# Analysis of TRMM-LIS lightning and related microphysics using a cell-scale database

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Previous studies of tropical lightning activity using Tropical Rainfall Measurement Mission (TRMM) Lightning Imaging Sensor (LIS) data performed analyses of lightning behavior over mesoscale “feature” scales or over uniform grids. In order to study lightning and the governing ice microphysics intrinsic to thunderstorms at a more process-specific scale (i.e., the scale over which electrification processes and lightning occur in a “unit” thunderstorm), a new convective cell-scale database was developed by analyzing and refining the University of Utah's Precipitation Features database and retaining precipitation data parameters computed from the TRMM precipitation radar (PR), microwave imager (TMI) and LIS instruments. The resulting data base was to conduct a limited four-year study of tropical continental convection occurring over the Amazon Basin, Congo, Maritime Continent and the western Pacific Ocean. The analysis reveals expected strong correlations between lightning flash counts per cell and ice proxies, such as ice water path, minimum and average 85GHz brightness temperatures, and 18dBz echo top heights above the freezing level in all regimes, as well as regime-specific relationships between lighting flash counts and PR-derived surface rainfall rates. Additionally, radar CFADs were used to partition the 3D structure of cells in each regime at different flash counts. The resulting cell-scale analyses are compared to previous mesoscale feature and gridded studies wherever possible.