EROS DATA CENTER, SIOUX FALLS, SD

EROSDATA

U.S. GEOLOGICAL SURVEY, NATIONAL MAPPING DIVISION

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Chinese Delegation Visits EDC

*As Center Chief **Dr. Don Lauer** looks on, members of the Chinese delegation take a closer look at some EDC image map products. (l. to r.) **Mr. Ma Ya'ou**, Department of Treaties and Laws, Ministry of Foreign Affairs of China; **Mr. Jian Fengmin**, Director of the Shanghai Municipal Institute of Surveying and Mapping; **Professor Yang Kai**, Deputy Director General of the National Bureau of Surveying and Mapping of China.*

As part of a General Agreement for the exchange of science and technology between the United States and the Peoples' Republic of China (PRC), the U.S. Geological Survey and China's National Bureau of Surveying and Mapping (NBSM) are conducting a Protocol to promote cooperation in surveying and mapping. Established in 1979, the Protocol has been extended three times and currently is set to run through 1996.

On January 7-8, 1993, four officials from the PRC visited the EDC while traveling to New York to participate in a United Nations Conference. The delegation received an overview of EDC's operations and detailed briefings on selected topics. During the delegation's visit, editors of EROSDATA met with Professor Yang Kai, Deputy Director General of China's National Bureau of Surveying and Mapping (NBSM), to ask a variety of questions concerning cartographic issues of importance to China and the United States. What follows capsulizes that interview:

EROSDATA: What is the purpose of your visit to the EDC?

Prof. Yang: "Primarily because we have the cooperative relations with the NBSM and the USGS. For me personally, this is the first visit to the EROS Data Center. Although I've been in America several times, I've never had the chance to visit here."

EROSDATA: After seeing our facility, what are your impressions?

Prof. Yang: "Very impressive because we find the EROS Data Center do a lot of applications, especially the global project. Very successful so we can learn a lot of things from it."

EROSDATA: How does the work of the NBSM in China compare with that of the

Continued on page 2

UP FRONT

Additional responsibilities and new opportunities seem to be the norm these days. Two significant activities recently have been assigned to our Center.

First, the International Council of Scientific Unions, through the U.S. National Academy of Sciences, has designated the EROS Data Center as a component of a consortium of World Data Centers. The growing need for global scientific information by the international community has led to an expanded network of information services centers. The EDC will join 39 other facilities located throughout the world in providing data on environmental conditions and global change. The World Data Center-A (WDC-A) for Land Remotely Sensed Data will be at the EDC. Two other new centers also are being established in the U.S.—the WDC-A for Paleoclimatology at the National Geophysical Data Center in Boulder, Colorado and the WDC-A for Atmospheric Trace Gasses at the Carbon Dioxide Information and Analysis Center in Oak Ridge, Tennessee. The World Data Center system was started in the late-1950s and now includes centers in the U.S. (WDC-As), the former Soviet Union (WDC-Bs), Europe and Japan (WDC-Cs), and China (WDC-Ds).

Second, increased involvement with the Landsat program already is affecting activities at the Center. Late last year the Center was given full responsibility for the National Satellite Land Remote Sensing Data Archive. Included in that archive will be significant management responsibility for historic and future Landsat data. For example, the EOSAT Company just recently agreed to discontinue marketing Landsat 4/5 Multispectral Scanner (MSS) data. Consequently, the entire collection of U.S.-held Landsat MSS data available at EDC now can be purchased by any interested user, without restrictions and at reduced prices.

As we move toward construction of the building addition, it is important that we also improve our ability to meet the data and information needs of the world-wide user community. Clearly, the events mentioned above enhance our responsibilities and continue the momentum of our satellite data management programs.

Donald T. Lauer

Chinese Visit Continued from page 1

U.S. Geological Survey's NMD?

Prof. Yang: "I think the topographic mapping is similar. Of course the standards show a difference. I find the USGS facilities for orthophotos are advanced, especially for digital mapping and industrialized procedures."

EROSDATA: Do any of EDC's applications compare with yours?

Prof. Yang: "I don't think in China we do a lot of work on global projects, so this is more advanced than China."

EROSDATA: Could you describe the structure of your NBSM?

Prof. Yang: "In China we have an umbrella system. The NBSM headquarters is in Beijing. In each province [a total of 30], we have a provincial bureau, or local bureau."

EROSDATA: What would you say are China's most pressing mapping needs?

Prof. Yang: "Primary uses, for instance, are for environmental protection, natural resource investigation and consultation, and engineering/surveying."

EROSDATA: What map projections and scales do you use?

Prof. Yang: "It is similar to the UTM (Universal Transverse Mercator system). One-to-50,000 is the basic scale. But, we have a scale series of 1:50,000 and 1:10,000. Our largest scale is 1:1,000 and 1:500. Our smaller scales are 1:250,000 and 1:1,000,000."

EROSDATA: What is the primary challenge facing Chinese cartography?

Prof. Yang: "From a technical point of view, going to the GIS (Geographic Information Systems), to a combination of geodesy with the satellite, or space geodesy, for the aerial photogrammetry, and to the remote sensing for digital mapping. These are the challenges. For the industry itself, the user society has new requirements for our expanded mapping program. They have wide uses and need some very timely digital information."

EROSDATA: What does the future hold for mapping in China?

Prof. Yang: "Originally the line maps were the main form. Later, of course, they become digital maps and digital products. Also, widely used geographic information."

EROSDATA: You mentioned the use of GIS technology. What kind of GIS software are you currently using?

Prof. Yang: "There are some commercial software packages from Germany and Australia. In Beijing we have used software such as these at the Research Institute of Surveying and Mapping. Also we have developed our own software package."

EROSDATA: Suppose I want to order a map of a province in China. Is this possible?

Prof. Yang: "Some maps in China are still classified - similar to some other countries. Some (maps) are public so they are divided into differ-

ent types. If a map is classified, then maybe through some cooperation project we can use it."

EROSDATA: Why are cooperative mapping efforts between America and China important?

Prof. Yang: "The cooperation is very successful and beneficial for both sides. For our side, we can learn a lot of experience and advanced technology from the United States. Of course from your side, you can become familiar with the activities in China and can exchange some knowledge and experiences."

EROSDATA: Is there anything you'd like to add that perhaps I neglected to ask you about your visit to the EDC or mapping in your nation?

Prof. Yang: "This trip was very short. We got a lot of information. Of course we met some new friends here. We have some old friends (points to **Don Ohlen**). For me, this is a first visit here. Some of the introductions made by the experts and staff members will find some new experiences and some very good results. So, later on to strengthen our cooperation, maybe we can find some new directions and new projects. Very good.

Hughes STX Holds First Annual Meeting

EROS Data Center management, USGS senior staff and professionals and Hughes STX senior officials joined Hughes STX (HSTX) contract employees at the Holiday Inn City Centre on January 19 for the first annual meeting of the EDC project.

The highlight of the meeting featured the Data Center's first-ever Peer Awards (see recipients on page 7). These awards were presented to 17 individuals who demonstrated extraordinary teamwork and dedication during 1992. The honorees were nominated by their peers and selected by a 14-member committee comprised of nonsupervisory staff (See AWARDS, page 12).

In addition to the Peer Awards, other HSTX employees were recognized for completing academic programs of study during 1992 and writing publications. **Dr. Gary Johnson**, HSTX Deputy Project Manager, recognized the award winning writing skills of **Joy Hood**, Information Sciences Section, and **Bruce Quirk**, EDSPO liaison at the Goddard Space Flight Center (see AWARDS, page 12)

Following remarks by HSTX President **Dr. Ashok Kaveeshwar**, **R.J. Thompson**, Chief of the EOS Data Systems Project Office, served as guest speaker. Thompson outlined the history of the EDC from a Landsat data perspective while alluding to many monumental "building blocks" that have shaped the Center into the "world class" facility it's recognized as today. Thompson closed his talk by recognizing some of the activities that will take the EDC into the next century. "We're getting close to putting together the first 10-day composite of all the land masses of the globe at 1-kilometer resolution. The products, services, and developments that you folks have been responsible for are the key elements, the key ingredient, to the progress we've made."

*Through the use of viewgraphs, **R.J. Thompson**, Chief, EOS Data Systems Project Office, recounts some of the noteworthy "building blocks" that have helped make the EDC a world class facility.*

PECORA 12 Update

by Dr. Robert Haas

Planning for the Pecora 12 Symposium, to be held at Sioux Falls on August 24-26, 1993, continues to progress. The theme for Pecora 12 is "Land Information from Space-based Systems." The program for Pecora 12 currently is being assembled and a preliminary program for the conference will be mailed in early May. A goal of this summer's Pecora Symposium is to evaluate the adequacy of space-based systems in dealing with land information needs in an era of global concern.

Invited and volunteer papers will examine the need for land information, current capabilities for developing land information, and expected future developments. Over 90 scientists, engineers, technicians, and other professionals have submitted titles and abstracts of papers and posters for information on remote sensing and other technologies for monitoring the lands of the Earth. Proposed papers are from agencies and institutions throughout the United States and a number of foreign countries. A recent Pecora 12 planning meeting at the EROS Data Center established a framework for the conference and selected papers and posters to be presented at the August meeting.

The 1993 Pecora 12 Symposium will offer EDC employees a showcase for their activities. We anticipate Center-wide involvement in various aspects of hosting this prestigious conference. The agenda for Pecora 12 will be revealed in the next issue of EROSDATA. If you have any questions about the Pecora 12 Symposium, please give me a call at ext. 6007.

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The NCAA Basketball Tournament: An American Classic

In the final days of college basketball's innocence, when televisions turned on in black and white, if they turned on at all, when Americans were asking not what their country could do for them, but what they could do for their country, the National Collegiate Athletic Association (NCAA) Final Four was a 32-team tournament and Center Chief **Don Lauer** was a red-shirt freshman basketball player at the University of California-Berkeley.

Thirty-three years ago the NCAA tournament was much smaller than today's 64-team, mega-money, media extravaganza. However, the NCAA Division I college basketball tournament, which has become an American Classic, was just as exciting and important then as the most recent Final Four (April 3 & 5, 1993, Superdome, New Orleans, LA). Contributing to the NCAA hoop hysteria of 1959-60 was a 6'2" "thin and bouncy" ball-hawking defensive demon called Don "Spider" Lauer. That's right, Lauer played with the University of California-Berkeley Golden Bear cage squad that won its first national championship in 1959 and returned to the Final Four in 1960 to defend its title.

Lauer learned the game of basketball growing up as a kid in northern California from stiff competition at playgrounds bordering Berkeley and Oakland. "All the best players in the area would show up...like **Bill Russell,**" explained Lauer. "He (Russell) was older than I was, but I was exposed to that kind of player in junior high and high school. That really had a big affect on me for just getting better. I played against **Paul Silas**, who later played for the Celtics, all the time."

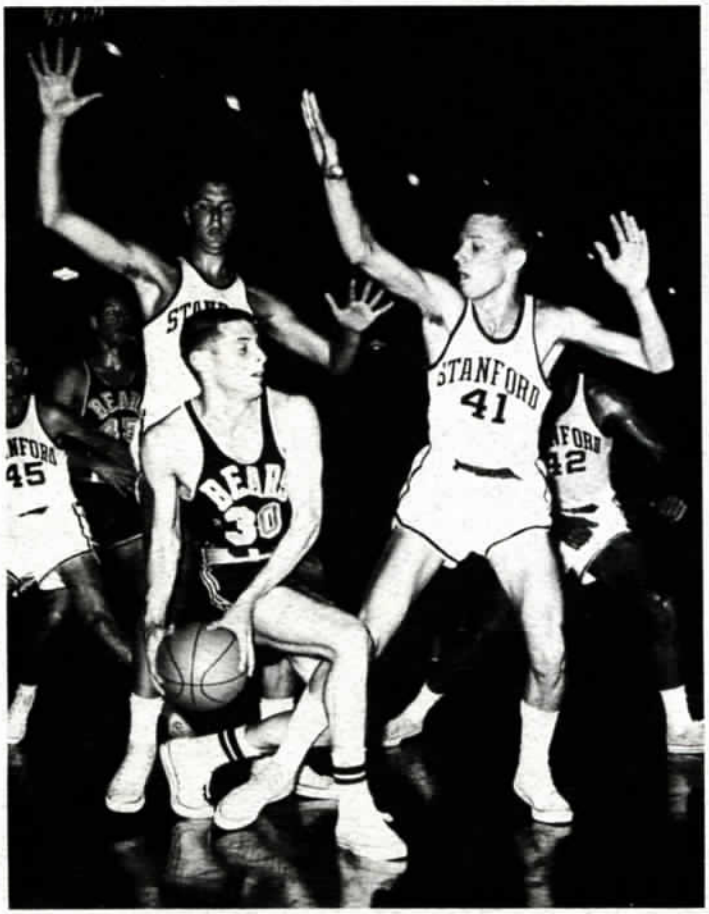
Bill Draeger, Chief of the Data Services Branch, and **Dave Carneggie**, Science & Applications Branch, were forestry majors at the UC-Berkeley with Lauer. While Draeger's and Carneggie's recollections tend to differ, they both agree Lauer was a feisty hardwood hustler.

"He was a pretty good forward," said Draeger pensively as he scratched his chin. "He rebounded reasonably well (for his size) and played best inside (in the paint)."

A 1962-63 Cal basketball program described Lauer in this manner: "Exceptional in no single phase, the 'little' (6'2") forward does a consistent job and does most things intelligently."

As a sophomore reserve, Lauer played in only one varsity game during the 1960-61 season - a game against the University of Southern California (USC) at the Los Angeles Sports Arena. "I got in for about 30 seconds," explains Lauer, "and when I got the ball I wasn't thinking pass; I was one-for-one and it was from 25 feet out (worth 3 points with today's rules!)"

Despite his lack of size at the forward position, Lauer led the Bears in rebounding as a junior. He finished third in team scoring and second in rebounding his senior campaign (1962-63). "Spider" also set a single season team and conference field goal percentage mark of 47.3%, which stood for a number of years. Because of his outstanding junior season (1961-62), Lauer was voted by his teammates as Cal's most valuable player (MVP) - receiving the **Nibs Price** Award.



*Berkeley's **Don Lauer** (30) "A scarecrow who bounds over the court like a cheetah, with quick, long arms producing many slick steals."*
***Jim Scott**, Berkeley Daily Gazette*

While Draeger attended many Cal basketball games during his collegiate days, his interest dwindled as the program fell on hard times. "They (the Bears) had great teams in 1959 and 1960," recalls Draeger, "then the bottom fell out."

According to Lauer, a few fickle fans, of course, had become accustomed to top-ten rankings and a 90% win-

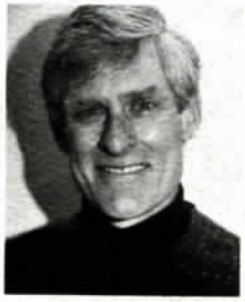
Continued on page 11

The Terrestrial Ecosystems Regional Research & Analysis (TERRA) Laboratory

The EROS Data Center is known for its on-site Photographic and Data Analysis Laboratories as well as its off-site research facilities in Anchorage, Alaska and Niamey, Niger. Another research facility now may be added to the list–the TERRA Lab.

Located about 3 blocks from the campus of Colorado State University, Fort Collins, CO, the TERRA Lab was established in August 1992 as a dual-agency land processes research facility. In addition to the USGS National Mapping Division, the TERRA Lab receives support from three agencies within the U.S. Department of Agriculture: the U.S. Forest Service, the Soil Conservation Service and the Agricultural Research Service. The TERRA Lab reports to its supporting agencies through a Board of Directors composed of executives. Dr. Allen Watkins, Chief of the National Mapping Division, represents the USGS on the board.

According to **Ray Watts**, USGS Geophysicist and EDC TERRA Lab liaison, the mission of the facility is to: "Improve the analysis that supports decision-making about land resources." To do that Watts adds, "We're trying to build and deliver scientific expertise, process models and the geographic information that comes both in relatively raw form and as the output of models to decision- makers. We also want to try and work between decision-makers and scientists so that the decision-makers understand the science that's gone into the models - where it's good, where it's bad, where it's well-known, where it's not so well-known...and actually have tools for visualizing and understanding those kinds of issues."



Ray Watts

Currently the 1,200-square foot TERRA Lab is staffed by six individuals. It soon will be expanded to 2,400-square feet to support expanded capabilities. In addition to Watts, the Lab features a person from the Forest Service, **Doug Fox**, who serves as TERRA Lab Director; two people from the Agricultural Research Service; an individual from the Consortium for International Earth Science Information Network (CIESIN), **Bill Wallace**; and a person from the IBM Federal Systems Company. The staff anticipates delivery of two, high-end Hewlet-Packard workstations, two Data General workstations and about a dozen, 386 and 486, personal computers.

"During this coming year," projects Watts, "we might grow to about 10 or 12 people participating full-time in the Lab. But, the ultimate answer to how big we get, more than anything, depends on budget. I'm optimistic. I think everybody in the Laboratory is optimistic that the environmental orientation of the new administration favors this kind of activity."

Watts comes to the TERRA Lab with 11 years of experience with the Survey's Geologic Division (GD). He worked in the Branch of Geophysics in Denver, CO and worked mostly on hydrologic issues while in the GD. Early in his career with the GD Watts measured glacier ice in Alaska and Antarctica before landing in southeastern Utah performing electrical and electromagnetic research for a potential nuclear waste disposal site. Watts transferred to USGS Headquarters in 1984 where he became Assistant Deputy Director for Research for the USGS Director's Office. Four years later he became the Executive Secretary of the Committee on Earth and Environmental Sciences - the interagency committee that established the Global Change Program and budget.

"The lion's share of the budget for the whole global change program," explains Watts, "goes to NASA for Earth Observing System (EOS). What is left after you strip away EOS is something on the order of 80% that goes to oceanic and atmospheric research. So, the 20% that's left for studying land-related processes seems rather meager when it's really the effects of climate change on the land and the effects of what people do on the land that ultimately have an effect on human welfare. So, it seems that we are putting the least amount of resources of the program to the part of the system that has the most direct impact on people."

Because of the slim global change budget land processes research receives, Watts and an individual from the Agricultural Research Service proposed an interagency effort to develop land models deliberately designed to complement general circulation models so scientists could better study interactions between the land and the atmosphere. Because this proposal appeared after global change program funds had been allocated, TERRA Lab initiators had to rely on leftover program funds.

If the TERRA Lab is to resemble a facility on the scale of the National Center for Atmospheric Research (NCAR), Boulder, CO or the Geophysical Fluid Dynamics Laboratory, Princeton, NJ, its budget

Continued on page 10

Building Addition Could Be Delayed

The EROS Data Center's new building addition, as reported in the Winter issue of EROSDATA, will house the Land Processes Distributed Active Archive Center (LPDAAC), a part of the National Aeronautics and Space Administration's (NASA's) Earth Observing System (EOS) Program. According to **Dennis Hood**, chairperson of the EDC Building Addition Task Force, the schedule for construction of the Center's 65,000 square foot building addition are temporarily in limbo because of a complex financial equation.

"There are two or three different efforts afoot to secure the necessary contractual authority to go ahead with the building," explained Hood.

"The Building Task Force continues to meet on approximately a weekly basis. We are now wrapping up the last of the Final Design Review. That's actually a bit behind schedule. It was impacted by late delivery of some specifications by the architect and engineer [Spitznagel, Sioux Falls] and by the fact that we continue to find little, non-controversial discrepancies in either the descriptions of the project or in the plans themselves."

A three-volume, 600-page set of specifications accompanied by sets of plans totalling 113 sheets are being reviewed one at a time to make sure each sheet speaks to all other sheets. "I think they're in pretty good shape," says Hood. "Most of what we're finding is little, niggling details."

The seven-member Task Force team completed the design phase of the project the end of February. With the completion of the design, Hood anticipated an updated lobby model and artistic rendering of the exterior of the building to be completed as well. "The architect generated a perspective and a local artist is filling in some people, trees, and cars - making it look like a landscape as opposed to a just a 3-D perspective."

While design issues seem to be answered, several questions remain concerning the areas impacted inside this building [all of the existing lobby area]. As a result, there still are a number of questions about the final size and shape of that space. Hood says questions such as these will be decided later when the EDC knows more about the timing of the building addition itself.

Funding the construction is where the complex financial equation comes into play. It actually includes three different scenarios. "The first alternative was to go immediately to the Sioux Falls Development Foundation for leased construction. Because of a change in Office of Management and Budget (OMB) regulations, that now looks like it's dead in the water. We're now pursuing funding for the building under three different scenarios: 1. As a part of the President's economic stimulus package. That's a slim hope but still alive. That option would result in fairly immediate budget authority and let us proceed very quickly. 2. As a supplemental appropriation to the Fiscal '93 budget, or current budget year. If that were to happen, we could similarly proceed pretty quickly. 3. As a Fiscal '94 budget issue, which would delay the start of construction until 1994. So, we're actually chasing three of these things simultaneously and if one is successful, we drop the other two."

According to Hood, "Optimistically, we could start as soon as summer of 1993...pessimistically, as late as summer of 1994. We need to be ready by the summer of 1995 to start staffing up to meet the requirements of the EOS program under the agreement we have with NASA."

NEWHIRES

U.S. Geological Survey

Donna Scholz has joined the Data Services Branch as a Physical Scientist. She will serve as the Chief of EROS' Data Management Section, which is responsible for archive management and information systems development for the photographic and digital holdings of both aircraft and satellite land remote sensing data of the USGS. Scholz, formerly the supervisor of the Information Management Section (IMS), has worked at the EDC since 1980. Prior to the IMS, Scholz has worked in supervisory roles in data and image analysis, and geographic information systems. Scholz holds a B.S. in Geology from Indiana University and an M.S. in Geology with an emphasis in remote sensing from Purdue University.

Hughes STX

Robert Klaver has joined the International Projects Section after working on various projects in Brazil as a geoprocessing consultant. Before moving to Brasilia in 1991 to work on projects involving environmental management of hydroelectric reservoirs in the Amazon and irrigation of the Rio Sao Francisco Valley, Klaver worked for the U.S. Department of the Interior, Bureau of Indian Affairs, Portland Area Office. While in Portland, he coordinated geographic information systems (GIS) for a five state region. Klaver's experience also includes wildlife biology. He used GIS for wildlife planning for the BIA Flathead Agency, Pablo, MT. Klaver was graduated with a BS in Biochemistry from Iowa State University, Ames, IA, in 1971. He

added a BS and MS in Wildlife Biology from the University of Montana, Missoula, MT, in 1974 and 1977.

John Faundeen replaces Donna Scholz as the supervisor of the Information Management Section. John has been with the EDC since 1985. Faundeen began his career at EDC in Customer Services before joining the IMS during its inception in 1990.

Mike Wehde, formerly with the International Projects section, Science and Applications Branch, has agreed to join the Computer Services Branch to work on the Digital Line Graph-Enhanced (DLG-E) project. Since 1983 Mike has worked in a varying mix of technical and managerial positions at the EDC.

Pete Mumford, Computer Services Branch/Science and Applications Branch, also has transferred to the Computer Services Branch DLG-E project. Mumford rejoined the Data Center in August of 1991 after teaching computer sciences and mathematics courses at Sioux Falls College (1987-1991). Pete's first "EDC hitch" occurred from 1983-1987 when he served as a Senior Programmer Analyst. Prior to accepting the DLG-E assignment, he worked in support of EDC international projects.

AWARDS

The following employees were honored with Peer Awards at the First Annual Meeting of the Hughes STX EROS Data Center Project, Jan. 19, 1993 at the Holiday Inn City Centre, Sioux Falls, SD. Nominated by their peers and selected by a committee of non-supervisory employees, the 17 award winners received plaques and cash stipends.

Charles Luden - Chuck was recognized for the timely and inventive manner in which he handled the EA-5 bleach contamination problem in April of 1992.

Barbara Hubbling - Barb was honored by her peers for her effectiveness, enthusiasm, and contributions to the diverse phases of digital line graph (DLG) processing and production.

Sheri Holt - Sheri received her award for excellence in job performance and great attitude while fulfilling her normal accounting duties, in addition to assisting other customer service representatives.

Linda Heilman - Linda was acknowledged for efficiency and dedication to her job, while demonstrating a cheerful and helpful attitude; for handling the tremendous workload involved in the change-over to Hughes STX, in addition to her duties as secretary for the Project Office and several other sections.

Carla Lynn - Carla was awarded for her efforts in developing and promoting a series of activities designed to improve mental vitality, physical fitness, employee productivity and overall morale.

Michael Madigan - Mike picked up his award for the friendly and helpful assistance he provided to his co-workers in the area of system and equipment support, and for having those "special qualities" promoting a sense of team spirit in the Archive Management and Information Management sections.

Paul Berg - Paul was recognized by his peers for his contributions in Geometric Registration activities, and for displaying a friendly, helpful, and positive attitude.

Kristine Machmiller - Kris was rewarded for her exemplary dedication and inventive ideas as part of the Wide Band Video Project, while maintaining a daily work flow in the Digital Archive, and for her positive and enthusiastic attitude.

Dwayne Wipf - Dwayne was cited for his dedication and efficiency in

Continued on page 12

Peer Award winners: (front l. to r.) ***Linda Hansen, Linda Heilman, Chuck Luden, Larry Murtha, Kris Machmiller.*** *(middle l. to r.)* ***Dwayne Wipf, Paul Berg, Carla Lynn, Barb Hubbling, Pat Johnson.*** *(back l. to r.)* ***Dave Eitreim, Mary Jo Martin, Kris Higgins, Sheri Holt, Mike Madigan*** *(Not pictured:* ***Mary Weinheimer, Dan Akkerman****).*

"SUPER" Computing

by Brian Davis

Just what is a supercomputer? That's a difficult question to answer. A supercomputer isn't easy to define. To help understand what a supercomputer is, let's look at some of its features. A supercomputer is any computer that can perform calculations at a speed or volume much greater than any other class of computers, and costs much more than most computing facilities can afford. Although people at the EROS Data Center are using supercomputers, supercomputing is not being done at the EROS Data Center. Does this sound exciting, frightening, confusing.or all three? I will try to explain.

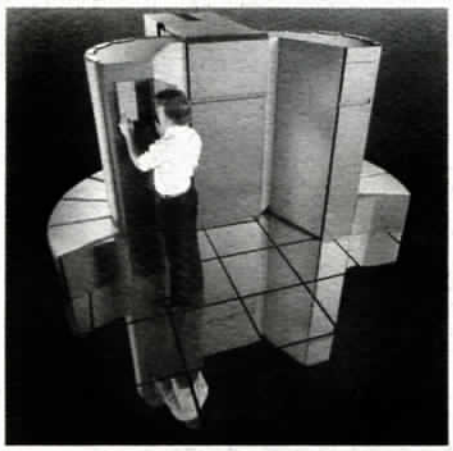
EDC Supercomputing Objectives

EDC management and **Dr. Allen Watkins**, National Mapping Division Chief, believe the government programs we have been assigned require supercomputing capability; however, we don't have a supercomputer yet. In the interim, we get access to supercomputing centers using telecommunication lines, and are starting to match the appropriate supercomputers to our computer-intensive work.

Supercomputing officially has become an important part of the EDC's preparation for Earth Observing System (EOS) responsibilities in NASA's "Mission to Planet Earth," proposed Landsat-7 Ground Station processing, and our growing involvement in global change research.

One objective of the project is to obtain expertise in High-Performance Computing (HPC). Investigations leading to the replacement of our outdated VAX computers in 1990-91 exposed us to various high-end computers.

Another objective is to define and coordinate all of the EDC's supercomputing. During 1988, a supercomputing needs survey was taken within the Science and Applications Branch (SAB). From that survey, several areas were identified that could benefit from supercomputing. Existing programs, software, or set of computer programs, were then run on supercomputers, but each as a separate activity under the direction of a separate project. Now a conscious effort is being made to coordinate these individual ventures. This way, knowledge gained in one area can be used in others.



*A Cray Y-MP8 supercomputer similar to the model used with **Sue Jenson's** (SAB) drainage software.*

A third objective is to ensure that the computer programs run on remote computers assist our projects that need more computing power. We do not want to conduct experiments that only help us learn about supercomputers. We want the knowledge gained to help us do our work. The Science and Applications Branch (SAB) has helped identify those problems that may be a good match with HPC. I have modified some programs written by **Sue Jenson,** SAB Earth scientist, so they run on a Cray supercomputer with a significant increase in speed. These programs assist analysis of land surface structure, and support the digital elevation model (DEM) Database Development and Analysis research project. I am now working to create a program for supercomputers that will define land cover types from satellite imagery. This has been done in the past with a satellite image, but now we want to do it for large groups of images that cover continental size areas.

EROS has obtained many new computers in the last couple of years to handle well-defined, immediate processing needs. The research projects now being undertaken are increasing our computational needs dramatically as we begin working on global change research.

Satellite images, and other data we need to process, are increasing both in size and number. For a long time, scientists have wanted to use remote sensing techniques to study large areas, but the cost of processing data was too high. Recent legislation has reduced the cost of historical Landsat data by a factor of 10. Institutions can now afford to buy thousands of Landsat scenes, they just can't afford to process them. EDC supercomputing can help solve this problem by expanding the use of supercomputers best-suited for remote-sensing applications.

We have become more actively involved in global change research. Therefore, our computer programs need to increase in scope and complexity. While being faced with a deluge of data, we want to continue to advance state-of-the-art sciences that exist at EROS. In addition, we want to provide capabilities that do not currently exist so we can continue to participate in new research projects.

I currently use low-speed network connections to supercomputer centers to develop computer programs. One limitation of this arrangement is the time it takes to transfer images to a remote computer. For now, it is only practical to transfer small test images. In late 1993, however, we are scheduled to obtain a high-speed network connection to the Minnesota Supercomputer Center in Minneapolis, MN. This connection would allow us to transfer a full Landsat multispectral scanner (MSS) scene in about 30 seconds. A result of this capability could be, for the first time, getting real work done by using a supercomputer.

Massively Parallel Processing

Not only is our focus on supercomputing evolving, the supercomputing field itself is evolving. It actually began with computers developed by Cray Research, Inc. These computers, better known as "CRAYS", were designed to have one very fast, large, powerful, and expensive processor, or central processing unit (CPU), the device that does the work.

More recently, Massively Parallel Processing (MPP) supercomputers have become popular. These machines divide a job into very small sub-tasks, and assign each sub-task to one of many processors - more than 65,000. The power of each of these small processors may be compared to that of a personal computer, or PC.

Another approach used by MPP is to have each small processor carry out the same operation on a member of a large set of numbers. For example, suppose you have an array of 64,000 numbers that all need to have the value of 1 (one) added to them. Instead of looping through an addition equation 64,000 times, a MPP machine will have each processor get a number, and then have each processor simultaneously add 1 to its number. Instead of a few computer program instructions being executed 64,000 times, a few more computer program instructions are executed just once.

The problem with MPP is that only certain types of work can be easily broken into sub-tasks that small processors may perform. Normal, everyday computer programs don't "know" how to do work this way, unless some special instructions are added to help them. New computer programs must be written, usually with an unfamiliar and more difficult language. The solution to our enormous processing responsibilities cannot be solved by merely buying expensive computers. We still may need programmers!

Both centralized and parallel processing approaches are migrating toward a middle ground. Crays now have 16 very powerful processors, while some MPPs have a modest number - 512 - of moderately powerful processors. The power of these processors now is comparable to that of a high-end scientific workstation - a SUN Sparc, for example. According to some industry experts, MPP now stands for Moderately Parallel Processing rather than Massively Parallel Processing.

One example of our use of the original "uni-processing model" is my work with the "Drainage software" developed by the Data Center's own **Sue Jenson**. The results of this work was published in a paper, "Using Cray Computers to Extract Hydrology and Topography from Digital Elevation Data." This paper was presented at the Fall 1992 Cray User Group Conference in Arlington, VA. It also was presented in a poster display at the Supercomputing '92 Conference in Minneapolis, MN last November. A summarized version of the paper will appear in the next issue of "Cray Channels," Cray Research, Inc.'s trade magazine. Also, the Drainage software was requested by Cray Research to be one of the applications used to test the performance of their newest computer, which has the largest available memory to date.

Although "Drainage" is not a typical use of remote sensing, it is a classic example of an algorithm developed for small-area study sites that demands High-Performance Computing when applied to large-area data sets. Examples in other scientific fields suffer similar limitations when applying proven remote sensing techniques to data sets of a continental or global scale. As applications important to global change research emerge, the EDC needs to be able to apply to them the appropriate HPC resources.

An example of an EROS use of MPP is Land Cover Characterization, an essential component of several EDC research projects: (Landsat Pathfinder Humid Tropical Forests, North American Landscape Characterization [NALC], and Infobases). Once again, we are trying to do on a large scale, something previously done on a small scale using workstation computers. We are currently developing a computer program that would use parallel processing. This is a task that can be split to run simultaneously on many processors. We would then be able to process large-volume data sets in days instead of years.

High Performance Computing

The emphasis on supercomputing at the EDC has begun shifting away from obtaining knowledge and experience. The priority now is discovering how data processing systems may support research program elements. We are attempting to use the High-Performance Computing we now have access to, thereby providing solutions that otherwise would not be possible.

The name of this project has evolved from "Supercomputing" to "High-Performance Computing." The term "supercomputer" may be interpreted in many specific ways, while HPC is a more general and all-encompassing term. This all-encompassing aspect becomes important as work flows are considered and specialized processing becomes required. HPC implies a total supercomputing environment, which includes such entities as high-speed networks, mass storage devices, interconnectivity, and special high-level computer programming languages.

I know I did not explain everything about "supercomputing." I do hope I successfully explained some terms and concepts, as well as the importance of supercomputing to EROS. If nothing else, now you will understand why, when passed in a hallway and casually asked the question, "How's it goin'?", at least one EROS employee can be heard to answer "SUPER!"

TERRA Lab Continued from page 5

will some day have to mirror these installations.

"Really, to do the business of land modelling right over the next couple of decades," says Watts, "I still believe that level of effort is the kind of thing that's required. The TERRA Lab just doesn't have the resources to undertake that kind of monumental, integrated effort so we've decided to limit ourselves topically and geographically."

Watts' participation in laying the foundation for USGS activity in the nation's Global Change Program will undoubtedly link present and future EDC environmental change research to the overall U.S. Global Change program. "The first linkage is it forms a definite connection to the modelling, which really is the audience or the consumer client for the global change data that are being developed.

The overall objective of the Global Change Program is to quantitatively describe the interactions of the various parts of the Earth's environmental system. Of course that has to be based on geographic information when it comes to land/atmosphere interaction processes.

The second one (linkage) is to carry that a step further into the decision making environment. We're really trying to make a point of analyzing regional problems and looking at issues that are at the policy level. TERRA Lab is going to try and analyze what the connections are between policy changes, how those get implemented at the local level and how those aggregate back up to regional scales."

An initial project for the TERRA Lab will involve studying water rights of the Climax Mine, near Leadville, CO. Owners of the Climax Mine want to sell, or lease, those water rights, but it has asked the Northwest Council of Governments and the Colorado Headwaters Forum to educate them as to the water demands, impacts and options. Climax owners may decide to auction the water to the highest bidder.

While the TERRA Lab begins studying this Colorado water rights issue, another project featuring a larger problem might be a study of the Rio Grande ecosystem. Whatever the project, Watts believes the work of the TERRA Lab will complement the mission of the EDC just as the Data Center's global change research supplements the work of the global change research community.

Collaborators affiliated with the Forest Service and the Agricultural Research Service meet at the TERRA Lab to train in the use of a Modular Modelling System (MSS), developed by the University of Colorado-Boulder.

Remember: EROS Data is published quarterly for EDC employees. The success of this publication depends on your input. EROS Data coordinators welcome your comments and ideas for future issues.

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NCAA Basketball Continued from page 4

ning percentage, so when Cal's winning percentage dropped to 50%, as it did during Lauer's 3 years of eligibility, the fans wanted to know what went wrong.

The two primary reasons the program fell on hard times was because incoming coach **Rene Herrerias** was left with many young and inexperienced players following the departure of former coach **Pete Newell** after the 1960 NCAA Tournament and "The Wizard of Westwood," **John Wooden**, had begun to build his basketball dynasty at the University of California at Los Angeles (UCLA).

While Draeger says Lauer was a forward with rebounding as his forte, Carneggie remembers him at the guard position...and his defensive posture. "The strong point to his game was defense. That's where I think he got the name 'SPIDER.' As I recall, he kind of had bony knees and tended to be skinny."

Carneggie rises from his desk and begins to demonstrate how Lauer played defense for the Golden Bears - waving his arms as a windmill. "The Spider nickname," explains Carneggie as he whipped his arms up and down, "meant that it appeared that he had more than just two hands (when guarding opponents)."

According to the Berkeley Daily Gazette, Lauer's teammates called him "Spider" because he seemed to have eight arms the way he snared rebounds.

When Lauer was deciding where he would continue his basketball career after starring at Berkeley High School, 1956-59, the 1959 Final Four was being held at Freedom Hall, Louisville, KY. West Virginia University featured guard **Jerry West**. Cincinnati showcased **Oscar Robertson**. The Louisville Cardinals benefited from playing on their home floor. The California Golden Bears had 6'10" all-America center **Darrall Imhoff**, a Forestry major with Lauer, Carneggie, and Draeger.

"We've got some great pictures of him (Imhoff) out doing field verification with some of the smaller people on our (forestry) staff," recalls Carneggie with a grin. "He was just a huge man."

West Virginia guard Jerry West tossed in 28 points in the title game, however, with 17 seconds left Imhoff tipped in the winning bucket to give California a dramatic 71-70 win and its first-ever NCAA title. That same year, Lauer was graduated from Berkeley High at mid-term, enrolled at Cal for the spring semester, and practiced as a red-shirt freshman with Imhoff and the rest of the Cal varsity basketball team.

A year later, the California basketball tradition continued as the Bears reached the Final Four for the second straight year. Don Lauer was a full-year freshman, and again practiced with the veterans back from the 1958-59 NCAA championship team. Lauer never saw any varsity action his first full-year because, according to NCAA rules which since have been revised, freshmen were ineligible to play. While California dreamed of winning its second national title before the home folks in San Francisco's Cow Palace, it wasn't meant to be. The Bears fell in the final game to a very young, but talented Ohio State University (OSU) squad led by center **Jerry Lucas**, forward **John "Hondo" Havlicek**, and reserve **Bob Knight** (who some years later would make a somewhat better coach than player).

In the first half of the title game, the Buckeyes shot a phenomenal 84% from the field. Despite the experience of Cal and the Bay Area home court advantage, OSU ended up taming the Bears 75-55. "They (OSU) set the NCAA record for shooting percentage in a title game," recalls Lauer. "There's no way you're going to beat anybody who does that. That record held for 25 years. There was no team in the world that would've beaten them that night."

The 1960 U.S. Olympic Basketball Team was formed later that year, which many consider to be America's first "dream team." This squad included Robertson, West, Lucas, and Imhoff and was coached by Cal's Pete Newell. This talented unit easily took the gold medal at the Olympics in Rome.

Because of his lack of size, Lauer really had to play intelligently. He couldn't rely solely on his physical ability. As he added strength and matured as a player, he gained more playing time. Because of the caliber of players he played with, he became a solid, consistent performer who started for the Bears 2 seasons and earned Big Six (now the Pacific 10) Conference honorable mention as a senior.

As the NCAA crowns its 1993 champion this month, it's fun to reflect on the history of the NCAA Basketball Tournament - an American Classic. It's also interesting to discover the Cal basketball lore of EDC's - Don "Spider" Lauer.

HELP Desk Seeks Old Software

by Jim Hovatter

What are you doing with your outdated computer software? Is it gathering dust in your office? The Technical Support HELP Desk has a better use for your old software. HELP Desk staff would like all EROS personnel to review the

software they are not currently using and forward it to the HELP desk. Once all unused software in the building is collected, the HELP Desk will make it available for other potential users through the Micro Checkout pool.

If you would like to make your old software available for others in the building to use, please take note of the following "software reclamation" guidelines:

- Software must have the original disks and manuals and not be a package that has been replaced by an upgraded version.
- Even though the software may be one or two versions behind the current version, it's possible it can be upgraded and used for an upgrade fee rather than buying another complete package.
- Any software received by the HELP Desk that can't be used will be discarded.

Please review your old software and call HELP (ext. 4357) if you have any questions.

AWARDS Continued from page 7

which he performs his job. In addition, he was praised for his vast knowledge of archive information which is complemented by his sincerity and helpfulness toward his coworkers.

Linda Hansen - Linda received recognition for her efficient and congenial manner of accepting special assignments and projects beyond her daily duties. She also was cited for her versatility and helpfulness in handling Landsat problems, and for always being available to help her coworkers.

Patricia Johnson - Pat was recognized by her peers for her dedication and perseverance in supporting the Information Management Section in Global Land Information System (GLIS) development and testing; for her positive attitude and willingness to accept new responsibilities; and for her enthusiasm and cooperation in working with co-workers.

Lawrence Murtha - Larry was honored for his exemplary help with offsite film requests, imprest orders, and general procurement support, while always demonstrating a cheerful and positive attitude.

Mary Weinheimer - Mary was cited for her unique and exceptional efforts, fervor, and dedication in detailing the documentation and procedures required for the CD-ROM premastering process.

Kris Higgins - Kris was acknowledged for consistently meeting customer expectations and deadlines in the processing, packaging, and shipping of EDC products. In addition, she was cited for her positive and effective interaction with others while accepting increased responsibilities.

Daniel Akkerman - Dan received a Peer Award for sharing his expertise of the X-Windows system environment, positive attitude, commitment to his job, and desire to help fellow employees make a smooth transition into the DLG-E group.

Mary Jo Martin - Mary Jo was recognized for making significant contributions in the organization of the DLG-E Annex office; for her conscientious attitude and strong commitment to high quality job performance; for the fairness and good judgement demonstrated while interacting with others.

David Eitreim - Dave was honored for his teamwork, as well as his unique and orderly solution to problems. He also was recognized for the professional attitude he exhibits on all assigned projects.

Bruce Quirk (EDSPO liaison at the Goddard Space Flight Center) & **Joy Hood** (Science & Applications Branch) received two awards on a publication they co-authored titled, "A Technique for the Reduction of Banding in Landsat Thematic Mapper Images." This publication appeared in the October 1992 issue of Photogrammetric Engineering and Remote Sensing and won the 1993 John I. Davidson President's Award for Practical Papers, 2nd place, and the 1993 ERDAS Award for Best Scientific Paper in Remote Sensing, 3rd prize, American Society for Photogrammetry and Remote Sensing.

Peer Awards Committee

The Peer Awards presented at the HSTX Annual Meeting, Jan. 19, 1993, were based on nominations submitted to the Peer Awards Committee. The Committee is composed of 14 Incentive Award winners from 1992. The 1992 Peer Awards Committee is comprised of non-supervisory staff:

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Photographers: **Bill Winn, Max Borchardt, Ray Watts**