Background

retrieval is a near-ubiquitous in-situ cloud study element.

Cloud droplet size distribution (DSDs) are central to understanding droplet formation, precipitation development, and macro scale dynamic processes. Each

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 bias due to coincidence error, sample volume uncertainty, and inhomogeneous sizing response. Error sources artificially broaden DSDs and compromise derived liquid water content (LWC) values.

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)