ARE THERE WARM SECTORS IN PHILIPPINE TYPHOONS?

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On the back of "The Pilot Chart for Central American Waters" for June, 1937, published by the U. S. Hydrographic Office, there appears an article entitled "The Structure of Tropical Cyclones," by Lieutenant Arnold E. True, U. S. N., a reprint from another magazine. Lieutenant True maintains that logical exigencies and observational evidence (admittedly meagre) gathered by him on his trip to the Far East in 1936, favor the assumption that the warm sector, which in the temperate zone is to the south of the cyclone, is on the contrary to the north of the typhoon in tropical regions. At first sight this seems a very logical assumption. In fact the present writer while in Bergen, Norway, in 1932, after discussions with the eminent Norwegian meteorologists, had come to the same provisional conclusion. Indeed the writer has in his possession maps of the Far East for selected periods, upon which Professors J. Bjerknes and Petterssen were kind enough to draw the fronts according to Norwegian air mass analysis. For the tropical typhoon they drew a warm sector to the north, as Lieutenant True has done, but they made sure to occlude the typhoon quickly. Unfortunately however, the data at our disposal in Norway at the time were admittedly quite insufficient for a definitive decision, and the present writer had not been forecaster of the Philippine Weather Bureau for more than half a year when he discarded the above view as erroneous, and then elaborated his present ideas, the beginnings of which were published as early as September of 1933 in the Monthly Weather Review.(1) They are described in detail in the writer's "Outlines of Philippine Frontology"(2) and elaborated in his "Weather and Clouds of Manila"(3) and also "Wind and Rainfall Distribution in Selected Philippine Typhoons."(4) The ideas expressed by the author in these papers are also those adopted by Rev. Bernard F. Doucette, S. J., forecaster of our Bureau since 1934, and by the forecasters of the Pan American Airways stationed at Manila. They have met with approval from other Far Eastern meteorologists as well.(5) It is the unanimous opinion of all the experienced forecasters of the Philippines that the typhoons of our region that have come under their observations do not show any warm sector *at the surface* to the north of the typhoon. What happens aloft we do not know, since the available data are not sufficient for a decision.

It is not the intention in this paper to examine Lieutenant True's article in detail, for the precise reason that, regarding the particular storm in question (end of August, 1936), which was certainly only a depression when it reached our Islands, the data are decidedly insufficient for satisfactory discussion. The writer prefers to prove his points from other evidence. The following will therefore be discussed or proved in succession:

(A) Typhoons passing both to the south and to the north of Yap, Western Carolines, show no evidence of a warm sector either to the north or to the south of the typhoon.

(B) Typhoons crossing the Philippines show no warm sector.

(C) Data from the very start of China Sea typhoons show no warm sector.

(D) Statistical and other data are given leading to the same conclusion.

(E) The true disposition of the air masses entering into tropical typhoons in the Far East is briefly described and illustrated.

(A) THE EVIDENCE FROM YAP

Yap is a small island in the Western Carolines under Japanese mandate, at about 9.5° N. Lat., 138° E. Long., on which the Philippine Weather Bureau by agreement is