MEETING BRIEFS

Space Experts Convene in The Nation's Capital

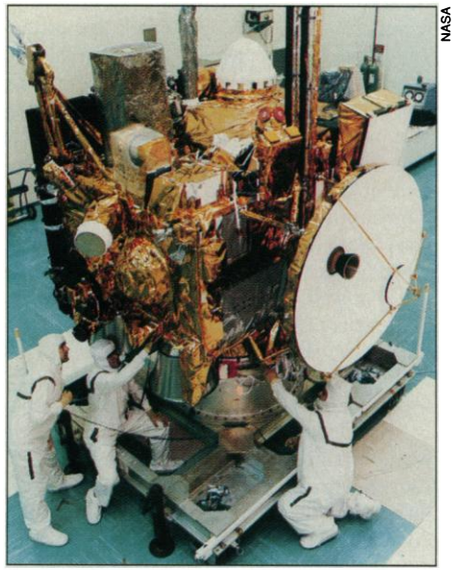
Last week in Washington, D.C. some 4000 delegates and 6000 other attendees gathered for the World Space Congress–the climax of the International Space Year–combining meetings of the International Astronautical Federation and the Committee on Space Research. The topics discussed ranged from astrophysics and planetary science to problems caused by dust and debris–both on Earth and in orbit.

Dusty Old Satellite

Norman Gauss of GE Astro Space spent the weekend of 21 August holed up in Orlando, Florida, avoiding Hurricane Andrew. When the storm ended, Gauss hurried back to Cape Canaveral to check on his main professional responsibility: NASA's Mars Observer satellite, scheduled for launch this month, which his company built. Gauss was relieved to find the launch site had escaped a battering. But when he peered at the spacecraft through an observation port, he got an unpleasant shock: The probe was speckled with dust. "What I saw was my glass coffee table on a Sunday morning with the sun shining onto it," Gauss told a press conference at the World Space Congress.

On your living room coffee table that dust is no tragedy. For a spaceprobe, however, it's a serious problem. If the probe were launched with dust on it, it could damage instruments and prevent solar arrays from being deployed. As a result, NASA was forced to abandon the original 16 September launch date. Engineers so far haven't managed to figure out the root of the problem, and if they don't do that soon—thereby making sure it won't happen again—the launch could be delayed further, possibly even causing the mission to miss its launch window and face a 2-year delay.

At first, it looked as if it would be an easy case to crack. Shortly after the contamination was discovered, NASA had a prime suspect. As a precaution against hurricane damage, Cape Canaveral engineers had disconnected the flexible pipes feeding gas into the nose cone's air-conditioning system. When they replaced these with a sturdier line to pump in nitrogen, the engineers mistakenly attached it to a general supply line used for—among other things—powering jackhammers; this line could easily have been the source of the dust. Later, however, NASA staff "beat on the pipe with a 6-pound sledgehammer," said Gauss, and the dust particles that came out matched some—but not all—of those contaminating the probe. The composition of the rest suggests that much of the dust came from the newly refurbished launch pad below the Titan rocket, but as *Science* went to press, NASA still hadn't been able to puzzle out how the offending specks had gotten into the nose cone.



NASA

Dust busters. NASA's Mars Observer.

Assuming no further problems, the launch of the newly cleaned up probe is now slated for 25 September, but further delays could pose problems. NASA would consider launching until 13 October, but, says deputy project scientist Frank Palluconi of Pasadena's Jet Propulsion Laboratory, because of the geometry of the launch, for a 13 October date there's only a one-in-five chance of getting the probe into the low circular orbit of Mars needed to map the planet's surface.

Cleaning Up Space Garbage

Which organization wins the highest marks for minimizing the debris its satellite systems leave in space? NASA, would you guess, or the European Space Agency? If those are your guesses, you're wrong. When the world's experts on orbiting debris—which is becoming a serious hazard for orbiting spacecraft—met at the World Space Congress to discuss their specialty, a private company reaped the loudest applause: the Motorola Corp., for its efforts to minimize debris from a set of communications satellites planned for 1996.

The constellation of satellites is named Iridium because initial plans called for 77 satellites, mirroring the 77 electrons in the Iridium atom (though later changes may lower the final tally). The package has impressed debris experts because each satellite will be propelled down out of orbit when it nears the end of its useful life. "This is a completely new thing," says Dietrich Rex, from the Braunschweig Technical University in Germany. Experts at the meeting argued that the "new thing" should start a trend to be followed by other organizations operating satellites in low Earth orbit to halt the long-term buildup of orbital debris; and some experts expressed concern that few space program project managers are taking the debris threat seriously enough to alter their programs.

The concern expressed at the meeting stems from the fact that space debris, mostly derived from explosions of satellites or rocket upper stages, is now poised to make the transition from being an irritant to being a serious threat for satellite systems. Many researchers believe that at heavily used altitudes, orbital debris is reaching "critical density"—meaning that collisions between existing fragments, and between small pieces of debris and spent satellites, will cause the number of orbiting fragments to grow faster than they can be removed by atmospheric drag. The result: A chain reaction that could see the number of fragments rocket out of control. And each of these little pieces could act like artillery shells aimed at orbiting satellites, because when it hits a satellite in low Earth orbit, a 1-gram shard of metal impacts like the explosion of 10 grams of dynamite.

Although other measures may be helpful in the short run, in the long run, says Rex, the only thing that's going to work is the removal of spent hardware from orbit. The reason a private-sector group is leading the way to this goal is the bottom line. The Iridium project will consist of six or seven sets of 11 satellites, each set chasing one another around the same polar orbital plane, 765 kilometers above Earth. If one satellite breaks up, the stream of debris released into its orbital plane could damage the trailing orbiters. So, for sound commercial reasons, "we have to keep our orbital planes clean," says John Fleming, a member of Motorola's space operations team.

Some at the conference argued that it isn't enough to let the problem sort itself out. Darren McKnight of Kaman Sciences Corp., presenting an orbital debris position paper from the International Astronautics Academy, said there's a need for a global working group on space debris made up of experts who can prepare the ground for an international treaty to tackle the problem of a big cleanup in the sky. But it's not obvious who should oversee this, cautions Rex: "We need a global managing organization for all space activity."

–Peter Aldhous