Michigan Tech Π Convection Cloud Chamber

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Overview

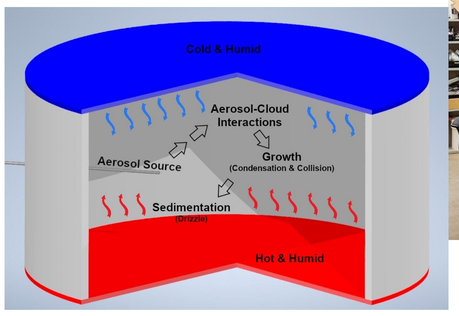
The MTU Π-Chamber is a convection cloud chamber designed to study atmospheric clouds under a wide variety of temperatures and pressures. The internal volume of the Π-Chamber is 3.14m^3, which gives the Π-Chamber its name. The temperatures of the top, bottom, and sidewalls of the chamber are independently controlled, allowing us to create a turbulent environment through Rayleigh-Bénard convection. Because the chamber can form a cloud due to turbulent mixing, we are able to create and maintain a cloud for several hours.

Operating Conditions

Pressure:
- 1.0 to 0.1 atmospheres

Temperature:
- -50 to 40 Celsius

Rayleigh Number:
- ≲2*10^9



https://phy.sites.mtu.edu/cloudchamber/nsf-cif/

Research Topics and Publications

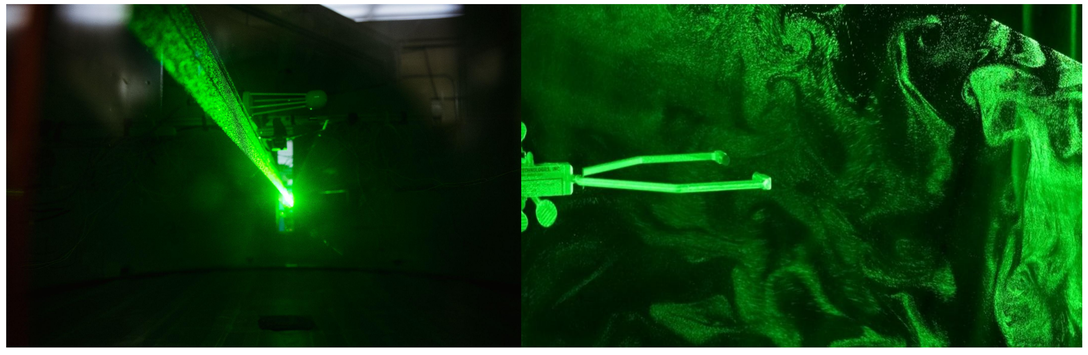
Aerosol-Cloud Interactions
- Soot compaction through cloud processing *(Bhandari et al. 2019).*
- Turbulence induced broadening of the cloud droplet size distribution *(Chandrakar et al. 2016, 2018, Desai et al. 2018).*

Mixed Phase Clouds
- The role of aerosols in the glaciation of mixed phase clouds *(Desai et al. 2019).*
- Ice nucleation in the wake of falling hydrometeors *(Prabhakaran et al 2020).*

Aerosol Removal and Cloud Cleansing Through Activation
- Aerosol activation and cloud formation in a turbulent environment *(Shawon et al. 2021, Prabhakaran et al. 2020).*
- Aerosol removal and cloud collapse is accelerated by supersaturation fluctuations *(Chandrakar et al. 2017)*

Cloud Optical Properties
- Optical blurring due to aerosols *(Packard et al. 2018).*
- Light scattering in a turbulent cloud *(Packard et al. 2020).*

Humid Rayleigh-Bénard Convection
- Properties of turbulence and the large-scale circulation in moist Rayleigh-Bénard convection *(Niedermeier et al. 2018, Anderson et al. 2021).*
- Supersaturation fluctuations in moist Rayleigh-Bénard convection *(Chandrakar et al. 2020).*



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