stead from crystallisation differentiation. Moreover, he suggests that, by involving silica metasomation for Troodos, supporters of the ridge origin are contradicting themselves insofar as modern oceanic ridges show no signs of metasomatism.

In a final critical article, Gass *et al.* (*Earth planet. Sci. Lett.*, **25**, 236; 1975) point out, among other things, that in discussing the FeO*/MgO ratio Miyashiro has taken no account of the replacement of Mg-bearing mineral phases by carbonates and other non-magnesian pseudomorphs, and that the analyses quoted by Miyashiro were carried out before the precise boundary between the upper and lower pillow lavas was defined (so that many are in fact from the upper lavas). To these specific objections, however, Gass and his colleagues add what is perhaps the most telling general point of all, namely that in this whole argument there has been more than a tendency to ignore the wide variety of evidence available.

The fact is that few, if any, workers have claimed that an oceanic origin for Troodos has been proved. Instead, the case is based on an extremely wide range of evidence from many different branches of the earth sciences, with no single piece of evidence yet obtained being regarded as conclusive by itself. By concentrating public disagreement largely on the geochemical data, support for Troodos as ancient ocean floor has thus somehow been made to appear more equivocal than it really is. For the time being, the balance of argument remains with Miyashiro's opponents.

Rotating fluids

from a Correspondent

'Can the geomagnetic dynamo be powered by precession?' was one of the geophysically motivated questions raised at the recent Euromech meeting entitled "Non-linear processes in rotating fluids" held at University College, London between April 14 and 17.

THE sufficiency of precession as an alternative power source to convection in the Earth's core was discussed by Jacobs (University of Cambridge). Estimates of the power required to maintain the geomagntic dynamo against ohmic dissipation have been variously assessed as between 10^9 and 10^{12} W with the probable value between 10^{10} and 10^{11} W. According to Jacobs and his co-authors (Rochester, Smylie and Chong) the precessional power input to the core (at the expense of the obliquity) fails by at least two orders of magnitude to satisfy this requirement, and thus the possibility of a precession-driven dynamo is extremely remote. This contrasts with the views of Malkus (*Science*, **160**, 259; 1968) and, more recently, Stacey (*Geophys. J.*, **33**, 47; 1973) who have both argued in favour of precessional torques producing the driving mechanism for dynamo action. Jacobs attributed the disagreement not only to Malkus's failure to allow for electrical conductivity contrast at the core–mantle interface and Stacey's incorrect determination of the tilt-over angle, but also to the neglect by both authors of the dependence of the strength of the dissipative part of the core–mantle coupling on the diurnal frequency of the precession-induced core flow relative to the mantle. Loper (Florida State University and University of Newcastle upon Tyne) was equally pessimistic regarding the role of precession. His investigation of the transmission characteristics of the core's hydromagnetic boundary layers indicated again that precessional power is inadequate by at least 10^2.

In attempting to extend further the laboratory modelling of atmospheric flows in the rotating annulus, Leach (Meteorological Office) investigated the particular effects of topography and found that its presence significantly affected the well-known transitions between the different flow regimes and that it reduced the amplitude of the free baroclinic waves. The interplay between these free waves and those generated by the topography resulted in an increase in heat transfer, indicating that the free waves play a diminished part in the energetics of the system. A related study by Mason and Hide (Meteorological Office) into the effects of sloping end walls upon the transition from axisymmetric flow to baroclinic waves was illustrated by an interesting cine film. Various combinations of end-wall orientations were investigated and non-linear effects were identified by comparing the observed wave numbers with those predicted by appropriate linear theory.

The meeting also included contributions from other branches of fluid mechanics. Wimmer (University of Karslruhe) reported a very careful experimental investigation into the viscous flow between rotating concentric spheres (the outer sphere usually being stationary). Measurements of the friction torque were presented for a wide range of gap widths and Reynolds numbers. Photographs of the transitions from laminar stable flow to unstable flow to turbulent flow were shown and it was stated that, in addition to the well known Taylor–Görtler-type vortices, several new types of instability were discovered. One example in the wide gap case was a class of instability confined to the equator (the number of vortices being independent of Reynolds number) and having five different modes of instability for the same Reynolds number.

Several numerical investigations into atmospheric phenomena and related laboratory models were presented, including two papers by Hoskins (University of Reading) and Simmons (University of Reading) on non-linear properties of baroclinic waves and the formation of fronts, and the results of Quinet (Meteorological Institute, Brussels) on a numerical simulation of amplitude and tilted-trough vaccilation observed in the annulus experiments. Egger (University of Munich) reported the results of his numerical experiments on the cyclogenesis occurring in the lee of a long north–south mountain chain as this barrier is approached by a depression. By studying the time-development of the system it was claimed that a satisfactory mechanism for the cyclogenesis process could be obtained.

Space tribology

from a Correspondent

The first symposium in Europe, if not in the world, to be devoted to space tribology was organised by the European Space Research Organisation at its establishment at Frascati on April 9, 10 and 11.

THE papers varied from a very fundamental contribution by M. Barquins, R. Courtel and M. Maugis (Centre National de la Recherche Scientifique, Meudon) on the friction of Cu–Cu, Mo–Mo, Cu–Mo and Cu–Ni couples in ultra high vacuum to a paper by E. J. Robbins (European Space Tribology Laboratory, Risley) on the testing of the tribological performance of space mechanisms in a vacuum, in which the author presented a clear picture of the true environment in the satellite and considered the effect of water and other desorbed vapours on spacecraft mechanisms.

In general the emphasis was upon dry lubricated systems and a whole session was devoted to lead film lubrication of rolling element bearings, which is a largely European development, with now over 10^6 hours of vacuum operation to support it. The limitations of the performance of the film in air were clearly indicated in a paper by M. J. Todd (National Centre for Tribology, Risley) who reported tests showing rapid bearing failure at speeds beyond about 20 r.p.m.

Another session was devoted to the performance of slip rings in ultra high vacuum, mostly operating in the dry lubricated regime. The behaviour of slip rings under these conditions is sur-