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SPEC Inc. brings innovation to global warming research

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BOULDER — Not everyone making a contribution to global warming studies is located at a major university or national laboratory. In fact, at Boulder's Stratton Park Engineering Company Inc. (SPEC), a private firm is conducting cutting-edge instrumentation for global warming research.

"It took us quite a while to establish enough of a reputation so we were recognized as an equal," said Paul Lawson, president of SPEC. "You start small and work up. We've risen to the level of competing with universities and national labs. Government contracting agencies, such as NASA, National Science Foundation and departments of energy and defense, had to build some trust in us, and it took some time to get there."

HIGH-TECH MARKETPLACE

Nevertheless, the company Lawson began in the late 1980s has expanded from pure instrumentation contracts and competes with the big boys for government (especially NASA) contracts in global warming studies through a rare mix of capitalism and government-sponsored research.

DOUG STORUM

Paul Lawson, center, president of Stratton Park Engineering Company Inc. in Boulder, stands at the nose of a Learjet 25, which the company loads with cutting-edge instrumentation for global warming research. At left is Patrick Zmarzly, an optical/mechanical systems engineer, and at right is Darren O'Connor, senior electrical engineer for SPEC Inc.

Four members of the regular 12-person staff, including Lawson, have doctorates in atmospheric physics. They all spend a great deal of time doing the same things as their counterparts at a university environment: that is, writing proposals for research grants, participating in field experiments using new instrumentation they design and build, analyzing collected data, and writing and publishing their findings.

"That's actually how we advertise," said Lawson, noting his firm also employs numerous subcontractors. "Scientists read our papers in journals."

Revenue streams

While the government contracts are closely overseen for actual profit, SPEC has also begun extending its commercial revenues, as well. SPEC studies a number of events with commercial application. Aircraft icing, for example, has helped Ford Motor Co. design a duplicable test on how snow affects engine air intake. And, SPEC has sold its $120,000 cloud particle imager to foreign governments interested in cloud research related to global climate change.

Lawson, whose doctorate is specifically in cloud physics, was working at the National Center for Atmospheric Research in Boulder — sometimes flying sailplanes into thunderstorms to gather data on storms and clouds — when he decided to go it on his own.

"There wasn't that much dedicated money available through conventional university and national lab channels to develop instrumentation," said Lawson, who also has an undergraduate degree in electronic engineering.

However, in 1982 Congress mandated the Small Business Inno-

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vation Research (SBIR) program, which now allocates to small business 2.5 percent of the funds from 11 government agencies, putting that money in a pool specifically earmarked for private companies developing innovative technology.

Today, Lawson said, the SBIR program accounts for about half his company's approximately $1.5 million annual revenue — and half of his research team, as well, which also includes four engineers — while most of the other half comes from competing for research dollars. "(The SBIR) essentially opened up a pot of money for small business to do instrumentation development," Lawson said.

DOUG STORUM

A cloud partical imager, made by Stratton Park Engineering Company Inc. in Boulder, is mounted to a Learjet 25. The imager takes high-resolution digital images of and records data about cloud particles as the plane passes through clouds. The company has sold its $120,000 cloud particle imager to foreign governments interested in cloud research related to global climate change.

SPEC's primary focus is on clouds, especially measuring and ascertaining the physical properties of the small particles, such as ice crystals, that make up clouds in the upper atmosphere.

That may sound incredibly specialized, but in fact this research is a very big part of modeling climate change in an increased carbon dioxide environment. In that environment, the entire hydrological cycle is speeded up; meaning faster evaporation and transpiration could increase cloud cover.

Cloud studies

Clouds, in a general sense, cool the planet, leading to speculation that the faster hydrological cycle could be a feedback mechanism that would slow global warming. However, different types of clouds have different properties. Cloud cover in some instances traps heat, meaning clouds could increase the rate of warming.

And that's exactly what landed SPEC in an exhaustive multi-institutional study funded by NASA. The Cirrus Regional Study of Tropical Anvils and Cirrus Layers (CRYSTAL) project studied what is known as the anvil or thunderstorm blow-off that pervades the tropical section of the globe.

There were more than 80 principal investigators on the projects — representing such large organizations as the Jet Propulsion Laboratory, Harvard, the University of Colorado, NCAR, and National Oceanic and Atmospheric Administration scientists — but just two were from the private sector, including SPEC.

"You have this huge mass of clouds being blown off from the tops of tropical thunderstorms, and they just spread out over the top of the atmosphere," Lawson said.

"One aspect of these clouds is they are very significant in trapping the (heat) radiation from the earth and the ocean," he said. But the other factor is the clouds also reflect sunlight. "So one aspect of the clouds tends to slow the amount of warming, and the other one tends to enhance it."

But these on-location studies, called "in situ," are designed to go much further than gathering data. Really, much of the studies focus on verifying the readings from ground- and satellite-based radar and radiometer systems by making actual measurements at exactly the same location and time those remote systems are gathering their own information.

The long-term goal, Lawson said, is to measure and increase the accuracy of the remote-based systems so they can provide the incredible volumes of data required to validate today's global warming computer models.

Today, Lawson has traded in the NCAR sailplane for a Learjet 25, which the company loads up with instrumentation, including the extremely accurate GPS and directional technology needed to correlate the data with remote measurements. But SPEC is always designing its own instruments to be carried on board, including its new In Situ Cloud LIDAR, or laser radar.

"Now the In Situ LIDAR is a very clever instrument," said Warren Wiscombe, a senior scientist at NASA's Goddard Space Flight Center in Maryland.

Wiscombe, who has worked with SPEC for more than a decade, said the company continues to be a national leader in both laboratory and in-situ instrumentation, including laser measurements of photons and light extinction.

It's a field that Wiscombe believes ultimately will lead SPEC into commercial applications, much as it did the company's predecessor in cloud-measurement instrumentation, Particle Measuring Systems (PMS), also of Boulder.

"SPEC pretty much took the baton from PMS," said Wiscombe, noting the latter company went on to commercial success with particle measuring systems, for instance, for clean rooms. "But what SPEC can now do is actually make these (physical property) measurements in volume."