easier, because it opens the way to doing many of the studies in simple organisms like yeast and C. *elegans*. Says Henry Bourne, a pharmacologist and longtime G protein researcher at the University of California, San Francisco: "Yeast and worms and people have much the same machinery. That makes it a whole lot faster to figure out what's going on." The cells may be tuning out, but biologists are eagerly tuning in.

–Wade Roush

Additional Reading

L. De Vries, M. Mousli, A. Wurmser, M. G. Farquhar, "GAIP, A Protein that Specifically Interacts with the Trimeric G Protein $G\alpha_{i3}$, is a Member of a Protein Family with a Highly Conserved Core Domain," *Proceedings of the National Academy of Sciences U.S.A.* **92**, 11916 (1995).

H. G. Dohlman *et al.*, "Inhibition of G-Protein Signaling by Dominant Gain-of-Function Mutations in Sst2p, a Pheromone Desensitization Factor in *Saccharomyces cerevisiae*," *Molecular and Cellular Biology* **15**, 3635 (1995).

K. M. Druey, K. J. Blumer, V. H. Kang, J. M. Kehrl, "Inhibition of G-Protein-Mediated MAP Kinase Activation by a New Mammalian Gene Family," *Nature* **379**, 742 (1996).

M. R. Koelle and H. R. Horvitz, "EGL-10 Regulates G Protein Signaling in the *C. elegans* Nervous System and Shares a Conserved Domain with Many Mammalian Proteins," *Cell* **84**, 115 (1996).

D. P. Siderovski, A. Hessel, S. Chung, T. W. Mak, M. Tyers, "A New Family of Regulators of G-Protein Coupled Receptors?" *Current Biology* **6**, 211 (1996).

INFRARED ASTRONOMY

New Images Wet Researchers' Appetites

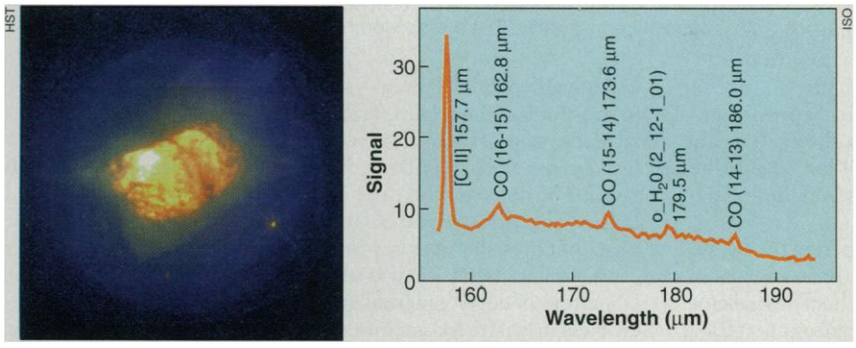
CHILTON, OXFORDSHIRE—In the 3 months since the European Space Agency launched its Infrared Space Observatory (ISO), engineers have been rigorously checking and testing the spacecraft's instruments, communications links, and other systems. But even before the testing was completed, scientists in the project could not resist taking a quick peep at what ISO is capable of—after all, they had waited 12 years since the demise of the only previous infrared observatory to rise above the "fog" of Earth's atmosphere. That glimpse has already provided several surprising observations—including the first-ever detection of water vapor from a source outside our solar system—and has given researchers great hopes for the rest of ISO's 2-year mission. "We see something new almost everywhere we look," said Dietrich Lemke of the Max Planck Institute for Astronomy in Heidelberg, Germany, principal investigator of ISO's imaging photometer, at a press conference last week.

Infrared astronomy is very difficult from the Earth's surface because air itself emits in the infrared, blinding instruments, and water vapor and carbon dioxide in the atmosphere absorb large chunks of the infrared waveband. But astronomers are keen to observe in the infrared because it is the main signal to come from the cooler objects of the universe, such as the interstellar gas clouds from which stars and planets form, the dusty remnants of dying stars, and planets themselves. A 10-month mission in 1983–84 by the U.S.–Dutch–U.K. Infrared Astronomical Satellite provided a map of almost the entire infrared sky, cataloging 250,000 cosmic sources, but astronomers have had to wait until now to get a more detailed look.

Since its launch on 17 November, ISO has chalked up several firsts:

- It has detected particles of ice in space for the first time, as well as frozen carbon dioxide and hydrogen cyanide, in a cloud around a newly forming massive star;
- It has spotted the coolest ever clouds of molecular hydrogen, which are virtually undetectable by other methods. Such clouds may account for some of the unidentified "missing mass" of the universe and are thought to play a key role in star formation;
- It has obtained the first clear and comprehensive spectrum from the atmosphere of Saturn, clearly identifying such molecules as ammonia and phosphine; and
- It has identified hot spots of star formation in the spiral arms of our near neighbor, the Whirlpool Galaxy, and traced the arms right into its nucleus.

But the discovery that is getting astronomers really excited is the detection of water vapor. "It's something of a Holy Grail," says Roger Emery, head of the astrophysics division at Britain's Rutherford Appleton Laboratory (RAL) in Chilton, Oxfordshire, and project scientist on ISO's long-wavelength spectrometer. Water is important in cosmological theories because it can help to cool clouds of interstellar gas and it is one of the essential building blocks of life. So astronomers are keen to know how and in what quantities it is created in space. The signature of water vapor is completely masked to telescopes on the ground by moisture in the atmosphere, so identifying it is a prime goal for ISO. It turned up in a surprising place, however.



A hint of water. ISO spectrum from planetary nebula NGC 2027 (image, from Hubble Space Telescope) shows emission lines for both carbon monoxide and water vapor.

One of the sources ISO looked at during its validation phase was a planetary nebula called NGC 2027, the debris ejected from a dying star. The spectrum ISO obtained showed strong emission lines characteristic of carbon monoxide, implying that a lot of carbon was ejected from the star. Theorists have predicted that there would be little water in such carbon-rich debris, because the carbon would mop up all available oxygen before water had a chance to form. But ISO scientists found an emission line for water in the spectrum of NGC 2027. "All the ingredients [for life] are available in one cloud, ready for the next generation of stars and planets," says astronomer Helen Walker, who coordinates user support for ISO at RAL. If an astronomer had made an observation proposal to look for water in NGC 2027, she says, it would not have been accepted: "It's so unlikely."

"This is going to be very important," says astronomer Ian Furniss of University College London. Many models of interstellar clouds suffer from an excess of energy, so if water vapor is common, its cooling properties could play a key role. "We will understand the energetics of these regions very much better," says Furniss. "I'm very excited. It will fire up a lot of new theories."

ISO scientists are now trying to confirm the water vapor finding in NGC 2027 using a different one of the observatory's four instruments—the short wavelength spectrometer (SWS). "We've made a quick scan and not seen anything yet," says Thijs de Graauw, principal investigator for the SWS at the Netherlands' Institute for Space Research, adding, "we're now making a more detailed scan." Emery is confident that soon ISO will be finding water all over the sky. "We expect to find stronger sources," he says. "This shows that a key element of life is detectable."

–Daniel Clery