

from an agency at Strasbourg (the BCIS). Surely, it was argued, computers would speed up operations so that the last word would be only two years at most after the event. These hopes have not been realized. The last *Bulletin*, published six months ago, was for March 1965. In the first three years of publication, the clock has slipped back more than a year and a half. Now, of course, the money-givers (predominantly the US National Science Foundation and the Royal Society) are bound to want to know about the future. Less money could bring the ISC to a grinding halt, but will funding even at the present level help ISC to keep reasonably abreast? An attempt has been made to put the bulletins on a commercial basis by charging for them, but many complimentary copies have to be distributed and other users may feel that they cannot afford a *Bulletin* which is published at irregular intervals.

The root cause of the trouble, however, is probably the remarkable achievement of the US Coast and Geodetic Survey in the publication of *Preliminary Determination of Epicenter* cards within a month or so of the occurrence of an event. These cards are widely circulated free of charge and the supporting material can be obtained on request. The service, started in the early 1960s, now has two hundred contributing stations (the vast majority also reporting to ISC) and no praise can be too high for it. The recent publication of global seismicity maps based on these data for the past eight years (something neither the ISS nor the ISC seems to have bothered to do), the regular annual seismicity maps and assorted literature which comes with the cards (the latest, a splendid layman's glossy account of what earthquakes are and how to avoid earthquake damage, 30c to the public, free to the card users) all commend the operation widely to the geophysical community. The inevitable question for the ISC Committee is whether the Edinburgh effort will continue to be justified.

The answer may well be no. What do geophysicists want from bulletins? First, they want a clear picture of global seismicity, which they now have. Second, they may want a more local picture of certain areas. This they cannot get unless the area is densely populated with seismic stations, and most of these areas have been fully studied. If any other region is coming under scrutiny, there are several laboratories round the world with portable equipment which are steadily covering the Earth's surface in micro-earthquake studies. Third, they may want to study the quirks that are likely to be the ingredients of the next few years of geophysical research—the stations that do not fit the pattern well, the earthquakes that are not recorded in some azimuths but are in others, the persistent mislocations of known events. It is quite possible that the ISS and its successor have, or will have within a year or two, recorded everything that bulletin searching will ever turn up.

So what? Do we dismantle the ties that have been built up over the years? Do we write to eight hundred stations and tell them their services are no longer

needed? Do seismologists want nothing more from international cooperation? The answer is, of course, that it would be nonsense to jettison all the goodwill because only some needs are satisfied within the present framework. ISC should be serving the geophysical community by changing its principal wares as demand changes, and one commodity for which the demand is bound to increase is seismic records themselves. At present, the ISC deals in times and operators' decisions, but many of the quirks can only be fully studied by analysis of the total seismic record, and this analysis can only be performed by one person looking at many seismograms. It can be argued with some justice that the excellent system by which the hundred or so World-Wide Standard Stations installed by the United States in 1962–64 send in their recordings regularly for copying and subsequent cheap distribution is adequate. Certainly one major advance—the reliable determination of earthquake mechanisms—has sprung from just this. But the coverage of this network is, as its supporters would readily admit, not always adequate, nor is the instrumentation necessarily the most suitable for every environment. It cannot be argued that if ISC could produce a library eight times as big, it would be eight times as useful. Some of the contributing stations are very poorly sited and badly instrumented, but if they were made part of a global data exchange system they might well do something to improve their siting and instrumentation—or ISC could help them. One of the obvious attractions is that the high quality Soviet and Chinese networks already report to the ISC and might well be prepared to consider sending records. But this is an incursion into the political arena, with nuclear test detection and its ramifications. The Soviet Union reports none of its own nuclear tests and claims it is capable of identifying American tests satisfactorily. Since nobody believes either that the Soviet Union does not test regularly or is as good as it makes out in monitoring American tests, there seems little point in withholding data.

If ISC were to assume this major new role as keeper of the records, distributor of them on request and perhaps aiding seismic stations in increasing their usefulness, a lot of money will be needed as capital outlay. Photographic reproduction in a standard format would probably mean several hundred give-away cameras. Adequate servicing of the archives, and provision of advice and maybe even new equipment, is not going to be cheap. However, unless someone heeds the seismologist's requirements, the ISC could easily capsize. Here is a golden opportunity to add a high class data service to the high quality arrays that the United Kingdom now has.

POLLUTION

Pesticides and the Rhine

THE Danish Government's ban on DDT, announced last week, and the pollution of the Rhine on June 24 by a chemical unknown at the time *Nature* went to press—there was speculation of an organophosphorus

insecticide—are likely to add new impetus to the various campaigns against pollution of the environment. DDT and the other organochlorine pesticides are plainly in the front line. In March, Sweden declared a two year moratorium on the use of DDT, aldrin and dieldrin, to start from 1970, and the states of Arizona and Michigan followed suit by banning DDT. Bills have been introduced in the Senate to ban DDT throughout the United States.

In Britain the use of DDT is under review by the Advisory Committee on Pesticides and Other Toxic Chemicals. The committee's predecessor recommended in 1964 that no restrictions should be placed on the uses of DDT then current, but that this decision should be reviewed at the end of three years, a step that is now more than two years overdue. DDT residues in human tissue have averaged two to three parts per million over the past few years, compared with twelve parts per million in the United States, where for a long time DDT was used indiscriminately. These levels are not toxic, as far as is known, and it is in fact remarkable that the 1.5 million tons of DDT applied throughout the world in the past 25 years have caused no known human death except in cases of improper use.

The campaign against DDT has rested more on what it may do than on any particular damage that can be laid at its door. The persistence of DDT residues, their ability to creep up extended food chains, to accumulate in the fauna of the Antarctic thousands of miles away from the chief sites of application and to reduce photosynthesis by phytoplankton, are all matters to make ecologists sleep uneasily. It says much for the changed climate of opinion that concern about issues of this kind has reached a wider public and with sufficient impact to bring about legislation.

If the Advisory Committee on Pesticides were to decide solely on the scientific evidence available, it would doubtless follow Sweden and Denmark in declaring a trial ban on DDT and possibly further restrictions on some of the other organochlorines. (Certain uses of aldrin, dieldrin and heptachlor were curtailed in 1964.) But the cost of such action would be considerable, although far less for Britain than for countries with hot summers and flourishing pest populations. It has been calculated that a total ban on DDT, aldrin, dieldrin and heptachlor would add £1 million to the annual pesticide bill of British farmers.

SPACE RESEARCH

ESRO makes Plans

THE Scientific and Technical Committee of ESRO, at its meeting in Frascati last week, seems to have provided the managers with a straightforward account of the immediate future. By all accounts, the committee has recommended that ESRO should go ahead with two projects—a cosmic ray satellite launched into a polar orbit and a geostationary satellite designed to study solar-terrestrial relationships. The committee also said that it would like to hear more of the ambitious scheme to launch an ultraviolet astronomical satellite, although it is not expected that this will be possible until later in the year or even in 1970.

The particular decisions which have been made at Frascati—altogether there were six satellites to choose from—are less important than the spirit in which the

decisions seem to have been arrived at. At the end of the Frascati meeting, nine of the ten governments represented voted in favour of the decision. Only the Belgian representative abstained. All this augurs well for the meeting of the Council of ESRO next week in Paris when the approval of the member governments will be sought for the commitment of the necessary funds. As things are, ESRO is already assured of the funds needed to support the two new satellites between now and 1971, but it would at some stage be necessary for the council to supply the money needed to complete the project by 1974 or even 1975.

The experiments for the cosmic ray satellite will travel in a highly eccentric orbit reaching out to a hundred thousand kilometres and with a period of roughly a day and a half. Experiments will be contributed by groups from the Universities of Southampton, Leiden and Milan and by the laboratories at Saclay and Garston. This and the geostationary satellite would serve as vehicles for carrying experiments developed with national funds. The proposal for an ultraviolet satellite is more complicated, chiefly because this would have to be used in much the way in which large telescopes are used, with would-be observers allotted time in rotation. By all accounts, the resolution passed last week at Frascati suggests that here too the proposal should be worked up in such a way as to allow a consortium of laboratories to design and share the device.

No doubt the Council of ESRO will be most of all heartened by the way in which it seems that technical priorities have been established in an orderly fashion, but there is no likelihood that next week's meeting will throw much light on the continuing future of ESRO and of ELDO. The working party of officials of the European governments to devise a joint programme for ELDO and ESRO seems to have made good progress on matters such as aircraft navigation systems, but has, to the surprise of some observers, run into difficulties with its scheme for the development of telecommunications satellites. The immediate problem seems to be the similarity between a programme which makes sense for Europe as a whole and what the French Government is already embarked on. It remains to be seen just how this conflict is resolved, but everybody seems cheerful that something will be known by the autumn.

ELDO

Plain Sailing?

WITH any luck, the Europa I rocket, with all three stages fully operational, will launch a test satellite into orbit on June 30. This will be the ninth development flight of the rocket and the first since the European Space Vehicle Launcher Development Organization was forced severely to curtail its programme to survive the British Government's reduced commitment. Speaking in London on Tuesday, Sr H. E. Renzo di Carrobbio, the director-general of ELDO, said that, with the April decisions (*Nature*, 222, 311; 1969) behind it, the organization now had its feet firmly on the ground. He looked forward to the development of the third generation rocket Europa III and to the start of a production programme for Europa launchers.

In all the previous test flights of the Europa I, the first stage, a Blue Streak rocket, has fired successfully.