

framework of advanced technology, and set out three principles which technological cooperation in Europe should satisfy.

"(1) It would extend to the major subjects of advanced technology such as space, nuclear energy, data-processing and computers, aviation, transport and telecommunications; (2) it would be based on the establishment of industrial consortia which would be granted, on the one hand, the support of research and development contracts and, on the other, that of public orders coordinated among our governments; (3) it would ensure that each country has its fair share in the new jobs, flows of business and stimuli to progress which will result from joint action, this fair share applying to the programmes as a whole and not to each of them in particular, which assumes that our efforts should be established on a continuous and durable basis."

This thoroughly sensible and constructive approach got nowhere in spite of—or perhaps because of—a prompt British welcome. After a day and a half of mumbling, a resolution reintroducing the Lefèvre principles but linked with the specifically ELDO problem was re-introduced by the British delegate, Mr J. P. W. Mallalieu, Minister of State at the Ministry of Technology, but was voted against by France and Germany. A German resolution to do much the same but woollier in its terms was finally adopted with Britain and Australia abstaining.

The result is that there will be another committee of officials representing ELDO government ministers to draw up proposals for a European space programme. It is to take into account work already done, applications satellites for Europe, and available resources—and to report back by November 11. It looks like the Causse Report all over again except that the Causse inquiry drew strength from the ESRO countries as well as the ELDO countries. "The Causse Report minus", some officials were calling it. This seems to be one of the British Government's objections to the terms of the final resolution. It would like to have seen the inquiry opened up to all countries in Western Europe with an interest in space and in collaboration in advanced technology. The national appointments to the new committee (which is to meet in Brussels under a Belgian chairman) must be made by October 12. It is not quite clear yet whether Britain will send a nominee.

PLANETARY ASTRONOMY

The Stay-at-homes

Is it necessary to venture into space to study the planets or can they be observed more comfortably and at leisure by staying at home? The Panel on Planetary Astronomy of the United States National Academy of Sciences' Space Sciences Board argues that ground based measurements are often as effective and are almost always considerably less expensive than measurements made in space and should therefore play an important part in any programme of planetary study. Thus the panel throws its weight behind the stay-at-homes in a report now published (which can be had from the National Academy in Washington). The panel, under the chairmanship of J. S. Hall, the director of Lowell Observatory, was asked to survey

the current state of knowledge in planetary astronomy, to indicate potentially productive fields for ground based research and to survey the available techniques. The fields of research they considered include the dynamics of planetary motion, the study of planetary surfaces and atmospheres and the gathering of information on the interiors of planets and their associated magnetic fields. Ground based instruments have the advantages that they can handle data much faster than space instruments can and they have much longer effective life-times. Their relative design flexibility means that recent technological developments can be incorporated to good effect. Time is an important factor because information from ground based studies is used in planning space programmes and also because the planets can most usefully be observed only for certain periods. The limitations on such instruments are caused largely by the Earth's atmosphere—its opacity to radiation of all but a few wavelength bands and its turbulence. Some of these restrictions are already being overcome by the use of better observing sites, image scanning and image enhancement devices and, most importantly, by the use of radio and radar techniques. Here the limitations are purely instrumental and there is scope for order of magnitude improvements.

The panel makes eight specific recommendations for improving the efficiency of ground based studies. It asks that a 60-inch optical telescope designed for spectroscopy, interferometry, photography and photometry of the planets should be erected as soon as possible in the southern hemisphere. Two reflectors for the infrared would be useful—one with a 120-inch aperture at a site with very low water vapour content and the other with a 36-inch aperture installed in the Convair 990 aircraft operating from the Ames research centre. Existing facilities for planetary radar observations should be more extensively used, the panel says, and a large filled-aperture instrument for use at millimetre wavelengths and a high resolution one for use at 3 cm to millimetre wavelengths should be built. The recommendation of the Whitford Committee for construction of large radio telescope arrays by the National Radio Astronomy Observatory and the California Institute of Technology is endorsed. Fourier interferometers with resolutions of at least 10,000 should be developed and "the importance of technological development should be recognized by ensuring that funds are available to support it". The establishment of a "worldwide photographic planetary patrol" distributed in longitude to ensure adequate coverage for the period from January 1960 to January 1974 was recommended. The panel emphasizes the need for a solution to the thorny problem of how to provide experts who also have a comprehensive knowledge of the field as a whole.

METEOROLOGICAL RESEARCH

Set Fair at Bracknell

THE completion of a series of research projects on the Earth's atmosphere and a noteworthy advance in international cooperation are highlights of the Annual Report of the Meteorological Office for 1967 (HMSO, 11s.). On a budget of £7.5 million, the Meteorological Office seems to have pushed ahead with modernizing