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A plan and plea for increasing communication about Digital Geologic Field Mapping

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INTRODUCTION

The Alaska Division of Geological & Geophysical Surveys (DGGS) collects, analyzes, and publishes geological and geophysical information to help inventory and manage Alaska's natural resources and mitigate geologic-hazard risks. In 2005, DGGS began investigating the potential of digital field mapping technology to streamline data collection and processing (Athey and others, 2009). Digital mapping is defined as using a computer or personal digital assistant (PDA) to display and record information that has traditionally been recorded on paper, whether on notecards, in a notebook, or on a map. To facilitate discussion in the geologic community regarding digital field mapping technology, DGGS implemented a three-prong plan. In 2009, DGGS created a Wikipedia page for digital geologic mapping (http://en.wikipedia.org/wiki/Digital_geologic_mapping). In 2010, DGGS created an electronic mailing list (http://list.state.ak.us/soalists/geomapping_technology/jl.htm) that currently has more than 60 members, in the U.S. and abroad. DGGS also surveyed the geologic community regarding interest in digital geologic field mapping and the currently used technology. With the help of the American Geological Institute, the e-mail survey went out to more than 1,250 organizations (university geology departments, state and national geological surveys, and the private sector) with a ~13 percent response rate. Results of the survey are available at http://ngmdb.usgs.gov/Info/dmt/docs/DMT11_Athey.pdf.

COMMUNICATION IN THE GEOLOGIC COMMUNITY

Toward the goal of developing a workable digital field methodology, the biggest asset that geologists have is the experience of all the other geologists in the geologic community. Worldwide, geologists working for government surveys, universities, engineering firms, mining companies, and in other related occupations perform many of the same tasks and, consequently, have many of the same requirements for a digital field mapping system. Many digital mapping hardware and software options are available on the market, but it is cost prohibitive for one person or organization to evaluate a variety of different systems. Increased communication among geologists regarding successes and failures in digital mapping will provide a knowledge base to help them quickly select the system that best suits their needs. A knowledge base will

spur new ideas and encourage growth of programs. As a collective voice, the digital geologic mapping community can have greater influence on the development of mapping-related technology.

Ideas and methodology in science are commonly exchanged through published papers, formal presentations at conferences, and person-to-person networking; however, these methods of communication are not ideal when discussing technology. By the time a formal paper is published, a manufacturer may already have moved on to the next generation of devices. By nature, conference presentations and personal networking reach only small, targeted audiences. Instead of these traditional methods, geologists can benefit from user-friendly online communication and social media to promote the exchange of information in a timely manner.

DGGS hopes to spur conversation in the geologic community on digital field mapping by maintaining this e-mail list and Wikipedia page on digital geologic field mapping. We chose these forums in part because they are manageable with our limited financial and staff resources. Electronic mailing lists facilitate fast communication, are easy to use, and membership is open to anyone. However, they also have disadvantages in that messages are easily overlooked and it is difficult to develop a target audience. Wikipedia is structured to ensure that the resource is easy to access and edit by anyone, the language is free of jargon or defined, and information is well documented. Wikipedia is excellent for recording the current state of digital geologic mapping, but is far from ideal for the purpose of sparking conversation because posting original research or opinions violates two of its core content policies (http://en.wikipedia.org/wiki/Wikipedia:Neutral_point_of_view). Therefore, the geomapping_technology e-mail list is better suited for this purpose. In addition to DGGS's efforts, attendees of the Digital Mapping Techniques 2011 workshop are designing an additional online resource and discussion board for geologists, GIS specialists, and cartographers, which will include a section on computing in field geology. We anticipate that this new resource will be a virtual meeting place where ideas, opinions, successes, failures, methodology, tips, and tricks can be shared with the community.

DIGITAL GEOLOGIC MAPPING SURVEY, 2010

Many researchers are experimenting with and using digital geologic field mapping, while relatively few of these efforts are reported in publications or informally, online. To capture the experience and wisdom of these pioneers and take a snapshot of the technology, more than 1,250 organizations (university geology departments, state and national geological surveys, and the private sector) were surveyed in 2010 regarding their thoughts on and use of digital field mapping. Two basic categories were addressed in the survey: (1) general interest in using computing technologies as a field tool, and (2) the current technology being utilized to conduct digital field mapping. The majority of respondents (82 percent) stated that they are interested in applying digital mapping to their field programs, although only half of them are currently using digital mapping. Comments indicate that, although the interest exists, expense and lack of a proven methodology (including hardware and software well suited to fieldwork) remain major hurdles to digital mapping becoming commonly used in the field.

In geologic education, the best role of digital field mapping is undetermined. A significant number of geology faculty at universities responded that digital mapping is inappropriate at the undergraduate level, when students are still learning the fundamentals of

geology, but that it may be useful for graduate students and experienced researchers. However, a few universities do have successful undergraduate field programs with a digital mapping component, e.g., Bowling Green State University (http://www.bgsu.edu/departments/geology/page58461.html), University of Kansas (http://www.geo.ku.edu/programs/tectonics/digitalmapping/mappingwebpage.shtml), and University of Texas at El Paso (Pavlis, 2010).

In 2010, the most popular digital mapping device was the PDA, and Trimble brand devices in particular (http://www.trimble.com/). The most widely used software was ArcPad by ESRI (http://www.esri.com/software/arcgis/arcpad/). Mappers are collectively using a large number of hardware and software combinations, sometimes including traditional handwritten notes or paper maps. Around 40 percent of geologists are satisfied with the systems they have devised. Another 40 percent of geologists are willing to overlook minor annoyances and imperfections in their digital field systems for the convenience of taking digital notes and producing real-time digital geologic maps while on traverse.

CONCLUSIONS

The geologic community is still working the bugs out of methods for digital geologic field mapping. Many geologists are excited about the possibilities, but a simple, easy-to-use, cost effective, and robust system is not yet widely available. Increased communication on the successes and failures of computing in the field using various forms of online digital and social media will help this technology grow and improve more quickly to meet users' needs. Crowdsourcing, i.e., "Many heads are better than one," is a viable option to design digital field mapping systems that meet the needs of the mapping community. The Wikipedia page "Digital geologic mapping" and the geomapping_technology e-mail list are currently available avenues of communication. The National Geologic Map Database website (http://ngmdb.usgs.gov) will have a link to the new digital geologic issues forum/wiki when it becomes available for online data sharing opportunities.

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