have been researching hundreds of applications for the new technology so the system will not rely on one kind of user.

Able to measure such things as soil and vegetation moisture and soil salination, the Radarsat system will be especially useful in agriculture. For example, the system will be able to monitor health in crops, predict the extent of harvests and aid in inventory control and marketing. The system will also be able to help in timber mapping, forest regrowth monitoring and forest fire surveillance.

Sensitive to water surface texture, Radarsat will be able to discover new freshwater sources, forecast floods, detect oil spills and monitor currents that affect offshore drilling operations.

Measuring density and depth of snow, the system will also provide information on snow distribution. This is important for reservoir management, crop irrigation and hydro power, and in flood forecasting.

The SAR sensors can accurately detect changing patterns of vegetation and different contours of the earth's surface, providing useful clues on subsurface features for geologists. For instance, gas field structures can be defined from associated surface fracture zones.

Uses for other countries

Though developed primarily for Canadian uses, Radarsat will cover every part of the earth and could make data available to foreign countries, thereby generating extra revenues. For example, the system could monitor the harvesting of tropical forests and help Third World countries manage their resources.

To design a system best suited to a variety of uses, Radarsat scientists spent two years studying many applications of the technology and drawing up mission requirements. These specify the optimal parameters — such as the frequency and swath width — needed for a wide range of applications. In the next step, just completed, researchers studied various design options which would meet the performance requirements. Next, a set of options will be selected and detailed design studies carried out. During the final phases of the project, design requirements will be implemented and technology developed.

In addition to SAR, Radarsat may carry one or more of the following sensors: a scatterometer, mapping winds over oceans; an optical imager, gathering data in both the visual and infrared spectrum; a scanning microwave radiometer, measuring emitted microwave radiation; and an altimeter, to determine the shape of land and ocean surfaces.

If all goes according to schedule, the new satellite will be launched in early 1990 and remain in orbit for five years. Further similar remote sensing satellites may follow, depending on user needs and the success of the program.

One of the main technical problems still to be overcome will be to achieve sufficient power for the power-hungry C-band radar. Solar arrays absorbing energy from the sun will be affixed to the satellite, but additional power will have to be provided through potent batteries.

Scientists will most likely try to optimize use of solar energy by careful planning of the orbital path.

Circling the earth *via* the poles 14 times a day, Radarsat will travel in a sun-synchronous orbit. This means the plane of the orbit does not move relative to the direction of the sun. Thus the satellite crosses the equator at the same local time with every pass. The satellite could be positioned in a dawn/disk orbit so that it would always ascend over one side of the earth at dawn and descend over the other side at dusk, thus placing the solar arrays in continuous light.

Remote sensing satellites using conventional sensors which rely on natural light to illuminate the earth cannot be placed in such a dawn/dusk orbit, because the sensors will not have sufficient light to 'see' the earth's surface. But radar provides its own illumination, so to speak, by transmitting impulses, and thus can be used at any time of day. The factor limiting use of Radarsat's SAR will be power supply, so the system will probably not be switched on for more than 15 to 20 minutes *per* orbit.

Another major challenge of the Radarsat project will be finding a way to rapidly process and analyze vast streams of information. Researchers are developing a highly specialized data processing system which will transform raw data into quality imagery in a matter of hours.

Of the estimated $300 million cost, $17 million has so far been provided through the Canadian government for preliminary development. Costs may eventually be shared by potential users such as oil and gas companies as well as foreign space agencies such as the US National Aeronautics and Space Administration and the European Space Agency.

(Article by Gabriella Golger in GEOS, *1983/1)*

Toronto Stock Exchange moves

With the pageantry and fanfare of a circus parade, the Toronto Stock Exchange (TSE) moved May 10 from its art-deco building on Bay Street to a gleaming, futuristic concrete and glass tower a block away.

Surrounded by Bay Street's financial elite, reporters and curious passersby, exchange chairman Murray Howe and Secretary of State Paul Cosgrove officially locked the big steel doors that for 46 years had been the site of the exchange.

Then they led a "ceremonial walk", the 800 or so metres up Bay and King streets, to the exchange's new $25-million home a block west at First Canadian Place.

At the inner portals of the new building, several hundred people watched as Ontario Premier William Davis cut a ceremonial ticker tape to officially open the exchange tower.

After a New Year's Eve-like countdown on the trading floor, Ontario Lieutenant Governor John Aird pressed a siren to officially signal the first trade at 10 a.m. The first transaction — the trade of 100 shares of Bell Canada common stock at $28 — was carried out by Harry Abbey, 81, and Harold Dawson, 78, the two oldest traders on the floor. Both men began their careers in the mid-1920s before the great crash.

For Howe and exchange president Pearce Bunting, the ceremonies marked the end of three years of planning for expanded facilities. The old TSE had been considered state-of-the-art when it

Secretary of State Paul Cosgrove (left) *and Exchange chairman Murray Howe officially lock steel doors of old Exchange.*