Assuming that correlation coefficients provide a guide to the performance of a particular model, the results for the individual experiment attempted suggest useful forecasting ability up to a period of 3-4 days. Surprisingly, the model performance for the data sparse Southern Hemisphere is comparable with that obtained for the Northern Hemisphere. The correlation coefficient fell gradually during the first six days of the forecast and then rose to a high, and probably unrepeatable, secondary maximum around the seventh or eighth day. This secondary maximum was then followed by a further decline. The root mean square error distribution of height showed a similar pattern.

Synoptic deficiencies of the forecasts presented were the consistent errors occurring in the longitudinal position of upper troughs and the failure of the model to adequately predict the development and subsequent movement of cut-off lows. The diagnostic results, however, indicate considerable dynamic similitude between the atmosphere and the model.

In the general discussion that followed Mr. Clarke's address, Mr. Gauntlett inquired whether consistent phase errors in the forecasts were a manifestation of the finite difference scheme employed or perhaps the result of some physical deficiency in the model. In reply, Mr. Clarke acknowledged the possibility of the finite difference scheme causing a decrease in the phase velocity due to truncation errors. He suggested that further sources of error might be inaccuracies in the initial analyses and insufficient horizontal resolution in the forecasting model.

Dr. Tucker suggested that the rise of the correlation coefficient after one week could be explained by assuming that after this period the major wave components of the forecast field had, through a consistent accumulation of forecasting errors, once again become in phase with the analysed field. In reply, the speaker explained that a detailed examination of the model forecasts did not support this theory. In the speaker's opinion, the apparent poor performance of the model around the fifth and sixth days was geographically restricted to the data sparse area of the central Pacific and could be attributed to low quality verifying analyses in that area.

Mr. Wallington queried the significance of correlation coefficients in assessing the performance of a particular forecasting model over extended periods. He suggested the alternative procedure of identifying features of the synoptic pattern and studying how the model accommodated the movement and development of these particular features.

REFERENCE


D. J. G.

28 August 1968

TROPOSPHERIC JET STREAMS IN THE SOUTHERN HEMISPHERE

By T. T. Gibson

Mr. Gibson of the Meteorology Department, University of Melbourne, introduced the topic by drawing attention to the importance of the extratropical jet stream (ETJ) as a dynamical feature of the upper troposphere. He commented that, whereas meteorologists in Australia tend to attribute to the sub-tropical jet stream (STJ) a predominant control of the weather systems in their area, his own training in Canada made him conscious of the significance of the ETJ.
Of particular interest was the development of a "frontal wave" in the bottom surface circulation over the model equivalent of the Ross Sea. This was observed to move 60° long. eastward and to undergo occlusion. Simultaneously observed processes at the top surface appeared to be quite realistic; e.g. a marked vorticity advection near the jet axis and deepening of a trough with subsequent formation of a vigorous cyclonic vortex almost vertically above an occluded surface depression. Observations on the dyed fluid at the bottom also made it possible to observe the occurrence of a "polar outbreak" as far as the outside rim of the pan, which corresponds to lat. 42°S.

In the discussion that followed, Dr. P. Frenzen asked why, in the pan experiment, complicating features such as a literal (rather than simplified) model of Antarctica had been introduced while features observed in models with symmetrical heat sinks are not yet fully understood. Mr. Gibson, in reply, agreed that Dr. Frenzen had a valid point; but he suggested that the basic simplicity of the Antarctic circulation itself might justify the use of a more realistic terrain model in this case. He believed that the observed asymmetries in the circulation arose from the nature of the realistic experimental heat sink.

Dr. F.A. Berson enquired whether Mr. Gibson could explain why the pan model, although capable of simulating other important circulation features, generated a frontal wave in the Ross Sea where cyclolysis rather than cyclogenesis is known to be prevalent. Mr. Gibson said this was an unrealistic aspect of the model which probably arose from the latitudinal limitations imposed.

Mr. K.T. Morley raised the problem of the range of circulation patterns that might be generated with a given thermal Rossby number by different combinations of rotation rate and meridional temperature gradient. Mr. Gibson said he had looked into this but found that in practice very little variation was possible.

F. A. B.

REFERENCE

Beran, D. W. 1968 Jet Streams as observed by Infra-Red Satellites.