In an attempt to see whether, in Australia, earlier work on solar/weather correlations had remained valid Kidson's (1925) rather striking result that the extent of the annual latitudinal oscillation of the mean track of anticyclones varies markedly in harmony with the sunspot cycle, was tested with data subsequent to 1922. Out of the three solar cycles since then two had shown the effect very prominently, the third rather partially.

Opening the discussion Professor Leeper expressed much scepticism as to the statistical significance of the summer rainfall changes in Southern Australia over the period considered. He found (Leeper 1957) the sequence of wet and dry years (i.e. above and below median rainfall) to be random and that applied to the separate seasons as well. Discussion also extended to whether the temperature data prior to 1910 could be considered homogeneous with later observations in view of changes in exposure, etc.

Dr. Priestley pointed out that the strength of the argument for some climatic change in Australia resided in the degree of harmony between the various collateral lines of enquiry.

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Seasonal variations in the atmospheric circulation over the extratropical regions of the southern hemisphere

by W. Schwerdtfeger

Dr. Schwerdtfeger, on leave from the University of Buenos Aires with the Department of Meteorology, University of Melbourne, presented some facts on the semi-annual pressure oscillation over the southern hemisphere and considered its possible cause.

The mean annual march of pressure in different parts of the world can be interpreted as the superposition of an annual and a semi-annual oscillation, both being of the same magnitude in the extratropical regions of the southern hemisphere. Till now it was assumed that the semi-annual component was only related to the corresponding phenomenon in the annual march of temperature in the equatorial belt.

However, the results of harmonic analysis of the mean annual march of pressure at a great number of stations in both hemispheres showed that the amplitude of the semi-annual pressure oscillation increased with latitude, and that in the southern hemisphere, there occurred a clear cut change of phase between temperate latitudes (maxima in the equinoctial months) and polar latitudes (maxima in the solstitial months).

In fact, this change of phase has the consequence that the mean meridional pressure gradients over the sub-polar belt are much stronger in spring and autumn than in winter and summer (thus justifying the old concept of the "equinoctial storms"), and it can be proved that this seasonal variation of the strength of the westerlies is even more pronounced in the upper layers of the troposphere than at sea level.

Attention was called to the circumstance that the annual march of the differences of daily variation totals (theoretical and effective values) between middle and polar latitudes also shows a pronounced semi-annual periodicity, with the maxima occurring in the equinoxes. This implies the same periodicity in the annual march of mean tropospheric meridional temperature-gradients in the subpolar zones, and also therefore in the seasonal change of the meridional height-differences of isobaric levels, and in the variation of the mean strength of the upper westerlies. This has been confirmed by a 5 year period of upper air records at Port Stanley and Argentine Islands and shorter records of other pairs of stations, and by 9 years' data for winds over Port Stanley itself.

It was then suggested that an increase of the strength of the great zonal currents of the subpolar belt induces an increase of cyclonic activity and vice versa (confirmed by the long record of the Argentine station at Laurie Island, 60.7 deg. S), and that a more intense cyclonic activity favours an ageostrophic airflow towards lower latitudes in the upper troposphere, leading to higher pressure over the temperate zones during the equinoctial months.

Thus, in the last instance, the semi-annual oscillation of pressure at sea level over the extratropical zones should be considered a consequence of the corresponding periodicity in the differential solar heating of temperate and polar latitudes.

Finally, it was mentioned that the peculiar rise of temperature during the first part of the polar night, observed for several years in the south of the Ross Sea and of the Weddell Sea, can be related to the seasonal variation of the cyclonic activity in the sub-antarctic zones and therewith to the radiation conditions at other latitudes. When this activity decreases from April to June, then also the southerly winds, i,e, the advection of colder air from the interior of the continent, should become less frequent. The few existing data seemed to support this hypothesis.