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Null Island - a node of contention in OpenStreetMap

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Null Island refers to the location where the prime meridian meets the equator at 0 degrees longitude and 0 degrees latitude. With coordinates (0, 0), it is the origin of the WGS84 geographic coordinate system. It has been argued that Null Island can be considered a real place that is a product of our digital age [1]. Null Island's significance comes from the fact that it is erroneously associated with large amounts of geographic data that spans across geo-social media, location-based services and map databases. Even though Null Island is a fictitious, dimensionless, point object, its existence stimulates debate that elevates Null Island into a global issue worthy of serious consideration (a detailed description of associated issues is given in [1]). Members of the OpenStreetMap (OSM) project often interact with this location in various ways, and therefore understanding what Null Island means for OSM is relevant. We can find several examples of Null Island affecting OSM, such as a recent debate that arose in the talk mailing list in January 2022 with the title "Was the deletion of Null Island reasonable?" [2], where contributors argued for or against the deletion of Null Island. In addition, a web search for the term "Null Island" on the openstreetmap.org domain [3] reveals that Null Island was mentioned across the entire OSM ecosystem, including mailing lists, forums, user diaries, notes, features, changesets, wiki pages, help articles, blogs and even the Ruby on Rails codebase of the OSM website uses Null Island for testing (<https://tinyurl.com/OSM-Ruby-Null>). These suggest that Null Island already has a widespread reach within the OSM project.

The purpose of this study is to consider both qualitatively and quantitatively what the geographic oddity of Null Island means for OSM. No research works exist which tackle this issue in depth. Previous studies mentioning Null Island do so in a simplistic way and use the term to refer to the (0, 0) location (see e.g. [4–6]). Only a few studies recognize it as a special location and unique phenomenon [7,8] and to our knowledge, only one study tackles the issue in depth [1]. Indeed, at the outset of this work, we had expected to find many detailed treatments and inquiries into Null Island given that geographic oddities often attract research attention. In addition to contributing a robust academic study of Null Island, this work will produce a structured knowledge-based resource for the community to understand Null Island's impact on OSM.

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Building on [1] we investigate the various ways Null Island is represented in the OSM project subsequently contributing an evidence-based narrative history on the evolution of Null Island. This includes the qualitative review of various OSM communications channels (e.g. mailing lists, discussion boards and wikis) for mentions and references to Null Island. We believe these channels help provide insights about how the OSM community contextualizes, describes and deals with Null Island. The history of special map features related to Null Island, such as node #1 (<https://tinyurl.com/osm-first-node>) and the node located at (0, 0) (<https://tinyurl.com/OSM-Center>) will also be reviewed to illustrate what actions the OSM community took in terms of adding and removing Null Island to the database. In addition to these qualitative approaches, we utilize the ohsome API [9] to extract and analyze map edits made on or near Null Island, which provides a quantitative way to assess the frequency of erroneous data added to OSM near (0, 0) as well as the semantics of such data.

Interesting patterns have already emerged from the preliminary analysis of data. The most recent mailing list debate mentioned above [2] can be summarized as follows. 17 individuals contributed 45 e-mails to the discussion between January 3 and January 10, 2022. One of the (very few) rules of OSM is that data should be verifiable, meaning that others can visit the real location of a map object and see for themselves if the data is correct. This is also known as the “ground-truth rule” [10]. Null Island as a fictional place violates this rule, therefore a popular stand in the debate is that it should not be part of OSM. This was explicitly expressed by five individuals, including a member of the authoritative Data Working Group. A counter argument is that Null Island is fundamentally similar to localities and neighborhoods, that might not exist as political or physical entities, but are known only informally to a group of people inhabiting that area. In this sense, Null Island is a place that exists in the collective consciousness of people and the name refers to the same geographic area. This justifies tagging the (0, 0) location as *place=locality* and *name="Null Island"* in OSM. This view was explicitly supported by seven members on the mailing list. The remaining five individuals that contributed to the discussion did not take a clear stand on whether to remove or keep Null Island, but have provided arguments both for and against the deletion of it.

The full history of OSM data was extracted from the `elementsFullHistory` endpoint of the ohsome API [9] within the geographic bounding box defined by the southwest point of (-0.001, -0.001) and the northeast point of (0.001, 0.001) between January 1, 2012 and January 1, 2022. During this 10-year-long period, a feature was added, deleted or modified every three days on average within this bounding box, resulting in 1323 unique features (nodes, ways or relations). In addition, map Notes as well as GPS traces are also constantly being created, which makes Null Island and its surrounding a busy area in terms of OSM data activity.

Null Island is a socio-technological concept that has only been sparsely present in the GIScience literature so far. Our novel approach highlights how a seemingly lighthearted topic like Null Island can generate serious debates that are technological, social and even philosophical in nature. OSM and Null Island have a long tradition together with sometimes heated mapping debates resurfacing from time to time with no apparent resolution in sight. While resolving these debates is entirely in the hands of the OSM community, our research contributes to the potential resolution of them in a meaningful way by providing a factual, detailed, and accurate account of Null Island in OSM. Furthermore, while Null Island is

potentially the most prominent example of a fictional place affecting maps and mapping practices, other examples also exist. For example, the most remote location on Earth, Point Nemo (which is the point in the ocean that is farthest from land) [11] is also present in OSM (<https://tinyurl.com/OSM-PointNemo>). Our OSM specific investigations together with a more general introduction of Null Island from both technological and social perspectives presented in [1] will help demystify the abstract concept of a fictional place that is present in real databases. Increased understanding will potentially help OSM members resolve mapping debates about “real fictional places”.

Discussion around Null Island and other fictional places is unlikely to end with this work. Indeed, our work will contribute in a technical, socio-technical and philosophical way to the Null Island story in OSM carrying with it the potential to become a catalyst for further discussions related to wider debates in OSM around mapping practices. We also believe that these discussions around Null Island span future debates and conversations about virtual geographic spaces including those in virtual open spaces such as the Metaverse. Such convergences of virtually enhanced physical and digital reality with enhanced immersive experiences will surely lead to new and exciting geographical debates around what is a real or fictional place [12].

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