



**FROM THE EARTH...
A BETTER LIFE**

AMERICAN MINING CONGRESS

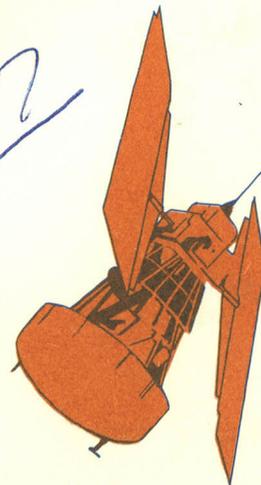
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Ian MacGregor
Chairman
(Chairman, AMAX Inc.)

J. Allen Overton, Jr.
President

33 met
PROGRAM

33 7/22



**The 1st Annual
William T. Pecora
Memorial
Symposium**

Emphasis Topic:
Applications of Remote Sensing
to Mineral and Mineral
Fuel Exploration

October 28-31, 1975
Holiday Inn (Downtown)
Sioux Falls, South Dakota

Sponsored by
American Mining Congress
In Concert With
United States Geological Survey
American Association of Petroleum Geologists
American Society of Photogrammetry
The Association of American Geographers
The Geological Society of America
Society of Economic Geologists

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American Mining Congress

J. Allen Overton Jr., President

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United States Geological Survey

Dr. Vincent E. McKelvey, Director

American Association of Petroleum Geologists

Mr. Fred Dix, Executive Director

American Society of Photogrammetry

General L. P. Jacobs, Executive Director

The Association of American Geographers

Dr. J. Warren Nystrom, Executive Director

The Geological Society of America

Dr. John C. Fry, Executive Director

Society of Economic Geologists

Paul K. Sims, President



SYMPOSIUM HOSPITALITY DESK

The Symposium Hospitality Desk is located in the registration area at the Holiday Inn (Downtown). A representative from the Sioux Falls Chamber of Commerce will be on hand during registration hours to assist in making tour reservations and to offer suggestions on entertainment in Sioux Falls.

The attendant will also take reservations for the Friday tour of the EROS Data Center. Please furnish the attendant with the approximate time you wish to visit the Center. See page 4 for Bus and Tour Schedule.



The 1st Annual William T. Pecora Memorial Symposium



October 28-31, 1975 • Sioux Falls, South Dakota

REGISTRATION

Hotel Mall, Holiday Inn (Downtown)

Tuesday—8:30 a.m.-7:30 p.m.

Wednesday—8:00 a.m.-5:00 p.m.

Thursday—8:30 a.m.-4:00 p.m.

Friday—8:30 a.m.-12:00 noon



REPRODUCTION OF TECHNICAL PAPERS

Proceedings of this symposium will be published in the United States Geological Survey's **Professional Papers Series**.

Following the symposium, the American Mining Congress will furnish attendees with instructions on how to order the **Professional Papers Series**.

The announcement of availability will also be carried in the Monthly List of New Publications of the United States Geological Survey.



NOTICE

Those attendees NOT residing at the Holiday Inn (Downtown) should encounter no difficulty obtaining taxi service to and from the meetings. Nevertheless, to insure each attendee who is staying elsewhere that he will arrive in time for the FIRST morning session, the following hotels have agreed to supplement the taxi service by providing complimentary transportation via their individual airport shuttle cars:

Howard Johnson's
Ramada Inn
Townhouse

The service will begin approximately at 8:30 a.m., Wednesday through Friday. Be sure to check with your hotel room clerk regarding actual departure time(s) and number of trips.





EARTH RESOURCES OBSERVATION SYSTEMS DATA CENTER TOURS

Featured during the Symposium will be specialized tours of the EROS Data Center geared to the interest of each attendee. The tours through the modern Data Center will feature user services' operations, applications assistance and training facilities, high volume photographic laboratories and equipment, and the central computer complex. Highlighting the tours will be a visit to the unique Data Analysis Laboratory. Demonstrations of interactive digital and analog image analysis equipment will be conducted to illustrate techniques for locating mineralized zones using satellite images. Applications scientists will be available to answer questions on specific image analysis techniques and equipment capabilities.



BUS AND TOUR SCHEDULE

Earth Resources Observation Systems Data Center (EROS)
Tuesday, October 28 • Friday, October 31

Buses Leave Holiday Inn	Tour of Center Begins
12:00 noon	12:40 p.m.
12:30 p.m.	1:10 p.m.
1:00 p.m.	1:40 p.m.
1:30 p.m.	2:10 p.m.
2:00 p.m.	2:40 p.m.
2:30 p.m.	3:10 p.m.
3:00 p.m.	3:40 p.m.
3:30 p.m.	4:10 p.m.

The buses will depart the Data Center for the Holiday Inn at 30-minute intervals beginning at 12:40 p.m.; the last bus will depart the Center at 5:20 p.m.



NOTE: Persons planning to tour the EROS Data Center on **Friday** should leave their names and approximate time of departure from the Holiday Inn (Downtown) with the attendant at the Symposium Hospitality Desk by **noon on Thursday**.

TUESDAY AFTERNOON

Tours of EROS Data Center. Shuttle buses will depart the Holiday Inn (Downtown) beginning at 12:00 noon. The final bus for the Center will depart Holiday Inn at 3:30 p.m.; the last tour of the Center will begin at 4:10 p.m.

TUESDAY EVENING



EARLY BIRD RECEPTION

International Ballroom
6:00-7:30



WEDNESDAY MORNING SESSION

8:30

International Ballroom

Presiding: The Honorable V. E. McKelvey, Director, U. S. Geological Survey, Reston VA

Welcoming Address: The Honorable Richard F. Kneip, Governor of the State of South Dakota

Opening Remarks: The Honorable V. E. McKelvey, Director, U. S. Geological Survey, Reston VA

INTERNATIONAL IMPLICATIONS OF LANDSAT DATA FROM A
GEOLOGICAL VIEWPOINT

Dr. John A. Reinemund, Chief, Office of International Geology,
U. S. Geological Survey, Reston VA

NASA PLANS FOR FUTURE EARTH RESOURCE MISSIONS

Dr. William Nordberg, Director of Applications, NASA/Goddard
Space Flight Center, Greenbelt MD

APPLICATION OF REMOTE SENSING (LANDSAT DATA) TO
PETROLEUM EXPLORATION

Michel T. Halbouty, Consulting Geologist and Petroleum Engineer,
Houston

LANDSAT APPLICATIONS TO RESOURCE EXPLORATION AND
GASLINE PLANNING

Dr. Carlos Brockmann, Director, Servicio Geologico de Bolivia
Programma del Sateelite Tecnologico de Recursos Naturales, La Paz,
Bolivia

WEDNESDAY NOON



WELCOMING LUNCHEON

Starlight Dining Room

Presiding: J. Allen Overton, Jr., President, American Mining Congress, Washington



Guest Speaker

The Honorable Frank E. Moss
U. S. Senator from Utah



WEDNESDAY AFTERNOON SESSION

2:00

International Ballroom

Presiding: John J. Collins, Vice President
ASARCO Incorporated, New York

AN OVERVIEW OF CANADIAN PROGRESS IN THE USES OF
LANDSAT DATA IN GEOLOGY

Dr. L. W. Morley, Director, Canada Centre for Remote Sensing,
Ottawa, Ontario and Dr. A. F. Gregory, President, Gregory
Geoscience Ltd., Ontario

MAPPING AND CHARTING FROM LANDSAT

Dr. A. P. Colvocoresses, Cartography Coordinator, EROS Program,
U. S. Geological Survey, Reston VA

RELATIONSHIP OF MINERAL RESOURCES TO LINEAR FEATURES
IN MEXICO AS DETERMINED FROM LANDSAT DATA

Ing. Guillermo P. Salas, Director General, Consejo de Recursos
Naturales no Renovables, Mexico City

USES OF LANDSAT AND OTHER REMOTE SENSOR SYSTEMS TO
ADDRESS ENERGY, MINERALS, AND RELATED ENVIRONMENTAL
PROBLEMS

Dr. John M. DeNoyer, Director, EROS Program, U. S. Geological
Survey, Reston VA

THURSDAY MORNING

9:00 CONCURRENT SESSIONS

SESSION A

International Ballroom—West

Presiding: Virgil W. Carmichael, Vice President-Exploration,
The North American Coal Corporation, Bismarck ND

LANDSAT CONTRIBUTIONS TO STUDIES OF PLATE TECTONICS

Dr. Jan Kurina, Consulting Geologist, New York and William D.
Carter, Geologist, U. S. Geological Survey, Reston VA

MACHINE PROCESSING OF LANDSAT DATA IN THE SEARCH FOR
ALTERATION HALOS

Dr. Lawrence C. Rowan, Geologist, U. S. Geological Survey,
Reston VA, Alexander F. H. Goetz, Jet Propulsion Laboratory,
Pasadena CA and Roger P. Ashley, U. S. Geological Survey,
Menlo Park CA

LANDSAT DATA CONTRIBUTIONS TO EXPLORATION OF
FOREIGN REGIONS

Seth I. Gutman, Geophysicist and Dr. F. P. Bentz, Chief Geologist,
Santa Fe Minerals, Inc., Orange CA

MEASUREMENT OF LUMINESCENCE OF GEOCHEMICALLY STRESSED
TREES AND OTHER MATERIALS

William R. Hemphill, Acting Assistant Program Manager, EROS
Program, U. S. Geological Survey, Reston VA, Robert D. Watson,
Physicist, U. S. Geological Survey, Flagstaff AZ, R. C. Bigelow,
and T. D. Hessen, U. S. Geological Survey, Denver

SESSION B

International Ballroom—East

Presiding: William A. Bragonier, Manager of Exploration,
Rochester & Pittsburgh Coal Company, Indiana PA

USE OF LANDSAT IMAGES FOR ENGINEERING GEOLOGIC
APPLICATIONS IN NORTH CENTRAL IRAN

Dr. Daniel B. Krinsley, Chief, Environmental Impact Analysis
Program, U. S. Geological Survey, Reston VA

FUTURE SENSOR TECHNOLOGY FOR GEOLOGIC AND
RELATED MISSIONS

Marvin S. Maxwell, Head, Systems and Missions Analysis Branch,
NASA/Goddard Space Flight Center, Greenbelt MD

THE USE OF LANDSAT DATA IN COMPUTER MAPPING FOR
SITE EVALUATION STUDIES

Lawrence D. Alexander, Remote Sensing Specialist and
Leo Eichen, Manager of Remote Sensing Technology Group,
Dames & Moore, Cranford NJ

LANDSAT DATA CONTRIBUTIONS TO PROJECT 'BIRDDOG'

Terrence J. Donovan, Geologist, Branch of Oil and Gas Resources,
U. S. Geological Survey, Flagstaff AZ

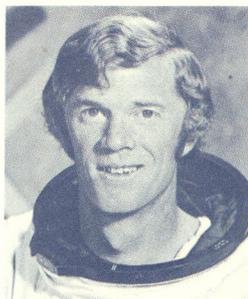
THURSDAY NOON



LUNCHEON

Starlight Dining Room

Presiding: William A. Fischer, Senior Scientist, EROS Program, U. S. Geological Survey, Reston VA



Guest Speaker

Russell L. Schweickart
Director, User Affairs, Office of
Applications, NASA

THURSDAY AFTERNOON

2:00 CONCURRENT SESSIONS

SESSION A

International Ballroom—West

Presiding: Dr. Floyd Sabins, Senior Research Associate, Chevron Oil Field Research Co., La Habra CA

LANDSAT IMAGE STUDIES AS APPLIED TO PETROLEUM EXPLORATION IN KENYA

John B. Miller, Staff Geologist, Chevron Overseas Petroleum Inc., San Francisco

REGIONAL LINEAR ANALYSIS AS A GUIDE TO MINERAL RESOURCE EXPLORATION—USING LANDSAT DATA

Dr. Robert A. Hodgson, Research Associate, Gulf Research & Development Co., Pittsburgh

LANDSAT AND OTHER REMOTE SENSING TECHNIQUES APPLIED TO INVESTIGATION OF VEGETATED GEOCHEMICAL ANOMALIES

Dr. Frank C. Canney, Geologist, U. S. Geological Survey, Denver and Gary L. Raines, Research Associate, U. S. Geological Survey, Denver

THE APPLICATION OF REMOTE SENSING TECHNOLOGY TO ASSESS THE EFFECTS AND MONITOR CHANGES OF COAL MINING IN EASTERN TENNESSEE

Alfred E. Coker, Hydrologic Geologist, U. S. Geological Survey, Tampa

SESSION B

International Ballroom—East

Presiding: Alan T. Broderick, Vice President-Development, Inland Steel Mining Company, Ishpeming MI

EXPLORATION BY PETROLEUM INDEPENDENTS USING IMAGERY AND PHOTOS FROM EROS AND MANNED SPACE SURVEYS
Robert W. Worthing, Chief Geologist, The Reserve Petroleum Co., Oklahoma City

TECTONIC DEDUCTIONS FROM ALASKAN SPACE IMAGERY
E. H. Lathram, EROS, Pacific Coast/Alaska, U. S. Geological Survey, Menlo Park CA and Robert G. H. Reynolds, Department of Applied Earth Sciences, Stanford University, Stanford CA

COMPUTER-ENHANCED LANDSAT IMAGERY AS A TOOL FOR MINERAL EXPLORATION IN ALASKA

Nairn R. D. Albert, Telegeologist, Alaskan Mineral Resources Branch, U. S. Geological Survey, Menlo Park CA and Par S. Chavez, Mathematician, Center of Astrogeologic Studies, U. S. Geological Survey, Flagstaff AZ

EVALUATION OF IMPROVED DIGITAL PROCESSING TECHNIQUES OF LANDSAT DATA FOR SULFIDE MINERAL PROSPECTING

Robert G. Schmidt, Geologist, U. S. Geological Survey, Reston VA and Ralph Bernstein, Senior Engineer, IBM, Gaithersburg MD

THURSDAY EVENING



6:15 RECEPTION

Embassy Room

7:00 BANQUET

International Ballroom

Toastmaster: The Honorable V. E. McKelvey, Director, U. S. Geological Survey, Reston VA



Guest Speaker

The Honorable Pere V. Domenici
U. S. Senator from New Mexico



NOTICE

To insure ample transportation for all attendees to return to their hotels following the Banquet, shuttle buses will be available at the entrance of the Holiday Inn (Downtown) beginning at 9:30 p.m., Thursday. This service will continue until approximately 11:00 p.m. when it is expected that the majority of attendees will have returned to their hotels.



FRIDAY MORNING

9:00 CONCURRENT SESSIONS

SESSION A

International Ballroom—West

Presiding: Robert G. Reeves, Staff Scientist, EROS Data Center, U. S. Geological Survey, Sioux Falls

A DEEPER LOOK AT LANDSAT 1 IMAGES OF UMIAT, ALASKA
Andre F. Maurin, Head, Research Department of Morphology and Mathematical Sedimentology, Compagnie Francaise Des Petroles, Paris and E. H. Lathram, EROS, Pacific Coast/Alaska, U. S. Geological Survey, Menlo Park CA

WHY REMOTE SENSING? A MANAGEMENT VIEW
J. Robert Porter, President, Earth Satellite Corporation, Chevy Chase MD

REGIONAL AND GLOBAL GEOLOGICAL STUDIES USING SATELLITE MAGNETOMETER DATA
Dr. Robert D. Regan, Geophysicist, U. S. Geological Survey, Reston VA

AIRTRACE—AN AIRBORNE GEOCHEMICAL EXPLORATION TECHNIQUE
Dr. Anthony R. Barringer, President, Barringer Research, Ltd., Rexdale, Ontario, Canada

SESSION B

International Ballroom—East

Presiding: Dr. David J. Barr, Associate Professor of Geological Engineering, University of Missouri, Rolla

AN APPLICATION OF SATELLITE IMAGERY TO MINERAL EXPLORATION
Mark A. Liggert, Research Geologist and John F. Childs, Research Geologist, Cyprus Georesearch Co., Los Angeles

MINERAL EXPLORATION APPLICATIONS OF DIGITALLY PROCESSED LANDSAT IMAGERY
Ronald J. P. Lyon, Director, Remote Sensing Laboratory, Stanford University, Stanford CA

OPTIMUM SLAR SYSTEM PARAMETERS FOR REVELATION OF GEOLOGIC DATA
Dr. Richard K. Moore, Space Technology Center and Louis F. Dellwig, Director, Remote Sensing Laboratory, Lawrence KS

WORLDWIDE INDEXING AND RETRIEVAL OF LANDSAT IMAGES
Dr. Floyd F. Sabins, Senior Research Associate, Chevron Oil Field Research Co., La Habra CA

FRIDAY AFTERNOON

Tours of EROS Data Center. Shuttle buses will depart the Holiday Inn (Downtown) beginning at 12:00 noon. The final bus for the Center will depart Holiday Inn at 3:30 p.m.; the last tour of the Center will begin at 4:10 p.m. See complete Bus and Tour Schedule on page 4.

NOTE: So the EROS Data Center will be prepared for these tours, please register with the Symposium Hospitality Desk in the registration area.

AMERICAN MINING CONGRESS

The American Mining Congress is a trade association founded in 1897. Its membership is composed of (1) U. S. companies that produce most of the nation's metals, coal and industrial and agricultural minerals; (2) more than 240 companies that manufacture mining and mineral processing machinery, equipment and supplies, and (3) engineering and contracting companies and financial institutions that serve the mining industry.

AMC serves as a clearinghouse for the mining industry in the nation's capital, keeping the industry informed as to matters pending in the U. S. Congress and in departments and agencies of the federal government and working for constructive action that will adequately recognize mining's special problems. AMC serves as the industry's spokesman on a wide range of matters, including taxation, environmental quality, public lands, mined land reclamation, safety and health, energy resources, and national stockpile policy. It coordinates the efforts of the industry in advocating measures that will promote the development of mineral resources and the maintenance of a strong and healthy mining industry.

The American Mining Congress spearheads the efforts of mining companies and mining equipment manufacturers in stimulating progress in mining practices and equipment. It vigorously promotes the continuing modernization of all phases of mine operation and the development of new and improved equipment to achieve greater efficiency and safety, better recovery and a higher quality product. Its specialized committees, comprised of operators and manufacturers of broad experience, its publications and its conventions and expositions play important roles in this activity.

UNITED STATES GEOLOGICAL SURVEY

The Geological Survey is a Federal research and fact-finding agency that provides for the people of the United States:

Accurate maps—valuable in nearly all activities related to the land including land-use planning and outdoor recreation—which show the slope of the land surface, the location of man-made features, and present land use.

Information on the composition and structure of rocks that is useful in prospecting for minerals and fuels, designing engineering and construction works, and identifying natural hazards such as earthquakes and landslides.

Data on surface and ground water essential to the development and conservation of water supplies, the determination of water quality, and the reduction of damage from floods.

Knowledge of earth history and natural processes important in maintaining environmental quality and achieving a harmonious balance with nature.

Appraisal of the Nation's potential energy and mineral resources to aid resource policymakers and to identify targets for exploration and technologic research.

Classification of the Federal lands for mineral and water power potential to guide wise stewardship of the public domain.

Supervision of oil, gas, and mineral lease operations on Federal and Indian lands and on the Outer Continental Shelf to assure resource and environmental conservation and fair return of revenues to the public.

Maps and reports that make available the results of these activities.