SPACE SCIENCES

Geos-2 betters Geos-1's orbit

The European Space Agency's Geos-2 satellite, designed to study the dynamics of the earth's magnetic field from a fixed altitude of about 36,000 kilometers, was launched successfully by NASA on July 14. Carrying seven experiments, it will study magnetic and electric fields, plasma characteristics and other phenomena in a part of the magnetosphere where many of the dynamic processes responsible for magnetic and ionospheric disturbances are believed to develop. During its first year of operation, Geos-2's position over the equator will be shifted between 9°E and 35°E to yield the best correlations with data gathered at lower altitudes by sounding rockets, balloons and ground stations.

The job was to have been that of Geos-1 (not to be confused with NASA's GEOS geodetic satellites or GOES "environmental" satellites), which had been foreseen by ESA as the world's first purely scientific geostationary satellite. Unfortunately, the third stage of the NASA Delta rocket that launched it on April 20, 1977, separated prematurely from the second stage (due to a malfunction of the explosive bolts that produce the separation) and left the otherwise functioning satellite in too low a "transfer orbit" to reach its geostationary goal.

European flight controllers, however, have since managed to make the best of a bad start, beginning by getting Geos-1 into an orbit that ranges from 2,050 km to 38,318 km above the earth, inclined 26.3° to the equator. The nongeosynchronous orbit meant that the satellite could be followed only a small part of the time by the German tracking station that was to have tracked it continuously, so some NASA stations were enlisted for additional coverage. The result, although the long-term monitoring at high altitude has not been possible, has included some data that could not even have been gathered from the geostationary post.

Since the satellite has been circling the world every 12 hours, it has been possible to study day-night differences in the magnetosphere and plasmasphere (particularly the region known as the "plasma bulge"). Because the orbit's apogee (farthest point from earth) occurs at successively different longitudes, researchers have been able to correlate the satellite's data with that from ground observatories in the auroral zones of northern Scandinavia, Iceland and Alaska. All of the on-board experiments have been recording data ranging between at least five and seven earth radii from the planet, and some have been working down to as little as two earth radii. It has even been possible to make some measurements near geostationary altitude, helped by the fact that a satellite in an elliptical orbit travels relatively slowly near apogee.

Furthermore, point out ESA officials, the presence of two Geos satellites (despite the unfortunate reason) is a plus for one of the project's major goals: participation in the more-than-40-country International Magnetospheric Study.

Astronaut candidates report

The 35 astronaut candidates recently selected by the National Aeronautics and Space Administration to train for space shuttle duty (SN: 1/21/78, p. 36) reported to the NASA Johnson Space Center on July 10 to begin their two-year training period.

Their activities for the rest of this month are devoted largely to emergency procedures and physiological training for the T-38 jet aircraft. All of the candidates will have had at least "rear-seat" training in the T-38 in the course of their pursuit of astronaut's wings, although only those selected as potential shuttle pilots will be expected to fly the jets themselves. As their training schedule expands, it will include engineering, shuttle systems and other subjects. Shuttle missions will not be assigned until after the training.

ENERGY

Old nukes still hot

At least 26 former atomic energy sites are still radioactive and require "remedial action" ranging from minor decontamination to the entire destruction of some structures, according to a report by the Department of Energy. The sites were used for nuclear materials processing and storage work in the early days of the atomic energy program. Most have since been turned over to other uses.

More than 70 sites were surveyed because in 1974 their radiological records were found to be missing or incomplete. According to the DOE report, five of the hot sites have also had aerial surveys "in an effort to locate and trace any radioactive materials which may have been removed for disposal in the vicinity of the sites." At an industrial park in Pennsylvania, for instance, elevated levels of radon were found in buildings. Now, after an aerial radiation survey, "engineering assessments are underway to determine options and costs of remedial actions," the report noted.

NYC blackout revisited

It was one of the worst failures ever to hit a major electric power system. The New York City blackout of July 13, 1977, put more than eight million people into the dark for 5 to 25 hours. And to mark its first anniversary, the Federal Energy Regulatory Commission has released a 208-page final report on the failure.

The blackout was triggered at 8:37 p.m. July 13, during a severe thunderstorm when lightning hit two high-voltage lines, knocking out one generator. Before the storm, Consolidated Edison was importing 35 percent of its power, according to the FERC report. Then it jumped to more than half. At 8:56 two more lines were struck, causing serious overloading and shutdowns on transmission lines carrying in power from nearby utilities. By 9:30 Con Ed was isolated. In the next six minutes its own generators overloaded and shut down one after another.

Poor management, operation and design contributed to the disaster, according to the report. Before the lightning even hit, three generator units and one major link to another utility were out of service for maintenance. Backup equipment also failed. Among other recommendations, the FERC report called for better control systems, less dependence on electricity imports during thunderstorms, better ties with other systems and emergency equipment that works. Some of these have already been done and have contributed to Con Ed's weathering a similar lightning-induced problem on September 26, 1977. In addition, the FERC report called for a general program to oversee the selection and training of control room personnel.

The bill for the blackout, by Con Ed's estimate, comes to $15.2 million. The FERC report notes that damage claims still pending against the company amount to more than $10 billion.

Biomass abroad

From seaweed to sewage, it's just about everything under the sun that can be used as an energy source. Plant tissues and organic waste make up the bulk (SN: 4/22/78, p. 258). New processes for converting biomass into usable energy are popping up all over but are hard to keep track of. Or were. Last month the United States, Sweden, Ireland, the United Kingdom and Belgium signed an agreement with the International Energy Agency to set up a biomass conversion technical information center. It will supply participants with data on the production, harvesting, processing, transportation and conversion of biomass. So what? When heated in the absence of air, one ton of dry biomass will produce 1.25 barrels of oil, 1,200 cubic feet of gas, and 750 pounds of a coal-like residue that can be burned.