

EDITORIAL

WHY THE 'ROARING FORTIES' DO NOT ROAR ALL THE TIME

Climatological maps in atlases represent rainfall, temperature, pressure and wind on a very broad scale. Some older atlases have maps of mean pressure with the words 'Roaring Forties' printed over a concentration of isobars in the Southern Hemisphere. New Zealand lies in this zone. There is no equivalent zone in the Northern Hemisphere and this feature represents one of the most remarkable climatic differences between the Hemispheres.

Present-day analyses of atmospheric surface pressure confirm that there is a systematic gradient of mean pressure in the Southern Hemisphere. The gradient is chiefly between 40 and 55°S so the terms 'Fighting Fifties' and 'Screaming Sixties' do not have the same basis as the 'Roaring Forties'. Somewhat surprisingly, evaluation of the geostrophic wind using the observed gradient over New Zealand south of 40°S yields a wind vector from just south of west with a speed about 6 knots.

In order to appreciate the significance of the mean pressure gradient over New Zealand it has to be understood that the winds which affect the country are associated with the hour by hour evolving pressure distribution and the mean pressure field results from the summation of many partially or wholly opposing patterns. The mean pressure pattern shows that pressures south of New Zealand are more often below those to the north than vice versa. Thus it indicates a predominance of westerly winds and does not indicate, directly, anything about the wind speeds. It so happens, however, that when the predominance of any one wind direction is increased the frequency of strong winds from this direction also increases. However, this effect is not the dominant one determining the mean wind speed at a site. This depends much more on the intensity of the pressure fields, irrespective of direction.

There is an implication in the term 'Roaring Forties' that places under their influence should be unusually windy. New Zealanders, and indeed visitors to this country, do perceive it to be windy. However, to consider the matter in any sort of quantitative manner requires the use of objective data. Mean wind speed over the sea away from land is probably the best basis for comparison because the data are observed over a standard surface uncomplicated by terrain details. The winds over the sea are, for a small island country, the same airflows which produce many of the higher speeds over the land.

Over the Tasman Sea at about 43°S mean speeds observed from ships are about 16 knots (they are estimated using the Beaufort scale but there are grounds for believing this to give consistent and accurate results over the open ocean). At the same latitude in the North Pacific and in the North Atlantic near the Azores the speeds are about the same. Thus New Zealand does not appear to be in an unusually windy part of the world and the term 'Roaring Forties' does not appear useful in relation to the New Zealand climate.

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