

Mineral exploration . . . seeing what lies below

The search for minerals buried beneath the earth's surface involves governments, large corporations and, even today, individual prospectors with the willingness to "rough it" in the isolated regions of the world. This hunt for resources continues. Today, pixel-by-pixel analysis of remotely sensed images has been added to the geologist's pick, and to conventional aerial magnetic and electromagnetic surveying, as a remarkable tool for exploration.

Structures and materials that are hidden beneath the topsoil or the sands or the vegetation can be indicated or revealed from satellite data, which can then be supplemented with current regional aerial data. New techniques of multistage, multispectral interpretation have led to great advances in image enhancement and information extraction. Canadian geologists MacDonald Dettwiler's MERIDIAN produces this ratio analysis image with digitized geological map overlay (Tonopah, Nevada, U.S.A.).

and remote sensing professionals have devised some ingenious approaches to the computer processing of satellite data, and in the use of small-scale colour infrared and high-resolution radar data.

Commercially proven

Exploration companies in Canada have made very good use of the methodology developed by the Canada Centre for Remote Sensing in the application of satellite data to geology in a variety of environments. Several Canadian firms are highly capable of undertaking this type of analysis on a commercial basis. Canadian-developed, programmable multispectral imagers and multidetector electro-optical imaging systems are now available to make new surveys cheaper, faster and more accurate. The new equipment can be flown in small aircraft. It features real-time airborne data processing, high radiometric sensitivity, variable spatial resolution and variable scan rates.

Imagery can be geo-coded with existing databases. Canadian geometric correction software systems permit accurate positioning. Several levels of Side-Looking Airborne Radar (SLAR) systems and Synthetic Aperture Radar (SAR) systems, built in Canada, are being used worldwide for geological and geophysical exploration. These are cost-effective alternatives to conventional aerial photography, and in addition, have a wide range of other applications, including suitability for military markets.

Volcanic thermal and geothermal resources can be identified through remote sensing. This technology is finding further applications in non-metallic mineral exploration. Structural mapping for tectonic evaluation, for identification of exposed surfaces and surface-influencing anomalies, for surface geomorphology and for erosion phenomena — all have become routine.

As in other areas, Canadian firms have extensive experience at home and abroad. Services, systems, software and instrumentation have been developed to high standards of performance.

> Gregory Geoscience's PROCOM-2 is an economical optical transfer device that helps resource analysts to scan, enlarge and integrate multiple sets of data of many types, shown here for mineral exploration.

