Pioneer-Venus: Did Astronomers Undercut Planetary Science?

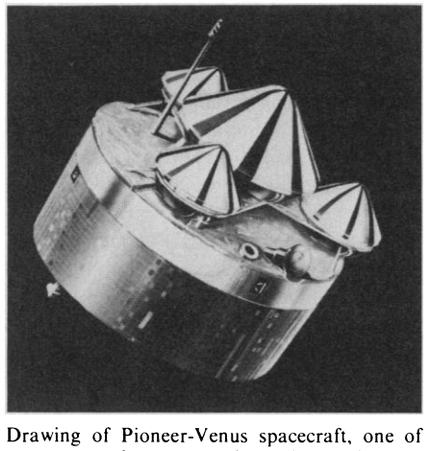
The House of Representatives late last month approved a $48 million cut in the National Aeronautics and Space Administration's Pioneer-Venus program, a two-spacecraft probe of the planet's atmosphere planned for 1978. The move took the agency by surprise and has created no little consternation among planetary scientists. Not only had the program been scrutinized and endorsed by House and Senate authorization committees, but construction of the spacecraft, for which planning began 4 years ago, is now well advanced. The potential loss is the more bitter in that Pioneer-Venus, more than most NASA projects, is a child of the scientific community. Ironically, however, the initial motivation for the House action appears to have been criticism of the space science program by astronomers in the course of defending funds for the Large Space Telescope. Efforts are now under way to persuade the Senate appropriations committee to restore the Pioneer money.

Whatever the outcome, the incident is remarkable on several accounts. The House appropriations subcommittee that authored the cut did not intend to eliminate Pioneer-Venus altogether, according to the report which accompanied the appropriations bill to the floor. Rather the intent was to delay it 1 year in order to allow further consideration of the relative priorities between it and the Large Space Telescope. Whether or not it makes sense to pair the two programs—they are not in any way comparable in their scientific objectives, and the Large Space Telescope is still only in the study phase—the committee's action appears to be based on a misunderstanding of the physical constraints of launching a spacecraft to Venus. Once the 1978 launch window is past, 1980 will be the next opportunity for a Venus shot. In 1980, however, the relative positions of Venus and Earth will be such that the spacecraft would have to approach Venus at higher velocities, which would necessitate a larger retro-propulsion motor and more fuel than would be used in the 1978 mission. Hence the scientific payload would have to be correspondingly reduced, or the cost of the spacecraft would be considerably higher, or both. In any case, substantial redesign of the spacecraft would be needed.

Effectively then, postponing the mission at this late date would waste much of the $40 million (of a total budget of about $170 million for the mission) already spent. Moreover, existing contracts for spacecraft components would probably have to be cancelled, NASA officials believe, since the $9 million voted by the House for management capability during the year-long deferral would not suffice to keep contractor teams together.

The subcommittee's decision seems to have been made rather abruptly and without any real attempt at investigating the consequences. There was no discussion of Pioneer-Venus during appropriations committee hearings, and the subcommittee staff never asked NASA whether the mission could be delayed. They did inquire of the agency whether the spacecraft could be launched from the space shuttle, scheduled to go into operation in 1980, apparently with the idea that the shuttle would be a cheaper launch vehicle than the Titan/Centaur planned for the 1978 mission. NASA officials confirm that such an arrangement is theoretically possible, but point out that interplanetary launches from Earth orbit require a third stage for the shuttle which is not yet off the drawing boards.

Even more remarkable is the motivation given in the appropriations committee report for reconsidering Pioneer-Venus.



Drawing of Pioneer-Venus spacecraft, one of two now under construction. The mushroom-shaped objects are probes that will be jettisoned and will descend through the atmosphere of Venus. The second spacecraft (not shown) will orbit the planet. [Source: Ames Research Center, Mountain View, California]

"Some astronomers have been critical of NASA's Space Science program because they contend that a disproportionate level of NASA dollars have been used on planetary astronomy missions, while little or no funds have been allocated to deep space astronomy which is the principal mission of the Large Space Telescope." According to a committee staffer, LST advocates taking this line of defense for their project, which narrowly escaped being cut out by the House last year, "planted somewhat of a seed" against planetary programs, although apparently not specifically against Pioneer-Venus.

Public internecine warfare over budgets among scientists of different disciplines is not unheard of, but it has been relatively rare in recent years, especially among basic researchers. Many astronomers have indeed felt that the space science budget has tilted away from deep space astronomy and toward planetary science for the past several years, although the usual forum for these debates is the Space Science Board of the National Academy of Sciences. Interestingly, the Space Science Board's latest report explicitly says that all approved missions (including Pioneer-Venus but not the LST) are to be given the highest priority, a statement ascribed to unanimously by the 19-member group, which includes 7 astronomers. But the distinction between existing missions and those still in the planning stages seems to have gotten lost in the process of airing the debate over the balance in the space science program before the House appropriations committee. To one senior NASA official, the incident has an obvious moral: when one part of the scientific community tries to move ahead at the expense of another, the budget cutters have a field day.

To many space scientists, the House action also raises serious questions about the credibility of the long-range planning process for big science projects. Pioneer-Venus is unique in that it was conceived within the scientific community as an extremely sophisticated but low-budget mission designed from the beginning around scientific objectives and later adopted by NASA. Thus, some scientists argue, cutting the mission after it has already been approved by Congress and after money and considerable talent have been committed to its development may jeopardize efforts to design efficient spacecraft and plan a logical program of planetary exploration.

In debate on the House floor, it was made clear that NASA would be permitted to shift money from other projects to keep Pioneer alive, if it should choose to do so. NASA officials, however, take the position that there is no slack in the budget

and that they could not shift $50 million or even a major fraction of that amount without damaging other programs; a substantial cut they claim, will kill the program. They have strongly urged the Senate to restore all the Pioneer funds, in the hope that the House would agree to go along. Pending final action on the bill, probably later this month, NASA is continuing work on the project, which entails spending at the rate of about $5 million a month in the current fiscal year. Two spacecraft are involved, one to orbit the planet and the other to drop four instrumented probes through the atmosphere of Venus, with the aim of giving a composite picture of atmospheric phenomena which could be compared to weather patterns on Earth.

Loss of the project, if it comes to that, may make for difficult relations not only between space scientists and government, but also between astronomers and planetary scientists. Perhaps with that in mind, several prominent astronomers have written to members of the Senate in support of Pioneer-Venus. For example, Lyman Spitzer, Jr., of Princeton, an outspoken backer of the Large Space Telescope, wrote Senator Proxmire, saying that although he has urged greater emphasis on deep space astronomy, he is opposed to changing priorities in midstream and believes postponement of Pioneer-Venus would be "a serious mistake." A great many planetary scientists would agree.

—ALLEN L. HAMMOND

Agriculture: A New Frontier in Coastal North Carolina

Plymouth, North Carolina. Lying between the famed North Carolina outer banks and this modest county seat is the largely wild and swampy Albemarle-Pamlico peninsula, so named for the major sounds that border it to the north and south. The greater part of the peninsula is still covered by forest and scrub, more typically the latter. Yet, off and on over the past 200 years, this flat, low-lying region of 1634 square miles has given rise to speculation that it might some day become a rich and productive farming area. For, demonstrably, its black soils, which include organic mucks up to 12 feet deep, can produce crops of corn and soybeans as abundant as any in the Midwest.

In fact, this agricultural frontier represents one of the most promising major reserves of potentially rich but unreclaimed land in the eastern United States. Because of the peninsula's high potential, a rapid expansion of farming into the wild lands is now in progress.

Draglines and bulldozers are at work over wide areas, digging drainage canals and ripping up trees and other vegetation, then pushing up the resulting debris into long windrows. A process of irreversible change has been set in motion. In many places where before there was pine or scrub, there is now only cleared land, the fields divided neatly into rectangles by the windrows and grids of canals, field ditches, and farm roads. Much of this land is already greening from new corn or soybeans; some of it, freshly cleared, will be a while yet before being ready for planting.

Now leading this agricultural expansion is First Colony Farms, a $200-million venture begun in 1973 by a free-wheeling, North Carolina–born multimillionaire. First Colony is engaged at its own expense in reclaiming land on a scale comparable to that of many reclamation projects undertaken elsewhere with public funds. Moreover, if First Colony's plans are realized, the peninsula will indeed become an agricultural domain rivaling some famous reclaimed areas, such as Florida's Everglades agricultural area and California's Imperial Valley.

Not a Pristine Wilderness

And, while this development will have a major environmental impact, the land being affected is no pristine wilderness. By the middle of this century, the forests that had once covered this region—pond pine predominating in the higher areas and white cedar in the lower—had nearly all been cut. Since then, some regrowth of the cedar has occurred, but there has been little regeneration of the pine. Because of the seasonal dryness and the combustible peaty soils that mark the pinelands, wildfires have swept over as much as 250,000 acres at a time and resulted in most of the cutover land growing up in thick scrub.

Successful large-scale farming on this peninsula requires lots of capital as well as management savvy, patience, and favorable price trends for the products produced. The drainage, land clearing, and other special preparation required for farming the soft black soils can alone cost as much as $360 an acre. And, at that, in wet weather some of the soils make a hopeless quagmire for even the most modern "high flotation" farm equipment.

Not surprisingly, up until several years ago agricultural development here generally came slowly. Although some outside entrepreneurs drained big Lake Mattamuskeet in the 1920's and began farming its bottom, pump failures and collapsing commodity markets brought this venture to a spectacularly bad end. The waters reclaimed the lake by the mid-1930's and flooded the new community of New Holland.

Since 1970, several major corporations have come here to initiate farming ventures, including American Cyanamid and John Hancock Mutual (in a joint venture) and the Japanese-owned Shima American Corporation. But what these companies have been doing, though impressive, is nothing compared to the First Colony Farms development. First Colony is the personal property and brainchild of Malcolm P. McLean, a shareholder and director of R. J. Reynolds Industries and one of the principals in the Diamondhead Corporation, owner of Pinehurst and other resort properties.

First Colony had its inception in mid-1973 after McLean, who has his offices in New York, saw an ad in the *Wall Street Journal.* Westvaco, formerly known as the West Virginia Pulp and Paper Company, was offering for sale all of its land in the Albemarle-Pamlico region, these holdings consisting of 289,000 acres running in a nearly contiguous tract from the eastern part of the peninsula to the north-central part.

An entrepreneur who is still vigorous at 61, McLean first came into prominence in the 1940's after building a large trucking line, operating out of Winston-Salem. Then, in the 1950's, he pioneered in the containerized shipping business by developing the highly successful Sea Land service for moving truck trailers by sea. Now, in the 1970's, McLean was looking over Westvaco's sales offer and standing at the verge of perhaps his biggest plunge yet. He did not deliberate long.

After only a limited investigation,