Using mobile GIS applications to support mineral resource investigations in the Eglab region, Algeria

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The Algerian Geological Survey Agency – U.S. Geological Survey (ASGA-USGS) mineral resource assessment project in the Eglab region, Algeria, comprises the eastern part of the Reguibat Shield bounded by the Tindouf, Reggane, and Taoudeni basins to the north, east, and south, respectively. The use of mobile GIS applications on handheld tablets facilitated team coordination and ease of transition from field planning and preparation, to data collection and integration, and transfer into project GIS databases. Mobile GIS applications facilitated collaboration between teams collecting disparate data types to support the geologic, geochronological, geochemical, field spectral, and geophysical investigations. This technology was used in parallel with traditional field investigation methods. These tailored applications on GPS-enabled tablets provided a platform for utilization of GIS data in the field and allowed for standardized data collection, picklists, fewer transcription errors, and the ability to store photos, coordinates, and field notes together in an integrated system. The suite of Environmental Systems Research Institute, Inc. (Esri™) mobile applications allowed for customized use on multiple platforms (Android/Windows/iOS) to streamline data collection, analysis, and storage.

The Eglab region GIS data from the ASGA National Bank of Geological Data (BNDG) were used for the project and an Esri ArcGIS Online (AGOL) working map was prepared. An AGOL group was set up to allow access only to ASGA-USGS team members. GIS layers included planned site locations, infrastructure, geology, known mineral occurrence locations, detailed basemap imagery, and other data critical for field mapping and mineral resource assessment. The imagery was from a 2016 compilation of best available data by Esri ArcGIS Online World Imagery basemap (Esri, 2019). The map was downloaded in the Esri Collector Classic application for offline planning, field navigation, data collection, and documentation of various types of geologic samples as well as spectroscopy and geophysical measurements. Navigation was improved using the tablets with access to detailed basemap imagery, infrastructure where available and in existence, and characteristics of features in the map. The application, Survey123, which is a digital form of field notes, was used to document rock, sediment, and soil samples. A sample collection form was customized for use in the field by the ASGA-USGS team. The form contained required location and descriptive fields as well as optional picklists of various sample characteristics for consistency. Each sample location with field notes and photos of both sample and site were tied together in a data layer.

Field work was conducted by having as many as three teams operating independently on a daily basis to focus on different thematic interests: geology and economic geology, geochronology, geochemistry, geophysics, and spectroscopy. Each team collected data on tablets recording field notes, measurements, and sample information. At the end of the field campaigns, the data collected from multiple tablets were uploaded to the AGOL cloud and a file geodatabase was exported and downloaded for integration into the local project GIS databases.

Tablet-based data collection in the field assisted in data management during the field campaigns and the Esri Collector and Survey123 applications provided flexibility to accommodate the needs of the various disciplines of research. A primary objective of the project was updating and compiling a geologic map of the region (Buffière et al., 1965). The applications aided examination and validation of as-mapped geologic units in the field. Using the GPS-enabled tablets, mismapped geologic units were identified and locations of lithologic contacts were noted. The field notes with geologic descriptions and suggested modifications were used to inform revisions to the geologic map. Our experience with the ASGA-USGS project demonstrates that the integration of these applications into field operations can successfully help and improve managing team planning, field navigation, data collection, and sample management. With successive testing and incorporation of feedback, these mobile GIS applications can be successfully integrated into field operations.

Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

References

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