

2.4 Analysis & Forecasting “Thumb Rules” for the Rainy Season

- Real-time high resolution satellite imagery is currently⁵⁰ the best mesoscale analysis/forecasting tool.
- The NMC ATOLL “low-level” and the NMC 200 mb “upper-level” analyses are excellent tools from which to *start* the analysis/forecasting cycle. (If real-time satellite or conventional data are available, perform local station streamline/isotach analysis, to locate the upper-level divergence and/or low-level convergence. Time cross-sections of available *upstream* radiosonde soundings may also prove helpful in tracking approaching tropical waves.)
- Streamlines sometimes fail to display low-level cyclonic *curvature* at the tropical wave (trough) axis, i.e., the cyclonic vorticity present near the tropical wave axis may be due to *shear* vorticity. While the more classic tropical wave has convective cloudiness trailing (*east* of) the axis, there are instances when instability and convective cloudiness exist both ahead (*west* of) and behind (*east* of) the tropical wave. (Informal communication with the staff of NHC indicates that the 700 mb surface is currently used to track tropical disturbances crossing the North Atlantic Ocean.)
- During the rainy season, in general, some portion of the countries of Central America receive rain every day—even when a tropical wave is distant.
- Anticipate enhanced convection and rainfall at stations when a tropical wave axis arrives at a station. (Their wave lengths and speeds are quite variable and should be calculated by noting their positions for several days *prior* to their arrival at the station or ship.)
- Tropical waves tend to slow their westward propagation when they approach an upper-level trough having strong divergence/diffuence to the east of the trough. (This divergence will enhance convection to the east of the upper-level trough.)
- Enhanced convection⁵¹ (the sea breeze front) often develops during the late morning/early afternoon—due to the cumulative effect of the *easterly* sea breeze and the *easterly* component of the Tradewind—along a north-south axis as the terrain rises about 50 mi inland from the Nicaraguan Caribbean coastline. Its westward progress may slow over mountainous central Nicaragua, but it normally continues to western Honduras and El Salvador during the evening and early morning—assuming the

⁵⁰However, in the near future doppler radar and vertical profilers promise greatly improved analysis.

⁵¹Pearson et al. (1987), in a detailed high-resolution satellite case study, find this occurrence more likely in the late rainy season (August to October). On the North Pacific coast (e.g., El Salvador) where the sea breeze opposes the prevailing easterlies, the convection normally develops later and dissipates in late afternoon.

700 mb wind flow is between 10 and 20 kt and the 200 mb flow pattern displays sufficient ridging/diffuence to support thunderstorm activity (Pearson et al., 1987).

- In the absence of tropical waves and temporals, etc., diffuent sea breezes normally provide clearing in the late morning in the vicinity of the Gulf of Fonseca; however, land breeze confluence enhances convection during the evening and early morning in the same vicinity.
- In addition to the enhanced rainfall attributed to the arrival of tropical waves, “Temporals” cause lengthy and heavy rainfall episodes, mostly near the North Pacific coast of Central America. They last an average of 2 to 3 days with embedded very strong convective activity sometimes accompanied by gale force winds, but without significant electrical activity. Although not discussed in detail in this handbook, the Temporal is expected to move slowly along the North Pacific coast toward the northwest—yet some Temporals are quasi-stationary or may move in another direction. Expect an average occurrence of one Temporal⁵² per year in both September and October, but only one *every two years* in June (Lessman, 1963).
- While the monsoon trough—a line of low-level confluence, frequently with embedded low centers—is normally located on the North Pacific Ocean side of Central America, it occasionally relocates to the western Caribbean Sea producing heavy convection off the east coasts of Honduras, Nicaragua and Costa Rica for several days. With the monsoon trough on the Caribbean side of Central America, *southerly* flow will lead to convection and cloudiness on the southwest-facing slopes and clearing on the northeast-facing slopes of Central America (Pearson et al., 1987).
- Enhanced convection⁵³ can be expected periodically over the warm, shallow Mosquito Banks (east of Nicaragua), as well as in the Gulf of Mosquitos (north of western Panama). Mostly cloudy skies with heavy convection is prevalent over the Caribbean-facing slopes of the Corillera de Talamanca mountains of Costa Rica and western Panama.
- If only NOGAPS analyses are available, synoptic features may be depicted; however, mesoscale features likely will be missing due to the coarse resolution. Improved Navy models are expected in 1989.

⁵²Lessman (1963) reports that rainfall records measured continuous rainfall of up to 426 mm (~17 inches) during ~23 hours which was only part of the whole Temporal during 6 to 8 September 1961. Lessman, in his study of El Salvador and the North Pacific coast, further describes the Temporal as a warm-core low level cyclone, often with its origin linked to the ITCZ or to a resonance depression promoted by a hurricane crossing the western Caribbean Sea.

⁵³See Appendix B for coastal stations bordering the Mosquito Banks, such as Bluefields, Nicaragua, exhibiting inordinately high rainfall totals during the rainy season.