

Astronomy

Ron Cowen reports from Boulder, Colo., at a meeting of the American Astronomical Society's Division for Planetary Sciences

Neptune's northern half grows brighter

After several nights of poor viewing atop Hawaii's Mauna Kea, astronomer Heidi B. Hammel finally captured clear images of Neptune on July 12, her last night of observing with the University of Hawaii's 2.2-meter telescope. But her elation turned to puzzlement when she examined the first picture. It looked as if the instrument's optics had somehow produced an upside-down portrait of the distant planet. How else to explain that Neptune's northern hemisphere appeared brighter than the southern — a phenomenon never before observed?

After further observations convinced her the feature was real, "I was dancing around the [telescope] control room," recalls Hammel, of the Massachusetts Institute of Technology. The new findings offer further proof that Neptune has one of the most variable atmospheres of any outer planet.

The near-infrared and visible-light images taken by Hammel and graduate student Ray LeBeau indicate that the brightening occurred at the cloud tops of the planet. Last month, John R. Spencer of Lowell Observatory in Flagstaff, Ariz., and Mark A. Shure of the University of Hawaii in Honolulu found similar brightening when they observed Neptune with the NASA Infrared Telescope Facility on Mauna Kea.

Hammel doesn't know what caused the brightening. Images she took a year ago show the planet's northern half fainter than the southern half — as it has been for the past eight years. She adds that a few bright features had previously appeared on Neptune's northern hemisphere — perhaps a prelude to the increase in reflectivity now observed. Neptune's northern half was bright in images from the late 1970s, but its southern half had always appeared at least as bright. Hammel notes that astronomers have only measured the brightness of Neptune's northern and southern latitudes since the early 1970s.

New dust ring for Jupiter?

When fragments of Comet Shoemaker-Levy 9 crash into Jupiter next July, many of the resulting physical and chemical changes in the upper atmosphere may only persist for days or weeks. But the encounter might also create a new dust ring around the planet that could take eight to 10 years to form and could last for more than 1,000 years.

According to Mihaly Horanyi of the University of Colorado at Boulder, Shoemaker-Levy's escapades have provided two key sources of dust: the comet's breakup last July, when it fragmented into some 20-odd pieces near Jupiter; and the freshly exposed chunks, which themselves release additional grains along the comet's trajectory. Only dust grains between 1.5 and 2.5 micrometers in diameter can lose just enough energy and angular momentum during collisions with charged particles in Jupiter's magnetosphere to coalesce into a ring, Horanyi notes. He calculates that the breakup of Shoemaker-Levy may have generated enough such dust for a ring.

The proposed ring would form much farther from Jupiter than its only known dust ring, identified in 1979. Horanyi estimates that it would lie 4.5 Jupiter radii from the planet and extend out to six Jupiter radii. He says the ring might be too faint for an infrared telescope to detect, but a dust detector aboard the Galileo spacecraft, which arrives near Jupiter in 1995, might find evidence of a budding dust ring.

Science & Society

Commuters drive 'greenhouse' policy . . .

Fossil-fueled vehicles not only account for more than one-third of all energy used in the United States, but they also produce roughly one-third of the nation's emissions of carbon dioxide (CO₂), a "greenhouse" gas. Indeed, these vehicles constitute the nation's fastest growing source of CO₂ releases, according to President Clinton's new Climate Change Action Plan (SN: 10/23/93, p.263).

That plan identifies several new initiatives designed to curb the growth of vehicle miles traveled — and CO₂ emitted. Chief among them are:

- a requirement that employers offer workers the chance to exchange a free parking spot for its cash equivalent;
- federal promotion of telecommuting — working from one's home instead of a central office complex; and
- federal-state efforts to either discourage unnecessary travel (with new parking charges or emissions-based fees on fuels, for example) or encourage the development of smaller and "smarter" vehicles, such as those that sense and bypass pollution-fostering road congestion (SN: 3/21/92, p.184).

By 2000, these three efforts together could reduce U.S. CO₂ releases by about 6.6 million metric tons a year, the plan estimates. How much CO₂ is that? Roughly what would be produced by some 5 million cars traveling 11,000 miles each and getting 20 miles to the gallon.

. . . and calls for stronger measures

If the President were really serious about aggressively tackling the nation's CO₂ problem, he would have pushed for raising the fuel economy standards of new cars, argues Daniel Becker of the Sierra Club in Washington, D.C. These standards, known by the acronym CAFE — for corporate average fuel economy — offer the single biggest payoff, he says.

For every gallon of gas consumed, cars pump 19 pounds of CO₂ into the atmosphere. Because the average U.S. car on the road now gets only 20 miles per gallon (mpg), each can spew some 50 tons of CO₂ over 10 years, Becker says. But phasing in a 45 mpg CAFE standard could cut U.S. CO₂ emissions 30 to 40 million metric tons annually by the year 2000, he estimates.

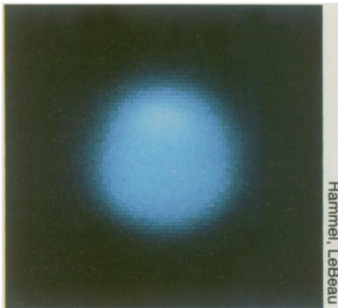
A similar call for higher CAFEs appears in a new analysis by the Berkeley, Calif.-based American Council for an Energy-Efficient Economy (ACEEE) and Public Citizen, a Washington, D.C., public interest group. Their report, which focuses on the social costs of oil use, also notes that U.S. imports account for 25 to 30 percent of oil shipped by water. As a result, it charges, "25 percent — or 1.04 million barrels — of maritime oil spills can be considered a consequence of U.S. oil use." Citing a U.S. Coast Guard estimate that each barrel of oil spilled into the aquatic environment costs society an average of \$24,000 — including the expense of cleanup and damage to natural resources — the report concludes that some "\$16.7 billion in oil spill related damages can be blamed on U.S. oil imports every year."

ACEEE and Public Citizen argue that such costs would be reduced if the administration increased fuel taxes, created stronger incentives for conserving fuel, enacted tougher CAFE standards, and spurred the development of cleaner fuels.

News updates

• On Oct. 7, the Senate confirmed Neal F. Lane as director of the National Science Foundation. Lane, who once headed NSF's physics directorate, returns to the agency after a seven-year stint as provost of Rice University in Houston.

• The United Nations' Convention on Biological Diversity (SN: 6/20/92, p.406) — drawn up at last year's Earth Summit in Brazil — becomes a formal treaty on Dec. 29. Mongolia became the 30th nation to ratify the document, the minimum number needed, on Sept. 30.



Near-infrared image of Neptune shows bright region in the planet's northern hemisphere.