



pour within the active aurora zone, damping its activity — like sprinkling water on a dying campfire. "The purpose of the experiment was to record the mechanics of the 'start-up' of the aurora," he explains. "The variety and intensity of the forces don't allow us to duplicate ionospheric conditions in the laboratory. So we had to temporarily halt the process ourselves and watch it begin again. By blowing a 50 km hole in the aurora we tested theories of the interaction of electro-magnetic fields and solar particles in the ionosphere."

Scarcely twenty years have passed since the discovery that the aurora is more than a scattered phenomenon. The glowing lights form rings around the poles and are now known to be but signposts of magnetic phenomena extending far out in space. "The old picture of the earth's magnetic field as a simple dipole with field lines running from pole to pole has been cast aside," Whalen continues. "Now we know the earth is surrounded by a teardrop-shaped magnetic sheath. At the poles this envelope is punctured

by deep wells of field lines which guide solar wind particles down into our atmosphere. These electrons ignite the atmospheric gases with the glow of ionization. Project Waterhole, in effect, created an umbrella that interfered with the electron downpour and permitted us to study their movement along the field lines. We are still assessing the information from the experiment and correlating it with Andrew's experiment."

Whalen's colleague, Andrew Yau, followed Project Waterhole with Project Sabre in May of this year and created a man-made aurora. His rocket carried three canisters of barium powder to a region near the aurora. "Barium ions produce a distinctive blue cloud that we could trace as it developed and moved under the influence of the magnetic and electrical fields," he explains. "The three barium bursts occurred about 300 km up and we could see them develop under the fields' influence as they ionized. From earlier work we expected them to move vertically along the field lines and drift across the intervening space to

*Project Waterhole punched a 50 km hole in the aurora to study the origins of this electrical phenomenon.*