

magnetic storms, but perhaps the most practical application of solar data is expected to be an improvement in the ability to predict or control certain aspects of our terrestrial environment. US weather statistics have already found correlations between solar disturbances and the frequency and intensity of Earth storms, and some theories suggest that climate, earthquake activity and even life pattern and growth rates are directly related to solar activity.

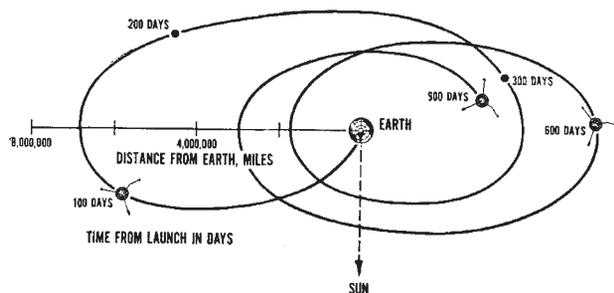


Fig. 1. Pioneer 10 positions relative to Earth for first 2.5 years of mission.

The Pioneer programme has already provided information with immediate practical application. During the Apollo landings, hourly reports on solar activity were sent to Houston to guard against any unexpected arrival of intense showers of protons, and this type of monitoring will become more important as supersonic aircraft fly on the fringes of space. And a geomagnetic storm, forecast six days in advance from solar disturbances picked up by Pioneer spacecraft, took place within three hours of the predicted time.

This mission does not, of course, possess the glamour of manned flights, but it could be just as valuable in terms of results which have immediate application on Earth. The Pioneer programme, if it leads to a clearer understanding of the links between solar activity and the climate on Earth, will strengthen the case for concentrating on unmanned explorations, rather than repetitions of the lunar stakes.

RESEARCH

Who Does What Where?

THE Department of Education and Science and the British Council have again published their annual three volume guide—*Scientific Research in British Universities and Colleges, 1968–69* (HMSO, Vol. 1: Physical Sciences, £3 5s; Vol. 2: Biological Sciences, £3 2s 6d; and Vol. 3: Social Sciences, £3). In spite of its usefulness, the guide is as usual marred by minor irritations and inconsistencies—the fact that some of the entries are out of date, and the infuriating practice in a few cases of lumping all research projects together under the head of a department instead of crediting the individual members of the department. These inconsistencies are perhaps inevitable in a series which has to rely on the cooperation of individual institutions, but the editors could surely smooth out a few of the irregularities. On the grounds of cost, the subject index cannot be expected to be fully comprehensive, but some categories are defined precisely and others much more broadly. One lapse which has persisted from the

previous year is the absence of an index entry for anti-lymphocytic serum which is currently the subject of so much exciting research. ALS cannot be traced under either antibodies or lymphocytes but only under serum (where seven projects are indexed).

In spite of criticisms, however, the guide is invaluable, and it must be wished that there were a similar comprehensive guide to research in progress in Government departments and research institutes. Social scientists are better served in this respect than biological or physical scientists, because the compilers of the social sciences volume in this series, helped by the Social Science Research Council, have continued their useful practice of including some of these and other institutions. It also includes research projects of PhD students. This volume has nearly 100 pages more than the last edition—it includes about 30 more institutions—and with some justification the publishers have increased its price by £1. The first two volumes have also increased their coverage by including more of the designated polytechnics such as the Leeds College of Commerce, the John Dalton College of Technology in Manchester, and the Oxford College of Technology, but with only 52 (Vol. 1) and 39 (Vol. 2) more pages there is less justification for a 30 per cent increase in price.

BRAIN DRAIN

Doctors Departing

A SURVEY of the present whereabouts of medical graduates of Aberdeen University who received their degrees in 1956–58, which was published in last week's *Lancet* (ii, 427; 1969), has once again drawn attention to the large losses of medical graduates. A third of the 186 graduates included in the survey are no longer working in British medicine. Forty-nine of the graduates are now living permanently overseas; thirty-eight of these are emigrant Britons and eleven are people from other countries who were trained at Aberdeen and have since returned to their homelands. Of the emigrants the largest group chose Canada (13), followed by Australia (8) and the United States (6), and only three graduates emigrated and then returned. Eighteen of the emigrants had received some sort of postgraduate qualification before emigrating.

The reasons for emigration given by the twenty-one emigrants who completed questionnaires are all familiar; the GPs reported their frustration with the National Health Service, in particular the size of the executive council lists, the unlimited demands of patients and the lack of access to hospitals. Those who had been in hospital practice described the usual grievances of lack of prospects for promotion, the rigid career structure and the low wages. Emigration has provided not only better facilities and more satisfying work but also more pocket money. Family considerations tinged with a sentimental attachment to Britain kept forty-nine of seventy-five men who had considered emigrating from doing so.

Of the fifty women in the survey, thirty-three who were living in Britain replied. Only four were in full-time medical employment, nine had regular part-time employment, four took occasional jobs and eight had nothing to do with medicine. The married women, of course, hope to return to medicine when their children

are off their hands but the lack of financial incentives does nothing to encourage an early return if only part time. Single women, on the other hand, had advanced as far in their profession as their male contemporaries.

Assuming the Aberdeen medical graduate is representative, the survey suggests the profession and the Government should aim to provide an attractive career rather than to increase the output of doctors.

ENGINEERING

NEL needs Customers

As the National Engineering Laboratory knows only too well, its initials are nowhere near as familiar as, for example, those of the NPL. But the NEL is now looking for customers and industrial collaborators and the glossy, free progress report which is an innovation this year is part of a publicity programme designed to make the NEL's facilities more widely known and used by industry. Tucked away in East Kilbride, in Scotland, perhaps the chief problem of the NEL is to break down the resistance of manufacturing firms to accepting help from a Government laboratory.

The latest report takes pains to emphasize the NEL's responsibility for solving problems of immediate importance to the community as a whole—for example, testing ropes, crane jibs and other machinery with which the public is in contact. But at a more sophisticated level the NEL is trying to ensure that computer programs for use in conjunction with machine tools are standardized and that individual machine tool manufacturers jointly develop the necessary software. One of the weaknesses of the current international standard language for automatically programming machine tools, known as APT, has its origin in the US aerospace industry. It is too sophisticated for most of the work it is used for in Britain and the NEL is looking for simpler alternatives. It has developed a national contour milling program, and drilling and turning programs are being assessed. Hopes that the German drilling program EXAPT might be used in Britain have not been realized and there are still a number of discrepancies.

NEL is hoping to expand its collaboration with a number of local companies in East Kilbride for computer aided design. The companies are cooperating with the NEL in building up a library of relevant programs and each has up to an hour's computing time a month on the laboratory's Univac 1108 computer. The NEL is particularly interested in equipment for the intermediate stages between design and machine tool control, such as Ferranti's drawing measuring machine which picks off positional data from existing drawings, and the reciprocal device, a drawing generating machine.

The NEL also has strong materials research groups currently concerned with testing components and structures in working conditions; it is becoming increasingly obvious that data on the materials themselves are not always sufficient to predict the properties of a machined component and extrapolation from tests of models or short term tests can often mislead. The high temperature division is tackling similar testing problems, trying to bridge the gap between simple static tests and tests in realistic conditions involving cyclic loading and temperature fluctuation.

Last year only £186,000 of the laboratory's total expenditure came from industry, with the Ministry of Technology footing the rest of the bill. The NEL's chief problem therefore is to persuade industry to help itself by using the laboratory's facilities to the full.

RUSSIAN METEOROLOGY

Byelorussian Automated Weather

A SERIES of automatic meteorological recording stations, at present under test in the Byelorussian SSR, will form the basis of the world's first fully automatic system for recording and processing meteorological information. The system will be run by the republic's Hydrometeorological Centre, which will be linked with the Hydromet Centre in the USSR and corresponding services throughout the world. Information from the Byelorussian network of automatic recording stations, together with data from weather satellites, will be processed automatically at the Hydromet Centre, where calculations will be made on variations in the current weather. Each recording station is equipped with a variety of sensors to record temperature, speed and direction of wind, rainfall, water-level in lakes and reservoirs and hours of sunshine and each is linked to the centre automatically by teleprinter.

The advantages of automatic recording stations are, of course, that they can give a better coverage of information throughout the day and night and they can be used in remote regions where it is difficult to man a normal station. It is claimed that this system in Byelorussia will greatly increase the capacity of the weather service and improve the accuracy of meteorological information there. The current thinking in other countries, however, is that although automatic stations provide a very useful supplement to normal methods of data collection some meteorological parameters cannot at present be obtained by fully automatic methods. For this reason, nobody has attempted to set up a complete system of automatic stations. The Meteorological Office has no such stations in operation at the moment, but there are plans for a small network which will include installations on the Lichfield TV mast and the GPO towers in London and Birmingham. But because of a shortage of money it is unlikely that these stations will be fully operational for at least two years.

GRASSLAND RESEARCH

Animals are Important

BOTANY is not the only interest of the staff of the Grassland Research Station near Maidenhead, as the latest annual report (price 15s) shows. The ecology division, which is concerned chiefly with the relationship between animals and the grass and other forage crops that they eat, has been investigating the efficiency of meat production by sheep. Mating three sizes of ewe—Devon Longwool (80 kg), Kerry Hill (60 kg) and Welsh Mountain (30 kg)—with Suffolk rams, the ecologists found that the size of ram relative to the size of ewe has a profound effect on the weight of lambs produced. The number of lambs that are born is also influential,