

Civil Applications Committee

2000-2001

Activity Report

April 3, 2002

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Chairman's Comments

As the new Chairman of the Civil Applications Committee (CAC), I would like to first recognize the outstanding contributions of our prior Chairman, Ms. Karen Irby. Her dedicated service as the National Civil Applications Program Manager and Chairman of the CAC was responsible for a number of key successes that will benefit the civil community well into the future.

I would also like to highlight some of our key successes during 2000-2001. The most significant achievement in 2000 was the approval of the new CAC Charter that significantly broadens opportunities for interagency collaboration and exploration of new civil applications of current and emerging national systems data technologies. Under the new charter, monthly CAC membership has been expanded to include the Department of Health and Human Services as a voting member, and the Department of State and the Central MASINT Organization as non-voting associate members. In 2000, the installation of Sky Media receiving stations in a number of civil facilities was successfully completed; this will greatly facilitate the ability to receive and integrate the use of commercial satellite imagery by means of the National Imagery and Mapping Agency (NIMA) Commercial Imagery Program (CIP). The successful installation of the [REDACTED] at the United States Geological Survey (USGS) Advanced Systems Center (ASC) was the first step [REDACTED] in a timely fashion. The ultimate value of these two achievements is realized in the ability to fuse national systems data, commercial satellite imagery, and geospatial data to create more useful products. To support outreach efforts, CAC Web sites were established on the Open Source Information System (OSIS) and Intelink. In addition to providing fundamental information about the CAC and its members, these sites will be used, beginning in the third quarter 2002, to post meeting minutes and agendas and to highlight civil agency projects. The "Civil Applications Committee Security Guidance Plan" was published to provide assistance to member agencies seeking to establish SECRET collateral facilities within their own organizations.

Over the last two years, the CAC Secretariat was successful in working with NIMA and the Imagery Policy and Security Committee (IPSCOM) to secure broadened approval for the production and release of Imagery Derived Products (IDP). This includes authorizations for digital elevation models, land use-land cover mapping, and products to support disaster and hazard response. These approvals allow CAC agencies to produce and disseminate needed products in a more timely and efficient manner. In 2001, new metadata guidelines for IDPs were developed (for distribution in January of 2002) that will facilitate the exchange of data in a common format. In addition, to support the training needs of member agencies, the Secretariat sponsored very successful national systems data training courses held in Washington, D.C., and Denver, Colorado.

The new CAC Charter highlighted opportunities that bring with them new and difficult technical and national policy challenges. The Nation faces increasing challenges to understanding global change, protection of environment and biodiversity, sustainability of critical resources, characterization of and response to natural hazards, impact of environment on national and regional security, and so on. There is increasing interest in exploring how the civil community can use national systems data to support homeland security activities. Evolving commercial satellite capabilities make it clear that we need to carefully evaluate how to best incorporate these capabilities, while preserving the use of national systems data for truly unique requirements that cannot be satisfied any other way. We are in the final stages of implementing infrastructure upgrades to ensure compatibility with the new Enhanced Imagery System (EIS). However, Department of Defense (DOD) and Intelligence Community (IC) development of Future Imagery Architecture (FIA) poses new technical and budgetary challenges that will need to be addressed

in order for the civil community to sustain the effective use of national systems data well into the future.

In order to address these challenges, in 2001 we took the important step of establishing the CAC Executive Steering Group (ESG). The ESG will oversee the activities of the monthly CAC and provide an appropriate political forum for elevating recognition of these important challenges and resolving key policy issues that impact civil community access to and use of National Technical Means (NTM).

Since 1975, the CAC has enjoyed numerous successes that resulted from the efforts of CAC members, both individually and collectively, to promote and maintain strong collaborative relationships between the DOD, intelligence, and civil communities. All CAC members past and present are to be commended for the fine record of achievements to date. I look forward to your support as we face the challenges of the 21st century together.

Dr. Charles Groat
Chairman

Working Group Activity Reports

Imagery Derived Products Working Group

The Chairs and Co-Chairs for the IDP Working Group (IDPWG) in the year 2000/2001 were Lew Moore, Department of the Interior (DOI) Bureau of Reclamation; Rick Dobie, United States Army Corps of Engineers (USACE); Erik Hund, National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center; Carolyn Holland, United States Department of Agriculture (USDA)-Forest Service; and Ron Keeler, USGS. Working group meetings were conducted on a monthly basis in 2000 and on a bimonthly basis throughout 2001.

The IDPWG continues to be the forum in which IDP policy issues are discussed and resolved, IDP use requests by the civil community are vetted, and guidance documentation is developed. In 2000, IDP policy changes resulted in changes in the IDP approval process for nonliteral IDPs and in NIMA requiring a site license for facilities to produce literal IDPs. Nine CAC agency secure facilities received a site license to produce literal IDPs: (1) USGS ASC, Reston, Va.; (2) USGS National Center Collateral Facility, Reston, Va.; (3) USGS Rocky Mountain Mapping Center, Denver, Colo.; (4) USGS Mid-Continent Mapping Center, Rolla, Mo.; (5) USDA-Forest Service, Remote Sensing Applications Center, Salt Lake City, Utah; (6) USACE, Topographic Engineering Center, Alexandria, Va.; (7) NOAA, Silver Spring, Md.; (8) NOAA National Geophysical Data Center, Boulder, Colo.; and (9) NOAA Coastal Services Center (CSC), Charleston, S.C. All sites, except NOAA's Boulder, Colo., site, were renewed for 2001.

Technical support to the CAC's IDP production facilities has been provided through the IDPWG.

[REDACTED], was distributed to each site-licensed CAC facility. A new version of the IDP ToolKit, with only nonliteral processing capabilities, was distributed to each facility. Six MET training courses were conducted for 37 CAC agency personnel between August and December of 2000. An e-mail discussion list was initiated that provides a mechanism by which personnel at all CAC agency IDP production facilities can communicate information related to data exploitation and product generation systems and techniques.

IDP educational activities were conducted through workshop and training presentations, production site visits, and other outreach activities. IDP presentations were made at the CAC-sponsored NTM 101 and 102 courses held in 2000 and 2001, at the Bureau of Land Management (BLM) Remote Sensing Conference in April 2000, and at the U.S. Coast Guard in Suitland, Md. IDP production site visits during 2000, made in conjunction with NIMA policy personnel, were conducted at NOAA Coastal Services Center, Charleston, S.C.; NOAA National Geophysical Data Center, Boulder, Colo.; USDA-Forest Service Remote Sensing Applications Center, Salt Lake City, Utah; USGS Mid-Continent Mapping Center, Rolla, Mo.; and USGS Rocky Mountain Mapping Center, Denver, Colo. An IDPWG Web page was developed for the CAC Web site, which was placed on Intelink in September 2000. In 2001 an updated IDP fact sheet was published, and the IDPWG completed a guideline on how to complete metadata elements for IDPs.

In 2000, six new civil agency use requests and three new techniques were submitted and approved through the Imagery Policy and Security Committee. In 2001, seven IDP use requests and three amendments to existing requests were submitted and approved.

Requirements Working Group

The CAC Requirements Working Group (RWG) was reestablished in January 2000 to develop and implement a requirements-gathering process to determine the data, product, and facility needs of the CAC community. The RWG considered several issues, including the identification of the current and potential customer base, exploration of barriers to the acquisition and use of various products, and development of a template for requirements gathering. The focus of the RWG through most of calendar year 2000 was the development of the requirements template; the template became the core tool of the Member Agency Project Requirement Survey fiscal year (FY) 2001. Information gathered from the Requirements Survey can be used by the USGS and other CAC member agencies to project the type and level of support needed for successful completion of national systems projects in FY 2001. An electronic version of the survey, developed with the assistance of The Analytic Sciences Corporation (TASC), was distributed to CAC member agencies in early August 2000. Completed templates were submitted to TASC for consolidation and sorting of the data in preparation for analysis by the RWG. The summary information was provided to the RWG beginning in October 2000, with revisions through the end of December. The survey can be revised and administered in subsequent years to gather yearly project data. This group met on a regular basis during the development of the survey and now meets on an ad hoc basis.

Global Fiducials Working Group

The Global Fiducials Program provides a library for the long-term collection and archiving of imagery of environmentally sensitive and indicative sites around the globe. The Fiducials Library creates a long-term archive legacy of information for current and future research, policymaking, and an understanding of processes associated with the causes and effects of environmental change.

The Global Fiducials Working Group was revitalized in 2000, with Rick Dobie (USACE) serving as chairman for one year, followed by the current chair, Lawrence Friedl (Environmental Protection Agency (EPA)). In 2001, representatives from nine agencies were active in the working group, with commitments from two additional agencies to join. These representatives work together to coordinate civil community input to the program and resolve issues associated with site management and collection of data.

During 2001, several CAC Agencies renewed their interest in the Fiducials Program. The agencies reexamined their original site nominations for the library and proposed new, additional sites. By the end of the year, the Working Group had proposals for 675 possible sites across the 9 active agencies. The Working Group established a classification schema to analyze the types of ecosystems represented by the current and nominated sites; the schema will be used to identify gaps and overlaps in the types of sites. Work is ongoing to finalize site lists, refine descriptions, and determine tasking parameters and requirements in order to initiate data collection.

The acquisition of imagery for sites already validated by sponsoring agencies is underway, and data are being archived in the library system. The imagery and associated IDPs are being used to support current agency programs while also being stored for future use by the scientific community.

Department and Agency Activity Reports

U.S. Department of Agriculture

USDA agency missions continue to benefit from the use of national systems data for emergency response, natural resource inventory and monitoring, mapping, development of conservation measures, and land management support. Applications during 2000 and 2001 are described below.

Emergency Wildland Fire Suppression Support

[REDACTED] This was especially true during the fire season of July and August 2000, which was the most active fire season for the United States in 50 years. During that season, the Federal fire community benefited greatly [REDACTED]

[REDACTED] These [REDACTED] were produced for [REDACTED]

[REDACTED] The ability to obtain this information [REDACTED] and achieve the necessary coverage of the affected area. These fire-mapping products were well received by field personnel. All told, during the 2000 fire season, 90,000 fires burned 7.2 million acres and cost \$1.6 billion to suppress. [REDACTED], the damage and loss of life and property could have been much worse.

Forest Service Mapping Activities

The Forest Service is responsible for mapping all National Forest lands. One of the critical steps in the mapping process is to obtain ground control point coordinates in order to accurately reference the map to a world coordinate system. The Forest Service typically uses Global Positioning System (GPS) technology to collect control by physically visiting field sites. In remote locations, such as wilderness areas, GPS field crews are prohibited from using motorized vehicles and can spend weeks hiking to the required locations to take the needed measurements. In 2000, a technique was developed and tested to collect control that eliminates the need to visit these remote field sites. In 2001, approval was obtained for the technique, and it was used on two projects for which it had been extremely difficult to acquire field-surveyed control.

In addition to collecting control as described above, the process of control extension can be used to generate control locations on the basis of a minimal number of field-surveyed control points. As part of the National Digital Orthophoto Program, the Forest Service is responsible for creating and maintaining digital orthophoto quadrangles over National Forest lands. In support of this activity, five control extension projects were completed in FY 2000, covering approximately 10,000 square miles. In FY 2001, an additional four projects were completed, encompassing about 12,000 square miles. This activity saved field personnel about \$125,000 in surveying costs each year.

Other Activities

The Forest Service is directed by Congress to perform a National Forest Inventory and Analysis for all lands within U.S. borders and to develop a strategy to incorporate remote sensing and other

advanced technologies into this analysis. The benefits of national systems data to support inventory and monitoring applications are being studied by the agency. Selected sites in Montana were imaged on a trial basis to determine their potential utility for deriving tree and plot-level information for the FIA program. The results were promising for a variety of resource-monitoring applications within the Forest Service.

Imagery was collected of the U.S. Great Plains area for identification of prairie dog habitat. The resulting analysis, performed at the Forest Service Remote Sensing Applications Center in Salt Lake City, yielded some interesting results. Prairie dog habitat has been increasing in importance, and the Forest Service has a critical need to monitor habitat status. This is particularly necessary as it pertains to locations on the National Grasslands administered by the Agency.

The Forest Service is an active participant in the IDPWG and currently chairs the group. The Agency has also created a number of IDPs, including nonliteral polygon maps to support long-term rehabilitation activities in northern Minnesota following devastating high winds in 1999 that affected more than 600 square miles of the Boundary Waters Canoe Area Wilderness and surrounding areas. The Forest Service continues to be actively involved with recovery and monitoring efforts for this area.

A presentation was made at the NTM 102 session in the Denver area, in July 2001, concerning [REDACTED]. This session was well attended, and there is increased appreciation for the benefits of NTM in this area. The Salt Lake secure facility has seen increased use by Federal law enforcement personnel and representatives from the National Reconnaissance Office and NIMA related to the 2002 Olympics security arrangements.

In cooperation with the BLM, the Forest Service created a digital terrain model of an area near the Bering Glacier in Alaska. Water dammed up behind the glacier periodically breaks through and floods across BLM land and the Chugach National Forest to the ocean. The digital terrain model will be used to analyze and predict the extent of future flooding.

The Agricultural Research Service (ARS) is charged with conducting research to improve the quantity and quality of U.S. food production and to protect the agricultural and renewable natural resource environment. Ground surveys are one of the parameters used by the ARS in its research on how nutrients and chemicals migrate through the soil and into the ground water and streams. To study this migration requires a very accurate ground survey. A digital terrain model was created over an ARS study site in Iowa and successfully used to validate the accuracy of data collected on the ground by a new kinematic GPS process.

Department of Commerce – National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration of the U.S. Department of Commerce has been a participating member of the CAC since its inception. From the beginning, NOAA's National Ocean Service (NOS) has used national systems data in support of its coastal mapping program, but the past several years have seen increased use for various applications by other NOAA offices.

National Ocean Service

The Remote Sensing Division of NOAA's NOS National Geodetic Survey (NGS) continued to use national systems data to support the nautical charting program during 2000-2001. These data are used for updating and evaluating the adequacy of nautical charts. During 2000, the NGS used national systems data for shoreline compilation in support of the coastal mapping program for Kiska Island, the area of Cape Resurrection, and the area of Glacier Bay National Park in Alaska. During 2001, the NGS used national systems data for shoreline compilation in Harris Bay and Resurrection Bay in Alaska, as well as for several islands within the Northwest Hawaiian Islands chain. National systems data were also used to evaluate the need for chart revision in the port area of Richmond, Calif., as part of the Coast and Shoreline Change Analysis Program.

The Office of Response and Restoration, Hazardous Materials Response Division, received IDPs to assist in the assessment of and response to the oil spill resulting from the grounding of the Tank Vessel JESSICA in the Galapagos Islands in January 2001.

In 2000-2001, NOAA's CSC used national systems data to support remote sensing and geographic information system (GIS) activities, including land cover mapping, ecological characterization, hazards risk analysis, and National Marine Sanctuary visitor use.

The Gray's Reef National Marine Sanctuary, located 20 miles east of the Georgia coast, is one of the largest nearshore live-bottom reefs in the southeastern United States and contains a diverse ecosystem of fish and invertebrates. The sanctuary's management and research studies plan focuses on the long-term status of fish populations, benthic invertebrates, oceanographic conditions, sediment transport, and visitor use. An analysis of boat traffic was performed using national systems data and Coast Guard Auxiliary flight observations to detect seasonal variations in visitor use.

The CSC used IDPs to support an ecological characterization project for the Kachemak Bay National Estuarine Research Reserve (NERR), Alaska. The reserve is a unique, productive estuary that supports extensive tidal flats, deep-water fjords, clear and glacial rivers, and diverse fish and wildlife habitats. IDPs produced from NTM data provided historical coverage of the NERR and were used to verify historical logging activities on the Kenai Peninsula. In addition, ground control points obtained from digital orthophoto quadrangle (DOQ) IDPs were used to orthorectify NOS aerial photographs. The photographs were used to identify shellfish habitat in the intertidal zone.

The NOAA Coastal Change Analysis Program (C-CAP) maps groundcover along the Nation's coastal zone. The data used in this land cover classification effort are obtained using a combination of Landsat Thematic Mapper (TM) imagery, aerial photographs, and fieldwork. National systems imagery was used in coastal areas of North Carolina and in the Hawaiian Islands to validate the accuracy of land cover classes in areas that could not be field checked.

The CSC also produced IDPs for a coastal hazards GIS project in Newport, Oreg. Efforts from this project will increase the resilience of West Coast ports, harbors, and coastal communities when faced with earthquakes and tsunami hazards.

In December 2000, the CSC hosted the CAC Meeting at the NOAA Center for Coastal Environmental Health and Biomolecular Research in Charleston, S. C. The meeting included a tour of the Fort Johnson Marine Resources Offices, which was hosted by the South Carolina Department of Natural Resources Marine Resources Division.

National Marine Fisheries Service

The National Marine Fisheries Service is using archival imagery to study Chinook salmon habitat along the Sacramento River between Sacramento and Keswick Dam to identify diversions and other factors in the river and examine change in the riparian zone along the river. The imagery has not been exploited and no IDP request has been made.

In September 1998, a massive dredging project was completed in the Atchafalaya River Delta, creating new wetland habitat in coastal Louisiana. Imagery has been acquired for September 1995, 1998, 1999, and 2000 and 2001. The imagery has been exploited by the U.S. Geological Survey to determine shorelines and areas of accretion and erosion from year to year. IDP approval has been obtained, and products have been briefed to Senator Breaux's staff.

The National Marine Mammal Laboratory, Alaska Fisheries Science Center, conducted two pilot studies using national systems to evaluate distribution and abundance estimates of harbor seals in glacial haulouts and Steller sea lions located in remote locations. The harbor seal study focused on two locations in Alaska-Columbia Bay in Prince William Sound and Icy Bay in the eastern Gulf of Alaska. Imagery was regularly acquired at both locations over a 10-month period of time. Exploitation of the data has occurred and will continue in 2002.

The Steller sea lion study analyzed distribution and abundance estimates compared with traditionally used methods with viable results. Imagery was collected at five locations during the Steller sea lion breeding season. These locations were chosen to include evaluation of estimates at different types of preferred habitats; that is, rocky substrates and sandy beaches. Products were generated using national systems data, and a nonliteral IDP request may occur after internal review of the results.

National Environmental Satellite, Data, and Information Service

The NOAA National Environmental Satellite, Data, and Information Service's National Geophysical Data Center (NGDC) conducted a pilot study for the Federal Aviation Administration (FAA) to evaluate the potential use of national systems data in locating abandoned beacon fields and other target areas. These sites were established in the 1930s and decommissioned in the 1950s. The locations of many of these sites are no longer known, and the FAA must locate them so that any remaining environmental hazards can be removed. The value of national systems data for locating the beacon fields was limited by the restriction to collections on Federal lands. Using an evaluation of multiple sources, the NGDC recommended that the FAA use a light-aircraft pilot-observer method for locating, photodocumenting, and acquiring GPS locations of the beacon fields.

The NGDC managed collections of national systems data of coral reef areas in the Pacific region in support of the NOS coral reef mapping and monitoring program. The NGDC assisted NIMA in establishing a Defense Meteorological Satellite Program nighttime lights laboratory, which was used to analyze power grid conditions worldwide on January 1, 2000.

In 1999, the [REDACTED] established two secure facilities in [REDACTED]. One is certified at the secret level; the other is at the Sensitive Compartmented Information (SCI) level. These facilities are shared with the [REDACTED]

[REDACTED] Both the NGDC and the NTIA have digital

photogrammetric workstations in the secure facilities. The [REDACTED]

Department of Energy

The Department of Energy had no active civil projects in 2000-2001.

Department of the Interior

Bureau of Land Management

The BLM has used national systems imagery since 1994. BLM's first project using national systems data was the Alaska Wetlands and Hydrography Project. This was a collaborative effort among several Federal agencies including the intelligence community, the BLM, and the U.S. Fish and Wildlife Service (FWS). The project developed procedures to use national systems imagery for inventorying wetlands, documenting wetland trends (losses and gains), and identifying the boundaries for hydrographic features.

This initial effort to use national systems imagery was very successful, and BLM has continued to use national systems data for these purposes. Since that initial success, BLM has used national systems imagery to support other activities and has continued to implement an infrastructure to support field use of national systems data.

Following are summaries of the year 2000 activities that involved national systems imagery.

[REDACTED]

Bering Glacier - The objectives of these national systems data activities include (a) delineating and monitoring forelands and ice margins, (b) monitoring beach side and ice erosion, (c) identifying and assessing existing and potential anadromous fish habitats, (d) identifying dusky Canadian goose habitats, and (e) doing hazard assessment for recreation and transportation. Control panels were established in 1998 to monitor long-term changes in the forelands area. Initial results seem to verify the potential to monitor the environment accurately. Additional control panels of improved design were deployed in 1999 and 2000 in both the Bering Glacier forelands area and the Berg Lake area on the west flank of the Bering Glacier. The project has significantly improved our understanding of how to use this technology.

National Petroleum Reserve, Alaska - This project began in 1999 as a test for using national systems data to detect environmental changes as a result of oil and gas development. State-of-

the-art oil exploration technologies are used to minimize environmental impacts in this area; however, with the use of national systems data, BLM hopes to assess changes more accurately in the extremely sensitive arctic ecosystem. In 2000, BLM produced maps that accurately delineated the extent of oil development. The area continues to be monitored for environmental change.

Hydrography/Riparian/Wetlands - the USGS, FWS, National Park Service (NPS), and BLM are using national systems data in a multiagency agreement to revise and automate all hydrographic features in Alaska. The BLM is also testing the value of national systems data in monitoring the condition of riparian areas and updating wetlands inventories in Wyoming.

Alaska Land Transfer - National systems data were used to map meander hydrography to assist cadastral survey fieldwork. Much of the current activity is on small islands in the Aleutian Archipelago, where accessibility and other factors essentially foreclose other options to acquire data.

Tangle Lakes, Alaska - Archaeological Survey - This project is using national systems data to identify and map archaeological sites in the vicinity of Tangle Lakes, Alaska. This is an archaeologically significant area that is rich in artifacts of prehistoric man. The archaeological survey will be used to guide the Bureau's management of these cultural resources.

Despite some difficulties, the BLM believes that national systems imagery can meet many mission-related information requirements. The BLM will continue to use national systems data when and where appropriate, recognizing that technical and policy restrictions may limit the utility of these data. Even so, the BLM is convinced of the value of national systems imagery and continues to explore new applications.

National Park Service

The NPS has used national systems data and participated in the CAC for 3 years. Through the GIS and Natural Resources Inventory and Monitoring Programs, the NPS is working to provide new information to park GIS specialists and resource managers for park management and protection, long-term monitoring, and scientific studies. NPS efforts have focused on the production of literal DOQs for supplementing national mapping programs in Alaska and Hawaii and for mapping and long-term monitoring as part of the Global Fiducials Program. The Global Fiducials Program will ultimately provide a consistent multiyear dataset for 63 sites in about 14 national parks. These sites compose a temporal view, representative of ecosystems across the NPS. These data will be critical to setting up long-term monitoring protocols and resource management strategies for these ecosystems. IKONOS imagery, Landsat, and hyperspectral data are being acquired over the same sites to complement and augment national systems data and IDPs. All of these projects are expected to last another 10 years or more.

Several temporal sets of DOQs were distributed to Cape Cod, Denali, Virgin Islands, and Great Smokey Mountain National Parks for review and use for park monitoring and resource management. Denali and Cape Cod personnel found the literal IDPs to be very useful, and in the case of Denali, IDPs helped to eliminate dangerous site visits to glaciers by helicopters.

Cape Cod National Seashore is a heavily visited and impacted coastal park in Massachusetts. It also contains critical habitat for many species of flora and fauna, such as the endangered piping plover shorebird. With a coastal extent of 40 miles and approximately 44,000 square acres, Cape Cod is preserving some of the most pristine dunes, wetlands, and beaches on the East Coast. The

DOQs were used to study and manage restoration of an important tidal wetland area where the staff is removing a dyke built in 1930. The staff was able to map changes in the environment and will be able to monitor how closely the restoration effort will approximate the 1840 maps of the original natural estuary. They have also been able to develop baseline maps of barren areas, water, and wetlands to monitor changes in area and visitor impacts. Using IDPs, the staff discovered and mapped areas to support efforts to better manage visitors and local planning.

Denali National Park and Preserve in Alaska is one of the largest and oldest national parks and contains North America's highest mountain, 20,320-foot Mount McKinley. Denali is a designated wilderness area and a United Nations Biosphere Reserve. For the park staff, over 6 million acres of treacherous land in the Alaska Mountain Range to manage, satellite imagery is an important source of information. Orders for commercial imagery have been in place for as many as 5 years before images could be acquired. National systems data provide a dataset over five different special monitoring sites. National systems data have been used to monitor changes in the glacial environment. By using national systems data over several years and refining techniques for measuring changes, the park staff hopes to be able to eliminate dangerous fieldwork and derive important data and mapped information about the environmental changes occurring because of global warming.

U.S. Geological Survey

Geology Discipline

The Volcano Hazards Program continues to use national systems data for monitoring volcanic eruptions worldwide in support of the Volcano Disaster Assistance Program (VDAP). During 2000, the USGS monitored the ongoing eruptions of Guagua, Pichincha, and Tungurahua in Ecuador. In February 2000, volcanic activity at Mayon, in the Philippines, was assessed for a possible VDAP response. In June-July 2000, baseline imagery was obtained for Momotombo, Nicaragua, in response to a report of unrest at that volcano. Baseline imagery was also obtained for Turrialba, Costa Rica, in December 2000-April 2001, following reports of changes at that volcano.

Other volcano-related requests came from USAID's Office of Foreign Disaster Assistance, including a request in April-May 2000 to assess volcanic activity at two volcanoes in the Democratic Republic of the Congo, Nyiragongo (not erupting at this time, in spite of major seismic activity) and Nyamuragira (erupting). A request was also made to assess the Mt. Cameroon eruption in June-July 2000.

In addition, VDAP requested that national systems data be obtained for the debris flow/flood at El Altar volcano in Ecuador. This event, which occurred on October 13, 2000, killed at least 13 people and many livestock. The imagery allowed VDAP scientists to determine that a large rock-fall triggered the event, not the collapse of a glacier, as was initially reported. In August-September 2001, imagery was also used to assess conditions of the crater lake at Mt. Pinatubo, Philippines, for a project that would allow controlled drawdown of the lake by breaching the dam created by volcanic debris.

National Technical Means (NTM) data were also used to support the Landslides Hazards Program following the Venezuela landslides and floods that occurred December 14-16, 1999. Initially, Landslide Program scientists used the imagery to assess the events. Later they used literal IDPs of the area to plan subsequent aerial photograph collection and fieldwork in Venezuela. USGS Landslide Program personnel carried out the fieldwork, with support from

USAID's Office of Foreign Disaster Assistance.

In 2001, a series of major quakes affected El Salvador (January 13 and February 13), India (January 26), and Peru (June 23). The Earthquake Hazards Program used NTM to locate ground breaks for each of these events, as well as to assess areas of land sliding and damage in El Salvador, damage to infrastructure from the 7.7 quake in Gujarat, India, and tsunami run-up distances from the 8.4 quake in Peru. In each case, a team of USGS scientists from the Earthquake and Landslides Programs was sent to the country affected, and their work was facilitated by information derived from NTM imagery.

Three additional geologic applications were supported by NTM during the 2000-2001 timeframe. A study of the Wabar Meteorite impact crater in the "Empty Quarter" of Saudi Arabia made use of archived imagery to help analyze the extent, age, and nature of the impact. Studies of this and other impact sites enable scientists to make predictions on the frequency and effects of future meteorite impacts on Earth. The USGS is also supporting a pilot project to investigate methodologies for using national systems data for the identification and evaluation of sinkholes and other karst area features in order to develop a geologic framework. Karst features have potential for direct contact with ground-water systems, and the opportunity for ground-water contamination is very real. The development of identification methodologies is critical to helping land and resource managers understand potential pathways for contaminants to enter the ground-water system. Finally, a geologic mapping project in the Middle Rio Grande Basin area of New Mexico involved exploring methodologies to quickly produce, digitize, and update existing geologic maps. The USGS Rocky Mountain Mapping Center developed techniques using Landsat and other sources for producing and updating geologic maps.

Water Discipline

The following projects were conducted to support activities of the USGS water districts:

The USGS Washington District Office initiated a project involving the production of elevation models for several glaciers in Washington, Montana, and Alaska. The models are being released as IDPs for inclusion in a glacial change study that will continue over several years.

The USGS Water Resources Missouri District Office, using Landsat 7 multispectral imagery in conjunction with NTM data, is investigating various image classification techniques that will allow the examination and monitoring of impervious surfaces in the James River Watershed. Data from this project will help determine if the new calculation methods prove to be cost-effective improvements.

IDPs of floods in south-central Texas were prepared for the USGS Texas Water Resources district office. Vector outlines of the high-water flood extent were used to compute the peak water discharge of the flood.

A study was conducted to remotely evaluate water flow of nine test streams and rivers. Study results corroborated well with current evaluation processes.

Biology Discipline

In 2000, the USGS Biological Resources Discipline began working on a study of riparian habitat over three project sites in Colorado and Utah. The Green River, Utah, site involves a test of high-resolution elevation models against a dense, high-accuracy GPS dataset collected in the field.

Both models are incorporated into a fish habitat and water-modeling study, and the comparison of one model against the other will serve as a detailed accuracy assessment of elevation IDPs.

A Yellowstone Bison Wildlife Study is also being conducted with the support of national systems data. It involves studying bison herds within Yellowstone National Park to learn more about herd behavior and movement patterns.

National systems data are being collected twice a year and are being used in conjunction with other sources to monitor the ecological changes of a naturally formed chute along the river at the Big Muddy National Fish and Wildlife Refuge near Columbia, Mo. Knowledge gained from this site will help scientists in evaluating conservation and mitigation strategies for river hydraulics and hydrology.

Geography Discipline

The USGS Geography Discipline supports USGS and other regional civilian agency use of NTM data through services offered at its facilities in [REDACTED]

[REDACTED] These facilities support regional, as well as national, programs of the civil agencies. Each facility is equipped with rapid exploitation systems (REx) that use off-the-shelf software and hardware with the ability to ingest and use national systems data and commercial source data. In 2000, these systems were enhanced with the installation of an NT-based system and new software to process data and generate products more quickly and efficiently. These enhancements support the growing hazards and disaster response activities of the USGS. Also during this year, the Digital Cartographic Production (DCP) System, which processes USGS DOQs (that is, photomaps), was also replaced with an NT-based system that allows greater flexibility of use. With these systems, each [REDACTED]

In 2000, each site was also equipped with a SkyMedia antenna and station that allows transmission into the facility of imagery from NIMA's Commercial Imagery Library System (CILS).

[REDACTED], completed most of the [REDACTED] with plans to be fully operational by mid-2002. [REDACTED] and support western regional activities, where there are more occurrences of earthquakes, volcanic action, and wild fires than in any other region. Activities concerning other earth science issues, such as mudslides, flooding, water contamination, wild life preservation, air pollution, and population growth, will also be supported.

The Rocky Mountain Mapping Center (RMMC), in Denver, Colo., also serves western region customers, and over the last 2 years has increased its system capabilities to provide better customer support. The installation of a Requirement Management System (RMS) that operates as a node to the RMS stations at the USGS Advanced Systems Center (ASC) provides agencies with enhanced data acquisition capabilities. In addition, the newly acquired Enhanced Land Characterization (ELC) and TerraModel software provide additional data exploitation tools to support mapping and science applications.

During 2000-2001, RMMC supported numerous projects for the USGS and other Federal agencies. For the NPS, the RMMC provided support in creating literal IDPs over selected NPS-sponsored global fiducial sites. Twenty-one IDPs for the NPS were released in 2000, and an additional 41 IDPs were released in 2001. High-resolution elevation models are being created for

the EPA, which will be analyzed in TerraModel site-design software to determine the volume of mine tailings found at historical mine operations. Other key activities at the RMMC include a National Science Foundation-funded study of sea ice, as well as a glacier-monitoring study conducted by the USGS, Washington District Office. The glacier study will provide elevation models for several glaciers in Washington, Montana, and Alaska, which will in turn support a multiyear glacial change and volumetric assessment study. The RMMC also produced IDPs for the USGS Alaska Volcano Observatory, which is using them in its hazard assessment and mapping efforts. Personnel at the RMMC continue to conduct an ongoing study and comparison of national systems data and commercial data, including a geometric evaluation of IKONOS imagery over a Morrison, Colo. test site.

The Mid-Continent Mapping Center (MCMC) in Rolla Mo. supported a number of investigations into the viability of using NTM as a data source. The MCMC supported the use of NTM for a USGS study monitoring watershed quality, where high-resolution elevation and land cover products were created for Little River, Ga. The data will help determine if proportional increases in input resolution lead to a statistically significant improvement in the results of watershed and water quality models. MCMC personnel are also applying the techniques used to create digital elevation models with NTM data and systems to the revision of elevation data in the USGS Digital Elevation Program. This project demonstrates how the techniques and processes used with national assets can be extended to a broad range of users. Future investigations will be conducted that support modeling activities of the National Weather Service, the USGS Karst Mapping Program, and the FWS's use of Global Fiducial site data.

The USGS ASC in Reston, Va. functions as the hub of operations for the CAC and the USGS. [REDACTED], the USGS ASC supports data acquisition and management activities, in addition to conducting data exploitation for CAC agencies. Imagery analysis and product generation is provided for disasters and hazards events. Working with USGS scientists and other agencies, the ASC data exploitation team supported activities related to the [REDACTED] and volcanic eruptions, [REDACTED] earthquake and landslides, and [REDACTED] earthquakes during 2000. Disaster support in 2001 included the [REDACTED], and [REDACTED] volcanic eruptions, [REDACTED] earthquakes, [REDACTED], and the James River, S. Dak., and New River, W. Va. floods. For the New River flood, literal 7.5-minute orthophoto products were prepared for the NPS to assess the extent of damage caused by landslides.

During 2000-2001, the ASC produced literal and nonliteral products showing shoreline and vegetative changes in support of a Louisiana Wetlands Study led by NOAA. This study will track changes from 1998 through 2003. Another key project begun in 2000 included deriving image-identifiable control points for Landsat Image Maps of the Antarctic for the National Science Foundation's Antarctic Program. Control points are needed in areas where it is dangerous or impossible to have personnel on the ground. Four mapping projects are currently in process, with mapping of other areas planned for FY 2002 and FY 2003. Also in 2000, the ASC supported the updates for the National Wetland Inventory Status and Trend for the FWS. In 2001, the ASC data exploitation team supported the Wabar Meteorite Impact Study and conducted an evaluation of the Multiresolution Land Characterization (MRLC) data for the EPA. The MRLC was originally produced using aerial photographs and Landsat imagery, and NTM and other data are being used to verify data quality.

The USGS continues to produce DOQs using NTM data at the [REDACTED] whenever newly revised products are required and no coverage is available through the [REDACTED]

National High Altitude Photography Program. These products are restricted to U.S. Government Use Only and support USGS map revision efforts and other agency directives. They are produced over Alaska, the Pacific Basin, and the continental United States. During the 2000-2001 period, almost 700 DOQs were produced to support the DOI-Alaska High Priority Lands Initiative. Under this program, DOQs are used by the USGS and other Federal agencies for map revision and data analysis. More than 300 DOQs were produced over the Trust Territories of the Pacific basin, primarily to support USGS map revision efforts. Nearly 300 DOQs were produced for the Forest Service to update their maps in preparation for the 2002 Winter Olympics in Salt Lake City, Utah.

Department of Transportation, United States Coast Guard

During 2000-2001, the U. S. Coast Guard (USCG), working through the CAC, used NTM to support its mission responsibilities for search and rescue, oil spill monitoring, port security, and navigational aid.

Search and Rescue

During 2000-2001, the USCG Intelligence Coordination Center (ICC) used nationally owned remote sensing systems to determine the applicability of these systems as Search and Rescue (SAR) tools. The experiments were primarily designed to evaluate remote sensor capabilities in open ocean environments, determine effective collection strategies, and investigate data processing methods that promised to increase target detection rates. The first SAR project was performed in September 2000, in international waters off of southern Florida, and the second SAR project was performed in December 2000, in U.S. waters south of Key West, Fla. ICC imagery analysts and scientists from national agencies jointly exploited the resulting data. Data gathered during the first experiment were used to develop promising collection strategies. Analysis of the data gathered during the second experiment is ongoing, and the USCG is planning further experiments against similar targets.

Oil Spills

During November 2000, in response to a request from Coast Guard District Eight (New Orleans), the ICC provided data obtained from national systems following an oil spill on the lower Mississippi River. The ICC provided data on the river, its estuaries, and delta that allowed on-scene personnel to focus their efforts where they were needed most.

In August and September 2001, the USCG used imagery to monitor oil spills near Key Largo, Fla., and in Prince William Sound, Alaska. The information derived was passed on to area USCG command elements and maritime assets for use as an assessment and operational planning tool.

Port Security

Immediately after the terrorist attacks on the World Trade Centers, the USCG used NTM to assist harbor security forces manage vessel traffic and perform vital Port Security missions in Long Island Sound. Port Security forces, both air assets and ships, were heavily engaged in evacuation and relief efforts. There was concern that tactical control of shipping movement was jeopardized, thus increasing the vulnerability to a second-strike terrorist attack. Imagery derived information was provided as a force multiplier.

Finally, the USCG used imagery to assist in developing of vulnerability assessments in the aftermath of the terrorist attacks of September 11, 2001. Imagery of Los Angeles, New York, and Houston was used to develop preliminary studies on the significance of the area-of-effect if vessels carrying a variety of hazardous cargoes were used as weapons by terrorist organizations.

Aids-to-Navigation

In July 2000, USCG Atlantic Area (LANTAREA) provided ICC with target information in the lower Chesapeake Bay, Hampton Roads, and the York and James Rivers to test the feasibility of using national sensors to collect information that can be useful in a posthurricane or flood scenario. The study showed that NTM has the potential to be used to collect information that will help maintain safe operation of traffic in ports, river channels, and sealanes during these events.

In June 2001, imagery was used to assist on-scene USCG personnel determine the amount of disruption to maritime lines-of-communication in the aftermath of a hurricane. Other goals were to monitor navigational aids and to use GIS "scripts" to speed exploitation.

U.S. Environmental Protection Agency

The mission of the U.S. EPA is to protect human health and to safeguard the natural environment—air, water, and land—upon which life depends. The EPA's purpose is to ensure that all Americans are protected from significant risks to human health and to the environment where they live, learn, and work, that national efforts to reduce environmental risk are based on the best available scientific information, and that Federal laws protecting human health and the environment are enforced fairly and effectively. For more than 20 years, EPA's Environmental Photographic Information Center has worked with the CAC and with national systems data, and in recent years, the EPA has developed secure facilities that permit the use of national systems data at many of its locations around the United States.

In 2000 and 2001, the EPA used the national systems for research and emergency response purposes. In research, the EPA completed a report of long-term landscape changes and associated effects on water quality in the New York City Watersheds. The project used archival NTM imagery to assess and confirm the accuracy of Landsat data, which formed the primary dataset. The report helped document and describe changes to help decisionmakers determine land use policies to maintain water quality.

The EPA's Environmental Monitoring and Assessment Program (EMAP) also initiated the use of NTM for a research project on riparian zones along the Upper Missouri River. Combining *in situ* data and NTM imagery, this study helped EPA researchers map river resources, such as sandbars, riparian habitat, and in-stream habitat. The primary goal of the EMAP study is to generate State and regional scale assessments of the condition of ecological resources and to identify stressors associated with the degradation of these resources. The EPA also used NTM as part of the accuracy assessment exercise for the interagency National Land Cover Data 2000 (formerly MRLC).

Through its Emergency Response responsibilities, the EPA supported response to and recovery from the September 11 terrorist attacks and assisted the NIMA in mapping potential asbestos exposure around the World Trade Center site. In addition, the EPA used NTM to support its response to a pipeline break in Arkansas and to support emergency response activities in Ukraine.

In addition, EPA became the Chair of the Global Fiducials Program. For the Fiducials program, EPA provided an initial list of 82 sites of interest to EPA. EPA employees developed additional, detailed information to support collection parameters. The EPA sites focus on the long-term impacts of global change and development on ecosystems and landscapes.

The EPA was also active in the IDP Working Group. The EPA representative to the working group was the primary author of the guidance for preparation of metadata to accompany cleared IDPs. In addition, the working group developed procedures for the approval of blanket IDPs and also implemented a streamlined system for review and approval of IDP requests that greatly expedited the process.

Several EPA employees attended the NTM102 training in July 2001 and presented papers and posters at the training session.

Federal Emergency Management Agency

The year 2000 was not a very active year for the use of national systems data to support disaster response. Two hurricane-related requirements were submitted by the Federal Emergency Management Agency (FEMA) to the CAC for evaluation and approval. Neither event warranted the production of IDPs. Though the hurricane season was very active, no major hurricanes made landfall. The requirements to support responses to the wildfires that ravaged the Nation were handled by the fire community. No damage or impact assessments were required concerning tornadoes, flooding, or severe weather events.

During 2001, seven requests for data were submitted through the CAC. Four of the requests, related to tropical storms, an earthquake, and an aircraft accident, did not result in the production of IDPs. Three requests, related to the Midwest flooding, tropical storm Barry, and damage assessments from events on September 11, were processed, and IDPs were created for FEMA to distribute.

U.S. Army Corps of Engineers

The Topographic Engineering Center (TEC) represents the USACE Engineering Research and Development Center on the CAC. The TEC currently participates in the IDPWG, and the Global Fiducials Working Group.

In 2000, the TEC received approval for five Domestic Imagery Requests; two of these were requested as add-ons to FEMA requests. Two long-term USACE projects, the Baseline Imagery Collection over U.S. Flood-Prone Areas, as well as the collection of imagery for the Corps' Global Fiducial Library sites, were renewed. In addition, TEC received permission to provide imagery from the U.S. Flood-Prone Areas database to a contractor for software testing. During 2000, TEC received approval for one civil-oriented IDP Use Request. Approval of this request allowed the production of IDPs for use by Military Land Managers. The IDPs will also familiarize the users with the capability of national systems data. This project is designed to generate products showing land use changes over time and was initially requested by one of the USACE's Civil Laboratories.

In 2001, TEC received approval for five Domestic Imagery Requests; three of these were requested as add-ons to FEMA requests. One long-term USACE project, the collection of

imagery for the Corps' Global Fiducials Library (GFL) sites, was renewed. Also during 2001, TEC produced, for the USACE Huntington District, one literal IDP in support of responses to West Virginia flooding. In response to the September 11 attacks, the TEC produced one literal and one nonliteral IDP, which were provided to USACE and responding districts. In addition, TEC sought permission to provide imagery to the USACE Huntsville District for a historical photographic analysis of Amchitka, Alaska, as part of an ongoing series of projects supporting the Formerly Used Defense Sites (FUDS) Program. This request was denied owing to public release issues.

National Aeronautics and Space Administration

In 2000, the National Aeronautics and Space Administration (NASA) initiated a project to acquire geographic coordinates to support NASA's RADARSAT Antarctic Mapping Project (RAMP). The project is a collaboration between NASA and the Canadian Space Agency to complete two mappings of the whole of Antarctica. The first imaging campaign was completed in October 1997. Under the NASA Pathfinder Program, the RAMP Team finished the first high-resolution, radar map of Antarctica during 1999. A second RADARSAT mapping of Antarctica was completed during the fall of 2000. These data will be used to produce a second high-resolution image mosaic for use in change-detection measurements and for long-term studies to understand the response of the Antarctic Ice Sheet to climate change. Products will be provided to the Byrd Polar Research Center.

National Science Foundation

The National Science Foundation (NSF) and the science community very much appreciate the continued interest and commitment of the CAC and the various members of the intelligence community for the assistance they have rendered to make both nonliteral and literal IDPs available to support research in NSF's Long-Term Ecological Research (LTER) sites and in several areas of the polar regions. The NSF and its research community now can obtain access to unique and otherwise unavailable long-term datasets (both literal and nonliteral IDP's) from national systems. The processes are in place to support our scientific interests while maintaining appropriate oversight of our national security interests.

NSF-sponsored researchers and NSF staff have learned considerably more over the last year about the potential research uses of IDPs. Researchers uniformly make the point that the imagery is very valuable for timeseries analysis.

Long-Term Ecological Research Sites

The LTER network is a collaborative effort among over 600 scientists and students, which extends the opportunities and capabilities of the individual sites to promote synthesis and comparative research across all sites and ecosystems. The NSF is supporting an effort to exploit archived national systems for four LTER research sites: Jornada, N.M., Dry Valleys, Antarctica, Sevilleta, N.M. and Virginia Coastal Reserve, Va.

IDPs that were produced in 1999 for Jornada and the Dry Valleys are continuing to be of value for scientific analysis. The success of these efforts resulted in NSF's sponsoring additional requests for archive imagery searches and IDP production for the sites of Sevilleta and the Virginia Coastal Reserve in 2000. The goal, again, is to achieve, in combination with existing

aerial photography and commercial satellite imagery, a good historical timeseries of images that show surface change over the last several decades.

Dr. John Vande Castle, of the LTER Network Office, is coordinating scientific access to the IDP, which was made available to the LTER scientists in late August of 2001. The data are currently being incorporated into the LTER "Spatial Data Workbench" (<http://www.lternet.edu/technology/sdw>) so these datasets can be more easily accessed and compared with the other remote sensing datasets acquired within the LTER program. A Web page has been developed to support the initial formulation and use of these IDPs, along with other remote sensing imagery, within the LTER program (<http://www.lternet.edu/technology/>).

Sevilleta - The Sevilleta site is in central New Mexico, and the research area includes the Rio Grande riverside forests, the upland Chihuahuan Desert, and montane subalpine forests and meadows. This site is a transition zone for a number of different southwestern vegetation types (biomes). This convergence makes it an important research area for geology, hydrology, archeology, atmospheric science, biology, and ecology, and for looking at the effects of changing climate conditions in the ecosystem. During 2001, the data from this site have been reviewed and assessed for general content. The high resolution and historical aspects of the data are important, and plans are being made on how best to extract useful information and compare them with other, more current datasets. The example shown demonstrates changes over time in the general land use and vegetation of just a small plot of land on the Sevilleta LTER site.

Virginia Coast Reserve - The Virginia Coast Reserve (VCR) site encompasses a barrier island chain along Virginia's Atlantic coast and is an extremely dynamic, frequently disturbed landscape with highly varied plant and aquatic communities. Evaluating hypotheses about ecosystem response to environmental change requires comprehensive map-based information. Research on the dynamics of change in this area will (1) improve the tracking of vegetation changes; (2) allow the identification of geomorphologic changes in both beaches and marshes, particularly in relation to individual storm events; and (3) facilitate a better understanding of the relationship between beach and landscape characteristics. Timeseries work similar to that being done of Sevilleta is being performed with the imagery of the VCR LTER site. For examples, see: http://www.vcrlter.Virginia.EDU/DataImages/Hog_declass.pdf, <http://www.vcrlter.Virginia.EDU/DataImages/phck63on.pdf>, and <http://www.vcrlter.Virginia.EDU/DataImages/brownsville63on.pdf>.

Jornada (New Mexico) Long-Term Ecological Research Program (LTER) - The Jornada LTER Program is continuing to make substantial use of literal IDPs to conduct a retrospective analysis of desertification of grasslands in the desert Southwest. These data have allowed detailed tracking of vegetation over time, which in turn has allowed the development of a significantly more sophisticated understanding of a critical step in the desertification process – the clumping of vegetation and resources over time. The data have also facilitated the identification, analysis, and interpretation of historical land management and restoration manipulations in cases where written records are poor or nonexistent. The IDP data have enabled the identification of some past manipulations and allowed the reconstruction of important aspects of ecosystem response.

McMurdo Dry Valleys, Antarctica - A literal IDP was released in September 1999, and the IDP and digital elevation model (DEM) were made available in November 2001 (see: http://usarc.usgs.gov/antarctic_atlas/dv88.html). Exploitation of the fully georeferenced images and the DEM is being undertaken by researchers working in the region. The literal IDPs provide a valuable dataset for retrospective analysis.

In addition, an experiment has been started to use literal IDPs to evaluate glacier front changes over time. This effort is being led by Dr. Andrew Fountain, of Portland State University, with assistance from the U.S. Antarctic Resource Center hosted at the USGS. The goal is to use IDPs from the archive to fill gaps in time-series coverage over the last two decades. The initial assessment of available imagery indicates that the effort will yield useful results.

Other NSF-Sponsored Projects

Barrow, Alaska - This is an ongoing NSF-sponsored study that is attempting to understand how tundra is changing in response to climate warming and to determine if areas that were previously disturbed by human activity are responding differently relative to undisturbed areas. This is an important societal issue because the permafrost in tundra regions represents a major reservoir of greenhouse gases, and the rate of release of these gases is directly related to the stability of the surface. During 2001, archive imagery was located and several literal IDPs were released. These images, in conjunction with available commercial imagery, have proved to be extremely valuable for filling in gaps in the aerial photo time-series that exists for the Barrow area (see http://www.cevl.msu.edu/ael/data_remote.html).

Penguin Colony Population Analysis - The NSF Office of Polar Programs (OPP) supports a research project at the University of California, San Diego, in collaboration with NRL-Stennis, to determine the feasibility of using national systems data to develop algorithms by which high-resolution commercial imagery – that is, IKONOS – might be used to estimate populations of penguin colonies. This work does not involve any request for the possible release of literal IDPs.

LC-130 Landing Site Evaluation - NSF /OPP has the responsibility for activities in the Antarctic. One major ongoing project is to determine if and how imagery from national systems can be used to evaluate potential landing sites for LC-130 aircraft (ski-equipped C-130 heavy lift aircraft) operated by the U.S. Air Force 109th Air Wing of the NYANG for the NSF U.S. Antarctic Program. Work initially done through the CAC demonstrated that there is considerable promise for exploiting national systems data in support of safer air operations in the Antarctic. Both literal and nonliteral IDPs will benefit the evaluation of these sites.

Arctic Studies - The IDPs created for the Surface Heat Budget of the Arctic Ocean (SHEBA) Program in 1999 continue to form a valuable dataset for heat budget modeling activities in the Arctic Ocean. The imagery is being used to determine the relative amounts of surface features with differing reflectivity and serves as a critical source of information that could not be collected with commercially available imagery. The CAC played a critical role in enabling the release of literal IDPs of the SHEBA site in the Beaufort Sea during 1997-98. SHEBA reconnaissance imagery is available through the Arctic System Science Data Coordination Center at the National Snow and Ice Data Center (http://nsidc.org/data/sheba_ntm/index.html).

One of the most important variables controlling heat distribution in the Arctic climate system is the amount of open water present in the ice pack. A significant part of that open water is present in the form of ponds that appear in the summer melt season. An ongoing study of these melt ponds is being sponsored by the NSF, and nonliteral IDPs were approved for release in August 2000. The data from this ongoing study, along with the SHEBA data, provide a time-series that is valuable in understanding the surface energy balance of the Arctic and that will provide critical data for climate modeling.

Global Fiducials - The NSF actively participates in the Global Fiducials Program and the Global Fiducials Working Group. More than 100 sites are under active consideration by NSF for

sponsorship. LTER program sites, as well as several sites in the polar regions, are of principal interest. The NSF and the LTER Network Office are working with the Global Fiducials Library at the USGS/ASC to verify the scientific goals for the various sites and to ensure that data collection can meet those goals.

Data Acquisition and Management Report

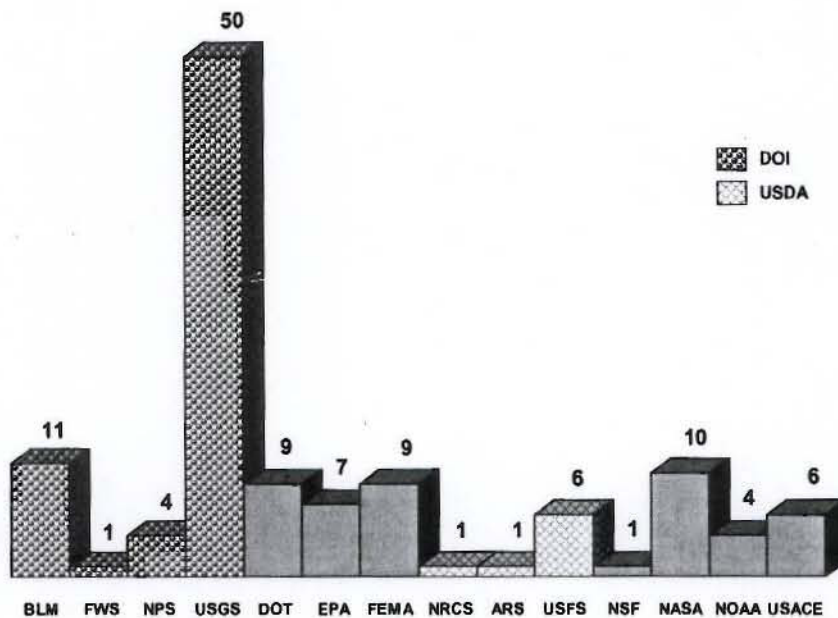
The Data Acquisition and Management Section at the USGS ASC handles requests from all CAC agencies for the acquisition of national systems data. The team provides expertise for acquiring, receiving, archiving, and disseminating data in support of a wide variety of scientific investigations and mapping projects with unique requirements. Government and contractor personnel work together with customers to analyze their requirements and submit their data requests for approval from appropriate authorities. In addition to initiating new data collections, the team also does archive searches to locate existing data sources to meet project needs. Upon receipt of data, USGS specialists perform a quality assessment to ensure that requirements are met before archiving the data and delivering copies to the requestor.

Activities are ongoing to investigate new technologies and processes for improving acquisition and data management. Capabilities for the electronic receipt of data were installed and put to limited use during the last quarter of 1999. The addition of a data storage library in 2000 facilitated the transition from hardcopy to softcopy operations. The Dissemination Element, which provides the ability to receive data in near realtime, directs the imagery to the Source Receipt Archive, where it is accessible for distribution to the CAC community. These enhanced capabilities significantly reduce the data acquisition timeline and enable rapid access to data sources for time-critical applications, such as responding to natural disasters.

The Global Fiducials Library is also managed and operated by the Data Acquisition and Management staff. As with other operations, this includes refining site information and determining collection requirements in coordination with the CAC sponsoring agency. Domestic Imagery Requirement generation, tasking and acquisition of data, archiving, and dissemination services are also provided for library users. The library system has been enhanced to support the electronic receipt of data and is being modified to support enhanced imagery systems data. Program issues are worked in coordination with the Global Fiducials Working Group, which provides a means for communicating with the GFL user community.

Civil Applications Committee Departmental Requirements Office

[REDACTED], has provided increased visibility and facilitated the communication of civilian community needs. The presence of USGS staff, which represents the CAC community's requirements at meetings in which imagery acquisitions are adjudicated, provides opportunities to further explain and defend CAC agency collection needs. Regular participation in the Domestic Requirements Working Group is particularly important because most CAC requirements fall within the United States and its territories. Daily interaction with other Departmental Requirements Officers and specialized teams facilitates solving problems with imagery collections, production, and distribution, while increasing awareness and knowledge of USGS staff. This improved coordination with other members of the imagery community is resulting in higher success rates for competing and obtaining sources in a way that does not interfere with other agency requirements.



APPENDIX A

CHARTER

Committee on Civil Applications of Classified Overhead Remotely Sensed Data

The mission of the Committee on Civil Applications of Classified Overhead Remotely Sensed Data (CAC) is to facilitate the appropriate civil uses of overhead remote technology and data collected by classified military and intelligence overhead systems and provided to Federal civil agencies pursuant to the Economy Act, 31 U.S.C. Section 1535.¹

Responsibilities

The Committee will have the following responsibilities:

To assist in ensuring the effective application of data collected by classified overhead systems to support the appropriate worldwide production, analysis, and research programs of Federal civil agencies.

To facilitate the use of such data to derive basic information for civil applications, including mapping, disaster assessments, monitoring environmental changes, supporting other scientific research activities relative to improving our knowledge of the Earth's environment, and to derive other information needed to support national policies and objectives.

To assist in economizing on the costs of collecting and using such remotely sensed data to support the above activities and encourage research and development of remote sensing technology.

To oversee Federal civil agencies' requests for the collection of classified remotely sensed data to ensure that the Constitutional and other legal rights of U.S. persons are not violated and that such requests and the use of such data are consistent with the authorities and responsibilities of such agencies and are in accordance with authorized programs.

To ensure that CAC uses of collected data adhere to guidelines established by the Director of Central Intelligence (DCI) for the protection of intelligence sources and methods and other security requirements.

To carry out additional responsibilities as assigned.

¹ As used in this charter, reference to "civil uses" or to the use of data by "Federal civil agencies" means by executive branch agencies or departments for nonintelligence and nonmilitary purposes. Generally, such "Federal civil agencies" are not part of the intelligence community or the Department of Defense.

Goals and Principles

Economy of effort--making efficient use of existing national resources--is a major goal. National resources include sensing systems that are carried on both space and airborne vehicles.

Technology that has been developed for military and intelligence purposes will be used to support current national policy objectives and contemporary problems that transcend national boundaries, such as global change and environmental monitoring.

Intelligence sources and methods must be protected.

Federal civil agencies will efficiently and lawfully use the data in support of their mission responsibilities and, where feasible and appropriate, consistent with applicable law and procedures for the protection of intelligence sources and methods and other classified information, also make data available to State and local governments and the scientific community.

Organization

The Secretary of the Interior will provide facilities and administrative support required to conduct the activities of the Committee. The Department of the Interior representative will chair the Committee. The Committee will include representatives from the Departments of Agriculture, Commerce, Energy,² and Transportation, the Army Corps of Engineers, Federal Emergency Management Agency, Environmental Protection Agency, National Science Foundation, and National Aeronautics and Space Administration. Membership may be extended to other Federal organizations with civil responsibilities at the discretion of the Committee. The DCI representative will be an ex officio member.

Functions

The Committee's functions will include the following:

Receiving, evaluating, consolidating, and prioritizing requirements for classified remotely sensed data from Federal civil agencies and transmitting them to the DCI representative for collection. The Committee will also transmit requests by such agencies for access to previously collected remotely sensed data from classified systems. Classified-collection system managers and operators will not judge the priorities established by the Committee, except to ensure that Committee collection requests do not interfere with the classified systems' primary mission of meeting national security needs and requirements.

² The Department of Energy is a principal member of the National Foreign Intelligence Board (NFIB); the DOE Senior Intelligence Officer has oversight of all the Department's uses of classified remotely sensed data, including uses by DOE's "civil users."

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Facilitating uses of classified system data by Federal civil agencies and coordinating the incorporation of such data and technology in performance of civil agency missions.

Supplying information to Federal civil agencies so that they may knowledgeably formulate requests for classified remotely sensed data and reach compromises between collection requests and collection capabilities.

Acting as the interface between Federal civil agencies and intelligence collectors, recognizing that the DCI will not be involved in judgments concerning Federal civil agencies' needs or priorities and that collection for their needs will remain secondary to foreign intelligence collection.

Representing the Federal civil agencies in defense and intelligence forums and activities relative to requirements, capabilities, research needs, and data applications of current and future systems.

Overseeing Federal civil agency uses of classified remotely sensed data in a manner designed to avoid concerns that such data are being used improperly.

Making arrangements for defense and intelligence agencies to provide technical and analytical support, where necessary and appropriate, to the activities of the Committee.

Preparing an annual report of activities, plans, and recommendations.

The DCI representative's functions will include the following:

Serving as a liaison on classified overhead remotely sensed data and technology with the intelligence and military communities.

Assisting in obtaining classified remotely sensed data requested by the Committee.

Addressing issues concerned with the use of classified remotely sensed data.

Facilitating the acquisition of security clearances for Federal civil agency personnel, as necessary.

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Serving as an intermediary on Federal civil agency questions concerning classification controls. Security guidance will be provided to the Committee as to which specific aspects of requesting, collecting, and using classified remotely sensed data require national security classification controls and which aspects can be handled at the unclassified level.

Signed

George J. Tenet
Director of Central Intelligence

June 4, 1998

Bruce Babbitt
Secretary of the Interior

August 2, 1998

Sylvia M. Mathews for Jacob J. Lew
Director of Office of Management and Budget

April 27, 2000

Note:

On October 2, 2000, the Assistant to the President for National Security Affairs, Samuel R. Berger, noted and concurred in the approval of the revised CAC Charter.

Appendix B

CAC Contacts

For more information about the CAC, contact:

CAC Secretariat
USGS Advanced Systems Center, MS 562
12201 Sunrise Valley Drive
Reston, VA 20192
Phone: [REDACTED]
Fax: [REDACTED]
E-mail: cac@usgs.gov

For more information about the collection of national systems data, contact:

Data Acquisition and Management Section
USGS Advanced Systems Center, MS 562
12201 Sunrise Valley Drive
Reston, VA 20192
Phone: [REDACTED]
Fax: [REDACTED]

CAC Representatives:

Dr. Charles Groat (USGS) Chair – [REDACTED]
Keith Elliott (USGS) Executive Director – [REDACTED]
Denise Perreca (USGS) Executive Secretary – [REDACTED]

Department of the Interior:

Ed Harne (BLM) – [REDACTED]

Department of Agriculture:

Chuck Dull (FS) – [REDACTED]

Department of Commerce:

Anne Hale Miglarese (NOAA/CSC) – [REDACTED]

Department of Transportation:

Amanda Paul – [REDACTED]

Department of Energy:

Brant Jones – [REDACTED]

Department of Health and Human Services:

Dr. Scott Lillibridge – [REDACTED]

U.S. Environmental Protection Agency:

Dr. Peter Jutro - [REDACTED]

Federal Emergency Management Agency:
David Garratt - [REDACTED]

National Aeronautics & Space Administration:
Granville Paules - [REDACTED]

National Science Foundation:
Dr. Karl Erb - [REDACTED]

U.S. Army Corps of Engineers:
Regis Orsinger (TEC) - [REDACTED]

Appendix C

ACRONYMS

ARS	Agricultural Research Service
ASC	Advanced Systems Center
BLM	Bureau of Land Management
BRD	Biological Resources Division
CAC	Civil Applications Committee
C-CAP	Coastal Change Analysis Program
CIA	Central Intelligence Agency
DCI	Director of Central Intelligence
DCP	Digital Cartographic Production
DE	Dissemination Element
DEM	Digital Elevation Model
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
DOQ	Digital Orthophoto Quadrangle
DRO	Departmental Requirements Office
ELC	Enhanced Land Characterization
EPA	Environmental Protection Agency
ERWG	Emergency Response Working Group
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
FGUO	For Government Use Only
FWS	United States Fish and Wildlife Service
GD	Geologic Division
GFL	Global Fiducials Library
GIS	Geographic Information System
GPS	Global Positioning System
IC	Intelligence Community
ICC	Intelligence Coordination Center
IDP	Imagery Derived Product
IDPWG	Imagery Derived Product Working Group
IPSCOM	Imagery Policy and Security Committee
LTER	Long-Term Ecological Research
MAC	Mapping Applications Center
MC&G	Mapping, Charting, and Geodesy
MCMC	Mid-Continent Mapping Center
MET	Multi-image Exploitation Tool
NAPP	National Aerial Photography Program
NCAP	National Civil Applications Program
NDOP	National Digital Orthophoto Program
NERR	National Estuarine Research Reserve
NGS	National Geodetic Survey
NIMA	National Imagery and Mapping Agency
NMFS	National Marine Fisheries Service
NMS	National Marine Sanctuary

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NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRI	Natural Resource Inventory
NSF	National Science Foundation
NTM	National Technical Means
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
REx	Rapid Exploitation System
RMMC	Rocky Mountain Mapping Center
RMS	Requirements Management System
SAC	Special Applications Center
SCI	Sensitive Compartmented Information
SHIEBA	Surface Heat Budget of the Arctic Ocean
SMS	Source Management Section
TEC	Topographic Engineering Center
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey
USGUO	United States Government Use Only
VDAP	Volcano Disaster Assistance Program
WRD	Water Resources Division