Nimbus 6: Orbiting global monitor

Nimbus 6, a weather satellite described by NASA officials as "the most sophisticated package of meteorological research instruments ever developed," is now in its third week of a polar orbit that shows it the whole earth twice a day. Besides serving as a test bed for the latest weather-watching devices, a major role of Nimbus 6, launched June 12, is to gather data to be used in preparing numerical models of the atmosphere for the vast, international Global Atmospheric Research Program (GARP) to be conducted in 1978-79.

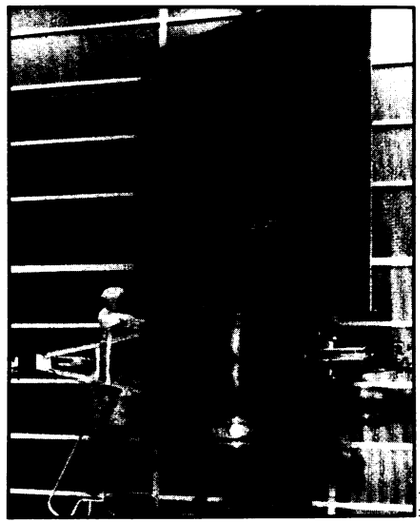
Unlike SMS-1, the synchronous satellite that photographed developing weather patterns from a fixed position for last summer's GARP Atlantic Tropical Experiment (GATE), Nimbus 6 moves around the planet reporting on temperatures, winds and water distribution.

Several of its instruments are concerned with "vertical profiling"—looking down to make measurements at different atmospheric levels. One, for example, measures in 17 separate infrared bands to monitor both reflected solar radiation and the earth's own emissions, yielding temperature and water vapor profiles in clouds as high as 40 kilometers from the surface. Another device looks at the limb, or visible edge, of the earth to record the structure and ozone-density distribution of the stratosphere, with vertical temperature resolution as fine as 6,500 feet, about five times as good as similar instruments on previous Nimbus probes.

Besides making these and other measurements on its own, Nimbus 6 will serve as a communications relay for a series of instrumented balloons in a multination study called TWERLE—the Tropical Wind, Energy-conversion and Reference Level Experiment. Floating nearly 30 kilometers up, the balloons will send temperature, pressure, altitude and wind data through Nimbus 6 to a central ground station. TWERLE will involve scientists in the United States, Australia, Brazil, Canada, France, Norway, South Africa and the United Kingdom.

TWERLE and two of the temperature profilers are the satellite's major GARP-related experiments. Their data will be used in conjunction with findings from GATE to develop numerical models of the behavior of the atmosphere, against which will be compared the findings from the 1978-79 GARP international phase.

And GARP planners need all the help they can get. Dividing the entire globe into imaginary 500 kilometer squares, they hope to use a minimum of nine satellites (including 4 Nimbus-style polar orbiters and 5 synchronous SMS-type weather-watchers) along with hosts of ships, planes, buoys, balloons and other devices to collect data from every square. □



Hughes

OSO-8 gets a check before launch.

OSO-8: Sun and beyond

The sun and a host of celestial exotica are among the targets of the eighth Orbiting Solar Observatory satellite, OSO-8, which was placed in its nearly circular earth orbit on June 21. The probe's primary instruments are a pair of ultraviolet telescopes—a UV spectrometer that will record spectral profiles from various parts of the solar disk for Elmo C. Brunner Jr. of the University of Colorado and an instrument that will study the fine structure of the sun's chromosphere for R.M. Bonnet of the French National Center for Scientific Research in Paris. Other instruments, however, will seek such phenomena as supernova remnants and the possible pulsars within them; certain X-ray-emitting binary stars that seem to include a visible star with a smaller companion that may be a neutron star or even a black hole; and cosmic X-ray background radiation.

In addition, OSO-8 carries a "stored-command processor" which will let astronomers on the ground prepare complex instructions for the probe's many instruments in response to changing conditions on the sun, then trigger the instructions at a predetermined moment. □

Two by two to Venus

The Soviet Union, which likes to send its Venus probes in pairs, has done it again. On June 14, less than a week after the June 8 launch of Venera 9 (SN: 6/14/75, p. 382), Venera 10 was sent on its way. Both spacecraft are due for an October arrival. Previous mission plans and the approximately five-ton weight of the new probes suggest that both vehicles will attempt either to land on the cloud-shrouded planet or to drop off descent stages from a fly-by trajectory.

In 1969, Veneras 5 and 6 reached the planet and reported data during descent through the atmosphere. Both Venera 7 in 1971 and Venera 8 in 1972 reached Venus, but their respective companion probes failed to get out of earth orbit. □

Cosmonauts crack barrier

Soyuz 18 cosmonauts Pyotr Klimuk and Vitaliy Sevastyanov set a new Soviet duration record for men in space on June 24, breaking the 30-day mark of the Soyuz 17 crewmen (SN: 5/31/75, p. 351). Both crews spent most of their time aboard the Salyut 4 space station, with Klimuk and Sevastyanov becoming the first crew to successfully re-occupy a Salyut. The busy Soyuz 18 itinerary has included solar spectroscopy, X-ray astronomy, solar and galactic cosmic-ray studies and investigations of earth's atmosphere including pollution and density measurements. □

A cautious twist in the risky shift

Henry makes good money grinding out schlock Westerns, but he is a talented writer and has recently been working on an idea for a novel of potential literary significance. Should Henry give up his lucrative Westerns in order to pursue a more creative career that may or may not be financially successful? In 1961 James Stoner posed this and a number of similar questions as part of a research project designed to test the old adage that groups are more cautious and less creatively daring than individuals. Compromise within groups, for instance, might put a damper on daring decisions and inhibit extremist positions.

Participants in Stoner's experiments were asked individually how they would solve Henry's dilemma. They then assembled to discuss the same problem and arrive at a group decision. The groups, on the whole, turned out to be more risk-prone than the average individual. Stoner's surprising finding was immediately dubbed the "risky-shift" phenomenon.

If group discussion does indeed result in more risky or extreme decisions, then some important questions have to be answered. For instance, does discussion in juries, in business committees and in military decision groups generally increase risk-taking? Perhaps not. Perhaps the risky shift is only part of a larger phenomenon.

David G. Myers of Hope College in Holland, Mich., and Helmut Lamm of the University of Mannheim in West Germany are among the many researchers in social psychology who have followed in

Stoner's footsteps. In the May-June AMERICAN SCIENTIST they discuss their own work, review the literature on group discussion and expand on Stoner's original conclusions. "After about five years of research and speculation on the great risk-proneness of human groups," they note, "it became evident that the risk shift was not as general as first thought. For example, some dilemmas did *not* yield a reliable risk shift, and some items were found to yield reliable shifts to greater caution after discussion."

A dilemma similar to Henry's demonstrates the cautious shift: Roger is a married man with two school-age children and a secure but low-paying job. He can afford the necessities, but not the luxuries of life. From a reliable source Roger has learned that the stock of a relatively unknown company might triple in value in the near future. Roger has no savings. Should he take a flier and invest his life insurance money in the unknown company?

Just as with Henry's problem, research subjects were asked individually and after group discussion what Roger should do. In this case, the groups tended to be more cautious than the individuals—the opposite of the risky-shift phenomenon.

So group discussion does seem to have an effect on human thoughts and behaviors, but the shift can be toward either risk or caution. The authors suggest there might be a "general principle that will allow us to predict in advance the likely direction of a shift." They found a strong relationship between the average initial response on an item and the average shift elicited by that item. Individuals were more likely to suggest risk-taking for Henry than for Roger. Group discussion only enhanced the already dominant point of view.

"The group-change effect discovered in dilemmas," Myers and Lamm conclude, "is therefore better described as a *group-polarization* phenomenon: The average post-discussion reponse will tend to be more extreme in the same direction as the average of the pregroup responses."

Social psychologists have long been divided on the question of whether group interactions have mostly beneficial or mostly destructive outcomes. Group therapy is based partially on the assumption that group discussion will be beneficial. Mob violence, on the other hand, shows the destructive aspects of group behavior. The group-polarization theory does not say whether group discussion will be beneficial or destructive. It does, however, yield some understanding of human behavior in certain social situations and suggests the importance and effectiveness of group discussion in bringing about behavior change. And because of this apparent effectiveness, say the researchers, it is "not surprising that, in Western culture, group discussion seems increasingly integral to our social and organizational existence." □

Rubber telescope bounces on

The earth's atmosphere has always been a barrier to astronomers. Its turbulence limits the sharpness of the sky. Astronomers would love to get from their telescopes the resolving power that the laws of optics allow, the so-called diffraction limit, but the images shimmer and dance and will not come sharp.

The atmosphere cannot be made to go away, but recently a number of ideas have surfaced for compensating for its damage. One of these is the so-called rubber telescope, a concept based on a flexible mirror surface that can be moved and wrinkled to compensate for the distortion (SN: 8/24-31/74, p. 132). A group at the Lawrence Berkeley Laboratory comprising Frank S. Crawford, Arnold J. Schwemin, Robert G. Smits, Richard A. Muller and Andrew J. Buffington, is working on such a project, and Crawford reported at the conference on Imaging in Astronomy held at Harvard University last week that it has gone from concept to experimental reality.

Atmospheric distortion varies from place to place and time to time—it changes about 50 times a second—but over a small enough patch of sky it will be virtually the same at a given instant. So the rubber mirror is divided into a number of small elements which can be driven in and out and tilted independently under the control of a computerized servomechanism.

A large observatory mirror of this type would contain hundreds of such elements. The models now being tested contain only six. There is a hexagonal array of circular elements ⅜ of an inch in diameter and two linear arrays of half-inch squares.

The group has been concentrating on the linear arrays because these can be used in the 30-inch telescope at the Leuschner Observatory in the Berkeley hills. A 12-inch telescope was built for laboratory tests. The light source was a laser beam that had come through 1,200 feet of turbulent atmosphere. The first test, on June 10, used the two outermost of the six mirrors to produce interference fringes that were stable despite atmospheric shimmering. On June 12 two adjacent mirrors were used in the attempt to get a stable image simply of the aperture itself. The result was just what was expected under the conditions of the experiment, Crawford says. So the idea seems to be beginning to work. The next move is to gradually bring more segments into the act until all six are working. At that point the astronomers will go "out to the Leuschner telescope and look at real stars." □