winter, which seems to show that convection and turbulence are equally strong in the two seasons.

The fall of temperature is greater in depressions than in anticyclones because in the first case convection is more active. For the same reason, the decrease of temperature in anticyclones is greater in summer than in winter.

The correlation coefficients between pressure and temperature, calculated by Dines from soundings in England, gave high positive values, that is to say, high pressures correspond to high temperatures. The results obtained by us are quite different. (See following table.)

Seasons (levels)	Means		Standard deviations		Correlation coefficients	Probable errors
	Pressure	Temperature	Pressure	Temperature		
Summer:						
Surface	1,008.9	28.8	3.1	2.9	−0.26	±0.08
2,000 m. s. l.	804.6	16.2	2.1	2.8	+.23	±.08
4,000 m. s. l.	633.7	5.9	2.1	1.7	+.42	±.10
Winter:						
Surface	1,017.6	22.7	4.2	2.7	−.55	±.06
2,000 m. s. l.	808.1	11.9	2.4	3.3	−.03	±.08
4,000 m. s. l.	634.2	2.6	3.1	3.5	+.91	±.03

From an examination of the mean values we may conclude that in winter the surface pressure is normally 8.7 mb higher than in summer. The difference becomes 3.5 mb at 2,000 m, and 0.5 mb at 4,000 m.

Pressures higher in winter than in summer are common above the continents at low levels, on account of the warming of the surface during the latter season.

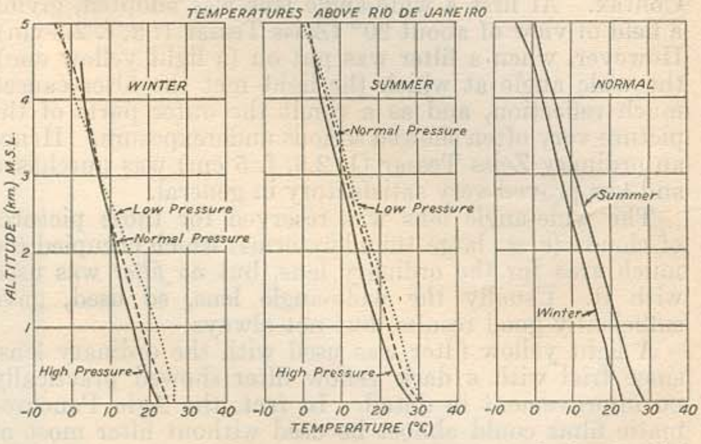
In summer, however, at very high levels, the heating is less and therefore the fall of pressure is also less than at the surface.

The standard deviations of pressure are higher in winter than in summer, because in winter there is great activity in the passage of depressions and anticyclones, while in summer this is weakened.

The decrease in the standard deviation at high levels seems to indicate that the original oscillations of pressure are amplified at low levels by the effect of the surface temperature. It also indicates that cyclones and anticyclones reach at least 4,000 m.

The standard deviations of temperature are higher in winter on account of the great activity of the secondary circulation, with consequent frequent passages of air masses with different temperatures.

The significance of the correlation coefficients is somewhat uncertain. There is, perhaps, positive correlation at 4,000 m in summer (+0.42), that is, high pressure at 4,000 m corresponds to high temperature. However, having seen that high temperatures correspond to low pressures at the surface, we may conclude that depres-



sions at the surface have, at 4,000 m, relatively high pressure, and vice versa. This conforms to the classic theory that depressions are formed by local heating.

There is also a negative correlation coefficient (−0.55) at the surface in winter (depressions warmer than anticyclones.) At 4,000 m there is a very high positive coefficient (+0.91), already explained, and similar to those obtained in the Northern Hemisphere. This means that at that level, in winter, surface depressions are still depressions, and not anticyclones.

At the other levels there appears to be no correlation at all; probable errors are generally small.

These notes are the first study of upper-air temperatures in South America.

CLOUD PHOTOGRAPHY AT THE MANILA OBSERVATORY

By Rev. C. E. DEPPERMANN, S. J., Assistant Director

[Philippine Weather Bureau, Manila, May 1935]

In order to correlate clouds with the various types of air currents that reach the Philippines, the Manila Observatory in May 1934 started a year's photography of clouds. Now that the program has been successfully completed, a few words as to the plan of campaign and the results achieved may be of interest.

It was quite a problem to decide upon the best method of procedure. Many have advocated the use of a cylindrical or "fish-eye" lens, of the type suggested by Wood in his Physical Optics, or at least some very-wide-angle lens, to enable the photographer to cover most of the sky in one picture. This would be an advantage, of course, if it could be done cheaply and efficiently. However, a lens of this type would be very expensive, and a special shutter would be imperative to get proper distribution of light intensity. Experience, moreover, has shown the writer that the sky very often shows remarkable contrasts in light intensity, especially in stormy weather, and no shutter would be equal to the task of bringing out properly all parts of the sky in one picture. Even with an ordinary camera, with its limited field of view, certain pictures have to be consistently rejected, unless the photographer when printing is prepared for the task of delicate "dodging", i. e., of shading parts of the negative. To take several pictures at a time of *ordinary size*, say 4 by 5 inches, or 5 by 7 inches, and select characteristic parts of the sky, is another alternative, but the cost would be very high, if one wishes, as I did, to take some 20 or more pictures a day, and often, in striking situations, 5 or 6 in rapid succession. The frequent loading of the ordinary rolls of 6 or 8 pictures would also be very inconvenient.

After much deliberation the following scheme was adopted and has proved quite satisfactory; the cost, though considerable, has not been prohibitive, considering the ambitious nature of the project. A Contax camera was purchased, using movie film, 36 pictures to a roll, but taking a picture twice as large as the ordinary