TROPICAL METEOROLOGICAL FACTORS.

A) BASIC FACTS.

Introd. Importance of the problem. During the War, lack of knowledge of the weather of the tropics was a serious handicap. In extent, we have 1/4 of the earth's surface between 15° N. and 15° S., 1/6 between 10° N. and 10° S.

Airplane traffic in the tropics steadily increasing in importance and amount.

A)1). Pressure. In general the gradient is 1-5 mb. per 10 degr. In temperate zone generally some 15-20 mb. per 10 degr. In strong northers, on edge of tropic zone the gradient can be 10 mb. per 10°. In moderately steep part of typhoons 20 mb. per degr. and really steep parts 50 mb. per degr. mb. 3/4 mm., and mm. 1/25 of an inch. In temperate zone storms gradient can also be high.

Notice, however, that in tropics greater wind speed needed to sustain the same pressure gradient usually, due to Coriolis term.

Daily variation. In the tropics this can be 4 or more mb. according as the day is sunny or ~~xxxxx~~ cloudy. Around St. Louis the oscillation is about 2 mb. The oscillation varies with altitude, but is stillabout 2.8 mb. at 2 km. level in the tropics. At Bogota, 2 mm. The important part to remember is this: Though the semi-diurnal wave in the mean is veryregular, the diurnal wave is not, and depends on changes in the lower atmosphere. At Manila the 10p. maximum is lower than the 10 a. max., except the reverse is true during the SW monsoon season. Why?

2) Temperature. Annual variation. Mean max. to mean min. in tropics 5-10° F. temperate zone 30-60° F. Diurnal. Over ocean a couple of degrees at most; along shores, i.e. open maritime countries, 5 degr. or so (enclosed valleys more). Africa deserts different. But in temp. zones, some 15 degr. F.

Due to even ocean current temp., temp. of air around N. Luzon at 20° L. same most of year as Zamboanga at about 5 degr. L. The average temp. of Zamboanga is that of the whole islands. Average temp. of tropics, 80 to 90 degr., that of the temp. zone 40-70 degr. F.

3) Water Vapor. Except those parts of tropics which border on deserts (Africa) the moisture content is high, both as to relative and absolute humidity. At Manila rel. hum. in the forties ~~was~~ is rare; at 6a. rarely ~~was~~ is the rel. hum. less than about 97%. During rainy season, sweaty underwear rarely dries except in sun. Fungus. Great problem during War. Absolute amount of water vapor. Note ~~xf~~ saturated air at 30 to 35 degr. C. (86-95 F) holds from over 20 to 30 kg. of water vapor to kg. of air. Great latent heat. I once figured that if it all condensed at once, the heat would be so great it would turn at once into steam.

Above 2 km. or so, at Manila, in trade and northers season the air quickly dries out. In SW monsoon air, decidedly most up to 4 km. generally. But may be different according to regions. Harmattan & monsoon W Africa.

4) Winds: Surface winds usually light. Even winds aloft for easterly winds average only B. 4. Temp. zone westerlies can go to 6 and higher. The tropical surface winds being light may not reflect air stream directions, but may be governed entirely by local considerations. Hence not representative, except a strong NE or SW monsoon circulation.

An important ~~xxxxx~~ factor is the smallness of the Coriolis parameter, 2 omega sine phi. Sin phi for 15 degr is 0.25, for 10° 0.17, for 5° degr. ~~xxxxx~~ 0.087. For 30° already 0.5. This has a most important bearing on geostrophic wind considerations as we shall see. Above the friction layer, the air currents reflect, usually a little more clearly the general circulation. pressure pattern.

5) Types of Weather: It is a fact that on the whole the weather does not change ~~xx~~ often, ~~xxxxxxxxxxxxxxxxxx~~, but remains the same for rather long periods. This persistence much more pronounced than in the temperate zone. Tell about Dutch meteorologists in Java and first airplanes. Said no use of forecasts, till a plane suddenly cracked up. Illustrates the danger of sudden unexpected changes. Trigger effects? Java did not have regular forecasting service till some five years or so before the War. Pilot balloons & my "Upper Air Circulation."

6) Inadequate data: Stations on oceans in tropical regions from 500 to 1000 or more miles apart at times. "No-man's land". Typhoons "lost" for days. Poor radios on ships. Until aviation and the War, need of spending money on upper air data not felt. Give situation now in the P.I. Speak about military network (later in B.