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THE MEAN WARMER ATMOSPHERE OF THE RAINY SEASON OVER THE WESTERN
TROPICAL PACIFIC OCEAN¹

by

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One of the main uses of standard atmospheres is that the synoptic sequence of events can be represented in terms of deviations from the standard. In addition, it furnishes mean climatic information. Neither the International Commission for Air Navigation nor the U. S. Standard Atmospheres are satisfactory for either of these purposes in the tropics. Mean conditions in low latitudes differ sufficiently from those of extratropical regions to warrant computation of a tropical standard atmosphere.

This was first done by Schacht [1] for the Caribbean area with soundings from Swan Island (17.4°N; 83.9°W); San Juan, Puerto Rico (18.5°N, 66.1°W), and Miami, Florida. He computed mean soundings for both daytime and nighttime. However, for purposes of defining standard atmospheres only the nighttime results should be considered since the daytime soundings have been found to be less reliable.

Subsequent to Schacht, the United States Weather Bureau [2] defined another standard atmosphere which, however, has remained unofficial. It is based on data from the same stations used by Schacht and a fourth station, Brownsville, Texas. This mean sounding differs from that presented by Schacht.

Recently, the writer has had occasion to require a tropical standard atmosphere for the western Pacific Ocean. For this purpose, data were available from several stations for the period 1944-1947. Of these, the nighttime observations (1500Z) from June to September at Kwajalein (8.9°N, 167.8°E), Guam (17.3°N, 144.8°E), and Palau (7.5°N, 134.4°E) were chosen as a representative sample.

Table I presents data for the Pacific mean sounding and a comparison with Schacht's sounding, along with the deviations of the three stations used from the mean. These deviations are quite small so that the combination is entirely permissible. The differences between the Caribbean and the western Pacific, also, are very small—perhaps smaller than might be expected. Over the western Pacific, the mean atmosphere is a little warmer in the low levels, a little cooler at high levels, and a little moister at all levels than in the Caribbean. Both soundings are reproduced on a tephigram in fig. 1. It is evident that definition of an official standard atmosphere for the western part of the tropical oceans in the rainy season is entirely feasible. Either of the soundings shown in fig. 1 or their mean can be used.

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REFERENCES

- [1] Schacht, E. J., 1946: A Mean Hurricane Sounding for the Caribbean Area, Bull. Amer. Meteor. Soc., 27, pp. 324-327
- [2] U. S. Weather Bureau, 1948: Hurricane Notes, Training Paper No. 1, 21C pp.

TABLE I

Mean Tropical Summer Atmosphere at Eight for the Southwest Pacific Region

Pacific soundings				Deviations from Caribbean soundings				Deviations from the Pacific mean			
				Guadalup				Palau			
Level (mb)	Ht. (tens of ft)	T (°C)	RH (%)	ΔT (°C)	ΔRH (%)	$\Delta Ht.$ (tens of ft)	ΔT (°C)	ΔRH (%)	$\Delta Ht.$ (tens of ft)	ΔT (°C)	ΔRH (%)
1010.0	0	28.6	85	+1.3	0	(-1.6)	-0.5	-3	(-0.4)	+0.2	-1
1000	32	28.0	82	+1.3	0	-7	+0.4	-3	-2	0.0	-1
950	179	27.0	86	+0.5		-11	+0.3	-1	0	-0.4	0
900	332	26.0	84	+0.1	+1	-9	+0.4	-2	0	-0.7	0
850	494	25.0	80	+0.1		-8	+0.3	-5	-1	-0.5	+1
800	653	24.5	75	+0.2	+2	-3	+0.4	-3	-1	-0.8	+2
750	812	24.0	70	+0.2		-8	+0.5	-1	-1	-0.6	+5
700	1030	23.5	67	+0.1	+7	-1	+0.5	-5	+5	-0.7	+7
650	1232	23.0	61	-0.1		-1	+0.6	-5	-3	-0.6	+3
600	1448	22.5	54	-0.3	+12	-7	+0.6	-9	-5	-0.5	+3
550	1675	22.0	48	-0.4		-5	+0.6	-6	-6	-0.3	+3
500	1919	21.5	42	-0.2	+12	-3	+0.5	-6	-3	-0.2	+3
450	2189	21.0	38	-0.1		-3	+0.4	-4	-7	0.0	+3
400	2482	20.5	34	-0.4		-6	+0.3	-5	-7	+0.2	+3
350	2804	20.0	30	-0.1		-6	+0.3	-5	-4	+0.3	+3
300	3165	19.5	26	-0.6		-8	+0.6	-6	-3	+0.2	+3
250	3574	19.0	22	-1.0		-11	+1.0	-6	-4	-0.1	+3
200	4053	18.5	18	-1.0		-14	+0.8	-5	-3	-0.1	+3
175	4380	18.0	15	-1.1		-16	+0.8	-5	-3	-0.5	+3
150	4639	17.5	12	-0.9		-13	+0.7	-5	-3	0.0	+3
125	4988	17.0	10	-0.1		-7	+0.8	-5	-3	-0.8	+3
100	5422	16.5	8	+0.6		-6	+0.8	-5	-3	-0.7	+3
80	5844	16.0	6	-1.0		-8	+0.5	-5	-3	-0.9	+3