Seeking extraterrestrial life

NASA is not quite alone

Boston

HAVING weathered a Golden Fleece award and, last year, a cut-off of funds, the National Aeronautics and Space Administration (NASA)'s Search for Extraterrestrial Intelligence (SETI) programme is back on its feet. This spring, the centrepiece of the programme — a multichannel analyser to scan 74,000 radio channels simultaneously for evidence of non-natural signals — will go on-line. And, confident that funding will continue, NASA has a five-year research and development plan that will eventually expand that capability to eight million channels.

The programme's recent financial troubles had seemed likely to kill SETI once and for all. Senator William Proxmire (who, in 1977, had awarded SETI one of his Golden Fleece prizes for projects that represent the biggest wastes of taxpayers' money) succeeded in attaching an amendment to NASA's appropriation for fiscal year 1982 forbidding the agency to spend any of its funds on SETI. NASA spent a year shutting the programme down, only to have it revived this year after a visit from Carl Sagan apparently persuaded the senator to mute his objections. NASA will spend $1.5 million on SETI this year.

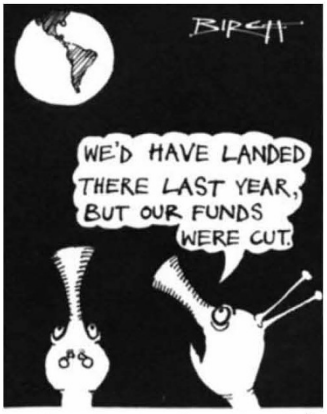
Criticism from within the astronomical community, however, persists. The latest row was set off by a letter by Dr Frank Tipler of Tulane University that appeared in *Science* last week. Tipler takes Carl Sagan to task for having argued that the SETI radio search will have "profound implications for our view of the Universe and ourselves", whether the results are positive or negative. Tipler says that "a negative result would probably not convince supporters of SETI that extraterrestrial civilizations do not exist. They could simply argue that advanced civilizations generally abandon inefficient radio transmitters like ours after a short time . . . SETI will only become a science when its proponents tell us what observations will convince them that it is reasonable to assume we are alone".

Tipler's criticisms did not impress SETI proponents attending the American Astronomical Society meeting in Boston last week. Dr Jill Tarter of the University of California, Berkeley said, "Tipler's arguments never did have validity"; Dr Frank Drake of Cornell University called them "a lot of baloney". In fact, Drake said, "there's no way ever to prove the negative" in any scientific experiment.

SETI supporters also pointed to the National Academy of Sciences study last spring on priorities in astronomical research (the Field committee report) which endorsed a modest SETI effort and to the establishment of a committee on extraterrestrial life by the generally staid International Astronomical Union (IAU) as evidence that they have the astronomical community behind them. Drake said that he has been "deluged with requests" from IAU members seeking to join the committee since its establishment last August.

Nonetheless, the underlying question in Tipler's recent criticism may have hit a raw nerve. SETI proponents seem painfully aware of the limitations inherent in the current research plan. Even with the full eight-million-channel real-time capacity, the analyser will cover a spectrum of only 8 MHz at one time. Each channel is 1 Hz wide in order to screen out natural astronomical phenomena, which have bandwidths of at least 1 kHZ.

But even the constraints imposed by natural noise (which interferes with signals at wavelengths longer than 10 m or so) and by thermal radiation (which interferes at



wavelengths shorter than 5 cm) leave a useful listening band 1,000 times broader than the 8 MHz capability of the analyser.

Similarly, limiting candidate stars to those nearby and those similar to our Sun leaves tens of thousands to be studied.

Thus it will always be easy to argue that the lack of a positive result is due to having looked in the wrong place — and thus easy to continue on what may in fact be a wild-goose chase. Tarter maintained that "it would be hard in a single lifetime to amass a statistically significant negative result".

Another difficulty that SETI may face is some foot-dragging, even on the part of enthusiasts — particularly enthusiasts who happen to be observatory directors. As Dr Stuart Bowley of University of California, Berkeley — a SETI researcher — said, "the intrinsic problem is that you must take over a radio telescope to conduct the search", taking away limited observation time for a project that, as Bowley readily admits, has an exceedingly small chance of success.

And for all the claims that SETI has achieved respectability within the astronomical community, the general scientific community remains sceptical. The National Science Foundation has no official policy on SETI research, but refers enquiries to the NASA programme.

Stephen Budiansky

NASA astrophysics budget

Hope springs eternal

Boston

DESPITE a flurry of last-minute budget revisions ordered by President Reagan to bring down a federal deficit projected to exceed $200,000 million, officials of the National Aeronautics and Space Administration (NASA) and other members of the astronomy community remain confident that they will fare well under the 1984 budget, due to be released on 31 January.

"I still believe that they will stand up and support the good, solid projects", Frank Martin, director of NASA's astrophysics division, said here at the American Astronomical Society meeting. Martin suggested that much of the credit for the favourable reception that astronomy is receiving at the White House belongs to the Field committee report, issued last spring, which ranked by priority various astronomical projects (see *Nature* **296**, 482; 1982). It is widely viewed as reflecting the consensus of the astronomy community, and represents the sort of priority-ranking that White House science adviser George Keyworth has been urging all disciplines to establish. "If you can get the community to agree on what to do, it's a very powerful statement", Martin said.

NASA will reportedly get the go-ahead for two major projects in the 1984 budget: the Very-Long Baseline (VLB) array and the Venus radar mapper. The VLB array, to consist of 10 radio telescopes, would permit an angular resolution of 0.3 milliseconds of arc, a hundred-fold improvement over current observational limits. The Field committee had recommended spending $50 million on the project over the decade.

The Venus radar mapper is the scaled-down version of the VOIR (Venus Orbiting Imaging Radar), born of NASA's realization that the only hope for approval of the mission was in cutting its $600 million cost. The Venus radar mapper will cost exactly one-half of that; it will also provide a 1-km resolution of Venus's surface, ten times degraded from the original specifications. In almost any form, though, approval of the mission would provide a much needed shot in the arm for the planetary exploration programme, whose last new project was the Galileo mission to Halley's comet.

NASA is meanwhile proceeding swiftly on the space telescope and the gamma-ray observatory and on plans for the project ranked first by the Field committee, the advanced X-Ray Astrophysical Facility (AXAF). AXAF will provide a sensitivity 100 times greater than that of the Einstein observatory (which "died" in orbit in 1981) and an on-axis resolution eight times greater. It will also fill a 10-year gap (by the