Big Bucks For Far Out Research

Five UNB professors will receive over a million dollars to conduct satellite research, and could move Canada to the forefront of GPS satellite technology.

The UNB team consists of electrical engineering professor James Tranquilla and surveying engineering professors Richard Langley, David Wells, Alfred Kleusberg and Petr Vanicek.

For the last six years, the team has been researching how satellites in the NAVSTAR Global Positioning System (GPS) can be used commercially for surveying and navigating. The United States Department of Defence will have launched the complete 24-satellite system by the 1990s.

"In certain areas of GPS, our research team, in concert with its industrial partners, could be the first developers of commercial differential GPS applications in the world," Dr. Tranquilla said. GPS satellites broadcast signals on their positions to receivers on the ground. Differential GPS, in which the relative positions of two or more GPS receivers are determined, is accurate to the subcentimetre level.

The UNB team will use the NSERC grants to purchase state-of-the art equipment and carry out five strategic projects in hydrography, geodesy and engineering surveys, arctic positioning, spacecraft positioning, and foresty and agriculture.

In the hydrography project, the team will develop techniques for mapping and surveying coastal regions, locating shoals, reefs and harbor entrances as well as positioning equipment such as buoys and oil rigs.

The team will study how antennas affect the accuracy of GPS measurements in geodesy and engineering surveys. This technology will be used to monitor land deformations such as earthquakes, movement of the earth's plates and sinking of the ground caused by mining oil or coal.

In arctic positioning, GPS can be used to situate oil rigs and other resource-related facilities in the north. Achieving the necessary accuracy is difficult because some communications equipment does not work in the high latitude.

The UNB team will also examine the use of GPS packages as standard equipment on most spacecraft launched by the United States; on RADARSAT, Canada's first satellite which will assist in arctic navigation and will be launched in 1990; and on the international space platform, to which Canada will contribute a service module, including Canadarm.

The fifth project is the commercial development of GPS technology in agriculture and forestry. In aerial spray operations, GPS satellites can guide sprayers, preventing them from missing areas or overlapping spray lines.

UNB Geologist Confirms

Earthquake Today!

Using techniques that enable him to recreate earthquakes at will, John Spray is able to study how energy is dissipated during a quake.

The behavior of the earth's plates as they move against one another, can be simulated with a friction welding machine. The machine rotates one core sample of rock against another producing first rock powder then a melt.

The movement of the plates along faults can produce sound, vibration and frictional heat. "The plates don't always move smoothly," explained Dr. Spray, "sometimes, they may build up stress and then slip. This behaviour, which is called slip-stick fault movement, can cause localized frictional melting along the plate walls."

From the comfort of his laboratory, Dr. Spray can pursue his interest in fault energetics. By doing so, he can avoid the dangers and difficulties of taking samples from active or dormant faults.

Dr. Spray also added that "melting on fault planes has been documented in every continent, and the melts can be used as an indication of past fault behavior and, in the case of dormant faults, for helping to assess future seismic risk."

His method is simple and relatively inexpensive. Dr. Spray commented "At the moment, no one else in the world is using a friction welder to study earthquakes." He expects that other researchers will begin to use his technique when it becomes more widely known.

The inspiration for this new method came to Dr. Spray two years ago during lunch with a metallurgist colleague who had been doing research on aluminum welding.