

Abstract for a talk at the workshop: "Atmospheric Convection and Air-Sea Interactions over the Tropical Oceans," 7-9 May 2019

Perspectives and Unfinished Results from Field Programs over the Tropical Atlantic, Pacific, and Indian Oceans: GATE, TOGA-COARE, and DYNAMO.

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The speaker has participated in all three of the major tropical oceanic field programs, conducted over each of the three major oceans: GATE in the Atlantic, TOGA-COARE in the Pacific, and DYNAMO in the Indian Ocean. All involved aircraft, ships, and radars. Held at ~20 year intervals, these field campaigns used evermore sophisticated instruments. All investigated the atmospheric and oceanic boundary layers, convective clouds, and associated large-scale circulation. An important result is that we now understand that mesoscale processes are a crucial link. Another result is the critical importance of convective and mesoscale cold pools in the boundary layer. Cloud microphysical processes and environmental thermodynamics have been well documented. Unresolved issues include how are how processes in the undisturbed boundary layer transition into disturbed (convective) regimes and how upper tropospheric processes affect the evolution of convective cloud populations. An insufficiently explored aspect is how the populations of convective clouds affect momentum transports. These topics will be summarized as a starting point for thinking about future research on convection over the tropical oceans.