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Abstract: Research aircraft conduct in-situ observations of cloud particles with scattering probes and imaging probes that are able to measure individual particles. Typically, measurements of individual particles are combined over a short (i.e. 1 or 10 s) time period to obtain a particles size distribution. During many field projects, in-situ measurements are obtained to provide details required to understand remote sensing observations made over a much larger area. Even active remote sensing observations (i.e. lidars and radars) make assumptions about particles which affect measurement accuracy. For example, the accuracy of remote sensing measurements in mixed-phase and ice clouds is reduced if spherical particles are assumed instead of using the actual shape of the cloud particles. A common assumption is that particles are randomly distributed in space and do not cluster into patches. In-situ aircraft observations using the particle-by-particle (pbp) data from the Cloud Droplet Probe (CDP) and the asynchronous data from the Two-dimensional Sterographic Probe(2D-S) and High Volume Precipitation Probe (HVPS) show particle clustering in many cloud environments. Analysis of concurrent remote sensing and in-situ measures is conducted to the uncertainty introduced in remote sensing observations by the observed particle clustering.