away, out beyond the Gum Nebula) Puppis A is still large enough to occupy a substantial microfraction of arc in the sky, enabling observers to distinguish between its center and the filaments at its rim. Also, its radiations are intense enough to be viewed in discrete wavelength bands, unlike many dim objects from which every available photon, regardless of wavelength, must be brought together to build up a useful image.

The rocket-borne telescope, assembled at NASA's Marshall Space Flight Center in Alabama, will be looking at Puppis A's X-ray emissions. A similar instrument was used aboard Skylab to photograph and study the sun, but the newer version will be updated with advanced mirror-polishing techniques and equipped with a position-sensitive proportional counter that can radio an image to the ground (in case the parachute-equipped telescope and camera don't survive the landing). Shepherded by co-investigators Richard B. Hoover of Marshall and Ian Tuohy of Mullard Space Science Laboratory in London, the telescope will be carried by a British Skylark rocket launched from Woomera Rocket Range in Australia, aimed at a planned altitude of 171 miles.

Another feat of space astronomy, meanwhile, has gotten off on the right foot with the successful launching on Aug. 30 of the Netherlands Astronomy Satellite, instrumented for both X-ray and ultraviolet studies of the sky. Despite a 72-hour delay due to technical problems, this first Dutch-built satellite, launched by NASA from California, marked the winning of a five-year-old bet for Netherlands officials, who in 1969 had predicted the launch of their maiden space probe right to the month.

A problem with the Scout launching rocket (it apparently pitched over too far before releasing the satellite) put the probe into an elliptical orbit ranging from 165 to 727 miles above the earth, rather than the nearly circular, 316-by-347-mile orbit planned. This is likely to mean that the worldwide NASA tracking system will have to supplement that of the European Space Research Organization throughout the probe's working life, rather than just during preliminary operations as originally planned.

All three of the satellite's instruments have been turned on and are working properly, although some computer correction of the data will be needed to compensate for the unanticipated orbit. Despite the orbit, NASA calculations indicate that the probe will be able to stay aloft for more than 800 days, which is as far ahead as the prediction program runs. □

# NAS scores EPA's research setup

For once, a committee of the National Academy of Sciences didn't mince words. In unusually blunt terms, an NAS committee appointed to evaluate the system by which the Environmental Protection Agency conducts research has found that present procedures "are not a satisfactory base for management and must be abandoned." The present system, the report concluded last week, "has started in a wrong direction and . . . a fresh start is needed."

The study was requested by EPA Administrator Russell E. Train, who accepted the academy's criticism gamely: "I very much appreciate the candor" of the report. The recommendations, he said, will serve as the basis of future actions, beginning with the appointment of a new assistant administrator for research and development. Both Train and the academy committee stressed that the report was a criticism not of the research performed by individual EPA scientists but of the methods of supervising and assimilating their work. The committee referred to researchers in various regional EPA laboratories as "dedicated and competent scientists."

The problems, according to the report, began outside the agency, with enabling legislation that is "noncoherent" and research objectives and timetables that are "unbalanced and uncoordinated." The problem has been aggravated by "parochial political pressures," the lack of an integrated approach to R&D and a "roller coaster" budget.

Inside the agency, the committee found priorities in a shambles because of a "vacuum cleaner" approach to soliciting ideas. "Severe resentment" has developed among researchers because planning is often separated from responsibility for execution of the work required. The system is overcomplex, demands excessive detail at all planning levels, and lacks a long-term program to meet stated goals. Relationships between headquarters and the field are "strained at best" and a "state of frustration in the field staff is apparent."

To overcome the internal problems, the committee recommends delegation of research program responsibility to the research center directors in the field, who would then report directly to an assistant administrator for research and development. He, in turn, would analyze the input and define R&D needs and objectives. To further the decentralization process, a performance evaluation system using outside committees should be established, the committee recommended, and permanent Washington staff should only be large enough to competently monitor grant and contract work. "The pyramid should decentralize quickly from Washington headquarters to major field units."

EPA has come under increasing criticism for the way it runs its R&D operations, with some critics even suggesting that this capability be removed altogether (SN: 7/28/73, p. 52). Train is thus expected to act quickly on the academy's recommendations. □

# Lagrangia: Pioneering in space

The migration of earthlings from our planet to another one is an old theme in science fiction. The trip can be taken for adventure, but often it is done because earth is overpopulated or has been made uninhabitable by natural or artificial means. Two facts now cross the fiction: Earth is becoming overpopulated, and the two most popular candidate planets, Mars and Venus, seem less and less hospitable as we know more about them.

Therefore why not artificial habitats out in near space at the Lagrangian points of the earth-moon system? This modest, close-to-home beginning is the suggestion of physicist Gerard K. O'Neill of Princeton University. After talking it up in a number of places he presents it in the Aug. 23 NATURE.

The Lagrangian points are chosen because matter put there will stay and orbit the earth in synchrony with the moon. The most likely Lagrangian points lie on the moon's orbit sixty degrees before and behind the moon and move with it. A modification of the space shuttle could get things there, and O'Neill believes that the technology of the current decade could build a habitat for 10,000 people. Once there, the pioneers of Lagrangia could sustain themselves using sunlight for energy and the mineral resources available on the moon. They could then construct ever larger habitats until by 30 years from now there could be communities of 100,000 to 10 million people. "Replication of these communities could lead to the exponential growth of new land area, with a growth rate more rapid than that of the total human population," O'Neill concludes, and he alleges that these communities could be as comfortable as the most desirable parts of the earth. □



Science Service, Inc. is collaborating with JSTOR to digitize, preserve, and extend access to *Science News*. www.jstor.org