

In view of the increasing importance of upper-air conditions in the South Pacific area, both for general forecasting and for aviation purposes, a start has been made with the reduction and analysis of the upper-air data collected in the Pacific during World War II. The information has been used to prepare charts of the average summer and winter pressure and temperature distribution along meridian 170° E. and extending from Antarctica in the south to Wake Island in latitude 19° North. This will prove valuable in further theoretical studies, as well as serving the practical purposes of aviation. A paper on this subject also was presented to the Seventh Pacific Science Congress by the Research Officer.

The Research Section has collaborated with the Meteorological Physics Section of the Council for Scientific and Industrial Research of Australia in a synoptic experiment designed to test the feasibility of the direct analysis of divergence from a given wind field. On occasion, the section has also given advice to the Meteorological Services of other countries on problems of which we have special knowledge.

At branch offices the following projects are in progress or have already been completed during the year :—

- (a) *Meteorological Office, Nadi, Fiji.*—Pressure of routine work at this office has seriously interfered with any attempt to investigate the fundamental problems of tropical meteorology. However, a beginning has been made with the computation of mean values of temperature and pressure over Fiji, using the results of radiosonde and aircraft ascents. Although lack of time has made it necessary to confine the results to levels below 400 mb., the information will be useful in many phases of forecasting and will supplement the investigations already made at Head Office.
- (b) *Meteorological Office, Auckland.*—In conjunction with the Physics Department of the local University College, work has been continued on the radiosonde method of investigating the distribution of electric potential inside various types of cloud. Although no releases have been made this year, the instrument has been modified and investigations have been made into ways of increasing its sensitivity. In addition, a study is being made of the variation of tropopause heights and high-level winds at Auckland in relation to the movement of pressure systems. In this connection a paper is being prepared by staff members entitled “A Method for the Interpretation of Radiosonde Ascents.” In view of the possibility in the near future of airline flights at very high levels, some investigations have been carried out into the possibility of introducing a routine 300 mb. level chart for this region. Lack of data is here a very serious problem.
- (c) *Meteorological Office, Paraparaumu.*—The investigation begun last year into local weather conditions at various airfields throughout New Zealand has been continued, but pressure of routine aviation forecasting has curtailed the amount of time that could be spent on this project.
- (d) *General Forecasting Office, Wellington.*—A study of the mean vertical pressure distribution over Norfolk Island has been completed, and the results are scheduled for early publication. A statistical investigation into the heights of the 700 mb. surface over Noumea has been undertaken with a view to improving the drawing of the upper level chart in this region. Radiosonde reports are no longer available from this station, and in these circumstances a statistical analysis of past material is of very considerable value. Detailed investigations have also been undertaken into the most serious cases of flooding that have occurred during the year, with a view to improving the forecasting of heavy rainfall and the conditions under which serious flooding is likely. These investigations are still in progress.