DIGITAL MAPPING TECHNIQUES 2024

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Bringing New, Old Metadata Tools for GeMS to ArcGIS Pro, and an Update on MapMerger, a Python-based Map Compilation Tool
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New metadata tools for the ArcGIS Pro Geologic Map Schema (GeMS) toolbox (https://github.com/DOI-USGS/gems-tools-pro) are being developed by staff of the Geologic Mapping of the Lower Colorado River System (LOCOS) and Western Basin and Range - Eastern California Shear Zone (WBR) projects, both funded by the National Cooperative Geologic Mapping Program (NCGMP). The metadata work is intended to restore functionality available in the ArcMap GeMS toolbox (https://github.com/DOI-USGS/gems-tools-arcmap), as well as provide new functionality, and is partially funded by and under the direction of the National Geologic Map Database Project (NGMDB).

The current ArcPro GeMS metadata tool (Build Metadata) creates a single stand-alone xml metadata record for all elements in a GeMS geodatabase, whereas the ArcMap GeMS toolbox includes three scripts that can be used to create and embed FGDC metadata records for each element of a GeMS file geodatabase (FGDC metadata - step 1, - step 2, and - step 3). Our projects would like the ability to create and embed object-specific metadata records, but with the recent removal of ArcMap from USGS computers, the ArcMap GeMS toolbox is no longer available. Results of the DMT'23-Lite2 meeting (Metadata creation for GeMS) also indicated that there is interest within the larger GeMS community in having this functionality as part of the ArcPro GeMS toolbox.

Importing/embedding standalone XML metadata files for each object within a GeMS database is one missing feature that we are working on to make metadata management less burdensome and susceptible to copy-paste errors when preparing geodatabases for NGMDB submission; however, creating an import metadata tool for GeMS is not without challenges. One challenge faced by this tool is making it flexible enough to accommodate different naming practices used by projects, organizations, and individuals. The initial implementation of this allows the user to specify whether the geodatabase name and/or the feature datasets within the geodatabase are included as part of the filename used for pattern matching to the geodatabase and objects within the geodatabase to which metadata is imported. If demand exists, support for additional naming practices could be added, and/or including custom text to use for pattern matching. This is relatively easy to do, however predicting all the naming conventions or practices different groups may use may not be reasonable, and imposing naming conventions may be more appropriate than supporting a wide variety of options.

A second challenge is supporting different metadata authoring workflows. Some metadata authors may prefer to focus on initially creating a top-level record, a required element of the NGMDB submission process, that optionally includes detailed Entity and Attribute information and secondarily on creating individual child-level records; however, importing a top-level record into a geodatabase using existing tools does not propagate metadata into child objects. Including well-formed, embedded metadata for all child objects within a geodatabase is not a GeMS requirement, but it has been suggested this could be a best practice since parts of databases are often used by end users for various purposes. When given a top-level record, this tool is designed to propagate relevant metadata into child objects. Part of the challenge accomplishing this is determining what gets passed from parent to child. This functionality is

still a work-in-progress but is expected to be available when an update featuring the Import Metadata tool is pushed out.

A third, but likely not final, challenge working with embedded metadata in ArcGIS Pro is that importing and exporting FGDC metadata often results in the undesired alteration of certain tags and text. This is a frustrating experience that has not yet been remedied. This behavior may not be experienced when importing an FGDC XML file that has been exported from ArcGIS Pro, but if the imported FGDC XML file was authored in another program then tags and text within tags may change, and tags may even be removed. Additionally, the USGS Metadata Parser (https://www.usgs.gov/tools/metadata-parser) can report errors in FGDC metadata exported from ArcGIS Pro that is not present in an FGDC compliant XML file imported into ArcGIS Pro.

Project staff are also working on improving the existing MapMerger tool (https://code.usgs.gov/gmeg-mappers/MapMergerPro) for ArcGIS Pro, in addition to the metadata tool development. MapMerger is a Python-based map compilation tool developed for use in the LOCOS project. Using cross-walk tables and a feature class that outlines and attributes GeMS-structured map databases to merge, the tool automates the compilation process by correlating and standardizing MapUnits and line features between maps, dissolving map boundaries, optionally incorporating new mapping, and preserving original data sources and provenance. Since MapMerger was last presented by Crow at DMT 2023, it has been moved from Ryan's GitHub repository to the official USGS GitLab instance at https://code.usgs.gov/gmeg-mappers/MapMergerPro, and several improvements have been made. Updates to make the tool faster, to incorporate new functionality to relabel/reattribute existing MapUnitPolys, to reduce the number of polygon slivers produced, and to address occasional undesired line direction reversals, which is particularly important when adorning faults, are some of the improvements that have been made in the last year. Planned future updates include but are not limited to adding comprehensive documentation, adding automated/unit testing of some form, making the tool easier to use and more robust, and performing general code cleanup and refactoring, all paving the way for a future provisional software release. While MapMerger was created to meet LOCOS project specific needs, existing and planned improvements prime the tool for a USGS provisional software release where it may reach a wider audience and help other projects and the wider community with the creation of map compilations.