

WSF 2020 Annual Report # 4164

PROJECT: Nebraska GeoCloud (NGC) and Airborne
Electromagnetic (AEM) Data Integration – WSF Application #4164
(awarded December 2016)

DATE: MARCH 29, 2020
(ANNUAL REPORT DUE ON OR
BEFORE APRIL 1, 2020)

[See Application 4164 Section D #2 For Project Scope Summary, Timeline and Acronyms](#)

PROJECT PROGRESS APRIL 2019 TO APRIL 2020:

Continued the advancement of the back and front ends of the NGC tailored to the unique characteristics of Nebraska data and the needs of stakeholders using I-GIS' development and software services. CSD and USGS continued collaborations on borehole, groundwater, and AEM datasets and documenting recommended methods and procedures for hydrogeological mapping with AEM in Nebraska. The team continued populating the NGC with all available data (30,000 line kilometers of AEM data is up online). A two day training on Nebraska GeoCloud and GeoScene3D, featuring guests from I-GIS in Denmark, attended by 21 groundwater professionals, was held at UNL east campus in Lincoln, NE on April 1 and 2, 2019. A tradeshow held January 28, 2020 at the NRD Legislative Conference was well attended and provided CEUs for 19 groundwater professionals. CSD and USGS geologists and I-GIS continued the NGC upload/download (through ENWRA funded subcontract separate from this WSF with AGF) and accessibility level testing and evaluation activities. See Exhibit A (attached PDF) for project accomplishments to date.

ANTICIPATED ACTIVITIES FROM NOW UNTIL NEXT ANNUAL REPORT DUE APRIL 1, 2021:

Workshops and training sessions along with project partner feedback will continue as requested/needed. CSD and USGS will continue collaborations on a NGC Standards and Guidelines Bulletin documenting recommended methods for AEM survey and related hydrogeological mapping, expected in summer 2020. The Bulletin will provide recommendations on flight line spacing, required dataset formats, and procedures for processing and interpreting AEM data, which will benefit the cost-effectiveness of future AEM surveys. CSD and USGS will publish the hydrogeologic maps from the case studies, providing water resources managers with tools for groundwater management. NGC is expected to go live in July 2020 and will serve as the central repository for data, geological models, and related information about the mapping efforts. A two-year extension to the interlocal agreement for sustaining the NGC online platform is anticipated to go through the 10 participating NRDs between April and July 2020 ensuring the continuance, expansion and access to the NGC for investors and their constituents.

ANTICIPATED CASH FLOW FOR REMAINDER OF THE PROJECT:

Following Claims 1 through 7 previously submitted and received totaling **\$222,505.15** in WSF reimbursements, two further reimbursement claims (#8 & #9) are anticipated between April 1, 2020 and July 1, 2021 totaling an approximated **\$24,932.45** additional from WSF (60% of CSD and USGS invoices). The final set of claims anticipated before June 30, 2021 will satisfy the cash flow total up to the award total of \$247,437.60 from WSF (60% of the \$412,396 project expenses incurred not including USGS coop funds).

LIKELIHOOD THAT BENEFITS PROJECTED IN APPLICATION 4164 WILL BE REALIZED: Based on collaborations presented by I-GIS, CSD, and USGS, the project is on target for achieving the benefits as described in the application.

Exhibit A

Report of Accomplishments for Nebraska GeoCloud (NGC) and Airborne Electromagnetic (AEM) Data Integration · WSF Application #4164

Data Inventory

- Approximately 30,000 kilometers of AEM data and project deliverables added to the NGC

Nebraska GeoCloud and GeoScene3D Developments

- Contract with I-GIS
- Expandable design for handling further developments and new projects
- Versatile database structures
 - AEM
 - 2D grids
 - 3D grids
 - Borehole drilling information (lithology, well construction, water levels)
 - Borehole geophysical logs
 - Point data
 - Shapefiles
- Nebraska GeoCloud Web user interfaces
 - Data administration (upload data files and associated metadata)
 - Data map (browse, explore, and download data through interactive map)
 - User administration (user role, permissions, new user invitation, and password reset)
 - Projects administration (create, upload, and share GeoScene3D projects, reports, and a variety of file types)
 - Projects map (browse, explore, and download GeoScene3D projects, reports, and a variety of file types)
- Customized Nebraska GeoScene3D viewer
 - Web data portal for connection to GeoCloud
 - Extended functionality for profile views and custom color scales

Training and Education

- Workshop 1 (August 15 – 17, 2017)
 - 2.5 day training on Nebraska GeoCloud and GeoScene3D in Lincoln, NE, featuring guests from I-GIS in Denmark
 - Attended by 32 groundwater professionals; 18 Continuing Education Units (CEUs) offered.
- Workshop 2 (August 7 – 8, 2018)
 - 2 day training on Nebraska GeoCloud and GeoScene3D in Gothenburg, NE

Exhibit A

- Attended by 28 groundwater professionals; 18 Continuing Education Units (CEUs) offered.
- Workshop 3 (April 1 – 2, 2019)
 - 2 day training on Nebraska GeoCloud and GeoScene3D in Lincoln, NE, featuring guests from I-GIS in Denmark
 - Attended by 21 groundwater professionals

Hydrogeologic Investigations

- Platte and Colfax Counties
 - Data assembled and checked for quality and consistency
 - GeoScene3D project created containing boreholes, AEM, groundwater levels, and supporting information
 - 2D and 3D grids created for selected areas
 - Project used in Workshop 2 for hands-on training
 - Completed validation study of hydrostratigraphic modeling methods (MS thesis)
 - Recommendations provided for future modeling efforts
- Bazile Groundwater Management Area (BGMA)
 - Data assembled and checked for quality and consistency
 - GeoScene3D project created containing boreholes, AEM, discrete groundwater levels, water-quality, and age tracer data
 - Released previously unpublished groundwater age tracer data
 - Interpreted continuous groundwater levels, water-quality, and age tracer data to understand water movement and groundwater vulnerability
 - Recommendations provided for future groundwater monitoring within the BGMA
 - Final report currently in review

Standards and Guidelines

- Finalized standards for coordinate system, AEM file naming and metadata
- Draft standards in progress for grids, shapefiles, boreholes, and point data
- Draft document in progress containing guidelines for AEM surveys and hydrogeological modeling
- Procedures developed for mapping the bedrock surface using boreholes and AEM data
- Procedures and codes developed for assigning keywords and hydraulic property estimates to borehole lithology descriptions