

## WIND AND RAINFALL DISTRIBUTION IN SELECTED PHILIPPINE TYPHOONS

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### INTRODUCTION

In a study of the true wind distribution around a typhoon, considerable difficulties are encountered. A typhoon wholly at sea would be ideally the best for research. Unfortunately, however, ship observations are usually quite meagre, wind direction and force are none too reliable, and more than anything else, within the violent part of the storm the true course and position of both ship and storm are in very considerable doubt. On the other hand, in the Philippines itself, where we have rather a close network of stations, there is the very irritating effect of mountain ranges upon winds and isobars. The writer, therefore, in the present study, has limited himself to typhoons crossing the Visayas, i. e. crossing the region between south Luzon and Mindanao. This is the only region where topographical features, while not perfect for research, still are not deemed prohibitively obtrusive.

*The Question of Undercutting.*—Before taking up the individual typhoons, it may be well to preface some words upon a few interesting preliminary points. In "Outlines of Philippine Frontology",<sup>(1)</sup> it is maintained that the temperature differences at the fronts are not great. Nevertheless, the humidity differences generally are considerable (i. e. at the trade-SW monsoon front), especially after we get above an altitude of about 1.5 kilometers. In searching through the weather situations prevailing at the time of the meteorograph airplane flights analysed in "The Upper Air at Manila",<sup>(4)</sup> only a few frontal situations were encountered, owing to the fact that the ships of the U. S. Asiatic Fleet are usually around China and elsewhere than our Islands during the typhoon season. One excellent example, however, was discovered, that afforded by a comparison between a flight taken on October 19, 1931, and one taken on the following day. From other considerations these two flights are known to be quite typical, and hence can without reproach be given extended analysis and study. On the 19th, Manila was in the southwest monsoon sector of a typhoon, with the front between southwest monsoon and old northern air to the north of Manila. The typhoon occluded and the northern air rushed south, so that by the 20th the front had progressed as far south as Legaspi-Culion in mid-Philippines, with Manila in northern air. It is rather surprising to notice (cf. Fig. 1) that for the first kilometer or two the temperatures encountered in both flights are practically the same, then for the rest of the flights the northern air is about one degree Centigrade warmer than the southwest monsoon! It may well be due either to air being descending air or trade wind that has coursed around the typhoon and not true northerly air at all. But notice especially the striking difference in the relative humidities. Whereas the southwest monsoon is very moist all the way up, the northern air gets drier and drier, and by the end of the flight its relative humidity is very low indeed.

Conditions are certainly not very favorable in the above example for undercutting by northern air at the surface. Let us see, however, what the uplifting of the south-