SDVIEW: REMOTE SENSING PARTNERSHIPS, INFRASTRUCTURE AND DATA FOR SOUTH DAKOTA

Mary O’Neill, Program Manager
Kevin Dalsted, Director
Pravara Thanapura, Research Associate
Engineering Resource Center
David Clay, Professor
Cheryl Reese, Research Associate
Plant Science Department
Sung Shin, Professor
Jae Lee, Student
Jungyeon Kim, Student
Hee Jeon, Student
Electrical Engineering and Computer Science Department
South Dakota State University
Brookings, SD 57007
mary.oneill@sdstate.edu
kevin.dalsted@sdstate.edu
pravara.thanapura@sdstate.edu
david.clay@sdstate.edu
cheryl.reese@sdstate.edu
sung.shin@sdstate.edu
calius10@hotmail.com
kim@csc.sdstate.edu
buenokeb@hotmail.com

ABSTRACT

SouthDakotaView (SDView) is a consortium of educational institutions, government agencies and private sector organizations in South Dakota with a vision of building partnerships and infrastructure to facilitate the availability, timely distribution and utilization of remote sensing and associated geospatial data and technology. South Dakota is a charter member of and active participant in the AmericaView program. The purpose and goals of SDView are in alignment with those of AmericaView and its focus on the support of applied research, K-16 education, workforce development, and technology transfer. This paper describes six long-term goals of SDView in the areas of consortium development, imagery archive development, education and outreach efforts and research. Achievements to date and anticipated activities related to the goals are also described.

INTRODUCTION

Remote sensing is a technology with a presence in South Dakota since 1969 when the Remote Sensing Institute was established on the campus of South Dakota State University. As in many states, it was a technology that for many years was considered esoteric and struggled for meaningful utilization in the public and private sectors. Even with the world renowned National Center for EROS and its voluminous archive of remotely sensed imagery residing in South Dakota, adoption of this technology in the state has been slow. The recent advent of remotely sensed data with improved quality, resolution and processing capability has renewed interest in the technology and increased demand for geospatial products and services. SouthDakotaView (SDView) is a program that seeks to address this demand as well as demonstrate and encourage further utilization of geospatial technologies in South Dakota and beyond.
South Dakota is among the charter states of the AmericaView, Inc. organization. The purpose and goals of SDView are in alignment with those of the AmericaView program and its focus on the support of applied research, K-16 education, workforce development, and technology transfer. The vision of SDView is to build partnerships and infrastructure in South Dakota to facilitate the availability, timely distribution and utilization of remote sensing and associated geospatial data and technology. In support of this vision, SDView has developed six long-term goals. These goals, achievements to date and anticipated activities related to the goals are described in this paper.

**SDVIEW CONSORTIUM**

Two of the long-term goals for SDView involve consortium and partnership development. They are:

- Develop the SDView consortium such that it meets the needs of South Dakota and participates synergistically within AmericaView, Inc.
- Build partnerships with state and local government entities that explore and test the utility of remote sensing data products for practical applications that will benefit the citizens of South Dakota.

Development of the SDView consortium began in 2002, the first year of AmericaView funding for South Dakota. Formal members in the consortium via a Memorandum of Understanding are the South Dakota Space Grant Consortium, the South Dakota Center for Biocomplexity Studies, South Dakota State University and Augustana College. Other members with a more informal membership arrangement are the South Dakota School of Mines and Technology, the University of South Dakota, and Dakota State University. State and federal agencies within South Dakota have also participated in consortium activities. South Dakota State University serves as the lead university in the SDView consortium. The recruitment of additional consortium members is an on-going effort.

A steering committee has been established to guide the direction of the SDView consortium as well as to provide a forum for the exchange of information among the steering committee members. Members include representatives from the formal and informal consortium partners as well as from Capital University, the USDA Natural Resources and Conservation Service, the South Dakota Bureau of Information and Telecommunications, and Raven Industries. A representative from the AmericaView program at the National Center for EROS also attends the steering committee meetings in an informational capacity. Two or more steering committee meetings are held annually.

SDView personnel are active participants in the AmericaView program and interface frequently with personnel from other AmericaView states. Interface opportunities are provided at the Winter Business Meeting held annually in the Washington DC area, at the Annual Conference held at various locations each fall, during monthly teleconferences, and during working group teleconferences and meetings. The 2004 Annual Conference was held at the National Center for EROS, making it convenient for SDView members to attend. SDView personnel served on the planning committee for this event.

SDView meetings are nominally held each year, often in conjunction with another statewide meeting. Anyone interested in geospatial technology is invited to participate in the meetings. An e-mail list of individuals who have expressed an interest in SDView has been compiled and is used for sending meeting notices and periodic newsletters. Information about SDView is also disseminated at various meetings in the state such as the Black Hills Digital Mapping Association meetings. An SDView website (http://sdview.sdstate.edu) has been established to provide information about SDView and its activities and disseminate data for the state. The website may also be accessed via the AmericaView, Inc. website (http://www.americaview.org) or the USGS AmericaView Program website (http://americaview.usgs.gov).

**IMAGE ARCHIVE**

Two long-term SDView goals concern an image archive for the state. They are:

- Build an archive of remote sensing data for South Dakota.
- Build a system for the visualization and efficient distribution of the image archive data.

In support of these goals, SDView has developed an archive of South Dakota Landsat data. The archive presently includes 229 frames of Landsat 4, 5 and 7 imagery. Two different tools are provided for imagery searching,
previewing and no-cost downloading from the SDView website – SDLandsat and SDVis. Both tools access the same imagery database. The SDLandsat tool is a locally developed, simple-to-use tool with limited functionality (Figure 1). The SDVis tool is an SDView adaptation of the USGS Global Visualization or GloVis tool (Figure 2). Upon release by USGS, improvements and updates for GloVis are incorporated into SDVis. In the past year there have been approximately 1500 bands of Landsat data downloaded from the archive. An enhancement under development for both SDLandsat and SDVis is the capability to clip out a portion of a Landsat scene and download only that portion of the scene. Although download times are currently reasonable and the system is capable of supporting several concurrent users, the addition of the clip capability will facilitate even faster download times. Another archive enhancement under consideration is the addition of MODIS data to the archive.

The Landsat data used to populate the SDView archive was donated by a variety of researchers and scientists from South Dakota and elsewhere who had previously purchased the data for various projects and applications. Through the AmericaView program and SDView, Landsat historical imagery not in the archive and new acquisitions can be purchased at reduced cost. Those who take advantage of this service are asked to share the imagery with others via the SDView archive.

From the SDView website, users can also access digital base data for South Dakota that is stored at the South Dakota Geological Survey on the campus of the University of South Dakota. These datasets include digital elevation models (DEM), digital raster graphics (DRG), and digital line graphs (DLG). Digital Orthophoto Quads (DOQ) from the 1990s and National Agricultural Imagery Program (NAIP) datasets for 2003 and 2004 can also be accessed.

Figure 1. Screenshot of the SDLandsat image search page.
Expanding the knowledge and utilization of remote sensing via courses, workshops and other educational opportunities for K-12 educators, university students and the existing workforce is another long-term SDView goal.

At the K-12 level, SDView has co-sponsored several workshops in which educators have received training on the utilization of GIS, GPS and remote sensing in their K-12 classrooms. Earth Science Tools for Educators is a week-long workshop held annually at the National Center for EROS. A maximum of 20 educators are trained each year. In addition to the use of their training room, EROS provides several guest presenters and an in-depth tour of the facility. In conjunction with the South Department of Education, four weekend workshops were also held during the past year. A total of 78 educators received training during these workshops. SDView data resources were utilized extensively in all of the workshops. In the coming year, more emphasis will be placed on follow-up assistance for educators who have participated in workshops. This assistance may be provided via e-mail, the telephone or school visits. Items that are deemed to be of interest to a wide audience of educators are disseminated via an e-mail distribution list maintained by SDView.

At the university level across South Dakota, remote sensing is increasingly used and taught in the classroom. A survey will be conducted in the coming year to determine the number and scope of remote sensing courses taught across the state as well as the number of students enrolled in the courses. Instructors for these courses will be made aware of SDView resources and encouraged to utilize them.

Figure 2. Screenshot of the SDVis image discovery tool.

EDUCATION, OUTREACH AND TRAINING

Pecora 16 “Global Priorities in Land Remote Sensing”
October 23 – 27, 2005 * Sioux Falls, South Dakota
Another educational resource supported by SDView is Adopt-a-Farm, a web-based instructional unit that can be accessed from the SDView website. The goals of Adopt-a-Farm are to show how spatial information can be used to improve resource management decisions in agriculture and to explain how those decisions affect those in rural and urban communities who are not actively involved in agricultural production. Lessons include information on GIS, GPS and remote sensing and how they are used in precision agriculture and other ag-related activities. Workshops have been held across the state to acquaint educators with Adopt-a-Farm and provide hands-on GPS instruction. A classroom set of handheld GPS units is available for schools to use in conjunction with Adopt-a-Farm.

Geospatial technology training has been provided to farmers and ranchers who are involved in precision agriculture. Workshops and personal visits are the venues used for the training.

SDView participates in the AmericaView Education Working Group. This working group exists to support remote sensing education, outreach and training efforts in the areas of K-12, collegiate and continuing education. It provides a forum for scholarly exchange of insights and experiences, for developing and sharing technical expertise and material resources, and for developing multi-participant collaborative projects.

RESEARCH

The final long-term SDView goal is to support remote sensing research at research universities in South Dakota through access to data and, as funding becomes available, through grants and contracts.

The SDView Landsat archive has been utilized by researchers for projects such as monitoring invasive species in a national grassland area and assessing the extent of flooding in the northeast region of the state. Landsat data from the SDView archive will also be used in a 2006 participatory research effort to identify yield management zones in the fields of the producers who have requested university assistance.

Researchers are currently taking advantage of an offer from USGS and AmericaView for three free taskings of the Advanced Land Imager and/or Hyperion instruments aboard the EO-1 satellite. The imagery will be utilized for natural resource assessment on tribal lands in the state and for classroom instruction.

REFERENCES

Websites and internet resources mentioned:

http://sdview.sdstate.edu SouthDakotaView
http://www.americaview.org AmericaView, Inc.
http://americaview.usgs.gov USGS AmericaView Program
http://glovis.usgs.gov USGS GloVis