WRD RETIREES

NEWSLETTER 155-S
SUPPLEMENT
May 2012

An organization of retirees of the Water Resources Discipline, U.S. Geological Survey, whose purpose is to keep its members in touch with each other and their former agency.

Our First Newsletter Supplement

Welcome to our first Newsletter Supplement. This came about after we received a suggestion from Jim Daniel (retired in 1995), former Assistant Chief Hydrologist for Scientific Information Management (SIM), when WRD was distributing minicomputers to all offices and desktop computers to all employees. Besides being a born storyteller, Jim realized that online information sharing was in the future of USGS, and he has been selling online sharing ever since. Our Newsletter is a very successful example of a printed and online method of communicating, and many of our 1,400 retirees are using it to keep up with each other.

The Newsletter Supplement will allow us to share and save more online histories, anecdotes, articles that are too long for the standard newsletter, old photographs, and just about anything a retiree feels is worth keeping somewhere. These items may have been too long for our regular newsletter format but can easily be placed online.

I talked with Charles Nethaway and Ken Lanfear, our Newsletter Editor and WRD Retirees Website Manager, respectively, about the Supplement. They proposed a way to do it with no increased costs and a small change to our current website. We will make the Supplement “online only” since this will control costs and let the Supplements be of any length.

Charles will provide details about submitting material, below. I invite all of you to make contributions to this new form of sharing our WRD stories and pictures.

--Andy

How to Submit Items to the WRD Retirees Newsletter Supplement

Our Newsletter Supplement will be online and will be capable of publishing color and black-and-white photographs along with articles, stories, and histories.

Please send your material to the WRD Retirees Newsletter addresses as shown on our web site at **http://www.wrdretirees.org/newsletter.htm**, using email to **whozit1130@aol.com** or US Mail to 2370 Albot Road, Reston, Virginia 20191. The desired formats are Word and .jpg digital photographs; however, we will accept other formats and typed material. Feel free to call me at 703-476-6782 (home) or 703-609-8271 (cell) to discuss.

We would enjoy seeing photographs from our working days. We hope that you can identify the date, place, and people in the photos. But if you have only partial identification, we will invite readers to write in and help complete names and captions for interesting shots. We can scan your paper photographs if you do not have them digitally. We will save copies of these photos in the Retirees Archives in Reston.

So, enjoy, and we hope to hear from you soon.

--Charles

USGS Satellite Real-Time
Data Network: How it came to be

By Jim Daniel
September 2011

The recent floods have highlighted the value of real-time data from USGS stream gages. More than 7,000 stations (9,000 counting ground water wells) are now part of that system. Perhaps some of the newer (and older) folks might be interested in how the current system got started.

Before 1970, the real-time data system consisted of a few land-line 'telemark' equipped stations funded primarily by the Corps of Engineers and the then Weather Bureau for their operational missions. In the 1960s, the Department of Interior through William T. Pecora (named USGS Director in 1968 and Under Secretary of Interior in 1971; instrumental in the first Earth Day) began to push NASA and Congress for a satellite to apply emerging remote sensing capabilities to domestic resource evaluation. The EROS Program was born. I continue to remind people that EROS spelled backwards is "Sore." Make of that what you will.

Funding and efforts were authorized for NASA to develop and eventually launch a series of satellites named ERTS (Earth Resources Technology Satellite which evolved to LANDSAT). These were to be small, polar-orbiting birds with a few sensors in the near visible spectrum having the capability to completely image the Earth on an 18-day cycle. A coarse 100-meter resolution was degraded from state-of-the-art in order to keep military capability out of the public domain (publicly available resolution today is about 1-meter). The EROS Program under its Director Bill Fisher and Associate Director Chuck Robinove (WRD alumnus) was to be NASA's primary design consultant. As something of an afterthought, the decision was made to include a data relay capability for two reasons: 1) It was easy, and, 2) they thought someone might need some actual data (ground-truth was the buzz word of the day) to calibrate the imagery. Because both Bill's and Chuck's background was not data-oriented, they turned to WRD to help get this little effort 'off the ground' (pun intended).

Morris "Moe" Deutsch was Chief of the WRD Office of Remote Sensing. Moe didn't have much data background either but his deputy, Dan Anderson, did and they went searching for some sucker to lead the effort to get some data relay onto ERTS. That's where I came in. Elwood Leeson, Mid-Continent Regional Hydrologist in St. Louis, offered me (then in Indianapolis) as this data relay guy on the condition that I be stationed in St Louis. The staff there wanted me to understudy Regional Research Hydrologist Irv Rorabaugh, you see. Moe had funding from EROS and from NASA so he agreed, as did WRD Headquarters as it would cost them nothing. I relocated to St Louis with the title of EROS Data Relay Coordinator (still in WRD, however). That's when I first learned that a 'coordinator' is someone who has all the responsibility, none of the authority, and is around to be blamed when things go wrong.

After an orientation period and a bit of thought, it became apparent that things were actually going wrong. NASA had charged an engineer named Al Arndt to design a data relay box to attach to earthbound sensors. In the absence of ANYONE to talk to, Al came up with a device that attached to measuring equipment whose output was an electric analog signal -- not his fault as before I came upon the scene he had no guidance. I let him know that we (WRD) didn't have many of those types of devices. All of our recorders were float-driven analog ink trace recorders (Leupold Stevens, remember?) or float-driven binary coded decimal (BCD) punched paper tape recorders (Fischer/Porter digital punch). We needed a device that would attach to our existing equipment. Nice old Al didn't have much stomach for a complete redesign. He'd done his job and was moving on.

I got together with Hal Wires at the WRD Columbus, Ohio, Equipment Lab (later to become the HIF at Bay St Louis, Mississippi) and showed him what NASA had and asked him how tough it would be to come up with something that would work for us. Hal assigned a young electrical engineer named Duane Preble to work with me on the problem. We (Duane and I) started a furious writing and screaming campaign to NASA about 'How could they prove their stuff was benefiting mankind when they wouldn't even put out a piece of equipment that matched up with the World as it existed!' We were surprised when we started getting favorable replies from a NASA Project Engineer named Earl Painter (turns out he was Arndt's boss) who was at Goddard Space Flight Center, Maryland. Earl came out to St Louis and I took him around to a bunch of gaging stations in all their spider-infested, weed-protected, snake-haven glory. He was impressed that WRD had almost 10,000 of these places nationwide and that the Nation's water supply was evaluated by such decades-old brute force procedures. He also went home to GSFC and immediately put some folks to work on designing a device to match up with our old stuff. Thus the Data Collection Platform (DCP) was born.

ERTS was a polar-orbiting satellite. There would be no continuous line-of-sight between DCP and satellite; there would be only regular periods in each of 12-14 daily Earth orbits when data could be transmitted AND received. The DCPs were designed to transmit regularly timed messages (no data storage capability) which could then be relayed on to a ground listening station only when the satellite was in view. Ideally, at least one message would get through every 12 hours. The DCP always broadcast, the satellite always listened, and a couple of times each day the message from a DCP would get through to a NASA receive site. Pretty simple, huh?

Now that we had some appropriate equipment, we set out to actually develop some Interior-wide experiments to prove the data relay concept on ERTS. We were able to generate proposals to NASA for a dozen, or so, groups of DCP installations in Arizona, Florida, South Dakota, Lake Ontario, Colorado, the Cascades, Central America, and the piece de resistance, the Delaware Basin in Pennsylvania and New Jersey. Data types included stage, precipitation, wind, snow, seismic events, tilt, and water quality. WRD, GD, and Geography Programs were involved from the USGS along with organizations as diverse as other Interior units, South Dakota State University, and the US Forest Service. The most sophisticated experiment was in the Delaware River Basin, where WRD was a key player in providing data for management of water quality of the River. Dick Paulson was the Principal Investigator and chief proponent of the potential of a satellite data relay system to provide management data to the River Master (always a WRD person) for system operation, as well as for other cooperating agencies such as the City of Philadelphia whose concern was possible salt-water intrusion to their water-supply intakes.

There came a time when Dan Anderson and I briefed Chief Hydrologist Roy Hendricks about our efforts to prove the potential for satellites to relay data from all of WRD's gaging sites. Dan and Roy were old stream gaging buddies so we had a relatively easy time getting an audience. I was taken aback though when Roy flat out stated that providing real time data was not in WRD's mission. I blurted out that "It is if you say it is!" Dan always got a big belly laugh out of my impertinence on that occasion.

Well, all's well that ends well, as stories go. A number of the experiments got funded, the satellite went up on July 23, 1972, the DCPs transmitted data, the satellite relayed the data, the Delaware Basin work was a big success, and the concept was proved. NASA continued data relay development on the Synchronous Meteorology Satellite and later on the GOES satellites where it exists today. Miniaturization and continued development of DCPs brought costs within reasonable range. The operational benefits of continuously relayed data were quickly recognized and now only a few stations remain outside the network that we can access at any time on the Internet.

I retired in 1995, 23 years after ERTS-1 was operational. Yet, when Admin Division pulled my property list for retirement accounting, on it there was a DCP that Jules Friedman (GD) had installed on Surtsey volcano in Iceland. I offered to go to Iceland to verify that the equipment still existed. They decided that was unnecessary. Perhaps it's still there.

The group that brought the first satellite data relay efforts to fruition included both government and industry (notably Westinghouse and General Electric) folks. The core group is pictured in this early 1972 photograph taken at the Mississippi Test Facility (later Stennis Space Center and home of the HIF).

Left to Right: Contractor, Gary North (EROS Liaison, later Assistant Chief Mapping Division), General Electric Representative, Jim Daniel, Earl Painter (NASA) holding DCP, Contractor, Contractor, Contractor, Dick Paulson, Duane Preble, Saul Cooper (New England Corps of Engineers).

History of the New England District

Water Resources Division

By John Baker
May 2, 1979

In New England, information on water-resources has long been recognized as important to the well-being of both the citizenry and commerce. As an example, beginning in 1784, records of the opening and closing dates of navigation on the Kennebec River in Maine were kept. Records of the flow of the Merrimack, River at Lowell had been kept by the Essex Company since the mid-1850s. The foundations for ground-water studies can be traced back to pioneer work by F. H. Newell who, while at the Massachusetts Institute of Technology (MIT) in 1885, had prepared a thesis on the flow of oil through rock – the earliest experimental data known bearing upon the relations of pressure to the flow of fluids through rocks. Thus, New England can be considered as the cradle of hydrology in America. Involvement of the U.S. Geological Survey began in New England in 1901, when Nathan C. Grover, operating out of Orono, Maine, accepted a per diem appointment to select sites and establish stream-gaging stations on rivers in that State.

By 1904, some work had been accomplished in each of the six New England States, and the New England District was formed. Operations were conducted from the office in Orono until 1903 when the move to Bangor was made. The Bangor office operated for two years until 1905 when another move was made; this time to Boston where operations in New England were headquartered. The State of New York joined the New England family in 1906 where it remained until 1909. New York moved out in 1909 and remained alone until 1910 when it returned to the fold. However, the return was in the form of reconsolidation, with the District headquarters being moved from Boston to Albany. Maine then separated, forming a new District with headquarters in Augusta where they remained until 1913 when work in the State was discontinued as a result of loss of cooperative funding. During the period 1913 to 1928, stream-gaging in Maine was conducted by State agencies under the general supervision of Survey engineers.

In 1915, Boston again became headquarters for the New England District, including Maine but excluding New York, and continued to serve the six States until 1928, when Maine again separated, followed in 1929 by the separation of Connecticut. From 1929 until 1965, the New England Surface-Water district consisted of State of Massachusetts, New Hampshire, Rhode Island, and Vermont.

Cooperative water-resources investigations began in New England in 1903, in Maine with a study of water-power possibilities and in New Hampshire where the relation of forestry and stream flow was investigated. It wasn't until 1909 that cooperation in water-resources studies became funded facts in Vermont and Massachusetts and not until 1941 in Rhode Island.

The earliest ground-water studies in New England were begun about 1911, were conducted from offices in Jamaica and Mineola, New York, and were largely concerned with the use of ground water for municipal and private supply in Connecticut. It wasn't until 1938 that cooperative ground-water investigations, consisting of standard well inventories were begun in Massachusetts. In 1944, a field office was established for New England in Boston, and in 1955 a ground-water district was established in Boston to conduct investigations in Massachusetts, New Hampshire, Maine, and, eventually, in Vermont. Work in New York, Rhode Island, Connecticut, and for a while in Vermont, was conducted from Albany. This arrangement continued until Division reorganization in 1965.

Water-quality work by the U.S. Geological Survey began in New England in 1904 when, at the request of the governor of Vermont, an investigation of the effects of sewage and industrial pollution on the waters of Lake Champlain was made by M.O. Leighton, head of the Division of Hydro-Economics. Prior to the Survey's involvement, however, the Massachusetts Board of Health had, in 1891, prepared a map showing lines of "normal chlorine" in that State; a study that was later incorporated by the Survey in a map showing so-called "normal chlorine" for the entire country.

In 1909, the Division of Hydro-Economics became the Division of Quality of Water which was merged with the Division of Ground Water in 1910 and where it remained until 1918. There was little emphasis on water-quality work in New England until the early 1950's. Some special purpose samples were collected but no large-scale water quality studies were made.

In 1953, responsibility for quality-of-water work in the northeast was given to the district chemist in Albany, New York, and quality-of-water operations in New England were conducted from that office until Division reorganization.

The year 1965 brought many changes to the New England water-resources operations. The Central New England WRD district was formed, and consisted of Massachusetts, New Hampshire, Rhode Island, and Vermont. The Boston office became the district headquarters with Subdistrict offices in Concord, New Hampshire, and Providence, Rhode Island and a field headquarters in Montpelier, Vermont.

Maine was established as a separate WRD district in 1965 with the District office in Augusta.

The New England district came into being in 1974 when Maine was added to the four States of the Central New England district and Augusta became a Subdistrict office.

Currently ***[May 2, 1979],*** the District has a staff of about 84 professional, sub-professional, and administrative personnel. The District-wide hydrologic data program includes about 268 surface-water stations, 155 observation wells, and 36 water-quality sampling points. The investigative and appraisal portion of the District program totals about 50 projects.

Funds are derived from many sources.

Principal cooperators are:

Maine:

Public Utilities Commission
Department of Environmental
Greater Portland Council of Governments
Androscoggin Valley Regional Planning Commission
Southern Kennebec Valley Regional Planning Commission
Department of Conservation

Massachusetts:

State Water Resources Commission
Department of Public Works
Metropolitan District Commission
New England Interstate Water Pollution Control Commission
Barnstable County
Lower Pioneer Valley Regional Planning Commission

New Hampshire:

Water Resources Board

Rhode Island:

Department of Environmental Management
State Water Resources Board

Vermont:

State Department of Water Resources
Town of Springfield

The present program ***[as of May 2, 1979]*** is split about 50-50 between maintenance of a sound and responsive data base from which effective decisions can be made, and conducting meaningful investigations designed to meet regional and national needs for hydrologic information.

Future plans include more emphasis on quantitative ground-water studies, assessment of the types of water-quality changes, particularly in the subsurface; and the establishment of a data base on water use.

MANAGERS IN NEW ENGLAND FROM 1901 TO 1982

Surface-water District Engineers

Name	Years	States
N. C. Grover	1901-1904	ME, MA, NH, VT, RI, CT
A. K. Barrows	1904-1909	ME, MA, NH, VT, RI, CT, NY
T. W. Norcross	1909-1910	ME, MA, NH, VT, RI, CT
C. C. Babb	1910-1913	ME
C. C. Covert (Albany)	1910-1915	MA, NH, VT, RI, CT, NY
C. H. Pierce	1915-1925	MA, NH, VT, RI, CT
O.W. Hartwell (Acting)	1918	MA, NH, VT, RI, CT
H. B. Kinnison	1925-1956	MA, NH, VT, RI
M. R. Stackpole	1928-1956	ME
C. E. Knox	1956-1965	MA, NH, VT, RI
G. S. Hayes	1956-1965	ME

Ground-water District Geologists

Name	Years	States
O. M. Hackett	1955-1961	MA, NH, ME, VT
R. G. Petersen	1961-1965	MA, NH, ME, VT
R. C. Heath (Albany)	unk-1965	NY, CT, RI, VT

WRD District Chiefs

Name	Years	States
C. E. Knox	1965-1973	Central N.E. District
J. R. Williams (Acting)	1973-1974	Central N.E. District
G. S. Hayes	1965-1974	ME
J. A. Baker	1974-1979	New England District, 5 States
P. N. Walker (Acting)	1979-1980	New England District, 5 States
I. C. James, II	1980-1982	New England District, 5 States
D. McCartney	1977-1982	Connecticut
I. C. James, II	1982-	New England District, 6 States

Stream Flow in South Florida

By John D. Warren
December 5, 2011

The Miami, Florida office was different from many USGS offices in the United States or the world. We had to measure the inflow and outflow of Lake Okeechobee to the Everglades. We also had to measure the flow from the Everglades into the Gulf of Mexico and Atlantic Ocean through the Miami, West Palm Beach, and Hillsboro Canals.

The 1927 hurricane caused many deaths in the town of Okeechobee. The hurricane blew all the water to the south side of Lake Okeechobee. As the hurricane passed the people from Okeechobee thought the hurricane was over, and they went down to the lake. However, the water came back from the south and many people were killed. The U.S. Corps of Engineers built a levee around Lake Okeechobee to prevent this from happening again. This lake also provided water for Miami and cities to the north of Miami along the Atlantic Coast.

The world's largest pumping station, S5A, was built on the south side of Lake Okeechobee. A horizon control gate was built at the site to let out water to irrigate the sugar cane to the south. During the rainy season, the water is pumped back into Lake Okeechobee. The canals had water flowing in different directions depending on the season. This was like the tide coming up and down rivers. The Miami office installed deflection veins on these tidal stations. The deflection vein is like a rudder on a plane. The deflection was used to relate to velocity; and the water level was used to relate to area. These two things were recorded on a Steven's recorder. It was very hard to compute the average discharge for each day. The Miami Office purchased a digitizer.

The water level was copied on one metallic tape and the deflection on another metallic tape. A person spent all day copying the record to the tapes. The two ratings for water level and deflection were used in the computation of daily discharge. The tapes, rating, and dates were punched on IBM cards and read into an IBM computer. The computer printer printed out the daily discharge and maximum, minimum, and mean water levels for each day of the period. The Miami office established five water-level stations in the Everglades, which had to be reached by helicopter. A special timer was made that sent the water level to the ERTS satellite as it passed Florida every 90 minutes. This timer is one of a kind.

The Miami Office replaced all deflection stations with electronic flow meters. When the GOES satellite was sent into space it didn't move (geosynchronous) so water level could be sent to the satellite every hour. The first diatizer was a Calmer, and a larger one was purchased that was twice the size of the old one.

Deflection meters were removed from the pumping stations and a rating table was developed with all pumps running at full speed. The discharge was computed using discharge for one pump running, and the number of pumps running was punched on IBM cards. Discharge was computed by multiplying the discharge for one running pump by number of running pumps.

Another way we measured flow was by the float stick method. Two tag lines were stretched across the canal, five feet apart. A dowel rod a little shorter than the depth of the canal was used. This rod with a weight on the bottom was timed between the two lines. This gave velocity and knowing that, discharge was computed by multiplying velocity times depth.

Measurement of flow over a sharp-crested weir was measured by making a flume one tenth of a foot wide; measuring the time it took to fill a cubic-foot bucket. If the weir was ten feet wide, ten measurements were taken, then added up to get total flow.

Jim Biesecker's Contributions to International Geosciences 1986 – 2000

By Brian Kelk

James E. "Jim" Biesecker passed away in January 2012 after an illustrious career and an active retirement. As Jim's positions increasingly involved information technology and information sharing within the geoscience context, he envisioned the integration and exchange of worldwide geoscience data from Geological Surveys in many countries. This article outlines some of Jim's international efforts while he worked for the USGS and after he retired in early 1996. –Editor's note

ICGSECS In 1986, Jim invited senior Information/IT Managers of a group of Geological Surveys from North America, Europe and Japan to a meeting in Reston, to identify and discuss the key requirements to aid in the exchange and integration of geosciences' data worldwide. This meeting initiated the **International Consortium of Geological Survey for Earth Computing Sciences** (**ICGSECS**) with the following Aims:

1. to exchange information related to the use and management of computer and telecommunications systems in support of the earth sciences;

2. to provide a forum whereby individual geological survey solutions to problems commonly experienced by each organisation, including but not limited to data capture, construction of databases, evaluation methods and presentations, can be presented and discussed;

3. to provide opportunity for discussion and promulgation of data standards, data exchange formats for the sharing of global databases and solutions to operational problems;

4. to act as a leverage group to influence the commercial design and cost of hardware, software and telecommunications systems;

5. to provide opportunities to establish cooperative projects that demonstrate data sharing and problem solving techniques among the member surveys;

6. to establish telecommunications links for the member surveys and facilitate the exchange of data and ideas.

In order to encourage all member nations to participate fully, the Chair of an annual meeting was to be provided by the host nation. Only the Executive Secretary (B. Welk until c. 1991) held a long-term office, but Jim was seen as the 'Father Figure' until he retired. This, of course, brought Jim and me into a long-term partnership and close friendship.

ICGSECS gradually expanded. It met annually thereafter in different member countries, until 2001 when it evolved into the **Geoscience Information Consortium** (**GIC**). The most recent meeting of this new forum was in Namibia in 2011 by which time the membership included 26 national Geological Surveys.

COGEOINFO In 1992, perhaps because of our ICGSECS roles, Jim and I were invited to a meeting in Budapest to discuss the future of the **International Union of Geological Sciences** (**IUGS: see [iugs.org]**) COGEODATA and COGEODOC. At that time, COGEODOC was the healthier of the two

Commissions, with a Working Group on the Multilingual Thesaurus of the Geosciences, but as the emphasis had changed since the early days of COGEODATA, away from the need for computer applications, etc., to the integration and use of geosciences information, and its subsequent communication, the old focus of COGEODATA was seen to be out-of-date.

Accordingly, the meeting successfully proposed to the IUGS that the two commissions should be merged into a new one with the name of **COGEOINFO** (**Commission for the Management and Application of Geosciences Information**), commonly abbreviated as "**CGI**." The mission of COGEOINFO was to stimulate and facilitate the full and wise use of geosciences information in the definition and solution of regional and global problems. To help achieve those aims, Working Groups were quickly established on:

1 Data Sources and Directories

2 Exchange of Geoscience Data

3 Multilingual Thesaurus of Geosciences

4 Integration of Multidisciplinary Datasets

5 Geosciences Modelling Methodology

6 Geosciences Applications for Developing Countries

Jim Biesecker was elected the first Chairman, and again I had the great pleasure of working closely with him as the Commission's Secretary/Treasurer, though in later years he and I alternated as Chair and Secretary/Treasurer.

The **Group on Geosciences Applications for Developing Countries**, under the Chairmanship of Dr. Max Fernandez of Belgium, brought COGEOINFO into a close working relationship with the **International Centre for Training and Exchanges in the Geosciences** (**CIFEG**) and UNESCO as they all worked to provide training and solutions to many Geological Survey organisations in African and Asian countries. This proved to be a favourite activity for Jim. He, with a number of COGEOINFO members, helped in those training sessions, and I am quite sure that many African and Asian attendees will remember the enthusiasm with which Jim made his contributions, and the warmth with which he befriended them.

The Commission was reactivated in late 2002 and is today thriving under a very active international Council.