

Spatial Data Infrastructure Supports Long Term Measurements to Detect Arctic Change

Allison Graves¹, Craig E. Tweedie², David Zaks², Shawn Serbin²,
William Manley³, Jerry Brown⁴, Robert Bulger⁵

1. Nuna Technologies, PO Box 1483, Homer, AK 99603, USA.
2. Arctic Ecology Laboratory, 100 North Kedzie Hall, Michigan State University, MI 48824-1031, USA.
3. Institute of Arctic and Alpine Research, University of Colorado, Campus Box 450, Boulder, CO, USA
4. International Permafrost Association, PO Box 7, Woods Hole, MA 02543, USA
5. Barrow Arctic Science Consortium, PO Box 577, Barrow, AK 99723, USA

On a global scale, the “Establishment of Spatial Data Infrastructures (SDI) is emerging as a major endeavor. The SDI encompasses the policies, organizational remits, data, technologies, standards, delivery mechanisms and financial and human resources necessary to ensure the availability and access to spatial data.”

Global Spatial Data Infrastructure web site: www.gsdi.org

The Barrow Arctic Science Consortium’s Digital Working Group (BASC-DWG) is striving to contribute to the global SDI effort through creation of a regional framework focused on the area surrounding Arctic research at Pt. Barrow, Alaska. The Barrow Area SDI is an essential framework to aid research efforts in detecting change over time. The tools of this framework are being developed and made available for the Barrow, Alaska area, but are applicable to other regions within the arctic system faced with the challenge of monitoring coastal dynamics.

Many research efforts are spatial in nature and often involve establishing and monitoring transects, referencing remotely sensed imagery or performing analysis with Geographic Information System (GIS) technology. Unfortunately, much of the data is dispersed, sets of measurements on the ground are not standardized and imagery exists in varying formats. The BASC-DWG is tackling these issues with the implementation of SDI resources and standards to promote the collection of consistent measurements for long-term monitoring programs. Components of the Barrow Area SDI include physical infrastructure, data and spatial data policy. The Barrow Area SDI provides tools such as a survey grade Differential Global Positioning System (DGPS), geospatial data (remotely sensed imagery, GIS themes, ground control points), standards (software, hardware, map projection, datum, metadata, use of ground survey markers), associated attributable databases plus a means for archiving and distributing this information. Through the Barrow Area SDI, user protocols will be stressed in an effort to ensure consistency for long-term monitoring.

A key component of the Barrow Area SDI is the Barrow Area Information Data – Internet Map Server (BAID-IMS). The Barrow Area Information Database began as a relational database in Microsoft Access. Through the efforts of the BASC-DWG, this tool was developed to include a web-based interface with mapping capability. The

resulting Barrow Area Information Database – Internet Map Server (BAID-IMS) provides a means for tracking historic and current research activities, a logistic planning tool, an aid for permitting new study sites, plus a means for connecting researchers working in the Barrow area and a tool for public outreach. Research efforts focused on tracking coastal erosion can use this tool to locate erosion markers, ground control points, a time series of coastline delineations, plus historic and current imagery (air photos and satellite images.)



Web address: <http://ims.arcticscience.org>

Standard data formats (ESRI shape files, ArcGIS GRID format, GeoTiffs, map projection and datum) and metadata have been compiled to meet the Federal Geographic Data Committee standard (FGDC). Metadata ensures that geospatial data is used appropriately while it preserves and passes on institutional knowledge to new users. FGDC formatted metadata is a requirement for publishing geospatial data on a federally recognized clearinghouse nodes such as the National Science Foundation's Arctic System Science (ARCSS) Data Coordination Center (ADCC) at the National Snow and Ice Data Center, Boulder, Colorado.

The Barrow Area SDI framework would not be possible without the foresight of a dedicated team of professionals who are actively involved in research that requires geospatial technology. The Barrow Area SDI is a prototype that may be modeled by other research hubs throughout the Arctic.

For more information on the emerging Barrow Area Spatial Data Infrastructure resources and tools, please visit our web site: www.arcticscience.org

References:

Recommendations for a Geographic Information Infrastructure to Support Arctic Research: Outcomes of the Arctic GIS Workshop, 22-24 January 2001, Seattle, Washington. Mark Sorensen, William F. Manley, Renée D. Crain, and Wendy K. Warnick. (eds.) The Arctic Research Consortium of the U.S. (ARCUS). Fairbanks, Alaska. 2001. 49 pp.

Global Spatial Data Infrastructure

<http://www.gsdi.org/>

Acknowledgements:

The Barrow Area SDI effort is made possible through support from the National Science Foundation (NSF Award OPP-0004401) and the US Geological Survey (USGS Award Number: 03HQAG0177) to the Barrow Arctic Science Consortium.

This manuscript is submitted for publication with the understanding that the United States Government is authorized to reproduce and distribute reprints for Government purposes.

The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.