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Fig. 1.1. Conceptual model of transformation stage of ET in the western North Pacific, with labeled areas as follows: 1) environmental equatorward flow of cooler, drier air (with corresponding open cell cumulus); 2) decreased TC convection in the western quadrant (with corresponding dry slot) in step 1, which extends throughout the southern quadrant in steps 2 and 3; 3) environmental poleward flow of warm, moist air is ingested into TC circulation, which maintains convection in the eastern quadrant and results in an asymmetric distribution of clouds and precipitation in steps 1 and 2; steps 2 and 3 also feature a southerly jet that ascends tilted isentropic surfaces; 4) ascent of warm, moist inflow over tilted isentropic surfaces associated with baroclinic zone (dashed line) in middle and lower panels; 5) ascent (undercut by dry-adiabatic descent) that produces cloudbands wrapping westward and equatorward around the storm center; dry-adiabatic descent occurs close enough to the circulation center to produce erosion of eyewall convection in step 3; 6) cirrus shield with a sharp cloud edge if confluent with polar jet. Caption and figure reproduced from Fig. 5 in Klein et al. (2000).

Fig. 1.2. Composite 500-hPa height (m) and sea level pressure (hPa, only below 1008 hPa with shading in 4-hPa increments starting at 1004 hPa) analyses based on grouping of cases in a northwest pattern at the (a) ET time, (b) ET + 24 h, and in a northeast pattern at the (c) ET time and (d) ET + 24 h. The composite northwest pattern is based on 13 cases and the northeast pattern is based in 17 cases. Caption and figure reproduced from Fig. 1 in Harr et al. (2000).

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Fig. 1.7. Schematics for landfalling tropical cyclones for (a) the LOC composite and (b) the ROC composite. The curved black lines represent streamlines of the upper-tropospheric (i.e., 250 hPa) flow. Arrows represent motion and deep tropospheric shear with the relative magnitudes given by the length of the arrow. The curved green line represents the trajectory of a parcel starting near the surface in the warm sector and ending in the mid- to upper troposphere in the cool sector. The gray shaded area represents regions of precipitation and pluses and minuses represent the local PV tendency resulting from a combination of advection and the diabatic redistribution of PV. Caption and figure reproduced from Fig. 10 in Atallah et al. (2007).

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Fig. 3.3. Same as Fig. 3.2., except at 1800 UTC 19 August 1969.

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Fig. 3.6. (a) Map of potential temperature on the 2 PVU surface (shaded every 5 K; every 10 K below 340 K), 850–200-hPa wind shear (barbs, kt), and 925–850-hPa layer-averaged relative vorticity (solid black every 0.5 10^{-4} s^{-1} starting at 0.5 × 10^{-4} s^{-1}) at 0600 UTC 19 August 1969. The yellow star denotes the position of TC Camille as depicted by the ERA-40. The black line denotes the location of the vertical cross section shown in Fig. 3.6b. (b) North–south vertical cross section of PV (shaded every 1 PVU), potential temperature (solid black every 4 K), and horizontal wind speed (dashed green every 5 m s^{-1} starting at 15 m s^{-1}) at 0600 UTC 19 August 1969. The yellow star denotes the location of TC Camille along the cross section.

Fig. 3.7. Same as Fig. 3.6, except at 1800 UTC 19 August 1969. The black line in (a) denotes the location of the vertical cross section shown in Fig. 3.7b.

Fig. 3.8. Same as Fig. 3.6, except at 0600 UTC 20 August 1969. The black line in (a) denotes the location of the vertical cross section shown in Fig. 3.8b.

Fig. 3.9. Same as Fig. 3.6, except at 1800 UTC 20 August 1969. The black line in (a) denotes the location of the vertical cross section shown in Fig. 3.9b.

Fig. 3.10. Map of PW (shaded, mm), 700-hPa vertical motion (light blue contour every 2 × 10^{-3} hPa s^{-1}, negative values only), 925-hPa geopotential height (solid black every 3 dam), 925-hPa potential temperature (dashed pink every 2 K), and 925-hPa winds (barbs, kt) at 0600 UTC 19 August 1969. The green TC symbol denotes the position of TC Camille as depicted by the ERA-40.

Fig. 3.11. Same as Fig. 3.10, except at 1800 UTC 19 August 1969.

Fig. 3.12. Same as Fig. 3.10, except at 0600 UTC 20 August 1969. The black line denotes the location of the vertical cross section shown in Figs. 3.24–3.26.

Fig. 3.13. Same as Fig. 3.10, except at 1800 UTC 20 August 1969.

Fig. 3.14. Adapted radar summary chart at 2245 UTC 19 August 1969. The yellow star denotes the approximate location of Nelson County, Virginia. The green TC symbol denotes the position of TC Camille as depicted by the ERA-40.

Fig. 3.15. Same as Fig. 3.14, except at 0045 UTC 20 August 1969.

Fig. 3.16. Same as Fig. 3.14, except at 0245 UTC 20 August 1969.

Fig. 3.17. Same as Fig. 3.14, except at 0445 UTC 20 August 1969.

Fig. 3.18. Same as Fig. 3.14, except at 0645 UTC 20 August 1969.

Fig. 3.19. Same as Fig. 3.14, except at 0845 UTC 20 August 1969.

Fig. 3.20. Same as Fig. 3.14, except at 1045 UTC 20 August 1969.

Fig. 3.21. Surface analysis at 0000 UTC 20 August 1969 displaying MSLP (solid black every 2 hPa), wind (barbs, kt), dewpoint (dashed green every 2°C), and temperature (dashed red every 2°C). The yellow star denotes the approximate location of Nelson County, Virginia. The green TC symbol denotes the position of TC Camille as depicted by the ERA-40.

Fig. 3.22. Same as Fig. 3.21, except at 0600 UTC 20 August 1969.

Fig. 3.23. Same as Fig. 3.21, except at 1200 UTC 20 August 1969.

Fig. 3.24. North–south vertical cross section of Petterssen frontogenesis [shaded, K (100 km)$^{-1}$ (3 h)$^{-1}$], potential temperature (solid black every 4 K), vertical motion (dashed red every 2×10^{-3} hPa s^{-1}, negative values only), horizontal wind speed (solid orange every 5 m s^{-1} starting at 15 m s^{-1}) and the ageostrophic wind component tangential to the cross section (arrows, m s^{-1}) at 0000 UTC 20 August 1969. The yellow star denotes the approximate location of Nelson County along the cross section. The location of the vertical cross section is shown in Fig. 3.12.

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Fig. 4.3. Same as Fig. 4.2, except at 0600 UTC 23 July 1997.

Fig. 4.4. Same as Fig. 4.2, except at 1800 UTC 23 July 1997.

Fig. 4.5. Same as Fig. 4.2, except at 0600 UTC 24 July 1997.

Fig. 4.6. Same as Fig. 4.2, except at 1800 UTC 24 July 1997.

Fig. 4.7. GOES-8 infrared satellite images taken at (a) 2345 UTC 22 July 1997, (b) 1145 UTC 23 July 1997, (c) 2345 UTC 23 July 1997, and (d) 1145 UTC 24 July 1997. The yellow star denotes the approximate location of TC Danny. [Images courtesy of the NCDC GIBBS (Global ISCCP B1 Browse System) page available at http://www.ncdc.noaa.gov/gibbs/.]

Fig. 4.8. National radar summary composites (shaded every 5 dB*Z*) at (a) 0000 UTC 23 July 1997, (b) 1200 UTC 23 July 1997, (c) 0000 UTC 24 July 1997, and (d) 1200 UTC 24 July 1997. The "D" symbol denotes the rainfall region associated with TC Danny. [Images available at http://www.mmm.ucar.edu/imagearchive/.]

Fig. 4.9. (a) Map of potential temperature on the 2 PVU surface (shaded every 5 K), 850–200-hPa wind shear (barbs, kt), and 925–850-hPa layer-averaged relative vorticity (solid black every 1×10^{-4} s^{-1} starting at 1×10^{-4} s^{-1}) at 1800 UTC 22 July 1997. The yellow star denotes the position of TC Danny as depicted by the CFSR. The black line denotes the location of the vertical cross section shown in Fig. 3.9b. (b) North–south vertical cross section of PV (shaded every 1 PVU), potential temperature (solid black every 4 K), and horizontal wind speed (dashed green every 5 m s^{-1} starting at 15 m s^{-1}) at 1800 UTC 22 July 1997. The yellow star denotes the location of TC Danny along the cross section.

Fig. 4.10. Same as Fig. 4.9, except at 0600 UTC 23 July 1997. The black line in (a) denotes the location of the vertical cross section shown in Fig. 4.10b.

Fig. 4.11. Same as Fig. 4.9, except at 1800 UTC 23 July 1997. The black line in (a) denotes the location of the vertical cross section shown in Fig. 4.11b and Fig. 4.33.

Fig. 4.12. Same as Fig. 4.9, except at 0600 UTC 24 July 1997. The black line in (a) denotes the location of the vertical cross section shown in Fig. 4.12b and Fig. 4.34.

Fig. 4.13. Same as Fig. 4.9, except at 1800 UTC 24 July 1997. The black line in (a) denotes the location of the vertical cross section shown in Fig. 4.13b and Fig. 4.35.

Fig. 4.14. Map of PW (shaded, mm), 700-hPa vertical motion (light blue contour every 5 $\times 10^{-3}$ hPa s^{-1}, negative values only), 925-hPa geopotential height (solid black every 3 dam), 925-hPa potential temperature (dashed pink every 2 K), and 925-hPa winds (barbs, kt) at 1800 UTC 22 July 1997. The green TC symbol denotes the position of TC Danny as depicted by the CFSR.

Fig. 4.15. Same as Fig. 4.14, except at 0600 UTC 23 July 1997.

Fig. 4.16. Observed Atlanta, Georgia (KFFC), sounding valid at 1200 UTC 23 July 1997.

Fig. 4.17. Same as Fig. 4.14, except at 1800 UTC 23 July 1997.

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Fig. 4.21. (a) WSR-88D 0.5° base reflectivity image from Birmingham, Alabama (KBMX), taken at 0013 UTC 23 July 1997. (b) GOES-8 visible satellite image taken at 2315 UTC 22 July 1997.

Fig. 4.22. (a) WSR-88D 0.5° base reflectivity image from Atlanta, Georgia (KFFC), taken at 1218 UTC 23 July 1997. (b) GOES-8 visible satellite image taken at 1215 UTC 23 July 1997.

Fig. 4.23. (a) WSR-88D 0.5° base reflectivity image from Greer, South Carolina (KGSP), taken at 0015 UTC 24 July 1997. (b) GOES-8 visible satellite image taken at 2315 UTC 23 July 1997.

Fig. 4.24. (a) WSR-88D 0.5° base reflectivity image from Wakefield, Virginia (KAKQ), taken at 1318 UTC 24 July 1997. (b) GOES-8 visible satellite image taken at 1315 UTC 24 July 1997.

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Fig. 4.27. Map of 250-hPa wind speed (shading, kt), 250-hPa PV (solid gray every 1 PVU), 250-hPa relative humidity (gray shading, %), 600–400-hPa layer-averaged vertical motion (solid red every 4×10^{-3} hPa s^{-1}, negative values only), and 300–200-hPa layer-averaged irrotational wind (vectors starting at 5 m s^{-1}) at 1800 UTC 23 July 1997. The green TC symbol denotes the position of TC Danny as depicted by the CFSR.

Fig. 4.28. Same as Fig. 4.27, except at 0600 UTC 24 July 1997.

Fig. 4.29. Same as Fig. 4.27, except at 1800 UTC 24 July 1997.

Fig. 4.30. Surface analysis at 1200 UTC 23 July 1997 displaying MSLP (solid black every 2 hPa), winds (barbs, kt), dewpoint (dashed green every 2°C), and temperature (dashed red every 2°C). The green TC symbol denotes the position of TC Danny as depicted by the CFSR.

Fig. 4.31. Same as Fig. 3.30, except at 0000 UTC 24 July 1997.

Fig. 4.32. Same as Fig. 3.30, except at 1200 UTC 24 July 1997.

Fig. 4.33. North–south vertical cross section of Petterssen frontogenesis [shaded, K (100 km)$^{-1}$ (3 h)$^{-1}$], potential temperature (solid black every 4 K), vertical motion (dashed red every 4×10^{-3} hPa s^{-1}, negative values only), horizontal wind speed (solid orange every 5 m s^{-1} starting at 15 m s^{-1}), and the ageostrophic wind component tangential to the cross section (arrows, m s^{-1}) at 1800 UTC 23 July 1997. The yellow star denotes the position of TC Danny as depicted by the CFSR. The location of the vertical cross section is shown in Fig. 4.11.

Fig. 4.34. Same as Fig. 4.33, except a north-northwest–south-southeast vertical cross section at 0600 UTC 24 July 1997. The location of the vertical cross section is shown in

Fig. 4.35. Same as Fig. 4.33, except a north-northwest–south-southeast vertical cross section at 1800 UTC 24 July 1997. The location of the vertical cross section is shown in

Fig. 5.1. Conceptual models depicting important mechanisms and processes leading to (a) “Camille-like” and (b) “Danny-like” events. For both conceptual models, 500-hPa geopotential height is indicated by solid black contours, the positive PV anomaly is shaded in orange, the upper-tropospheric jet is shaded in light blue, regions of warm-air advection and cold-air advection are indicated by red and blue shaded regions, respectively, and areas of PW exceeding 50 mm are shaded in light green. The red TC symbol indicates the position of the TC. (a) Low-level jet is indicated by the orange arrow. The placement of orography is indicated by the triangular symbols. The approximate area of heaviest rainfall is indicated by dark green shading. (b) Diabatically driven outflow is indicated by the black arrows emanating from the TC.