Occurrence patterns of cloud particles sizes

in cirrus and mixed-phase clouds

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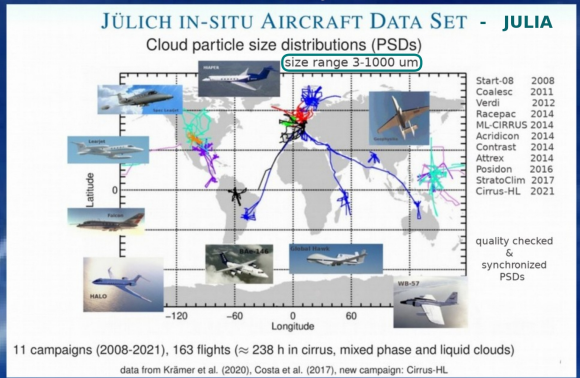
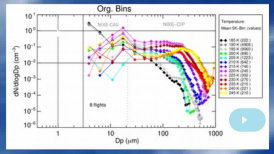
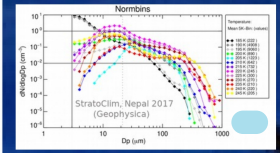
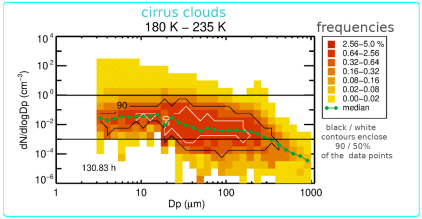
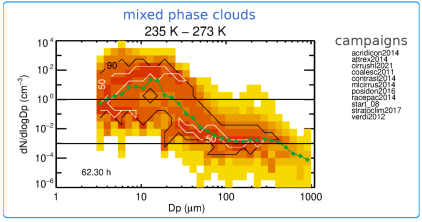






Cloud particle size distributions (PSDs)





➤ **JULIA** PSD-data base: see also subsequent presentations of **Spang et al.** and **Bartolomé-Garcia et al.**

Motivation:

- PSDs determine → microphysical and thus → radiative properties of clouds
- functional forms of PSDs are used for
  → retrievals of satellite cloud observations
  → input for global climate models

  improvement needed to reduce uncertainties in climate forecasts

Task:

Investigate PSDs from the large in-situ data set → emphasis on cirrus and mixed phase clouds

- variability of PSDs (temp., water content, etc.)
- occurrence frequencies of cloud particle sizes

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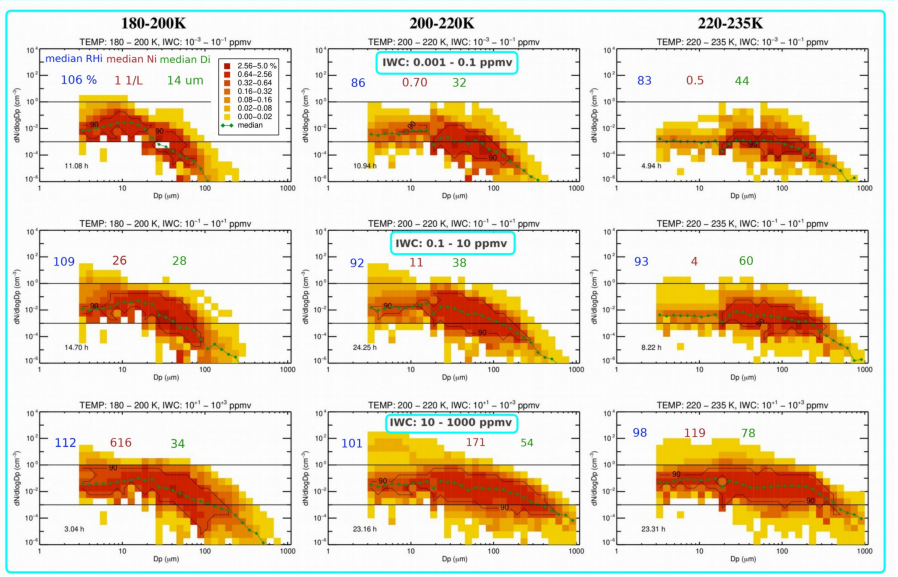
Cirrus clouds

mostly in-situ origin

↓

mostly liquid origin



→ increasing T and IWC larger ice particles (IWC: Ice Water Content)

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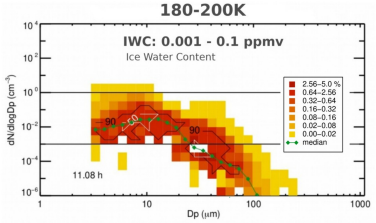
SUMMARY CIRRUS CLOUDS

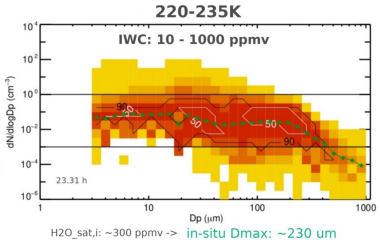
Occurence patterns of ice particle sizes & concentrations

from 131 hours aircraft observations



H2O_sat,i: ~5 ppmv -> in-situ Dmax ~60 um

mostly in-situ origin cirrus



H2O_sat,i: ~300 ppmv -> in-situ Dmax: ~230 um

many liquid origin cirrus

increasing T and IWC ➤ larger ice particles

➤ core size range ~ 20 - 100 µm

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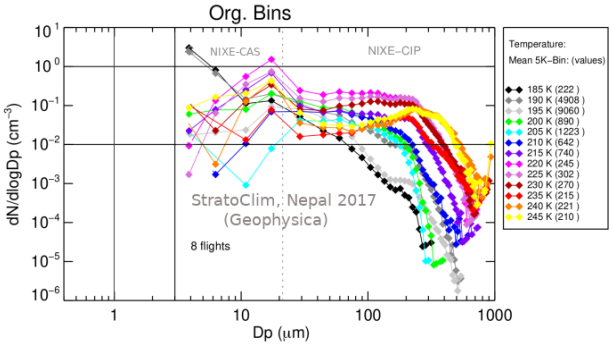
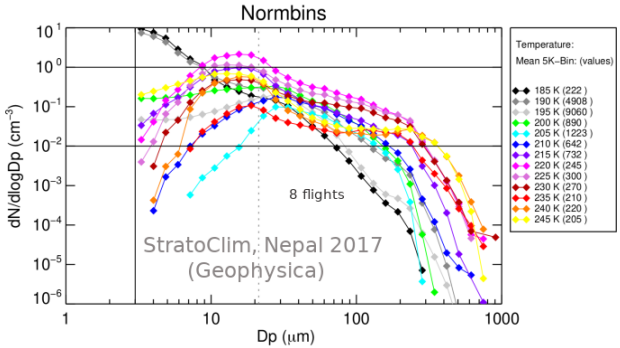
Cloud particle size distributions



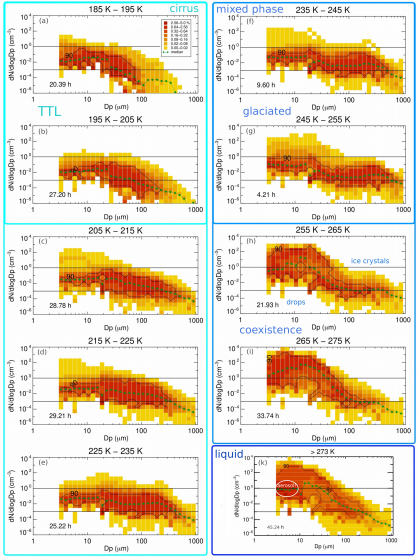
instrument original size bins with unequal width

Cloud particle size distributions



synchronized size bins with equal width

CLOUD PARTICLE SIZE DISTRIBUTIONS (PSDS)



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