

chicago manual of style citing geographic information systems

A Comprehensive Guide to Chicago Manual of Style Citing Geographic Information Systems

chicago manual of style citing geographic information systems presents a unique challenge for scholars and researchers. As Geographic Information Systems (GIS) become increasingly integral to academic disciplines ranging from urban planning and environmental science to history and sociology, the need for standardized citation practices is paramount. This article delves into the intricacies of how to properly cite GIS data, software, and analyses within the framework of the Chicago Manual of Style (CMOS), offering detailed guidance for clear and consistent attribution. We will explore the fundamental principles of citing spatial data, discuss specific approaches for software and metadata, and provide practical examples to illustrate effective citation strategies. Understanding these nuances ensures academic integrity and allows readers to accurately locate and evaluate the foundational information upon which your research is built.

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Understanding the Importance of Citing GIS

The integration of Geographic Information Systems into research methodologies has revolutionized how we analyze and present spatial data. However, this innovation also brings a critical need for rigorous citation. Proper attribution in GIS is not merely an academic formality; it is essential for transparency, reproducibility, and acknowledging the intellectual contributions of data creators and software developers. Without clear citation practices, readers may be unable to access the original data, verify the accuracy of your spatial analyses, or understand the provenance of your cartographic representations. This can undermine the credibility and impact of your work.

Furthermore, the ethical implications of using GIS data necessitate acknowledging its sources. Many datasets are developed through significant investment of time, expertise, and financial resources. Failing to cite these sources is a form of intellectual dishonesty. Adhering to citation standards, such as those adapted from the Chicago Manual of Style for GIS, ensures that credit is given where it is due and that your research builds upon a foundation of recognized and verifiable information. This practice is fundamental to the scholarly discourse and the advancement of knowledge in any field employing spatial analysis.

Core Principles of Citing GIS in CMOS

The Chicago Manual of Style, while not explicitly detailing every aspect of citing GIS, provides a robust framework for approaching such sources. The core principle is to provide enough information for a reader to locate and verify the cited material. This involves identifying the author or creator, the title or description of the work, the publication or distribution information, and the date. For GIS, this translates to specifying the dataset name, the source organization, the format, and access details.

A key challenge with GIS is the dynamic nature of data and the multifaceted components involved. A GIS project typically involves data layers, analytical processes, and sometimes custom-developed software or scripts. Each of these elements may require separate citation or a comprehensive description that encapsulates the entire spatial framework. The goal is to be as specific as possible while remaining concise and adhering to the overall style guidelines of CMOS, which emphasizes clarity and thoroughness. Consistency across your citations is paramount to maintaining a professional and scholarly tone.

Citing GIS Data Sources

When citing GIS data, the most crucial element is identifying the specific dataset used. This often includes the formal name of the dataset, the organization responsible for its creation or dissemination, and the version or date of the data. For instance, if you are using a shapefile of census tracts, you would cite the specific census data product, not just "census data."

The format of the data is also important. Whether it is a shapefile, GeoJSON, raster image, or geodatabase, indicating the format helps readers understand how the data was structured and potentially how it was processed. For proprietary data, licensing information or terms of use might be relevant to include, though CMOS typically focuses on direct attribution. For publicly available datasets, providing a URL or a stable identifier, if available, is highly recommended to facilitate retrieval.

A typical citation for a GIS data layer might look something like this:

- Author/Creator: U.S. Census Bureau
- Title: TIGER/Line Shapefiles: Census Tracts, 2020
- Publisher/Distributor: U.S. Census Bureau
- Publication Date: 2020
- Access Information:
<https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html>

When referring to this in a footnote or endnote, the format would be more condensed. For example:

- U.S. Census Bureau, "TIGER/Line Shapefiles: Census Tracts, 2020," accessed [Date of Access], <https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html>.

It is vital to distinguish between different versions of a dataset. For example, if your research relies on demographic data from 2010, you must cite the 2010 version, not a more recent update, as the differences could significantly impact your findings.

Citing Metadata

Metadata, the data about data, is a critical component of any GIS dataset. It provides essential context, including the data's coordinate system, projection, accuracy, lineage, and intended use. According to CMOS principles, if metadata is crucial for understanding or verifying the data, it should be cited or described. This might involve citing the metadata document itself as a separate source or incorporating key metadata details directly into the citation of the data layer.

For example, if a specific projection system is fundamental to your analysis and is detailed in the dataset's metadata, you might include this information. Often, the metadata is provided as a separate file (e.g., an XML file or a PDF document). In such cases, you would cite the metadata document following the same principles as citing any other document or report.

A footnote or endnote citation for metadata might include:

- U.S. Geological Survey, "Metadata for National Elevation Dataset (NED)," accessed [Date of Access], [URL to metadata file, if applicable].

The level of detail required for metadata citation depends on its importance to your specific research. If the metadata clarifies a potential ambiguity in the data or explains a methodological choice, it warrants more attention in your citation.

Citing GIS Software

When GIS software is integral to your research, whether for data processing, analysis, or map creation, it must be acknowledged. This includes the specific software package and its version number. Different versions of the same software can have different functionalities or produce slightly different results, making version identification crucial for reproducibility.

The citation should identify the developer or vendor of the software and the year of release or version publication. For proprietary software like ArcGIS or QGIS, you would cite the company or organization that develops and distributes it. For open-source software, the community or foundation behind it is usually credited.

A standard citation for GIS software in a bibliography might appear as:

- Esri. ArcGIS Pro. Version 3.1. Redlands, CA: Esri, 2023.
- QGIS Development Team. QGIS. Version 3.28.3 'Firenze'. Open-source project, 2023.

In footnotes or endnotes, the citation would be more concise:

- ArcGIS Pro, version 3.1 (Esri, 2023).

- QGIS, version 3.28.3 'Firenze' (QGIS Development Team, 2023).

If you used specific extensions or plugins within the software that significantly influenced your analysis, these might also warrant mention or citation, depending on their impact and distinct origin.

Citing GIS Analyses and Visualizations

Citing analyses performed using GIS software, and especially maps or visualizations generated from these analyses, requires careful consideration. The analysis itself is a product of your methodology, but the underlying data and tools must be acknowledged. When presenting a map or a spatial analysis result, it is standard practice to cite the data sources and software used to create it, often in the figure caption or in a note accompanying the visualization.

For maps, the caption should include descriptive information about the map's content, the data sources used, the analytical methods applied (if complex), and the software and version utilized for production. This provides a complete picture for the reader to understand the map's context and limitations.

Example of a map caption note:

Map created using U.S. Census Bureau TIGER/Line shapefiles (2020) and analyzed in ArcGIS Pro (v. 3.1) by the author. Base map data courtesy of OpenStreetMap contributors.

If the analysis involves custom scripts or algorithms, these might also require citation, particularly if they are published or shared resources. If the script is your own original work, it might be described in the methodology section of your paper. However, if you are adapting a published script, you would cite the original source of that script.

Citing Online GIS Portals and Services

Many GIS data and tools are accessed through online portals and web services. When citing these, the URL is crucial, along with the name of the service and the organization providing it. Treat these much like you would a website or an online database.

For example, citing data accessed through a government portal:

- Natural Earth. "Admin 0 - Countries." Accessed [Date of Access].
<https://www.naturalearthdata.com/downloads/110m-admin-0-countries/>.

It is important to note the date of access because web content can change or be removed. If the service allows for specific queries or data downloads that are time-sensitive, record these parameters. For web map services (WMS) or web feature services (WFS), you might cite the service endpoint and the specific layer or feature class you utilized.

Special Considerations for GIS Citations

The inherent complexity of GIS data, often comprising multiple layers, projections, and attributes, demands a systematic approach to citation. Researchers must decide on the level of detail that best serves the transparency and replicability of their work without overwhelming the reader. For instance, if your research heavily relies on the precise spatial relationships between multiple, distinct datasets, you will need to meticulously cite each one.

One common challenge is the use of historical GIS data. Older datasets might have less standardized metadata or be in less common file formats. In such cases, providing a descriptive note about the data's origin, its condition, and any known limitations is essential. This practice aligns with CMOS's emphasis on providing sufficient context for scholarly work.

Another consideration is the use of geocoding services. If you have geocoded addresses using a third-party service, you should cite the service, its version, and the parameters used. This ensures that your location data is traceable and verifiable.

The Role of Data Repositories

Increasingly, researchers are encouraged to deposit their data in institutional or public repositories. When citing data that has been archived in a repository, you should follow the repository's recommended citation format. This typically includes the author, title, repository name, accession number or DOI (Digital Object Identifier), and publication date.

For example:

- Smith, Jane, and John Doe. "Urban Green Space Analysis of Chicago." Data deposited in the University of Illinois GIS Data Repository, 2023. DOI: 10.xxxx/uir.2023.001.

Using DOIs is particularly valuable as they provide persistent links to datasets, even if the original URL changes. This is a best practice for ensuring long-term accessibility and proper attribution.

Best Practices for Clarity and Consistency

Regardless of the specific GIS components you are citing, consistency is paramount. Choose a citation style for GIS elements that aligns with the overall CMOS guidelines and apply it uniformly throughout your work. This includes the formatting of dates, author names, titles, and access information.

Maintain a detailed personal log of all GIS data, software, and services used in your research. This log should include all relevant details needed for citation, such as creator, title, version, date, and access information. This proactive approach prevents last-minute scrambling and ensures accuracy.

When in doubt, err on the side of providing more information rather than less. A reader should be able to understand where your spatial information originated and how it was processed. This level of detail builds trust and enhances the rigor of your research. Ultimately, the goal is to make your work as transparent and reproducible as possible, leveraging the powerful

capabilities of GIS while upholding the highest standards of academic integrity as guided by the Chicago Manual of Style.

FAQ

Q: What is the primary challenge when citing Geographic Information Systems (GIS) data using the Chicago Manual of Style?

A: The primary challenge lies in the multifaceted nature of GIS, which involves not only data layers but also software, analytical processes, and specific metadata. CMOS, while comprehensive, does not have explicit chapters dedicated to GIS, requiring researchers to adapt its general principles for citing diverse digital and spatial resources.

Q: How should I cite a specific GIS dataset like a shapefile or geodatabase in my bibliography according to CMOS principles?

A: You should cite a GIS dataset by providing the creator (e.g., government agency, research institution), the title of the dataset, the publisher or distributor, the publication date, and if available, the URL or access information. For example: U.S. Census Bureau, "TIGER/Line Shapefiles: Census Tracts, 2020," U.S. Census Bureau, 2020, <https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html>.

Q: Is it necessary to cite the specific version of GIS software I used, such as ArcGIS or QGIS?

A: Yes, it is highly recommended to cite the specific version of GIS software. Different versions can have varying functionalities, tools, and rendering engines, which can impact analytical results. For example: Esri, ArcGIS Pro, Version 3.1 (Redlands, CA: Esri, 2023).

Q: How do I cite metadata associated with a GIS dataset in my research?

A: If the metadata is crucial for understanding or verifying the data, it should be cited. This might involve citing the metadata document itself as a separate source, similar to citing a report or technical document, or incorporating key metadata details directly into the citation of the data layer.

Q: When presenting a map created with GIS, where should the citation information be placed?

A: Citation information for maps should typically be included in the figure caption. This caption should detail the data sources, software used, analytical methods, and any other relevant information that helps readers understand the map's origin and context.

Q: What if I used a web GIS portal or online service to access data?

A: When citing data from online GIS portals or services, include the name of the service, the organization providing it, the specific data accessed, the URL, and the date of access. For example: Natural Earth, "Admin 0 - Countries," accessed October 26, 2023, <https://www.naturalearthdata.com/downloads/110m-admin-0-countries/>.

Q: Should I cite custom scripts or code I wrote for GIS analysis?

A: If you developed custom scripts or code for your GIS analysis and they are not readily reproducible by others without your specific code, you should describe them in your methodology section. If you adapted or used published scripts, you would cite the original source of those scripts.

Q: What is the best practice for ensuring consistency when citing multiple GIS components in a single project?

A: The best practice is to establish a consistent citation style for all GIS-related elements early in the research process and apply it uniformly. Maintaining a detailed log of all GIS data, software, and services used will help ensure accuracy and completeness in your citations.

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