

Smathers Libraries Emerging Technologies (ET) Mini Grant APPLICATION COVER SHEET

Principal Investigator (PI) Name: Alexander Thurman

X Check here if this is your first grant application where you will serve as a principal investigator (PI).

Department: Information Sciences Email: athurma6@vols.utk.edu Phone: 865-974-1817

Additional project applicants, please give name, email, and brief role for each:

Sarah Gonzalez – Co-Principal Investigator – sarahgo@utk.edu

Timothy Holmes – Data Manager – tholmes9@vols.utk.edu

Yasmin Stoss – Metadata Specialist - ystoss@vols.utk.edu

Title of grant project: UNIVERSITY OF TENNESSEE GEOLOGIC DATA PRESERVATION PROGRAM:
PRESERVING HISTORIC COLLECTION OF MAPS AND GEOLOGICAL SAMPLES

Project abstract (no more than 100 words): The principal goal of this project is the digital preservation of physical maps and geological samples from a variety of locations around the University of Tennessee. This will be accomplished through the creation of a robust unifying metadata schema with accompanying documentation, designed to create a foundation for future additions to the same database. Similar collections are present in long-term storage and archiving centers across the world; the primary innovation in this project is the application of long-term data management tools, standards, and processes to the task of preservation. This includes the aforementioned metadata schema, created to be both machine- and human-readable; a searchable database of the data, for use in future research projects; thorough accompanying documentation to ensure the metadata schema is preserved; and entry forms designed to minimize human error in documentation.

Funds requested (Limit of **\$10,000**): \$9,964.99

Describe how the 10% mandatory cost share will be met (be specific): The Department of Earth & Planetary Sciences will provide the mandatory cost share of 10% or \$1,000. The funds will be applied towards outreach and promotion of the grant including costs of printed materials, cost of website creation and digital marketing materials. Estimated costs are \$300 in printing materials including posters, flyers, and brochures; \$400 to cover a portion of the salary of the web developer creating the website; and \$300 to cover a portion salary for the marketing manager for creation of digital marketing materials. The UT Office of Research will provide 30% additional cost share to cover a portion of salary for Timothy Holmes and Yasmine Stoss. Letters from the Department of Earth & Planetary Sciences and the Office of Research are attached to this proposal. This cost share is part of a university grant to encourage emerging technology discovery.

Please list the library resources/departments needed for this project and the name of the person authorizing the intended use and date authorized. Each authorizing person must initial their approval and confirmation of the availability of resources for this project. If you need more room, continue on a separate page.

Resources Required for Project as applicable including cost share contributions	Authorizing Individual	Approving Initials	Date Authorized
Coordination of project. Design lead.	Alex Thurman	AT	4/24/2019
Organization of resources. Report writer.	Sarah Gonzalez	SG	4/24/2019
Data manager.	Timothy Holmes	TH	4/24/2019
Metadata creation. Collection assessment.	Yasmin Stoss	YS	4/24/2019

I confirm receipt of approvals from all project team members to participate in this project as described in the narrative and budget:

Alexander Thurman

4/24/2019

PI Signature

Date

I support this project and approve the assignment of the described duties to the PI.

John G. Geology

4/24/2019

Dept. Chair Signature

Date

**Smathers Libraries Emerging Technologies Mini Grant
Project Pre-Proposal, Proposal Narrative, and Budget Narrative**

Pre-Proposal

“PRESERVING HISTORIC COLLECTION OF MAPS AND GEOLOGICAL SAMPLES”

The principal goal of this project is the digital preservation of physical maps and geological samples from a variety of locations around the University of Tennessee. This will be accomplished through the creation of a robust unifying metadata schema with accompanying documentation, designed to create a foundation for future additions to the same database. Similar collections are present in long-term storage and archiving centers across the world; the primary innovation in this project is the application of long-term data management tools, standards, and processes to the task of preservation. This includes the aforementioned metadata schema, created to be both machine- and human-readable; a searchable database of the data, for use in future research projects; thorough accompanying documentation to ensure the metadata schema is preserved; and entry forms designed to minimize human error in documentation.

Full Proposal Narrative

A) The goal of the project is to establish a comprehensive digital preservation system for geological maps and samples from the East Tennessee area. This will be accomplished by meeting the following objectives: Firstly, assessment of the starting collection, to determine the scope of the metadata required to adequately describe it. Secondly, consultation with similar collections in the region and elsewhere, as cross-compatibility should be maximized for the purpose of enabling future research using this data set and others. Thirdly, the creation of a robust metadata schema fulfilling the criteria determined from the prior tasks, designed to be both machine-readable (using a standardized markup language such as XML and a lexicon of reserved words) and human-readable (semantic meaning of tags is preserved, with full definitions available to any contributor). Fourth, the creation of an entry form designed to both streamline the addition of new data to the set and prevent, as much as possible, human error in the encoding process. Finally, the encoding of the starting data set using that form in order to locate any potential errors or hitches for future additions, and a revision of the schema and form to reflect these discoveries.

B) Lack of metadata and proper recording is a significant cause of lost data, especially when it comes to physical items such as maps and geological samples. By creating a long-term, accessible, expandable data storage system for these items, we can significantly decrease the amount of lost data while increasing the value and accessibility of stored data for future research.

C) Storage and inventorying of physical objects is generally handled by the department to which the objects belong (i.e. the Earth and Planetary Sciences or equivalent department in the case of core samples, Geography for maps, etc.). UT already has a functional map library, which gives a good basis of comparison for the effectiveness of the map schema. However, the major innovation of this project is the application of data management standards and long-term scalability to these collections, a set of applications rarely seen outside of archival practices.

D) N/A

E)

Phase 1: Assessment	2 months
Phase 2: Consultation	1 month
Phase 3: Schema creation	3 months
Phase 4: Form creation	1 month
Phase 5: Data entry and troubleshooting	5 months

PI duties (Alex Thurman): Design lead. Coordination of team.

Co-PI duties (Sarah Gonzalez): Consultation with experts, organization of resources.

Data Manager / IT duties (Timothy Holmes): Design implementation, usability testing, revision. Primary data entry.

Metadata Specialist duties (Yasmin Stoss): Schema creation, collection assessment.

F) The collection is owned by the University of Tennessee, and is split between Hodges Library and the UT Earth and Planetary Sciences Department as part of the Tennessee Geologic Survey group (TGS). Copyright issues should not arise.

G) The project will be considered successful if the resulting catalog is adopted by the Earth and Planetary Sciences department of the University of Tennessee for future projects. It is expected that the map library will prefer their current schemas, but the unification of geological maps and samples in one data set may prove useful to future researchers. The final project will be an annotated catalog of all geologic samples and maps included under the initial collection, with tools in place for long-term storage of the data, easy access to the catalog and metadata for researchers, and robust tools in place for adding future data to the catalog. EPS department expectations will be managed through regular communication.

H) As above, regular communication with the EPS department—if the project is especially successful, outreach to regional universities will be managed through the UT EPS department.

I) The cost to the university will be the maintenance of the data storage, the server infrastructure used to access it, and likely grant-mediated hiring of future graduate student research assistants to enter new data sets into the catalog. As the catalog will be managed in-house, it is likely that it will be notably less expensive than the majority of the database subscriptions used by the library already.

The metadata and inventory sample descriptions submitted to the National Digital Catalog, funded by the USGS, and all TGS inventories on our Website are freely and publicly accessible. The public may view all documents, research results (except where copyrighted), and most collections at no charge. However, when our labor is necessary, for example to facilitate or provide for sample examination and/or to take portions of samples to give to visitors for analysis (usually to industry members), we do charge nominal fees. Paper copies of all well records are freely available for use at the facility. If photocopies of the records or digital copies are requested by the user, we charge nominal fees. Thin sections are available for free examination but cannot be taken offsite.

J) Equipment purchased will be incorporated into the university infrastructure and maintained as a storage and server unit, covered by the Office of Information Technology and the Earth and Planetary Sciences Department.

Budget Narrative

K) Expenses for the mailing tubes, glass vials, and cardboard boxes were calculated by finding versions of these items online that meet our need. The travel expenses to Belmont University in Nashville were calculated based on communication with someone at the university who arranged accommodations for us and provided median pricing information for meals.

L) Plastic mailing tubes were selected to prevent further damage to maps as had been experienced with several items in the collection that was donated. The cardboard boxes and glass vials are needed to replace the damaged ones from the collection. Since the collection will be actively maintained we do not expect any more glass vials to be broken. The material of the boxes used to store the geological samples is not concerning as the samples will be protected within the glass vials. The trip to Belmont University in Nashville is for consultation. This will provide the team with the necessary information needed to meet regional standards and develop a system that is compatible with regional institutions allowing us to share data in the future and allowing scientists to easily work with multiple regional data sets.

M) Alex Thurman (PI) will spend an estimated 5% effort to oversee the project based on the detailed budget. He will also travel to Belmont University to consult with their Geology Department. Sarah Gonzalez (co-PI) will spend an estimated 4% effort to organize materials and travel to Belmont University. She will also be responsible for organizing the reports/technical documents for creation of a published paper.

N) The UT Earth and Planetary Sciences Department will provide the mandatory cost share of 10% or \$1,000. This proposal includes a letter from the department head outlining the plan to cover \$1,000 in cost share. The funds will be applied towards outreach and promotion of the grant including costs of printed materials, cost of website creation and digital marketing materials. Estimated costs are \$300 in printing materials including posters, flyers, and brochures; \$400 to cover a portion of the salary of the web developer creating the website; and \$300 to cover a portion salary for the marketing manager for creation of digital marketing materials. The marketing materials will outline the grant outcomes and how other departments and universities may use the processes created through the grant to preserve geologic collections. The UT Office of Research will provide 30% additional cost share to cover a portion of salary for Timothy Holmes and Yasmine Stoss. This cost share is part of a University of Tennessee grant to encourage emerging technology discovery.

Emerging Technologies (ET) Mini Grant Budget Form**UNIVERSITY OF TENNESSEE GEOLOGIC DATA PRESERVATION PROGRAM: PRESERVING HISTORIC COLLECTION OF MAPS AND GEOLOGICAL SAMPLES**

Please add lines to table as needed. If you need help completing this form, please contact Bess de Farber, PH# 273-2519.

1. Salaries and Wages (no fringe benefits required)

Name of Person	Salary times % of effort	Grant Funds	Cost Share	Total
Alex Thurman	63500 X 5%	\$3,175.00	\$0.00	\$3,175.00
Sarah Gonzalez	63500 X 4%	\$2,540.00	\$0.00	\$2,540.00
Timothy Holmes	55400 X 5%	\$1,662.00	\$1,500.00	\$1,662.00
Yasmin Stoss	55400 X 5%	\$1,662.00	\$1,500.00	\$1,662.00
		\$0.00	\$0.00	\$0.00
SUBTOTAL		\$9,039.00	\$3,000.00	\$9,039.00

2. Equipment

Item	Quantity times Cost	Grant Funds	Cost Share	Total
		\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00
SUBTOTAL		\$0.00	\$0.00	\$0.00

3. Supplies

Item	Quantity times Cost	Grant Funds	Cost Share	Total
plastic mailing tubes	23 X 17.65	\$405.95	\$0.00	\$405.95
carboard boxes	50 X 1.25	\$62.50	\$0.00	\$62.50
glass vials	100 X 1.30	\$130.00	\$0.00	\$130.00
		\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00
SUBTOTAL		\$598.45	\$0.00	\$598.45

4. Travel

From/To	# of people/# of days	Grant Funds	Cost Share	Total
Belmont University, Nashville	2 people / 2 days	\$327.54	\$0.00	\$327.54
		\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00
SUBTOTAL		\$327.54	\$0.00	\$327.54

5. Other (Vendor costs, etc. Provide detail in Budget Narrative section.)

Item	Quantity times cost	Grant Funds	Cost Share	Total
University Printing		\$0.00	\$300.00	\$300.00
Marketing (creation of website & digital marketing)	\$400 x 1: departmental web developer; \$300 x 1: departmental marketing manager	\$0.00	\$700.00	\$700.00
		\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00

SUBTOTAL		\$0.00	\$1,000.00	\$1,000.00
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	Grant Funds	Cost Share	Total
Total Direct Costs (add subtotals of items 1-5)	\$9,964.99	\$4,000.00	\$10,964.99

\$1,000 (10%) cost share provided by UT Department of Geology

\$3,000 (30%) cost share provided by UT Office of Research

UNIVERSITY OF TENNESSEE GEOLOGIC DATA PRESERVATION PROGRAM: PRESERVING HISTORIC COLLECTION OF MAPS AND GEOLOGICAL SAMPLES

A Data Management Plan created using DMPTool

Creators: Alexander Thurman, Yasmin Stoss, Timothy Holmes, Sarah Gonzalez

Template: U.S. Geological Survey (USGS)

ORCID iD: 0000-0001-9304-929X

Project abstract:

The University of Tennessee Geologic Data Preservation Program (UTGDPP), through the University of Tennessee Department of Information Sciences, preserves geological collections of historic maps and geological samples including rock and mineral deposits.

1. PROJECT AND CONTACT INFORMATION

University of Tennessee Geologic Data Preservation program: Metadata schema for preserving historic collection of maps and geological samples

Tennessee Geological Survey

Email: ask.TNSTATEPARKS@tn.gov

Phone: (888) 891-TDEC (8332)

Address: 312 Rosa L. Parks Ave Nashville, TN 37243

The Tennessee Geologic Survey (TGS), through its repository, the Tennessee Geological Repository for Research and Education (TGRRE), part of the Department of Earth and Planetary Sciences at University of Tennessee (UTK), preserves geological samples and data, making them readily accessible. For this project, the Survey will preserve, inventory and generate metadata for a large collection of historical maps and geological samples. During this process, a metadata schema for preserving historic collection of maps and geological samples will be created. The TGS will also submit that information in required format to the National Digital Catalog (NDC).

Proposed Start Date: September 1, 2019 Proposed Duration: Twelve months from proposed start date

This proposal is based off a similar project done in Michigan: [Preserving unique historical collection of drill cuttings and generating inventories together with metadata for them](#)

Principal Investigator: Alexander Thurman

Email: athurma6@vols.utk.edu

Phone: (555)555-5555

National Geological and Geophysical Data Preservation Program

Email: nggdpp@usgs.gov

2. PLAN AND ACQUIRE

The samples and maps have been donated to the Department of Earth and Planetary Sciences at University of Tennessee. The samples are small rocks from the great majority sedimentary formations throughout Tennessee. They were acquired through early oil and gas exploration from the late 1920's-1950's, carried out by one primary company in partnership with several smaller operators. Based on our initial examination of the collection, we expect these are likely the only remaining physical samples for most of these early bore holes. The maps detail the mine locations of the oil and gas operations from the 1920's -1950's.

All the samples are contained in fragile glass vials placed loosely on cardboard trays stacked in large paper boxes. The boxes have sustained water damage and deterioration from poor storage conditions. Initially vials were organized on trays from shallower to deeper samples. Because the boxes have been moved several times, many of the vials have rolled out of the trays and there is little remaining order. Often the paper labels on vials, identifying the well and sample footage, have come loose but are still wrapped around the vials. Some of the vials are cracked and a few have broken. Even so, most of the sample material remains in the vials. The maps are similarly in poor condition with some having experienced water and mold damage. Most of the maps are salvagable however.

Once the metadata for the samples has been created, it will likely stay the same over time.

3. DESCRIBE/METADATA AND MANAGE QUALITY

The Data Manager and Metadata Specialist will check identification parameters for each sample and map and create metadata: Box Number, Pallet ID, Pallet Location, Well Name, Operator Name, Permit Number, API Number, County, Township, Range, Section, Total Depth, Sample footages, Latitude and Longitude. Data are summarized into a single CSV file whose fields are compatible with NGGDPP formatting schematics. The CSV file will then be uploaded into the National Digital Catalog as per protocol.

1. Carefully remove all rock samples in trays or loose in the box, repair or replace cracked vials, keeping original labels, gently remove dirt and dust with dry cloth, tape loose labels to vials, tighten corks and screw tops, repair or replace cardboard trays as needed. Maps will also be carefully removed from the cardboard mailing tubes they are stored in.
2. Organize vials in trays and maps by identifier number shown on label; place vials and map tubes with labels facing up in order by depth (for rock samples) (shallower to deeper), tape vials to trays, label trays with permit number provided by supervisor
3. Complete inventory form for each box and tube, record identifier number, sample depths
4. Repair or replace the cardboard box or cardboard mailing tube if needed, retain original writing, place trays in, secure trays with Styrofoam, submit completed inventory to supervisor and discuss any remaining issues.

Metadata will be generated from data as written on the original map mailing tubes and sample vials and trays, the hand-typed samples and maps list accompanying the collection, and from available public records. Microsoft Office Suite is the primary software package used for document, spreadsheet, and database production. Both the Project Coordinator and the Data Manager trained and supervised student work. Through this initial work, we prepared written student instructions to assure quality control.

4. BACKUP/SECURE AND PRESERVE

Data will be stored by the Department of Earth and Planetary Sciences at University of Tennessee. The CSV files containing data for the project will be stored in several locations, including the Earth and Planetary Sciences lab and in the cloud storage service provided by UTK.

We will make these samples accessible and known to stakeholders by uploading inventories to the NDC and to our Survey Web pages. Making that data accessible will lay the foundation for scientific research about the geologic history of the Tennessee Valley, for resource exploration by industry, and for use in educating the next generation of geoscientists.

Data are summarized into a single CSV file whose fields are compatible with NGGDPP formatting schematics. The Tennessee Geologic Survey, through its repository, the Tennessee Geological Repository for Research and Education, will be responsible for the long-term preservation of the data. Because we would like to be able to offer all our services at no cost to all users, we are working toward obtaining on-going legislated financial support. Toward that goal, we are seeking support from community groups, industry organizations, and local governmental agencies.

5. PUBLISH AND SHARE

The metadata and inventory sample descriptions submitted to the National Digital Catalog, funded by the USGS, and all TGS inventories on our Website are freely and publicly accessible. The public may view all documents, research results (except where copyrighted), and most collections at no charge. However, when our labor is necessary, for example to facilitate or provide for sample examination and/or to take portions of samples to give to visitors for analysis (usually to industry members), we do charge nominal fees. Paper copies of all well records are freely available for use at the facility. If photocopies of the records or digital copies are requested by the user, we charge nominal fees. Thin sections are available for free examination but cannot be taken offsite.

All data lists are public accessible at no cost. We offer industry members an 8-month period of confidentiality for samples and data which they donate to the Survey. Donated materials become the property of the Survey.

The DOI will be created using the Digital Object Identifier Creation Tool provided by USGS.