trigger off earthquakes or tsunamis. The furore was nevertheless considerable, and not all of it was emotionally based or stirred up by professional peaceniks. Senator Fulbright's Foreign Relations Committee, which met urgently four days before the scheduled explosion, must have had much food for thought. The Canadian and Japanese governments both notified their concern, and it was difficult to find a practising seismologist who did not think that detonating a large explosion in a known earthquake belt was ill-advised.

In 1965 the AEC fired the 80 kiloton "Longshot" in the same spot with relatively little dissent. In 1969, however, there is more concern about tampering with the environment, and the AEC is visibly off balance in its Nevada operations, its Plowshare projects—the ill-fated Australian harbour as well as Project Rulison in Colorado—and now its Aleutians ventures. It is true that "Mihow" was unlikely to have triggered off a major earthquake or tsunami, but those who have been most closely associated with

finding the causes and characteristics of earthquakes seem to have regarded the opening of the Aleutians test site as an unwarranted taking of chances to which they would not wish to be party.

Where does the balance lie? Earthquakes in their hundreds have been triggered off in Nevada, a mild earthquake belt, by megaton tests (see *Nature*, **223**, 773; 1969). Smaller earthquakes they may be, but there is no law of nature to decree that aftershocks must be smaller than the first, especially in an active region. And experience emerging from recent megaton tests in Nevada shows local effects which vary grossly from one test to the next. Prediction of seismic effects is no simple business. The AEC should not be lulled by one trouble-free test into thinking Amchitka is demonstrably perfectly safe. The commission has had a remarkably good safety record since going underground—one of which it can be justifiably proud. Many people believe it is taking risks that are impossible to calculate in the Aleutians.

New Institute Mooted

from our Astronomy Correspondent

SCIENCE has fashions like everything else. They are not capriciously based, but arise when a new technique—experimental or theoretical—opens up fresh fields to study. Examples are easy to find. The way radio astronomy flourished in the late forties, after wartime progress in radio, is one case. Another is the stimulus which X-ray diffraction gave to biology at the molecular level. Fashions end when further progress is stymied by an apparently insurmountable block. Some pessimists think particle physics is reaching this stage. Part of the skill in handling funds earmarked for science is to know what future trends are going to be, not for the sake of being fashionable but to channel the money to where the rewards are likely to be greatest.

Undoubtedly, planetary science, which deals with the satellites and planets of the solar system (but which in general excludes the Earth), is ready for expansion. A decade ago, most of what was known in planetary science came from optical telescopes and the subject was flagging. Knowledge of a satellite or planet was proportional to some power of its apparent diameter. Little enough was understood about the Moon at half a degree across, but Mars subtends at most twenty-five seconds. Venus can be up to sixty seconds across, but is perpetually cloudy, and even in the largest telescopes, Pluto is never much more than a point source of reflected light. Ten years of American and Russian space research have added vastly to what is known from Venus out to Mars. Although there have been complaints from the National Academy of Sciences in the United States that the unmanned exploration of the planets is not as ambitious as it ought to be, there are plans in the United States to send two probes to Jupiter in 1972 and 1973, for a probe to visit Mercury and for further exploration of Venus and Mars including

a soft-landing of instruments on Mars in 1973 (the Viking project).

This is why the call to set up more schools of planetary science, which comes from people such as Dr G. P. Kuiper in the United States and Professor S. K. Runcorn and Dr G. Fielder in Britain, deserves attention. Of course, there are already excellent planetary science institutes in the United States, but much of their effort is connected with the Apollo programme—the mapping of suitable landing sites on the Moon and so on. The way the cameras on the Lunar Orbiter series of spacecraft were trained on a narrow band of possible landing sites near the lunar equator for most of the time, to the exclusion of more interesting parts of the Moon, is a case in point. It is reasonable to expect that a similar bias is going to creep into the analysis of data from the Mars probes. Clearly there is going to be a need for institutes to ponder over the flood of information which is beginning to come in. It would be a shame if the expensive fruits of space exploration met with the delays in publication which are familiar to the followers of some oceanography expeditions. Moreover, there is unlikely to be a shortage of questions. What is the explanation of the high titanium content of the lunar soil, for example? And the interpretation of the glassy patches which are found on clumps of soil within small craters and nowhere else is not likely to rest with Professor T. Gold's explanation in terms of a nova-like outburst from the Sun which caused selective melting in the craters.

Dr Fielder of University College, London, believes that there is a need for a school of planetary science in Britain, and that a sufficient flow of data would come Britain's way from the United States, from institutes

already overloaded with information, to make the effort more than worthwhile. Indeed, it is said that there are enough photographs of the Moon and Mars supplied by the United States to the group at University College, London, to provide a lifetime of geological mapping. What Dr Fielder would like to see is a school with a complement of experts in solar system astronomy, planetary meteorology, geology, geomorphology and geophysics. It would be a teaching as well as a research institute. There would be outside consultants to answer specialized questions, and the school would serve to integrate the work of outside groups doing analysis of planetary samples. The bulk of the analysis of the Apollo 11 samples, for example, is by scientists who have had little contact with lunar studies. Dr Fielder seems to have approached the Science Research Council essentially for moral support, the setting up of a school of studies being more a matter for the

University Grants Committee. But there is no doubt that the time is ripe for a better organization of the planetary sciences in Britain. The problem is to find a sponsor. The school need not be expensive as scientific projects go. It ought to be at a university where there are already specialized departments and ready-made teaching facilities, and Dr Fielder estimates that space equivalent to about twenty moderately sized offices is what would be needed. The present location of Dr Fielder's group at the University of London Observatory at Mill Hill is too hemmed in to contemplate expansion, and too specialized to be the basis of what is envisaged. It is also a fact that the generous support which radio and optical astronomy already receive in Britain will make it difficult to find funds. One possibility is to seek money from an independent source such as the foundations. All the same, a planetary science institute in Britain is long overdue.

Harvard's Self-improvement

IT is difficult to see much reform of substance in Harvard University's new Committee on Governance. The intention behind the establishment of the committee, drawn from all the groups which comprise the university, is to produce a design for a new structure for governing Harvard. Yet the committee is the brainchild only of Harvard's small and powerful Board of Overseers. Its composition has been laid down by Harvard's president, Mr N. Pusey. It will consist of representatives of each of Harvard's nine faculties; the largest of these will send five delegates—two from the teaching staff and three students. There will be one Harvard undergraduate, one Radcliffe undergraduate and one postgraduate student. The other faculties will each send two teachers and one student. Sitting with them as they seek consensus will be a representative of the alumni, a trustee of Radcliffe, a Fellow (a lesser grandee of university government) and not one but two overseers (there are only five altogether).

The overseers found that the students' faith in the university had been shaken by the frequent absence of senior professors and the narrow, abstract and technical manner in which the teachers express their intellectual concerns. They also found that the rapid expansion of the university had created such an enormous burden of administration that the president alone could not cope with it, and needed a bigger and stronger administrative structure to help him. (This is a polite way to criticize Mr Pusey, although the overseers did

not go so far as the president of Yale, Mr Kingman Brewster, the other day, and suggest that university presidents, like football coaches, be given contracts with limited tenure.) And while some reform of Harvard's central governing institutions may be necessary, the overseers conclude that nothing will quickly restore the 'high sense of mutual trust and confidence that formerly prevailed at Harvard'. What must happen—and no committee can bring it about—is that teachers must re-dedicate themselves to their primary task—teaching, and students to theirs—learning.

Yet how far should Harvard go to change itself in response to a student unrest which, the report admits, is—or was—world-wide? Some of its programmes already seem to be the very pinnacle of enlightenment. The programme for the freshman, for example, brings together first-rate teachers with small groups of seventeen and eighteen year olds. For several months, they dig into a problem of particular personal interest to the teacher. There are no examinations, no grades, but a great deal of research and discussion. Students entering Harvard and Radcliffe can choose to apply for one of forty-six seminars in topics ranging from the deformation of materials to the archaeology of the North American Indians. The programme was designed several years ago to intensify the intellectual experience of the first year. It all seems a far cry from what is supposed to incite students to riot—the hangar-sized lecture hall with a tiny figure droning lecture notes into a microphone.

Educational TV for India

SPACE officials tend to be carried away when they describe how money poured into what are called applications satellites is going to produce a better

world for everyone; and they mean everyone, not just the inhabitants of technologically advanced countries. But these ornate words hide a host of doubts