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BRINGING SATELLITES DOWN TO EARTH

by MICHELLE HIBLER

Since the first satellite was launched by the USSR in 1957, dozens have followed and are now circling the earth, beaming data and images or relaying information around the globe. The images gathered by satellites can be interpreted to provide a wealth of information, difficult to obtain by more conventional means.

Some satellites can be used for communications, for instance to transmit instructional television programs to isolated villages or to link scientists around the world wishing to share information. Others can help to forecast weather and predict the path and impact of disasters such as hurricanes or typhoons. Still others can help to inventory natural resources, geological features and soil types.

This last group, earth observation or remote sensing satellites, can also identify temperature differences on land and sea, an important feature for agriculture and fisheries. They can indicate if sufficient moisture is available for vegetation, thus helping to evaluate the effectiveness of irrigation schemes and to predict crop yields. And by retracing their orbit at regular intervals, they can indicate seasonal variations in these features. This use of satellites and of remote sensing technology is still recent and its potential is, as yet, largely untapped. It is likely, however, that within a few years all countries wishing to take advantage of this form of space technology for their own development plans will be able to do so.

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Remote-sensing took a giant leap forward in 1971 with the launching by the U.S. National Aeronautics and Space Administration (NASA) of the first Earth Resources Technology Satellite, later renamed LANDSAT I. Another similar satellite, LANDSAT II, was launched in February 1975: it cruises along an orbit 915 kilometers above the earth and retraces the same path every 18 days. A third LANDSAT with a still more sophisticated remote sensing system is scheduled for launching in September this year, and early in 1978, Explorer A will join the system: its program will include the more precise study of soil temperatures, evaporation and transpiration of plants.

Remote-sensing techniques are being made available to users throughout the world and a precise system is being established to correlate satellite observations and events on earth. The information is available either as photographs or recorded on magnetic tapes that can be processed by computer.

With the launching of LANDSAT I, the NASA introduced a program of participation in this research activity and announced its willingness to supply LANDSAT data and images to researchers. Sudan was one of the African countries to take advantage of NASA's offer, and in 1972-73 received more than 700 LANDSAT images. Using photo-interpretation techniques, Sudanese scientists worked with a team from the United Nations' Food and Agriculture Organization on the analysis of the resources of the province of Kordofan, southwest of Khartoum, an area designated for agricultural development.

The encouraging results from this preliminary work have led the Sudanese government to establish a centre for LANDSAT applications that can handle requests for specialized thematic mapping.

With the assistance of the International Development Research Centre, of Canada, the abundant data gathered during the preliminary work done in 1974 is now being transposed onto a set of thematic maps indicating seasonal variations in pastures, soil and water for a 60,000 square kilometer region of savanna near El Obeid.

Small-scale thematic maps, such as the ones being prepared in Sudan, are often needed in programs of natural resource prospecting and regional planning. In Tanzania, for instance, thematic maps are being made of the Rukwa region, in the southwest, a region rich in resources but little populated. The information obtained through the analysis of LANDSAT images will enable the Bureau of Resource Assessment and Land Use Planning of the University of Dar es Salaam to prepare a long-term integrated development plan for the area.

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In Bolivia, a similar project is designed to locate alkaline rocks and diapiric salts that could contaminate the water of the Desaguadero River and make the soils of the basin unfit for cultivation. At the same time, land suitable for agriculture and livestock will be identified since the government plans to establish new population centres here.

Such projects, underway in a number of countries, are not limited to making maps and training personnel. As a member of the Tanzanian research team points out, the experience gained will be most valuable in future decision making on the applications of technology to development.

At all levels, from small-scale thematic mapping projects and communication experiments to international communications, practical programs such as these are demonstrating to developing nations how space technology can be used to provide down-to-earth information.

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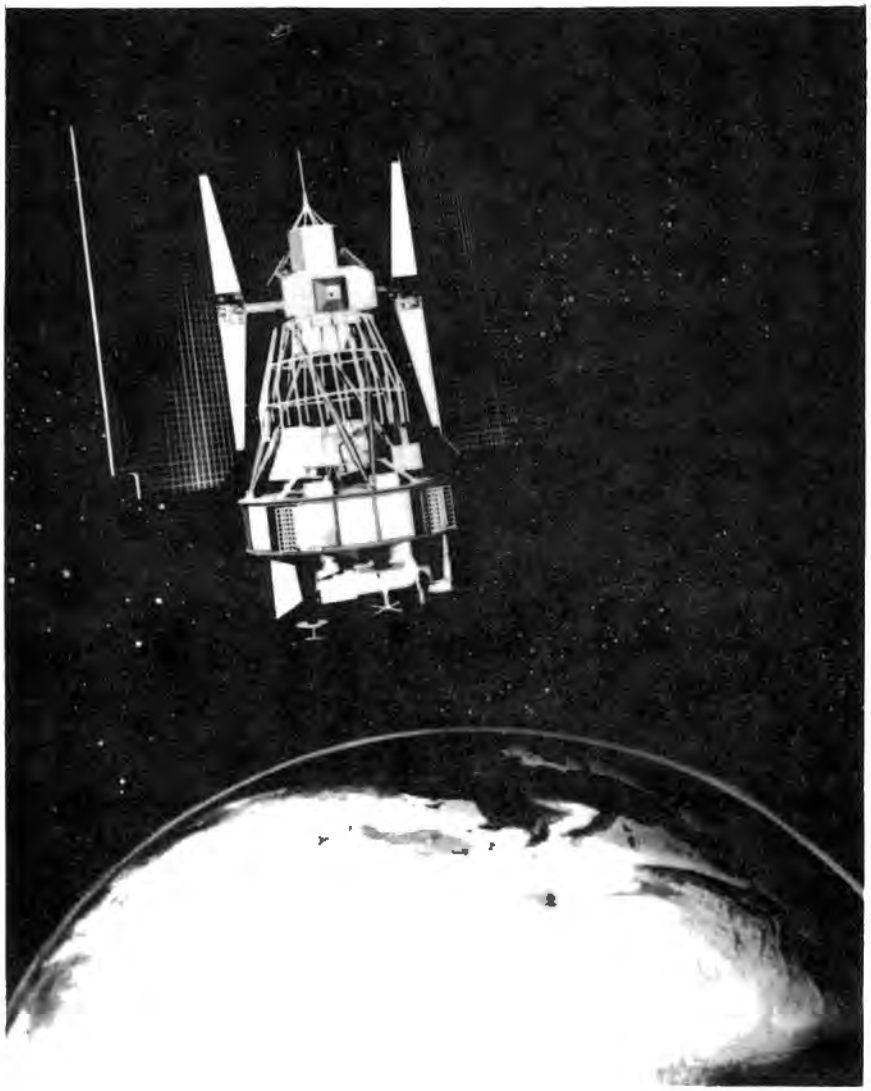

NASA's LANDSAT satellite provides valuable data on earth resources to many countries.

Photo: NASA
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