aerospace

Gathered from NASA's 3rd Annual Earth Resources Program Review in Houston last week

EARTH RESOURCES

Regional studies

The emerging earth resources program of the National Aeronautics and Space Administration is a many-headed, multidisciplinary effort. It deals with hydrology, water estuaries and erosion, agriculture and forestry distribution and disease, water and air pollution, mineral and oil deposits and urban planning and development. Data are collected through infrared, ultraviolet and multispectral photography and other remote sensing devices on aircraft and spacecraft.

In addition to the agency-wide program preparing for the Earth Resources Technology satellite flights in 1972-73 and Skylab in 1972 (SN: 10/10, p. 303), many of NASA's centers are developing regional programs.

One such program is being coordinated by the Wallops Island site in Virginia. Six areas for concentrated study have been singled out, according to James F. Bettle of Wallops. Each study will be coordinated with various organizational work already under way: A truck farm study with the Virginia Truck Experimental Station in Painter, Va.; studies of marshland, the Chesapeake Bay Bridge-Tunnel area and the bay shelf-slope with the Virginia Institute of Marine Science; a James River study with NASA's Langley Research Center, and a Rhode River watershed study with the Smithsonian.

RESOURCE MANAGEMENT

Aid to Indian reservations

Photography from Apollos 6 and 9 as well as aircraft remote sensing are providing to Indians data useful in management of the natural resources on their reservations.

The studies thus far vary from mineral exploration on the Papago Indian Reservation in southern Arizona to vegetative interpretations on the Fort Apache and San Carlos Reservations, says A. M. Woll of the Bureau of Indian Affairs in Washington.

One of the projects is to determine whether infrared images taken from aircraft flights Nov. 16 will detect the beetle-infected trees on the reservations.

METEOROLOGY

Effects of gaps in Arctic ice

Polar geophysicists know that the heat balance in the Arctic affects storms which then affect weather for the entire Northern Hemisphere. What they do not know are the correct models for this heat balance.

Heat goes into the atmosphere through large cracks, or polynyas, in the ice from the warm water below. "When a crack in the ice forms," says Dr. William J. Campbell of the U.S. Geological Survey at Tacoma, Wash., "the amount of heat that goes into the atmosphere is 100 times greater from any given area than the heat that goes through the ice.

"At any time of the year," says Dr. Campbell, "about 10 percent of the whole Arctic Ocean is open in cracks." Some are as large as 10 by 50 miles. These then help determine the heat balance of the Arctic.

Remote-sensing missions over the Arctic in the center of the Beaufort Sea indicate that it would be possible to obtain sequential synoptic images of the ice in all weather conditions and seasons. This can only be done economically from space, says Dr. Campbell. He and other Arctic scientists are looking forward to data from two polar-orbiting satellites, Nimbus E and F. Nimbus E, to fly in 1972, will have a passive microwave radiometer to scan the ice.

OCEANOGRAPHY

Radar detection of oil slicks

One growing source of water pollution is oil slicks, which are often not detected until they wash ashore. Scientists have recently discovered that radar aboard high-flying aircraft is not only an economical but also a highly reliable way of detecting and tracking such pollution and alerting authorities early enough for remedial measures to be employed.

Researchers at the Naval Research Laboratory in Washington discovered the method while using radar to map the sea and ice. An oil spill from the tanker ARROW in Nova Scotia's Chedabucto Bay was mapped for the Coast Guard. Since that time, says N. W. Guinard of NRL, several controlled tests have been conducted. Whereas photography is hampered by clouds and rough seas, radar, it has been discovered, can detect as little as 200 gallons of oil in waves up to 10 knots.

Although the research is still in the early stages, the technique is immediately applicable to aircraft, says Guinard. Use of the radar on satellites and spacecraft, however, is said to be even more promising.

GEOLOGY

Deposits and formations

By use of thermal infrared and solar infrared images obtained from space, scientists may one day be able to make geological maps of the United States.

Several examples of this capability have been demonstrated in work done at the U.S. Geological Survey in Denver, by T. W. Offield, L. C. Rowan and R. D. Watson. For example, thermal infrared images at test sites in several states provided information on geologic faults and fracture systems not obtainable from black and white photographs. Faults appear as thermal oddities where rocks with contrasting heat characteristics are juxtaposed or where water is concentrated in the fault zones.

In the Beartooth Mountains of Montana images showed the presence and distribution both of intrusions of igneous rock and deposits of crystalline rock called amphibolite bodies. In Mill Creek, Okla., granite, dolomite and limestone could be detected. Dolomite has a higher thermal inertia and absorbs more light in the day compared with limestone; thus at predawn, the limestone is cooler than the dolomite.