



THE MAINE GEOLOGIST

THE NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MAINE

JUNE 1978

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Two Things:

1. Enclosed is a new set of By-Laws, adopted on May 15, 1978, by Archie W. Berry, Jr. and other incorporators of GSM, Inc. The new version is slightly modified from the original August 1, 1975 By-Laws to conform with certain Internal Revenue Service needs. Please read the enclosed By-Laws, which should be formally adopted by the Membership at the Annual Meeting at UM-Gorham on July 28th.

2. Also, please everyone give deep thought to the matter of Society Officers, a Councilor, and the other workers who must be nominated and elected at the July 28th Annual Meeting (see enclosed Meeting announcement). The clock was stopped at last year's Meeting, and all officials have now been in office at least 2 years - some longer. It is your Society... Work on it.



COMMERCIAL GRANITES NEEDED

We've recently heard from Dorothy A. Richter, Chief Geologist of Rock of Ages Corporation, that they would like to locate new sources of "black granite" and red granite suitable for monuments.

They have checked out most of the old black granite quarries and prospects in Maine, and have found them unsuitable for a variety of reasons, including olivine content (oxidizes readily) and culture (zoning restrictions and high real estate values in coastal areas). Dorothy suspects that the best potential for black granite in Maine may be in the unexploited gabbros in the interior of the state. Basically, she is searching for fresh, fine-grained (<5 mm), little-jointed, black igneous rock which can be quarried in blocks at least 4' wide and comprising at least 50 cubic feet volume. Homogeneous texture and color are very important. Certain minerals are known to weather poorly and are to be avoided, in particular: olivine and its break-down products; fibrous amphibole; biotite flakes >5 mm in diameter; sulfides; epidote; chlorite; and calcite. The most successful commercial black granites have proven to be feldspathic quartz norites and diabase.

A deep red (not pink) granite is also desired. The known "red" granites in Maine are too pale in color and too coarse-grained for monumental uses. Unless someone out there has a really good red granite lurking beneath the trees of his project

area, historical experience suggests that there is no potential for finding an appropriate red granite in Maine. In this respect, Dorothy will be happy to hear from geologists who know of a deep red granite anywhere in North America which has not yet been quarried.

If you have some rocks which may appear to merit a closer look, would you consider getting in touch with Dorothy at Rock of Ages Corporation, Barre, Vermont 05641; Phone (802) 476-3115.

The letter below, from Dr. H. V. Donohoe, Jr., is self-explanatory, offering increased communication between geologists in Maine and Atlantic Canada. We propose that this matter be given thoughtful consideration at the GSM Annual Meeting, leading to some formal and useful response. (JRR)



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DEPARTMENT OF MINES
1690 HOLLIS STREET, HALIFAX-NOVA SCOTIA-CANADA

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Mr. W. W. Rideout,
President, Geological Society of Maine,
c/o John R. Rand,
Cundy's Harbour,
RD2, Box 210A,
Brunswick, Maine, 04011
U.S.A.

April 6, 1978.

Dear Mr. Rideout:

I am a member of the Executive of the Atlantic Geoscience Society. We are interested in increasing communication between geologists in Maine and Atlantic Canada. Our Society comprises about 300 geoscientists in industry, government, and university; we usually meet once a month to hear a guest lecturer and each year we hold a major meeting, alternating between a two day symposium and a colloquium on research in Atlantic Canada.

Perhaps we could further communication between geoscientists in each Society by advertising memberships in each Society, describing upcoming lectures, and generally providing news about events for each Society. Joint field trips can be initiated. We would also like to explore the possibility of a joint meeting in 1980 to recount major advances in Maine-Atlantic geology.

we feel there is a need to develop further communication between Maine and the Atlantic region.

Sincerely yours,

cc: Dr. Arthur Hussey.
cc: Dr. Graham

Howard V. Donohoe, Jr.,
President, Atlantic Geoscience Society.

Remote Sensing -A Bird's Eye View

By James K. Richard, Geologist
SCS ENGINEERS, 124 State Street
Augusta, Maine 04330

When J. Rand and I first discussed the possibility of my writing an article dealing with remote-sensing for this Newsletter, I thought it would be straightforward and fairly easy to do. Now that I've had the chance to organize my thoughts, it has become acutely apparent that it is not going to be a simple task. There is so much information available that condensing it to a length which is appropriate for this publication might leave too many unexplained bits of information. For this reason, I've concentrated on a broad overview of the U.S. Geological Survey EROS (Earth Resources Observation Systems) program and applications for geologic study in Maine.

What is remote sensing? Basically, anytime we observe something from a distance, whether it be with the aid of photographs, satellite images, or our own two eyes, and we make interpretations based on what we see, we are using the principles of remote sensing. We've all used aerial photos to aid us in field research and mapping programs. This is a basic form of remote sensing. We're all familiar with aerial photography, so I will focus this discussion on a facet of remote sensing which may not be so familiar - Landsat (formerly ERTS) imagery. In 1972, NASA launched ERTS 1, a modified Nimbus satellite, to acquire imagery of the earth from an altitude of 950 km. It was followed by a second satellite in 1975, at which time the names were changed to Landsat 1 and 2. Early this spring, Landsat 3 was launched. With the failure of Landsat 1 this past winter, data is now acquired solely from Landsats 2 and 3.

The satellites circle the globe in a sun-synchronous, near-polar orbit every 103 minutes. The orbit process is negligible, and total earth coverage is obtained as the result of the earth's rotation beneath the satellites. Each satellite covers the entire globe every 18 days.

Landsat acquires data in four spectral bands. Reflectance values from the earth's surface are recorded in wavelengths corresponding to green, red, near-infrared and infrared light. Each band may be examined separately, or combined as a "false-color composite". False-color composites resemble color infrared photos in that vegetation appears as various shades of red. That, in a very small nutshell, is what Landsat is and what it does.

The U. S. Geological Survey is responsible for archiving all Landsat data, and has an additional responsibility for training scientists from around the world in the use of Landsat imagery. It does this through its EROS program. The hub of the EROS program is the EROS Data Center, located near Sioux Falls, South Dakota. The Data Center is the central archives and training facility for EROS, and it is here that the data are catalogued, stored and produced. The Applications Branch of the Data Center is staffed by scientists with expertise in geology, hydrology, soils science, forestry, range management and land use. These people are responsible for training others, and for conducting training-oriented research.

Landsat images are available for virtually the entire globe. Each image covers roughly 13,000 square miles. Images can be obtained at scales of 1:1,000,000, 1:500,000 and 1:250,000 as standard products, and are available as paper prints, positive transparencies and negative transparencies. A standard 1:1,000,000 black-and-white positive image in any one of the four wavelength bands will cost about \$8, whereas the same image at a scale of 1:250,000 will cost about \$20. The pricing structure and types of products available are too numerous to detail here, but up-to-date and complete information can be obtained directly from the Data Center, whose address is given below.

Training programs are on-going at the Center, and are directed at specific disciplines. If you would like information concerning a training course in geology, I suggest that you contact Dr. James V. Taranik, Applications Branch, EROS Data Center, Sioux Falls, South Dakota 57198. For training in hydrology, contact Dr. James Lucas, same address.

In addition to looking great, framed on your wall, Landsat imagery can be a very useful research tool. It affords a synoptic view of large portions of the earth, making it particularly useful in unraveling regional geologic patterns. Structural elements are often discernible on imagery, and may be attributed to a variety of causes from vegetation association to soil moisture.

When Brad Caswell, Hydrogeologist for the Maine Geological Survey, visited the EROS Data Center last December, to take a remote-sensing applications course in hydrology, he and I had the opportunity to study portions of Maine in detail. Working primarily with an image covering Washington County, acquired on April 17, 1974, we made several interesting observations.

1. Surficial geologic features, particularly Pineo Ridge, stand out quite well. The different appearance of the deposits is due to deposit/vegetation associations, and could be a useful tool in mapping potential groundwater aquifers.

2. Brad and I noticed that the vegetation type is distinctly different in the contact zones of granitic intrusions. This may be due to many factors, one of which could be unique groundwater and soil chemistry in those areas.

3. Structural geology shows up quite well in the form of strong lineaments. Many of these lineaments coincide with mapped faults in the bedrock. Methodical study of these lineaments for other areas in the state may lend new insight to the structural geology of remote portions of Maine.

4. Turning from land to water, we enlarged portions of the image which covers Machias Bay. Here we were able to map the discharge of the cold, fresh water plume from the Machias River. Mixing patterns in the bay are quite clear, and may be useful in future estuarine studies.

In summary, I think that the central findings of our brief study were the definite relationships between vegetation and geology, and the way in which linear features can be mapped to help decipher regional geologic structure.

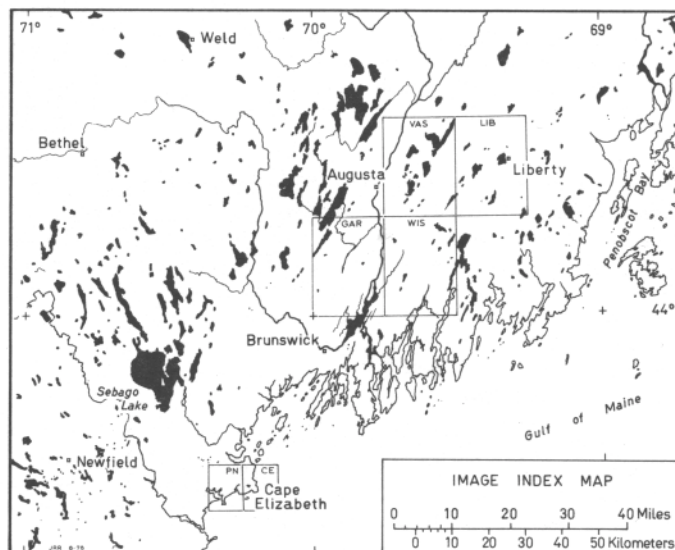
With all of us champing at the bit for the

up-coming GSM field trips on July 29-30, an image of south coastal Maine is reproduced here, covering the field trip areas. The most striking structure can be seen extending northeasterly from Casco Bay in the Brunswick area. There are also some fairly good lineaments at roughly 700 to it, to the north of Sebago Lake.

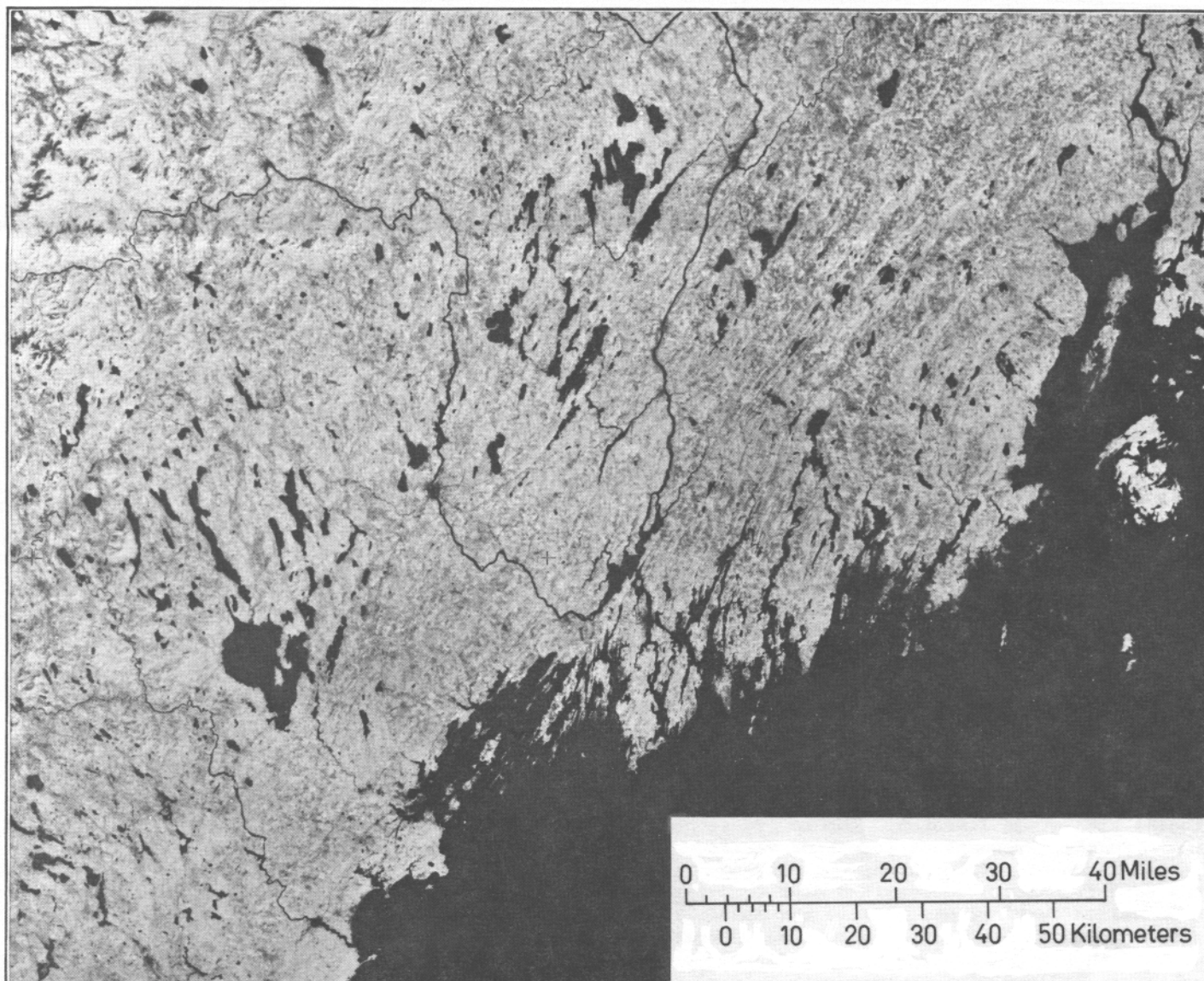
Should you want to order imagery, contact

User Services
U. S. Geological Survey
EROS Data Center
Sioux Falls, SD 57198
Phone: (605) 594-6511

They will tell you exactly what information you will have to supply and fill you in on other pertinent information. Try calling; you'll get better results. And if you have questions concerning what type of imagery is best (time of year, what spectral band, what scale, etc.), or if you have any other questions, feel free to contact me at (207) 623-1103 (work), or 623-4934 (home). I'm sure that Brad Caswell would also be willing to answer any questions you may have.



TOPOGRAPHIC QUADRANGLES: 15', LIB = Liberty, VAS = Vassalboro, WIS = Wiscasset, GAR = Gardiner; 7½', CE = Cape Elizabeth, PN = Prout's Neck.



ERTS-1 IMAGE, 0.8 to 1.1 micrometer band; July 23 - October 31, 1972. Sheet 22 (partial), Mosaic of Conterminous U.S. Soil Conservation Service, U.S. Dept. of Agriculture, Hyattsville, Maryland 20782

**The Geological Society of Maine c/o
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THE MAINE GEOLOGIST is published four times a year, more-or-less, in September, late Fall, late Winter and maybe June or July, for members of the Geological Society of Maine, a non-profit educational Maine corporation interested in all aspects of the geology of the State of Maine.

Correspondence about this Newsletter, or about membership in the Society may be addressed to John R. Rand, Cundy's Harbor, RD2-Box 210A, Brunswick 04011

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MAINE SUBSECTION, SME-AIME

On April 28th, through the initiative of Herbert R. Babitzke, U.S. BuMines, Augusta, the fledgling Maine Subsection of the Society of Mining Engineers, American Institute of Mining, Metallurgical & Petroleum Engineers (SME-AIME) gathered for its first formal meeting, with some 2 dozen members and guests in attendance. The occasion comprised an afternoon tour of the Martin Marietta cement plant and open-pit mine, Thomaston, followed in the evening by dinner, a short business meeting, and a talk by John S. Cummings, J.S. Cummings, Inc., Bangor, at the Sail Loft restaurant in Rockport. At the business meeting, H. R. Babitzke was formally elected the Chairman of the Subsection; J. S. Cummings, Vice-Chairman; T. C. Williamson (J. S. Cummings, Inc.), Secretary; and Bruce A. Bouley (Phelps Dodge Corporation, Bangor), Treasurer.

The Martin Marietta plant produces 425,000 tons of cement clinker per year through a 520' kiln, from about 800,000 tons of raw material including high-grade limestone, impure limestone ("Cement Rock"), Presumpscot formation marine clay-silt, iron ore (from Pennsylvania), and silica sand from local sources and Cape Cod. It is a so-called "wet" plant, because the local clay used as an alumina source has to be slurried to blend with the ground-rock mill feed; the use of schist in lieu of clay would permit a "dry" process. The commercial limestone beds, folded into complex structures, range in thickness from 30' to several hundred feet. Day-to-day sampling

of blast-hole cuttings at the mine face provides quality control of plant feed from the mine. The cement clinker derived from the mining, crushing, blending, milling, slurrying and kiln firing process is finally ground with gypsum (to retard cement setting time) to produce Portland Cement.

In his evening talk, John Cummings outlined the history of the past few decades of metals exploration in Maine. Serious exploration was first undertaken in the early and mid-1950's by Freeport Sulphur, Kennecott, Texasgulf and New Jersey Zinc, followed in the 1960's by numerous others including Anaconda, Black Hawk, Denison, Vitro, Spooner, Noranda, Callahan, and Scott and International Paper Companies. These exploration efforts were generally not planned as long-term scientific investigations, and in some cases were conducted without the benefit of proper land positions. Similarly, during 1963-67, J. S. Cummings, Inc. was doing short-term exploration projects, with little success. The inland bedrock terrane is better than 99.9% hidden by glacial deposits, and there was no known technical basis by which to evaluate mineralization potential in the area.

Starting on a long-range program with Superior Oil in 1967, under which Superior did almost all the land acquisition and JSC, Inc. the exploration, the methodical development of geologic hypotheses and geochemical-geophysical techniques eventually led to last year's discovery of a 30,000,000-ton zinc-copper deposit in T12-R8, Aroostook County. The key to a chance for success, we may suspect, resides in having enough time thoughtfully to work out the geologic and tectonic history of a terrane almost wholly hidden beneath soils and vegetation.