicative figurations of mediatized worlds: Mediatization research in times of the 'mediation of everything'. *European Journal of Communication, 28*(6), 615–629. doi:10.1177/0267323113501148

Hoskins, A. (2012). Digital network memory. In A. Erll & A. Rigney (Eds.), *Mediation, remediation, and the dynamics of cultural memory* (pp. 91–106). Berlin, Germany: De Gruyter.

Hoskins, A. (2018). Memory of the multitude: The end of collective memory. In A. Hoskins (Ed.), *Digital memory studies: Media pasts in transition* (pp. 85–109). New York, NY: Routledge.

Irwin, A. (2018). Citizen science comes of age. *Nature, 562*(7728), 480–482.

Ishimaru, H. (2016). Dojō sokutei kara miete kurumono [What soil measurements reveal]. *Kodoken Tsūshin, 2*, 2–5.

Kalinina, E., & Menke, M. (2016). Negotiating the past in hyperconnected memory cultures: Post-Soviet nostalgia and national identity in Russian online communities. *International Journal of Media & Cultural Politics, 12*(1), 59–74. doi:10.1386/macp.12.1.59_1

Katriel, T. (2016). Memory to action. *Journal of International and Intercultural Communication, 9*(3), 264–267. doi:10.1080/17513057.2016.1193935

Kaun, A., & Stiernstedt, F. (2014). Facebook time: Technological and institutional affordances for media memories. *New Media & Society, 16*(7), 1154–1168. doi:10.1177/14614448145440

Kenens, J., Van Oudheusden, M., Yoshizawa, G., & Van Hoyweghen, I. (2020). Science by, with and for citizens: Rethinking 'citizen science' after the 2011 Fukushima disaster. *Palgrave Communications, 6*(1), 1–8. doi:10.1057/s41599-020-0434-3

Kimura, A. H. (2016). *Radiation brain moms and citizen scientists: The gender politics of food contamination after Fukushima*. Durham, NC: Duke University Press.

Koide, H. (2019). *Fukushima jiko to Tokyo Orimpikku* [The disaster in Fukushima and the 2020 Tokyo Olympics]. Tokyo, Japan: Komichi Shobō.

Kuchinskaya, O. (2019). Citizen science and the politics of environmental data. *Science, Technology, & Human Values, 44*(5), 871–880. doi:10.1177/0162243919858669

Laclau, E. (2005). *On populist reason*. London, UK: Verso.

Löschke, A. (2018). Civil society advocacy after Fukushima: The case of the nuclear disaster victims' support law. In D. Chiavacci & J. Obinger (Eds.), *Social movements and political activism in contemporary Japan* (pp. 156–176). New York, NY: Routledge.

Manovich, L. (1999). Database as a symbolic form. *Convergence, 5*(2), 80–99. doi:10.1177/135485659900500206

McCurry, J. (2016, September 7). Former Japan PM accuses Abe of lying over Fukushima pledge. *The Guardian*. Retrieved from https://www.theguardian.com/environment/2016/sep/07/former-japan-pm-junichiro-koizumi-accuses-abe-lying-over-fukushima-pledge

Merrill, S., Keightley, E., & Daphi, P. (2020). Introduction: The digital memory work practices of social movements. In S. Merrill, E. Keightley, & P. Daphi (Eds.), *Social movements, cultural memory and digital media: Mobilising mediated remembrance* (pp. 1–31). Cham, Switzerland: Palgrave Mcmillan.

Minna-no Data Site. (2018). *Zusetsu 17 token hōshano sokutei mappu plus yomitoki shū* [Illustration 17 prefectures radiation measurement map plus commentary]. Fukushima, Japan: Minna-no Data Site Shuppan.

Minna-no Data Site. (2019). *Citizens' radiation data map of Japan: Digest edition*. Fukushima, Japan: Minna-no Data Site Shuppan.

Minna-no Data Site. (2020a). *"2020 Tokyo Orimpikku kaisaiji no dojō hōshanō mappu" mushō de kōkai* ["Soil radioactivity map at the time of 2020 Tokyo Olympics" available free of charge]. Retrieved from https://minnanods.net/blog/news/entry-1471.html

Minna-no Data Site. (2020b). *The 2020 eastern Japan 17 prefecture radioactivity measurement map estimated value of cesium 137 in July 2020*. Retrieved from https://en.minnanods.net/share/2020map-download.html

Minna-no Data Site. (2022). *2021 nen kinoko sokutei purojekuto: Sokutei kekka no matome* [Summary of measurement results of the 2021 mushroom measurement project]. Retrieved from https://minnanods.net/analyze/food-data/2021autumn.html

Moffitt, B. (2016). *The global rise of populism: Performance, political style, and representation*. Stanford, CA: Stanford University Press.

Mombu kagakushō. (n.d.). *Extension site of the distribution map for radiation dose, etc*. Retrieved from https://ramap.jmc.or.jp/map/eng/#lat=37.28458799999977&lon=140.5831109999977&z=9&b=std&t=air&s=0,0,0,0&c=20201029_dr

Mudde, C. (2017). Populism: An ideational approach. In C. Rovira Kaltwasser, P. Taggart, P. Ochoa Espejo, & P. Ostiguy (Eds.), *The Oxford handbook on populism* (pp. 27–47). Oxford, UK: Oxford University Press.

Mudde, C., & Rovira Kaltwasser, C. (2017). *Populism: A very short introduction*. Oxford, UK: Oxford University Press.

Müller, J. W. (2016). *What is populism?* New York, NY: Penguin.

Ogasawara, H., & Yamamoto, A. (2019). *Yappari iranai Tokyo Orimpikku* [We still don't need the Tokyo Olympics]. Tokyo, Japan: Iwanami Shoten.

Ogawa, S. (2021, July 22). Mou hitotsu no "kinkyū jitai sengen": Gempatsu jiko no Fukushima kaijo no mitōshi naimama 10 nen chō [Another state of emergency: Ten years have passed without prospect of termination]. *Tokyo Shimbun*. Retrieved from https://www.tokyo-np.co.jp/article/118366

Ōnuma, J. (2017). Tochigiken dojō hōshanō osen chōsa kekka 1 [The survey result of soil contamination in Tochigi Prefecture vol.1]. *C-Labo News, 6*, 2.

Ōnuma, J. (2018). Shimin hōshanō sokuteijo nettowāku ga egaita osen chizu: Shimin kagaku no hata takaku kakagete [Contamination map drawn by the Citizen Radioactivity Monitoring Station Network: Raising the banner of citizen science]. *Toshi Mondai, 109*, 31–45.

Oyama, K. (n.d.). *Tsutaekata no gijutsu wa fukugouteki ni! Sutōrī ga kokoro o ugokasu* [Combine the arts of communication: Stories move hearts]. Retrieved from https://www.foejapan.org/energy/fukushima/pdf/200311_oyama.pdf

Plantin, J.-C. (2015). The politics of mapping platforms: Participatory radiation mapping after the Fukushima Daiichi disaster. *Media, Culture & Society, 37*(6), 904–921. doi:10.1177/0163443715584102

Polleri, M. (2021). Radioactive performances: Teaching about radiation after the Fukushima Nuclear Disaster. *Anthropological Quarterly, 94*(1), 93–123. doi:10.1353/anq.2021.0015

Reiher, C. (2017). Food safety and consumer trust in post-Fukushima Japan. *Japan Forum, 29*(1), 53–76. doi:10.1080/09555803.2016.1227351

Rose, G. (2016). *Visual methodologies: An introduction to researching with visual materials* (4th ed.). Thousand Oaks, CA: SAGE.

Said, E. (1978). *Orientalism*. New York, NY: Pantheon.

Saitō, T. (2020). 2020 nen Tokyo Orimpikku/Pararimpikku e no kitai to ishiki [Survey of expectations and attitudes of the 2020 Tokyo Olympics and Paralympics]. *Hōsō Kenkyū to Chōsa*. Retrieved from https://www.nhk.or.jp/bunken/research/yoron/pdf/20200101_7.pdf

Smit, R., Heinrich, A., & Broersma, M. (2018). Activating the past in the Ferguson protests: Memory work, digital activism and the politics of platforms. *New Media & Society, 20*(9), 3119–3139. doi:10.1177/14614448177418

Sternsdorff-Cisterna, N. (2019). *Food safety after Fukushima: Scientific citizenship and the politics of risk*. Honolulu: University of Hawai'i Press.

Takagi Jinzaburō shimin kagaku kikin. (n.d.). *Shimin hōshanō sokutei jigyō* [The project to support citizens' radioactivity measurement]. Retrieved from http://www.takagifund.org/activity/sokutei/index.html

The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission. (2012). *The official report of the Fukushima nuclear accident independent investigation commission: Executive summary*. Retrieved from https://www.nirs.org/wp-content/uploads/fukushima/naiic_report.pdf

Tokyo2020 Olympics/Paralympics shōchi iinkai. (2014). *Shōchi katsudō hōkokusho* [Report on bidding activities]. Retrieved from https://www.2020games.metro.tokyo.lg.jp/taikaijyunbi/torikumi/syochi/pdf/syochihokokusyoall.pdf

Van Oudheusden, M., & Abe, Y. (2021). Beyond the grassroots: Two trajectories of "citizen sciencization" in environmental governance. *Citizen Science: Theory and Practice, 6*(1), 1–15. doi:10.5334/cstp.377

Wynn, J. (2017). *Citizen science in the digital age: Rhetoric, science, and public engagement*. Tuscaloosa: The University of Alabama Press.

Yoshida, C. (2018). *Sono go no Fukushima: Gempatsu jiko go o ikiru hitobito* [Fukushima after: People living after the nuclear accident]. Kyoto, Japan: Jimbun Shoin.

Yoshimi, S. (2020). *Gorin to sengo: Jōen to shiteno Tokyo Orimpikku* [The Olympics and postwar: The Tokyo Olympics as a performance]. Tokyo, Japan: Kawade Shobō Shinsha.

Yoshioka, H. (2011). *Genshiryoku no shakaishi: Sono nihon teki tenkai* [Social history of nuclear power in Japan]. Tokyo, Japan: Asahi Shimbunsha.