## **Cloud Aggregation**

Cloud aggregation is a fundamental process involved in the chain of events that produces precipitation. Ice crystal aggregation occurs due to the continuous influence of aerodynamic, inertial, and gravitational forces in clouds that result in collisions. Many recent field projects have observed elongated, chain-like aggregates comprised of ice crystals and frozen droplets in mid- and upper-level clouds produced by tropical (Northern Australia), sub-tropical (Florida), and mid-latitude (Colorado) summertime thunderstorms. Electrical forces have been the main explanation for how similar sized crystals can form long, linear aggregates. Laboratory experiments have demonstrated that chain-like aggregates form with strong electric fields (greater than 60 kV m-1) due to enhance aggregation efficiency likely caused by an induced dipole on the crystals which promotes collisions. Additional observations, laboratory experiments, and modeling work is necessary to understand the aggregation process, and in particular how, where, and when chain aggregation occurs. Machine Learning methods are a critical tool for interpreting the millions of aggregate images obtain during a single research flight. Additionally, aggregate observations need to be put into context with other measurements and related to the storm's life cycle. However, the wide-spread observations of chain aggregates has implications for vehicle flights, interpretation of remotely sensing data (radar, lidar), cloud radiative effect, and electrification processes.