Gathering of the planet people

"This," said Daniel Herman, the National Aeronautics and Space Administration's advanced planetary programs manager, "is our planetary constituency." And indeed, while a grievous lack of publicity left the outside world almost unaware of the fact, the cream of U.S. planetary scientists spent a week gathered in a Columbia, Md., auditorium discussing topics ranging from infrared spectra of a single asteroid to whether an Air Force decision on the NASA space shuttle will inhibit future exploration of the outer worlds.

From the first presentation—a panoramic history of geologic evolution on Mars by Thomas Mutch of Brown University—to the last—in which Michael Kaiser and Robert Stone of NASA's Goddard Space Flight Center suggested striking similarities between the radio outpourings of Jupiter and the earth—it was a space buff's dream: the sixth annual meeting of the American Astronomical Society's burgeoning Division for Planetary Sciences.

Several landmark events were announced during the brain-boggling week. The first oxygen-bearing molecule discovered in the outer worlds (water vapor on Jupiter), infrared spectra from the faintest IR source in the solar system ever to be so treated (Titan), a radar look at Jupiter's moon Ganymede. "It is my pleasure," said Jet Propulsion Laboratory's Richard Goldstein of his radar probe of the remote Jovian satellite, "to present to you the worst signal-to-noise ratio you've seen all week." Yet faint though it was, the echo of the tiny moon, recovered across hundreds of millions of miles of space, was distinctly there. It was even clear enough to reveal a slightly rough surface. "A perfectly smooth target would reflect only a glint from the center," Goldstein pointed out, "while a very rough one would reflect power from over the entire disk." This could represent a moonlike surface, crumbled by eons of meteorite bombardment, or, offered Goldstein, there may even be whole rocks, embedded by impact in an otherwise solid-rock surface—the "fruit jello model."

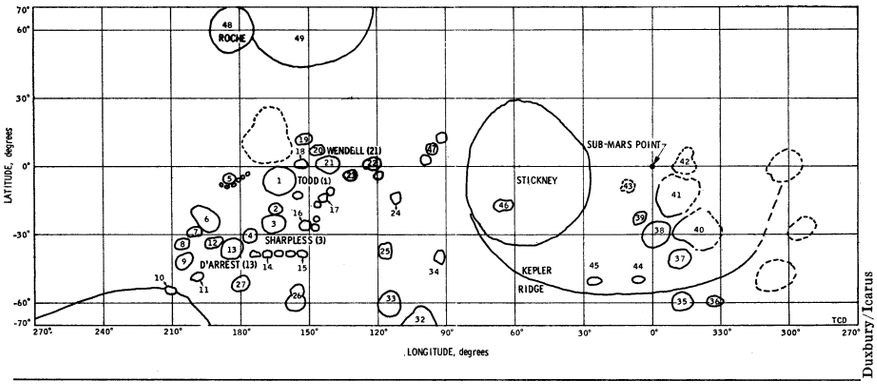
Many of the meeting's contributors were basing their work on isolated observations, such as those from the brief encounters of quick-looking spacecraft. Others summed up lengthy episodes of devoted data-gathering, including the University of Hawaii's David Morrison, whose brightness temperatures and albedo measurments for Jupiter's Galilean satellites resulted from four years of accumulated peerings.

To an outsider, it might have seemed as though all the spacecraft, telescopes, spectrometers and other tools whose findings were cited during the week should provide enough answers for even the most curious planet-watchers. Many scientists, however, are conservative about going out on a limb with their limited findings, so it is left to others to provide the interpretation that may or may not tie them together. The DPS meeting, while it was not structured as it might have been to encourage such speculation, did provide a forum.

Ron Prinn and John Lewis of Massachusetts Institute of Technology, for example, deduced the possibility of red phosphorus crystals coloring Jupiter's Great Red Spot (see p. 137) by combining Stephen Ridgway's observations of phosphene more than a year ago with a laboratory chemical reaction reported by a British team in 1961. Arvydas Kliore, a highly respected researcher at JPL, has been reluctant to suggest exotic theories to resolve the apparent discrepancy between upper-atmosphere Jovian temperatures as indicated by his radio occultation experiment aboard Pioneer 10 and lower readings from the spacecraft's infrared sensor. "A re-analysis of the data," he said, "did not shed any light on it." Other attendees, however (admittedly with less at stake, since they were not responsible for the data), felt free to openly hypothesize ammonia layers, dust clouds, gravity waves and other possibilities which, while sometimes remote, may lead future thinkers to the answer—which may be different still.

Most of the presentations, though, were devoted to the stock in trade of scientific evolution: adding a bit here, a bit there, brushstroke by brushstroke to the mural of the solar system. Typical was a study by Michael Noland and Joseph Veverka of Cornell University, who measured the reflectivity of the moons of Mars from photos taken by the Mariner 9 spacecraft. A comparison of the differences in sunlight reflected at different angles can be a valuable clue to the nature of the surface. One of the Martian moons, Phobos, has even been mapped, using the same Mariner images, by Tom Duxbury of JPL. Phobos, the Cornell researchers told the meeting, probably has "lunar-type, dark, porous, spectrally complex material," and Duxbury's map does not contradict them. The Viking orbiting spacecraft should provide additional evidence next year, Duxbury says, when as many as 50 photos of Phobos may be taken during the latter phase of the mission.

With spacecraft playing such an important role in planetology (and with tight budgets squeezing even ground-based work, some of it supported by NASA), the planetary scientists finally found time, four days into their five-day meeting, to discuss the economics and public awareness of their endeavors. Richard Goody, chairman of the National Academy of Sciences Space Science Board (approximately the scientific community's collective bargaining agent with NASA), spoke of the need for a united front on the part of planetologists (i.e., work through the board) in dealing with Congress, and even in influencing NASA's priorities. He mentioned with appropriate urgency that the Air Force's choice of an upper-stage booster for the space shuttle may bear on NASA's ability to send large, heavy probes to the planets beyond Jupiter in the 1980's and beyond. But it took an eloquent, impassioned talk by new DPS chairman Carl Sagan to inspire even an hour's consciousness of the fact that planetary scientists, for all their other-worldly focus, must depend on other earthlings for their future. □



Phobos map shows range of crater sizes (above) from Mariner 9 photos (below).