Background

Cloud droplet size distribution (DSD) retrieval is a near-ubiquitous in-situ cloud study element. DSDs provide information pertinent to better understanding droplet formation, precipitation development, and macro scale dynamic processes. Simulated droplet distributions and their evolution are central to binned cloud models. Improved measurement confidence is mutually beneficial for observationally and model-focused studies –finish this thought---.

Motivation

Sub-precipitation to precipitation sized (~ 2. um – 1. mm diameter) DSDs are commonly measured with two airborne instrument classes; forward scattering and optical array probes. Despite decades of development, both classes are subject to non-trivial uncertainty due to coincidence error (multiple drops detected as one), sample volume uncertainty, and inhomogeneous sizing response.

Objectives

Develop a laboratory optical probe water droplet calibration system.

* Uses probe’s target media (eliminates refractive index complications)
* Creates droplets of highly repeatable size and velocity
* Independent droplet diameter and velocity verification
* Employs autonomous, high precision digital micropositioning stages
* Operates with a range of forward scattering and optical array probes

Remaining work

* Incorporate micropositing stages
* Develop droplet verification image analysis software
* Develop beam mapping algorithms (incorporating stage position and CDP data)