

different beam shapes, multiple beams, and rapid steering. "Instead of profiles along the line of sight," explains Cesar La Hoz, project leader for Norway, "you will get volumetric data." The software steering will also allow the facility to "run 24/7," says EISCAT director Craig Heinselman. "The solid-state phased array technology can be on all the time. You are not killing the energy budget. And when the system sees something, it will be able to react. Or you can set up campaigns with optical imagers and other instruments."

Temporal resolution of EISCAT_3D will be improved over EISCAT's, from a few seconds to a fraction of a second, and spatial resolution will go from a few kilometers to about 100 meters. Scientists will be able to measure smaller, nonhomogeneous structures and rapid-firing, time-varying processes, many of them related to the aurora, says La Hoz. "We know the aurora is produced by accelerated electrons"

from the solar wind interacting with the ionosphere, he says. "But we don't know the acceleration mechanisms. This is fundamental. The universe is full of plasma."

Heinselman ticks off "noctilucent clouds, polar mesospheric summer echoes, wind systems at stratospheric altitudes—which are implicated in ozone holes over the Antarctic," as phenomena that EISCAT_3D could shed light on. "One big open question," he adds, "is how much energy and momentum are being dumped into the atmosphere by the solar wind? And where and when are they being de-

posited?" The upgraded radar facility will also be used to keep tabs on space debris, detect small meteors, and help predict space weather.

In a separate EISCAT development, China is planning to add a 50-meter dish to the collaboration on the Arctic archipelago of Svalbard, which is already home to two EISCAT antennas—one 32 meters and the other 42 meters—that both receive and transmit radar signals. In addition to studying the atmosphere, the new dish will be used to conduct very long baseline interferometry, map the Moon, and track space debris.

Toni Feder

Northern lights dance

"In my fantasy, I usually see ballet dancers in beautiful dresses" in the auroral lights, says Tatyana Kornilova, a senior scientist at the Polar Geophysical Institute in Apatity, Russia, who studies magnetospheric substorms. "My pictures are a synthesis of my professional occupation and my love for ballet." More often than not, Kornilova deforms, clips, and combines photos of the aurora to create her dancers; her line drawings complete the pictures. Here, though, the dancer's dress is a spectacular, unaltered image of an auroral display. More of Kornilova's artworks may be viewed at <http://kho.unis.no>. (Courtesy of Tatyana Kornilova; photo by Daryl Pederson.)

Toni Feder



news notes

Climate change viewer. Want to see for yourself what the climate models predict? And how various scenarios of carbon dioxide and other anthropogenic emissions translate into climate change? In May the US Geological Survey and Lawrence Livermore National Laboratory launched the Global Climate Change Viewer (GCCV; <http://regclim.coas.oregonstate.edu/gccv>), a Web application that allows anyone to check out simulated past and future changes in the annual cycles of precipitation and temperature around the world.

The GCCV incorporates more than 20 climate models covering the years 1850

through 2100, and also looks back at the mid-Holocene period of 6000 years ago and at the last glacial maximum (21 000 years ago). "Paleoclimate is a great way to test the sensitivity of models and how well they reproduce large recorded changes in climate," says Steven Hostetler, a USGS climate researcher at Oregon State University.

Often, the public hears that it will become one degree warmer in North America by a certain year, says Hostetler. He and the other GCCV creators hope that with their Web application, users will gain more perspective and a better understanding of what the models actually predict. **TF ■**

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