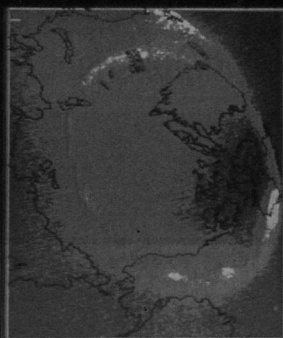


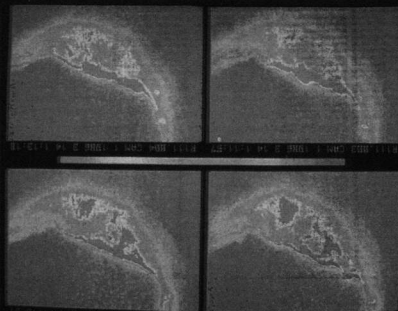
Theory into fact:

Satellite project helps to rewrite textbooks



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The ring of the auroras.



Images of auroral substorms.

by Sherri Ritchie

Dr. Gordon Rostoker, U of A physicist, is one of several Canadian scientists currently participating in an international project investigating the processes which cause the "Northern Lights." "What we have found will essentially rewrite textbooks," claims Rostoker.

Six countries are involved in the Viking Project — named after the Swedish satellite used for the experiments.

Although most people have seen the colourful and dynamic Aurora Borealis, few are aware of the complexities involved in the creation of the dancing lights.

"You see auroras strictly as luminosity," says Rostoker, "but that is just one tiny aspect of a very large dissipation of energy."

Charged atomic particles (protons and electrons) drift away from the Sun and blow towards the Earth. This Solar Wind comes up against the Earth's magnetic field, and the electrons travel down the field lines. "They come into the accelerator region and are blasted into the Earth's upper atmosphere," says Rostoker. "Here they encounter atmospheric gasses. The energy of these particles excite the gasses, and they radiate different colours — the colours of the "Northern Lights."

The processes involved are all part of a complex event called Magnetosphere-Ionosphere Cou-

pling. Simply, deep space (the magnetosphere) and the Earth's upper atmosphere (the ionosphere) are connected by massive electric currents.

Scientists have theorized about the causes and processes involved in the auroras since the early 1900's. At that time, however, they only had ground data to rely on. "This is like looking at a television set from the front and trying to explain how the picture is created," says Rostoker.

With the satellite, scientists may now observe and measure from above, below, and within the auroras.

The investigative team made up primarily of Canadians plays an integral role in the Viking Project, developing and operating the imager, which records pictures of the auroras from space.

"We are the global, all-seeing device," explains Rostoker. "We can tell the people who are measuring the electric fields precisely what is happening with the auroras when they take a measurement." Without those pictures, their measurements are meaningless.

What makes this project an innovative undertaking is the images of the auroras.

"Before the Viking satellite came along, the best they could do was one picture every 12 minutes," says Rostoker. "We get a picture every 20 seconds, and nobody had ever been able to do