

Whither the Launch Business?

For several years, the majority of the payloads launched into orbit by the National Aeronautics and Space Administration have been for "outside" customers — different government agencies, private companies and consortia, and other countries. The "launch business" has thus become a significant part of NASA's activities, and the space agency has in large measure justified the economics of developing the space shuttle on expectations that the business will grow. It may well do just that, particularly with the Defense Department's growing interest in space, but 1980 is likely to be a year in which NASA and other entities are keeping particularly close watch on the state of their predictions.

At the beginning of 1978, NASA cited expectations of launching as many as 25 payloads during the year. The actual number was 20. For 1979, the prediction was lower still — 16 (including the space shuttle's first orbital flight, now due late this year), and two of them were only optional launchings to be used if needed. The final total was down again, to nine.

This year's tentative schedule again calls for nine launchings (10 if the shuttle flies), and the list would be considerably smaller if it did not include several holdovers from 1979. One of those is the Solar Maximum Mission, designed to study the sun at the height of its activity cycle; it is NASA's only satellite to be orbited this year, meaning that if it had flown last year as planned, the space agency would be making no use at all of its own launching service. (Other launches include four communications satellites, two weather-watchers for the National Oceanic and Atmospheric Administration, and two Navy navigational beacons.)

Once the shuttle becomes operational, NASA believes, the launch business will pick up again, and in fact it is supposed to be sort of a self-help operation, in that the more users take advantage of the shuttle's capability, the lower the launching costs to each user will become. On the day before Christmas, however, the shuttle acquired some competition.

On Dec. 24, the European Space Agency's Ariane rocket (SN: 10/13/79, p. 250) made its first flight, launched from its site about 18 kilometers from the town of Kourou in Guiana. The successful flight inaugurated a line of vehicles which, while not reusable boosters like the U.S. shuttle, are expected to engage in a significant amount of launch business on their own — at least a portion of it at NASA's expense.

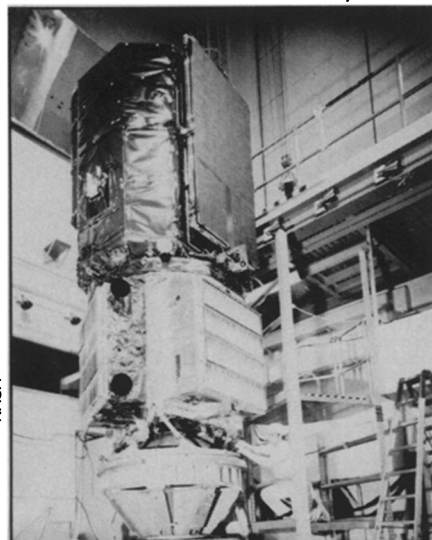
This year, for example, NASA plans to launch several Intelsat V satellites for the International Telecommunications Satellite Consortium. For 1981, however, the

1980 NASA Schedule		
Date	Mission	Description
Jan. 17	FELSATCOM	communications (DOD)
Feb.	Solar	
	Maximum	
	Mission	solar studies
Feb.	Intelsat V-A	communications (Intelsat)
Apr.	NOAA-B	weather and environment (NOAA)
May	Intelsat V-B	communications (Intelsat)
July	Transit	navigation (USN)
Aug.	GOES-B	weather and environment (NOAA)
Aug.	Intelsat V-C	communications (Intelsat)
Oct.	Transit	navigation (USN)
Nov. 12	Voyager I	Saturn encounter (launched 9/1/77)

consortium has made a firm commitment to fly at least one Intelsat V on Ariane, and it holds an option with ESA for a second. (The Intelsats, as the chart shows, account for one in three of NASA's projected 1980 launches.) Ariane rockets will carry a variety of European payloads, of course, some of which would probably have been launched by NASA, and the second Ariane flight, due in March, will even carry an amateur-radio satellite called OSCAR 9, whose eight predecessors were all launched (though without charge) by U.S. boosters. Indonesia holds an option for Ariane to launch two of its Palapa communications satellites, the first two of which were flown by NASA, and ESA is getting business from other sources as well: The third Ariane flight, now aimed for August or September, will carry a satellite for India, whose initial entry was launched by the Soviet Union. Other options on Ariane are reserving slots in 1982 and 1983 for Arabsats 1 and 2, communications satellites marking the Middle East's maiden forays into space. (Last week's Ariane carried only an instrumented test probe called CAT — *Capsule Ariane Technologique*.)

This is not to say the U.S. shuttle will find itself flying with an empty cargo bay. With its first orbital trip still an uncertain

NASA's Solar Maximum Mission spacecraft.



number of months away (NASA gives September a 50-50 chance, though additional setbacks could push the launch into 1981), customers are already signed up through the 39th flight. The Air Force (which has significantly influenced the shuttle's design and operations) has ambitious plans to use it, including construction of its own complete control center, far from the NASA facility at Johnson Space Center in Houston, for classified missions.

President Jimmy Carter has also added his backing, which is taken to mean influence on behalf of the substantial extra funding necessitated by the shuttle's numerous delays. "In light of the technical and resource problems we have been experiencing," wrote NASA administrator Robert Frosch in a Nov. 30 letter to agency employees, "that confidence is extraordinarily welcome. NASA must live up to its promise: we have much left to prove to ourselves and the world." □

Passing the climate buck

Modern humans may have hiked global temperatures with carbon dioxide, blitzed the ozone with fluorocarbons and staved off or invited in an ice age, depending on whom you talk to. But compared with the drastic, if somewhat primitive, environmental abusiveness of our ancestors, we're dishing out peanuts.

"It is possible that significant climatic changes may have been anthropogenically induced as early as [one million] years ago," say Cornell University's Carl Sagan and Owen B. Toon and James B. Pollack of NASA-Ames Research Center in Moffett Field, Calif. "In contrast to the prevailing view that only modern humans are able to alter the climate, we believe it is more likely that the human species has made a substantial and continuing impact on climate since the invention of fire."

The researchers base their conclusions, reported in the Dec. 21 SCIENCE, on humans' ability — and apparent proclivity — to alter the nearby earth's surface. With no environmentalists to bolster a social conscience, pre-agricultural people set fires to clear brush, to make hunting easier, to improve pastures and to wage war. Agricultural people destroyed forests to expand farming and grazing land. Technological humans carry on the legacy in urbanization, expansion of farmland, production of raw materials and generation of energy. But be comforted. Our means may be different, but the ends are no worse: "The most significant difference between human impact on the environment in the