

US space research

Crying for the Moon

Washington

"THERE'S a feeling that the Moon is going to rise up and bite somebody in the next ten years." This is how one lunar scientist mixed his metaphors in his excitement over the prospects of man's return to the Moon, the subject of the National Aeronautics and Space Administration (NASA)'s fourteenth Lunar and Planetary Science Conference in Houston in mid-March.

Lunar scientists have felt themselves overlooked while other planetary scientists have revelled in the space probe results of recent years. So for two days (while the White House's science office, which has quashed other NASA notions of new space initiatives, was offering a discreet "no comment" to the press) lunar scientists in Houston discussed their possible "giant foothold for mankind", which would come first in the form of modest probes and lead to Moon-based factories fuelling future space transportation systems.

Their argument was that lunar bases and resources may well be useful if the United States, in 20 years or so, decides on a major presence in space. So NASA needs to start building a data base now, by modest efforts such as a polar orbiting lunar satellite to determine whether the polar craters contain ice. If there is water on the Moon, future space missions may be redesigned.

But in their enthusiasm, the lunar scientists almost upstaged another presentation of far more immediate importance to US planetary science. At the meeting, the official Solar System Exploration Committee (SSEC) presented its plan for a low-budget programme of planetary exploration between now and the year 2000 (see below). Among the fourteen initiatives the SSEC has proposed, four have been deemed most urgent. The remaining ten — whose fate is unclear — include the two Moon-related probes.

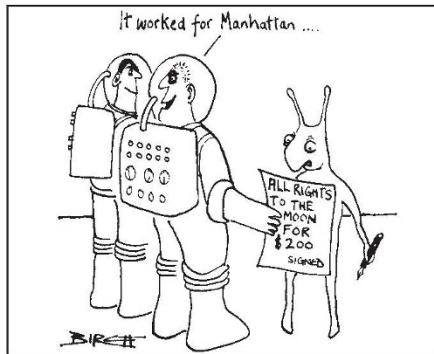
The chairman of SSEC, David Morrison, says he found the ideas for a return to the Moon, both for unmanned probes and manned habitation, "interesting" and "exciting". But a cautionary note was expressed by Philip Chandler of the Office of Technology Assessment of Congress, who was project director for that body's recent report on the poor state of planetary science. Chandler warned that the public was not about to pay the bill for major new US space spectacles and that NASA should think about putting its total programme on a cost-benefit basis. Unless a return to the Moon showed some sign of economic utility, he warned, it would never be approved.

The lunar scientists explained that in 10 or 20 years the United States may wish to mount another large, manned space effort, either for scientific reasons, for interplanetary travel or because of the Soviet

ambitions in space.

"Our original purpose", says W.W. Mendel of NASA's Earth and planetary science group at the Johnson Space Center, "was to make the Office of Space Flight [of NASA] more aware of lunar exploration so they would consider it in their planning". There were also hopes that as part of the follow-on to the shuttle, namely the proposed Space Station and Space Transportation System that would shuttle between the orbiting station and satellites in geosynchronous orbit, a lunar initiative might be added. Lunar enthusiasts also argue that NASA may make decisions, about the fuels for future spacecraft (which could come from the Moon, they argue) or the orbit of the space station, which could rule out a later return to the Moon.

The lunar enthusiasts' near-term programme is modest and many other people seem to think it worthwhile. The first aim is to get the lunar polar orbiter satellite funded, so that the poles, possibly the most useful part of the Moon, can be probed. NASA should also spend about \$1 million per year in Earth-bound studies of possible lunar resources. Finally, there should be a central office to disseminate the information so that it could be taken into account in the main engineering and



scientific programmes.

The more ambitious part of the proposed programme — such as landing men on the Moon again to determine the feasibility of extracting oxygen fuels from lunar materials — is more expensive. But, the lunar enthusiasts argued, such information may be needed for the space transportation system of the future. Even Hans Mark, the NASA associate administrator who gave a keynote address at the meeting, seemed to agree. He argued that man would return to the Moon once "enabling technology" is developed — just as man returned to Antarctica with the development of the airplane as a tool for Antarctic exploration. "I will do whatever I can to speed the day when people will once again put human footprints on the Moon", Mark said in his prepared text.

Deborah Shapley

Ambitious plans for the Solar System

Washington

THE SOLAR SYSTEM EXPLORATION COMMITTEE (SSEC) presented in Houston its plan for a "core programme" of planetary exploration that it says could be bought for approximately \$300 million per year. This would be half again as much as planetary science's present \$200 million per year — but still a small sum compared with its levels of nearly \$1,000 million in years past. The SSEC plan has met with a favourable response by the White House science office, by some members of Congress and at NASA, according to David Morrison of the Institute for Astronomy of the University of Hawaii, SSEC's chairman. Since SSEC represents many parts of the planetary science community and was formed in 1980 to even out the ups and downs in the programme, its views are likely to be influential.

The core programme would use less state-of-the-art technology and rely on the Mariner Mark II spacecraft adapted for different missions and on modified commercial Earth-orbiting satellites which the SSEC proposes to call the "Observer" class. There are 14 proposals for the next 15 years, of which four get priority.

- **Venus Radar Mapper**, scheduled for launch in 1988. The committee's early briefings may have caused the Administration to include it in the budget for fiscal

year 1984 (see *Nature* 3 February, p.361).

- **Mars geoscience/climatology polar orbiter**, to study the climate and map the surface of Mars with infrared, gamma and X-rays.
- **Rendezvous with a short-period comet** in 1990 using the Mariner spacecraft, which would fly alongside it past the Sun.
- **Titan probe** to examine the saturnian moon's atmosphere and the possibility of organic processes.

Among the other ten proposals are the polar orbiting lunar satellite (see above), probes to the atmospheres of Saturn and Uranus and a visit to four asteroids.

The \$150 million per year Mariner programme would lend stability and efficiency to planetary science, by frequent launches of common spacecraft, according to Geoffrey A. Briggs, executive director of SSEC.

SSEC is not limiting itself to scientific rationales for exploring the Solar System, according to Briggs. With NASA's blessing, the committee will take another year to study both higher cost, higher profile planetary missions like the Viking programme and the potential for study of resources in near-Earth orbit. And as a concession to the views of the lunar enthusiasts, SSEC recently added a strong advocate of lunar exploration, Larry A. Haskin of Washington University in St Louis.

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