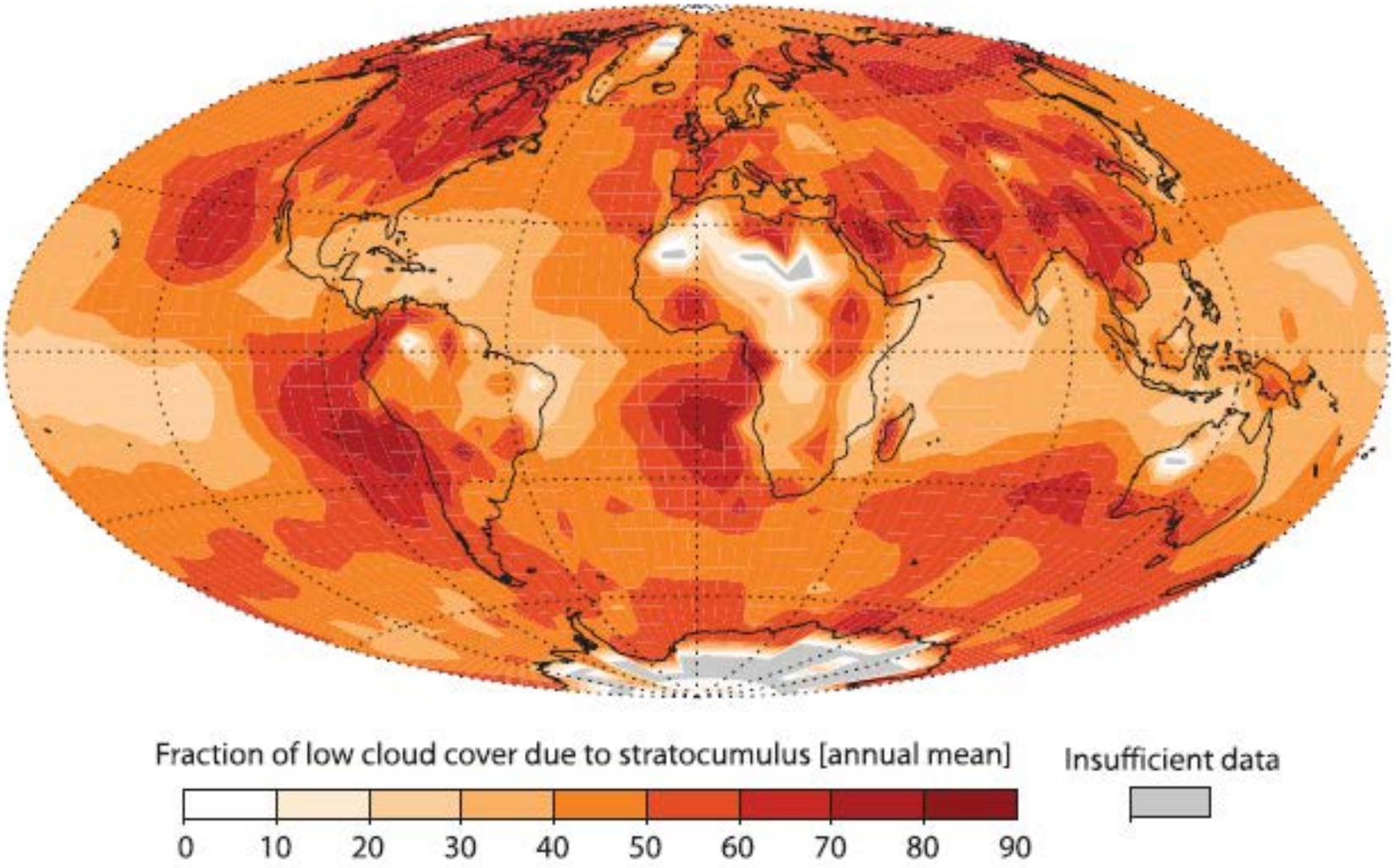
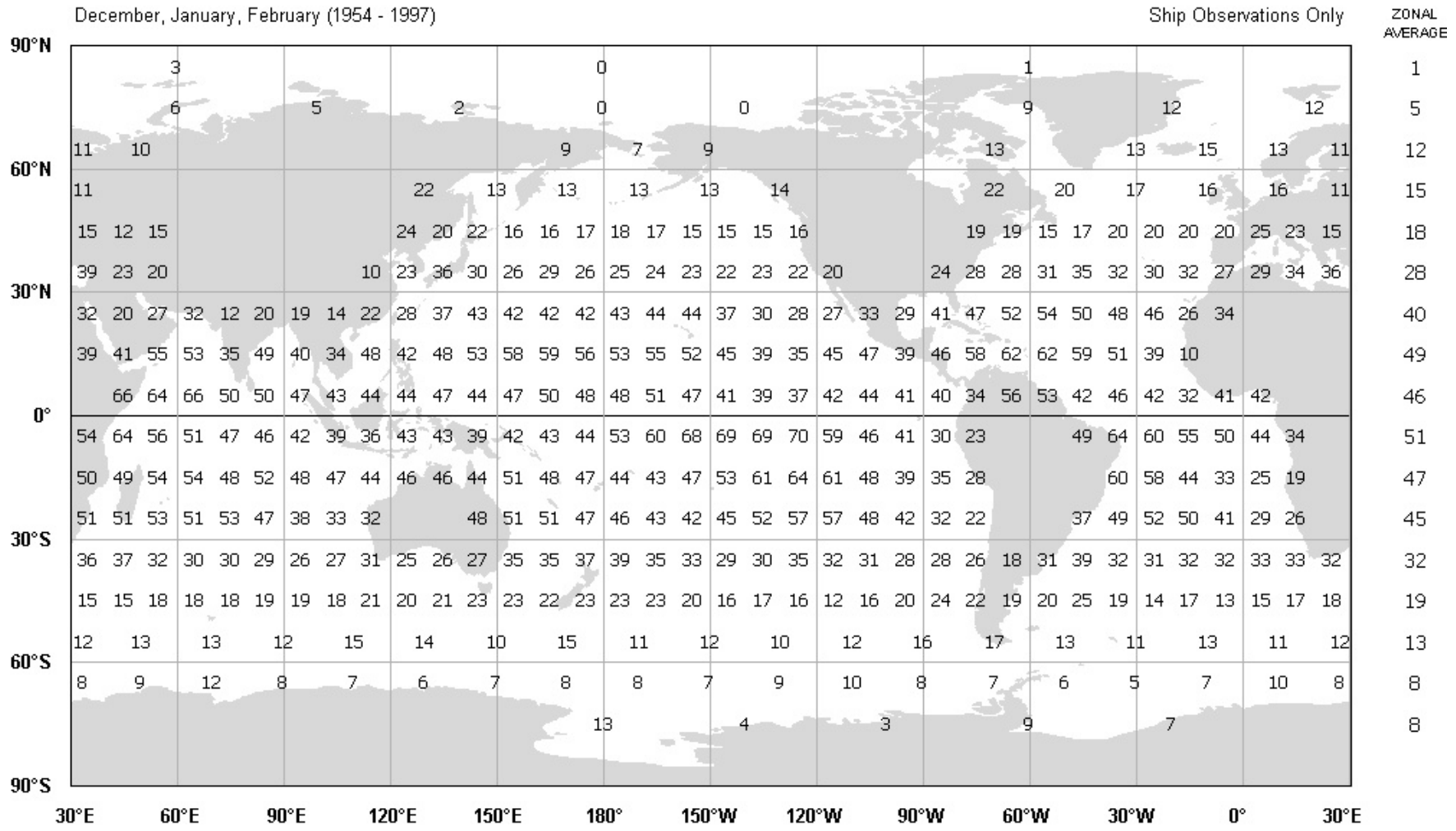
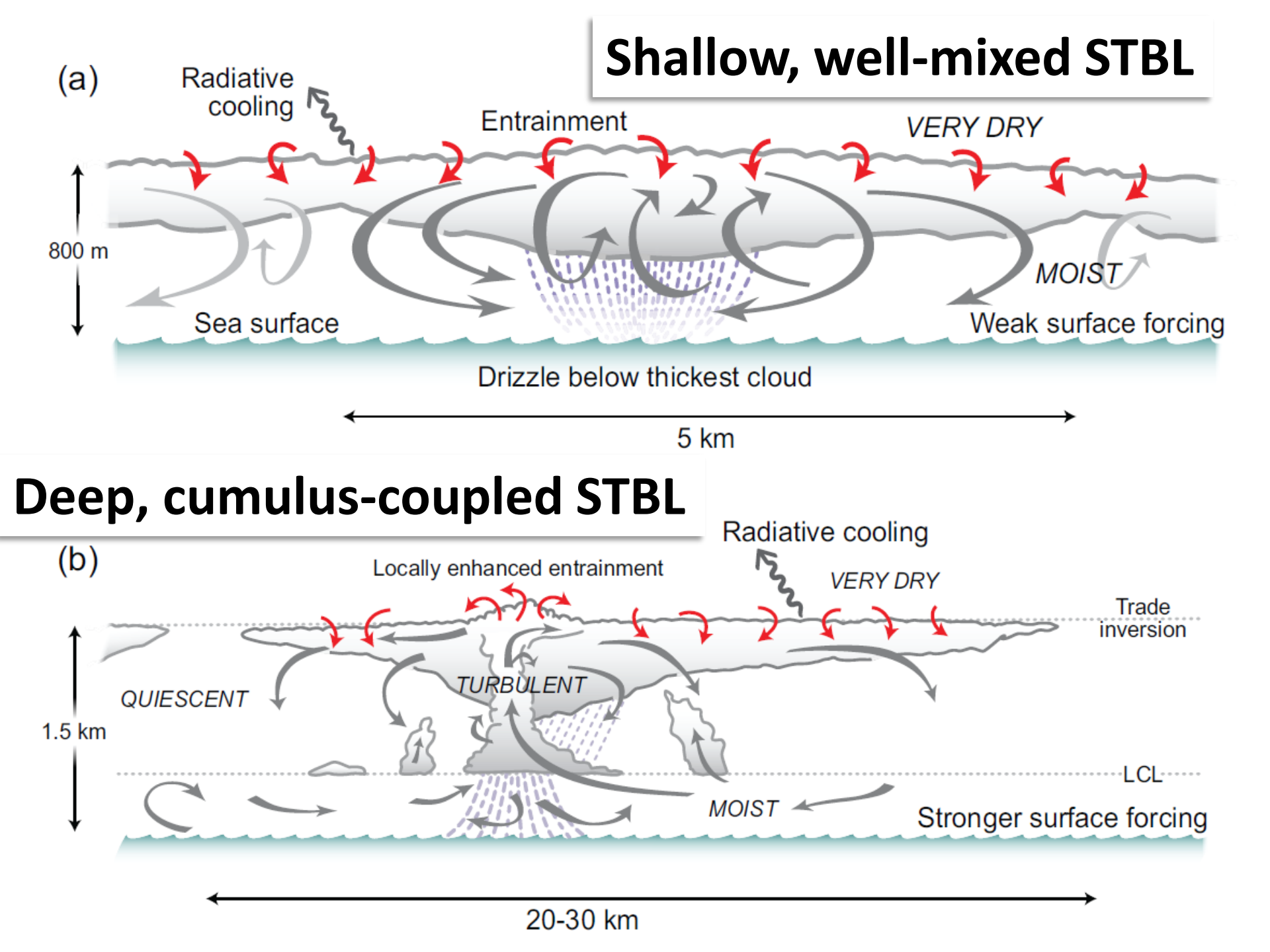
Fraction of low cloud cover due to stratocumulus



Cumulus, frequency of occurrence



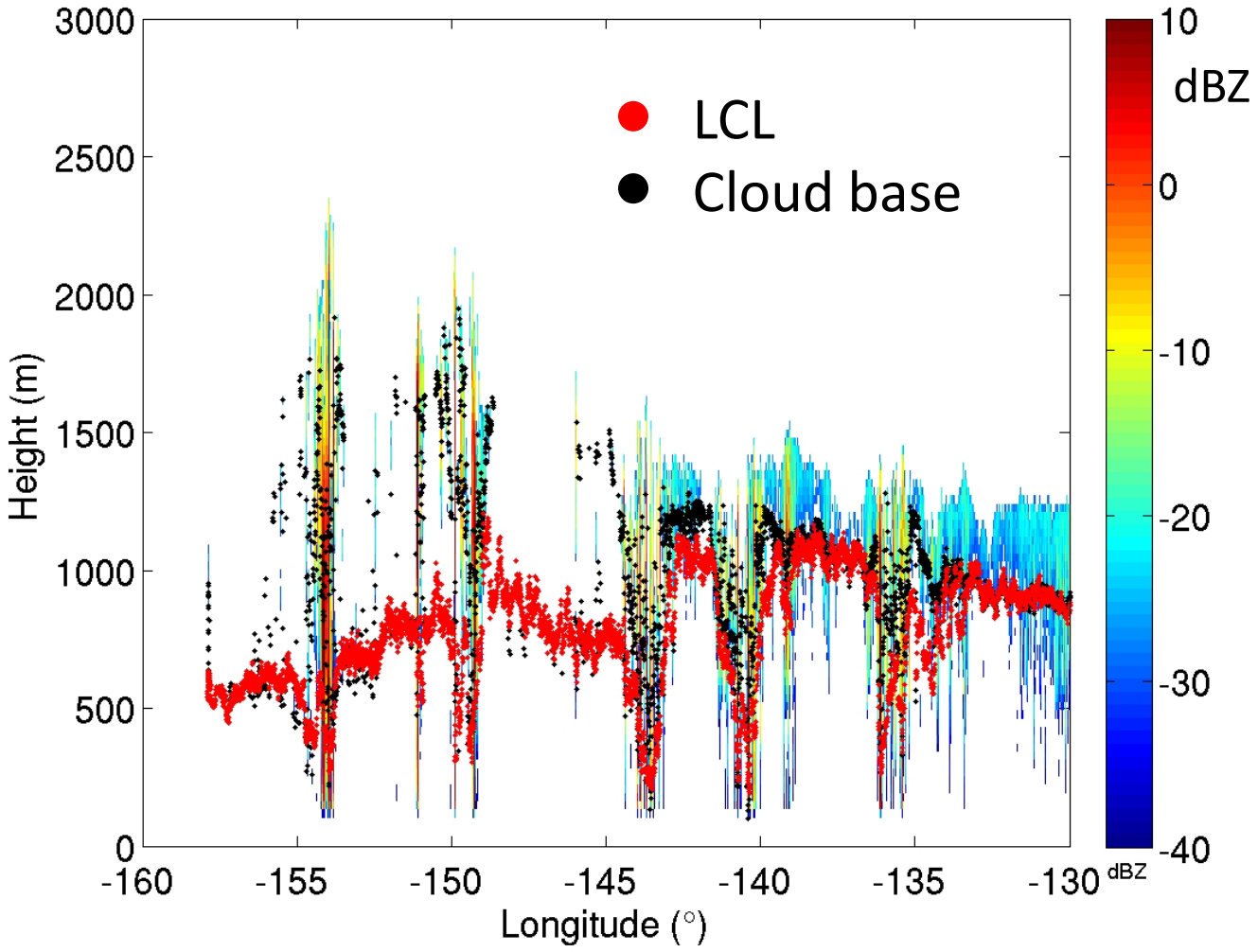
Warren cloud atlas


Shallow, well-mixed STBL
(a)
Radiative cooling
Entrainment
VERY DRY
800 m
MOIST
Sea surface
Weak surface forcing
Drizzle below thickest cloud
5 km
Deep, cumulus-coupled STBL
(b)
Radiative cooling
Locally enhanced entrainment
VERY DRY
Trade inversion
QUIESCENT
TURBULENT
1.5 km
LCL
MOIST
Stronger surface forcing
20-30 km

Stratocumulus to cumulus transition

New sampling approach for a longstanding problem

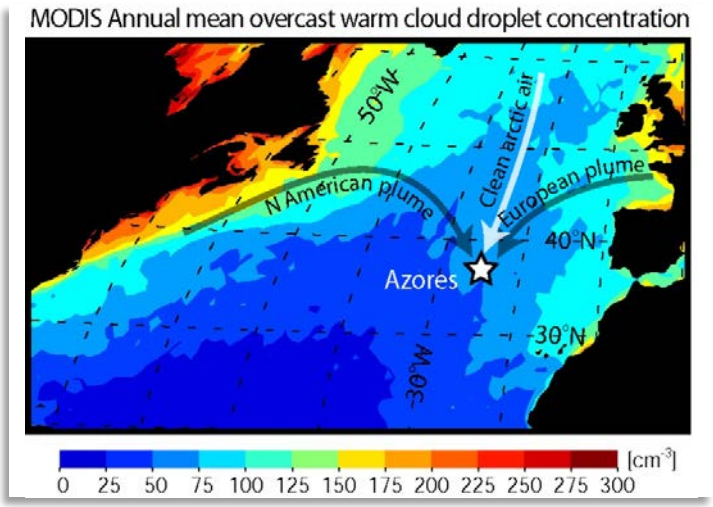
- MAGIC observations
- Will observe multiple transitions over all seasons
- Transition “flavors”



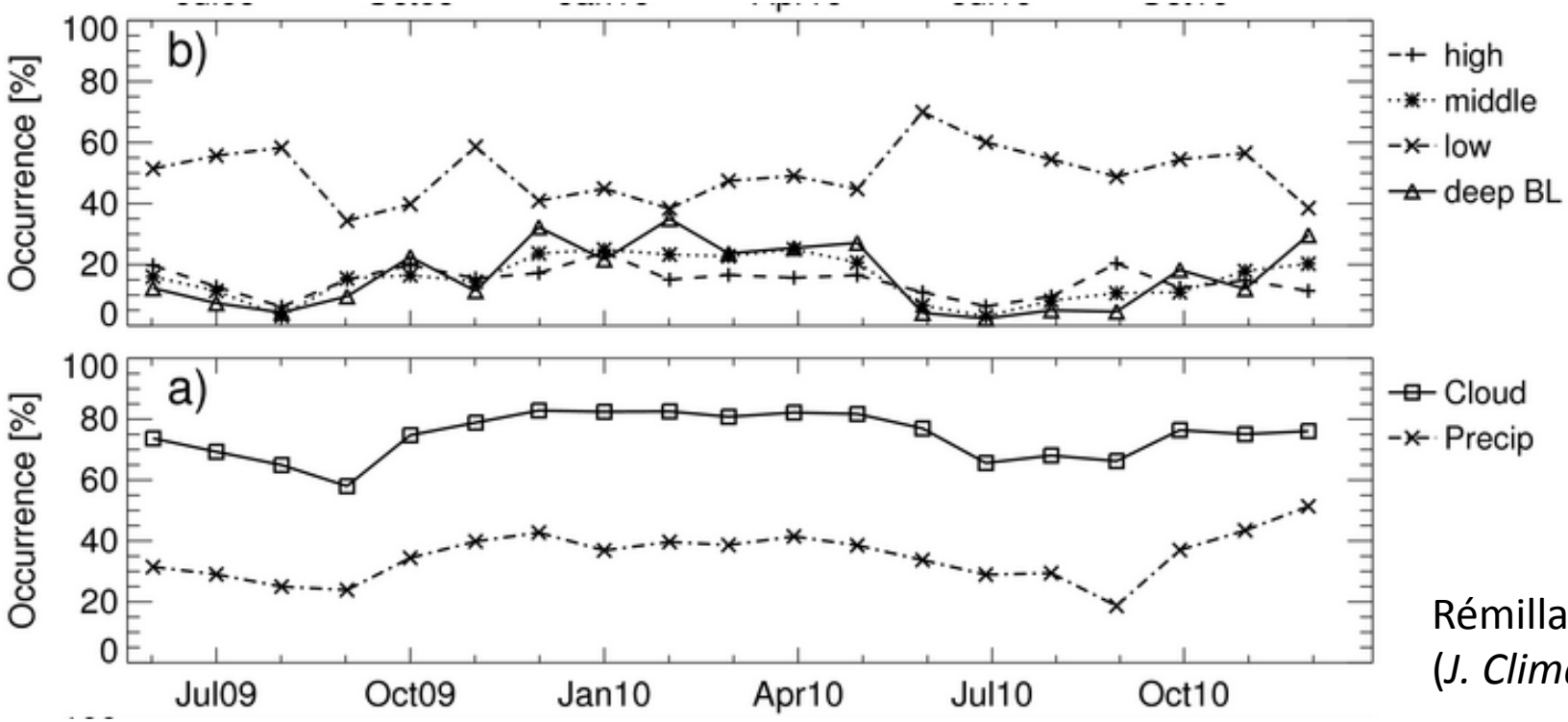
Virendra Ghate, Rutgers

Precipitation temporal variation

Azores, CAP-MBL AMF Deployment [May 2009-Dec 2010]

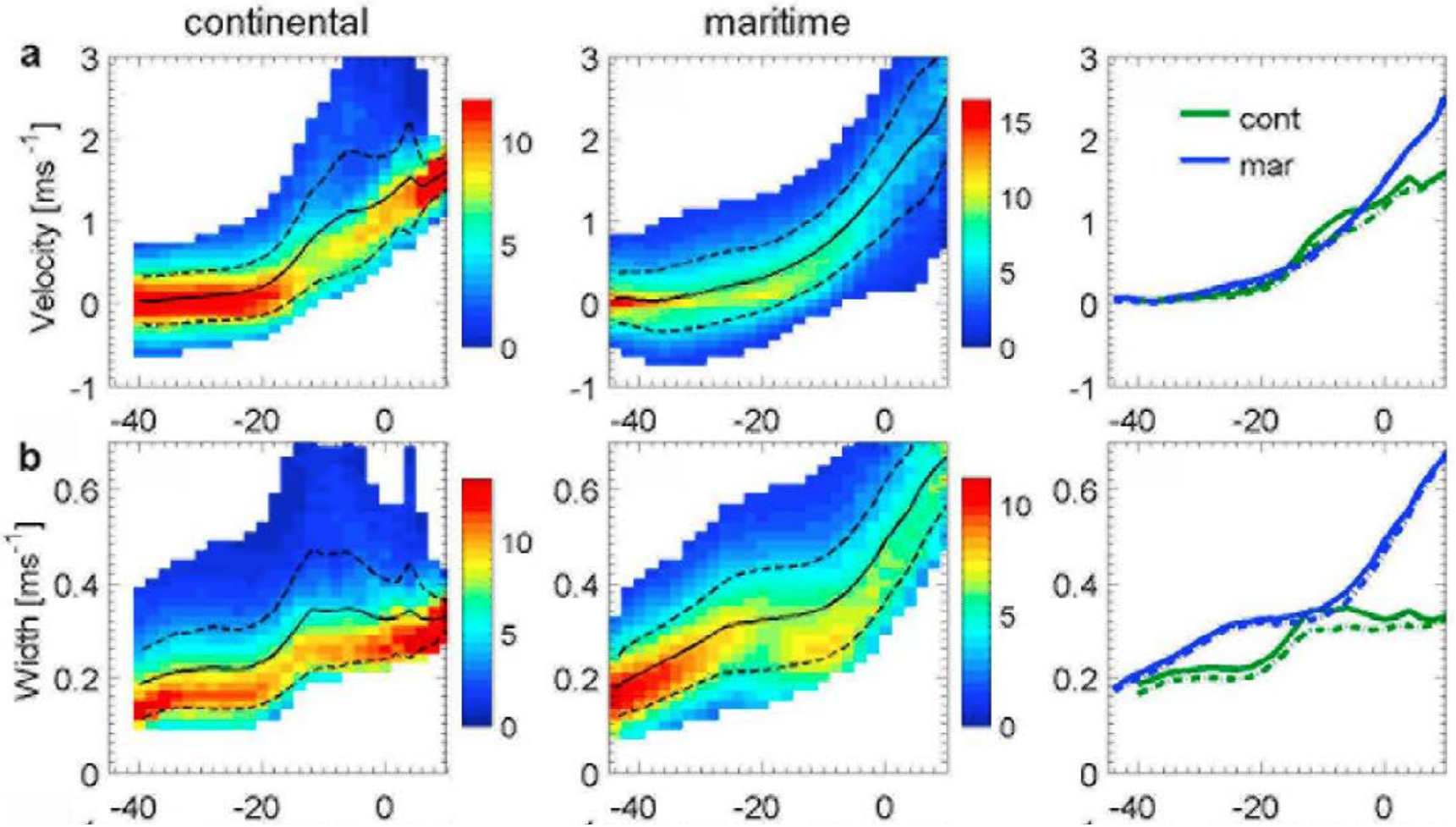


- Cloud cover 60-85% all year, with low clouds dominant
- 50% of clouds precipitate (radar echoes > -15 dBZ)



Rémillard et al. (*J. Climate*, 2012)

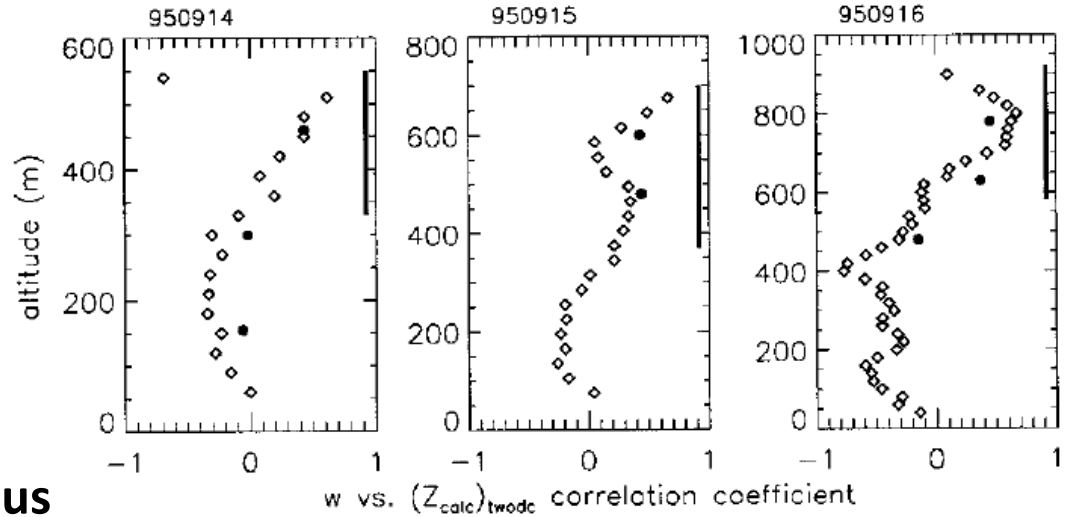
Continental-maritime Sc contrasts



Kollias et al. (2011)

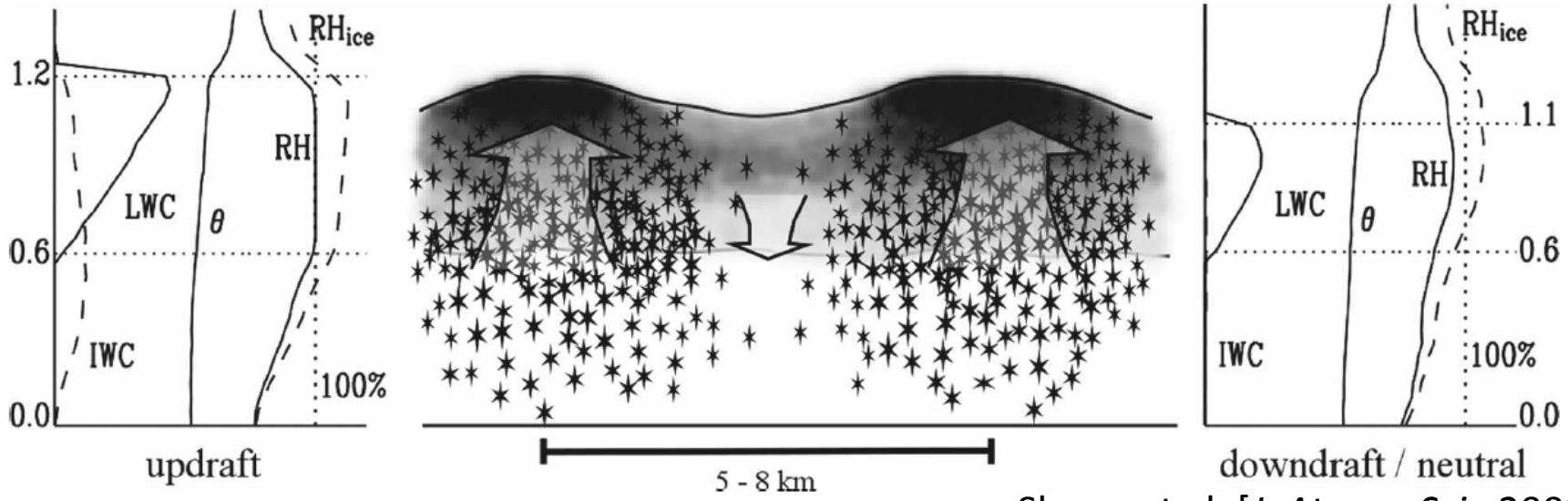
How do stratocumulus properties change across regimes?

Californian Stratocumulus



Vali et al. [*J. Atmos. Sci.*, 1998]

Arctic stratocumulus



Shupe et al. [*J. Atmos. Sci.*, 2008]

Possible objectives

- Sc-Cu transitions
  - What different “flavors” of transitions exist?
  - Are transitions in cloudiness affected by PBL height changes associated with entrainment? Precipitation?
  - How well do process and large-scale models represent transitions?
- We have good ARM observations of Sc from Barrow, SGP and the Azores.
  - What are the similarities and differences?
  - What are roles of surface vs cloud-top driving of turbulence?