

which use liquid hydrogen as ballast—controlled evaporation could turn ballast into lift. Flights lasting several days over the polar caps (and especially in the Antarctic, where national boundaries create no problem) come high on the list, as does the need for developing instruments for balloon flights which can yield information about the momentum, charge and directional distribution of cosmic ray particles which is comparable with that obtained from ground-based equipment. For the rest, where cosmic ray studies are concerned, the panel would like to see an all-round development of present work.

Throughout the panel's report, there is a constant repetition of the need for mobile facilities for the measurement of cosmic ray neutron flux, the measurement of geomagnetic disturbances and the recording of some kinds of solar phenomena. It seems to be acknowledged that the handling of geomagnetic data is a special problem, and the panel suggests that a world-wide communication link based on a COMSAT circuit would be sensible (but there is no estimate of cost). There is, the report says, a great need for the development of programmes which will continuously monitor whistler signals received at very low frequency.

The panel has several expensive proposals for the better study of the ionosphere, the chief of which is the building in the northern United States (at the edge of the magnetic shell $L=4$) of a transmitter-receiver capable of exploiting incoherent scatter techniques in the study of the motion of plasma in the ionosphere. The cost of this proposal is said to be potentially comparable with that of the Arecibo station in Puerto Rico. The panel also asks that there should be a smaller station in the auroral zone, and suggests that this might be established by moving the incoherent scatter equipment now at Palo Alto to College, Alaska. The panel is clearly anxious that the stations at Jicamarca (Peru), Millstone and Arecibo will be kept on tight budgets, especially now that the last of the three is due to be moved from the Advanced Research Projects Agency to the National Science Foundation. The financial position of these three stations seems also to concern those who would make simultaneous optical and radio measurements of the atmosphere from stations on the ground, but the panel also urges that there should be more detailed laboratory studies of important processes in aeronomy.

To the extent that the panel's report will help agencies such as the National Science Foundation to work out a strategy for solar-terrestrial physics, the report will be valuable. Inevitably, however, it is bound to seem like wishful thinking or even special pleading so long as it lacks a detailed costing. This deficiency is no doubt one of the inevitable features of reports prepared in the splendid isolation of Aspen, Colorado.

GEOLOGY

Applied Mapping

WITH an eye on the practical applications of its services, the Institute of Geological Sciences has been putting its surveying and mapping work to good use despite difficulties in recruiting staff and in re-siting numerous offices. One economically important project mentioned in the institute's recently published annual report on 1968 (HMSO, £1.2; 1969) is a comprehensive

survey of the Humberside area with a view to the optimum development of its industries, services and amenities. The field unit is revising the six-inch mapping of the area, a new marine geophysics unit has made its first ship-borne survey in the estuary and the hydrogeological department is studying the underground resources of the entire Humber drainage basin.

The engineering geology unit has played its part with a geotechnical study of the area of the new town of Milton Keynes, and maps and tables showing the variation of physical properties over the area will be ready within the next few months. This seems to have been helpful in planning the drainage for the town although too late to influence any of the major planning decisions. The institute is, however, involved right from the earliest stages of planning with all road projects costing more than a million pounds, by agreement with the Ministry of Transport.

In its programme for shallow geological mapping of the sea bed of the continental shelf, the institute hopes to encourage commercial firms to carry out more detailed deep surveys in areas which seem likely to have mineral deposits. The institute publishes these maps in a new IGS report series, and it has so far surveyed the North Irish Sea, the sea of the Hebrides and Minch, the Clyde and the Firth of Forth. One deep reflexion seismic survey was commissioned in Cardigan Bay, a deep sedimentary basin of potential interest to oil companies.

The radiogeological department, under a £250,000 contract from the United Kingdom Atomic Energy Authority, is examining two areas in North Scotland and the Midlands for uranium deposits. The results have not yet been fully analysed, but at least four areas have been identified where the radioactivity can be attributed to uranium and one where there is thorium. Hydrogeochemical reconnaissance seems to be an effective prospecting technique in this environment. A new twelve-inch mass spectrometer in the isotope geology unit is being used mainly for geochronological work using K-Ar, Rb-Sr and U-Pb dating techniques. An interesting development has been work on stable isotope ratios. The institute hopes, for instance, to set up a new unit to study the relationship between O^{16}/O^{18} ratios and the temperatures of formation of rocks and mineral deposits and is also interested in examining sulphur and hydrogen isotopes which may give information about the fluid inclusions in rocks and minerals.

LINNEAN SOCIETY

Successful Appeal

by our Botany Correspondent

FIFTEEN months after it was launched, the appeal for development of the rooms of the Linnean Society in London has drawn gifts and promises of more, totalling £69,000. So successful has it been that the first phase of alterations at Burlington House is already under way. The new strongroom is complete and only has to dry out before the collections of plants, shells, insects and fishes, made by Linnaeus in the eighteenth century, can be moved in from the wooden cabinets they have occupied since the society moved into its rooms in 1857.

The latest piece of good news for the organizers of the appeal came just before Christmas when they heard