Observed influence of moist convection and cloudiness on boundary layer wind and momentum flux profiles

Mariska Koning

Louise Nuijens, Pier Siebesma, Fred Bosveld, Harm Jonker and Remco Verzijlbergh

A.M.Koning@tudelft.nl

TU Delft

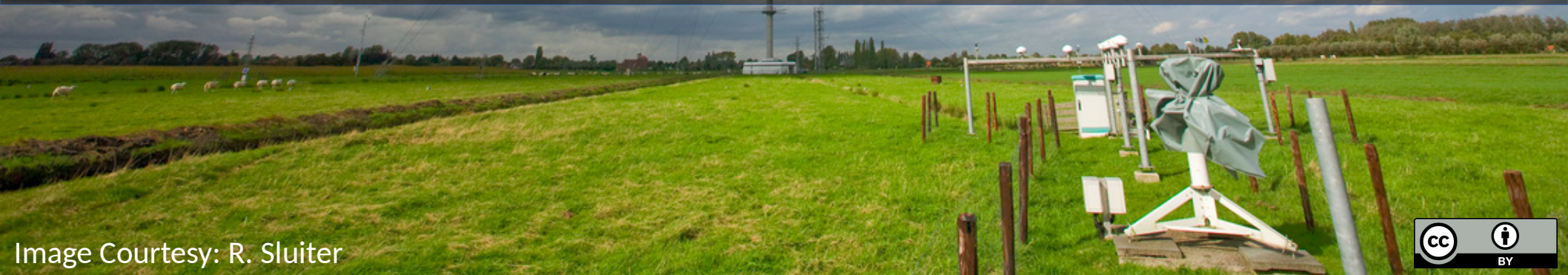
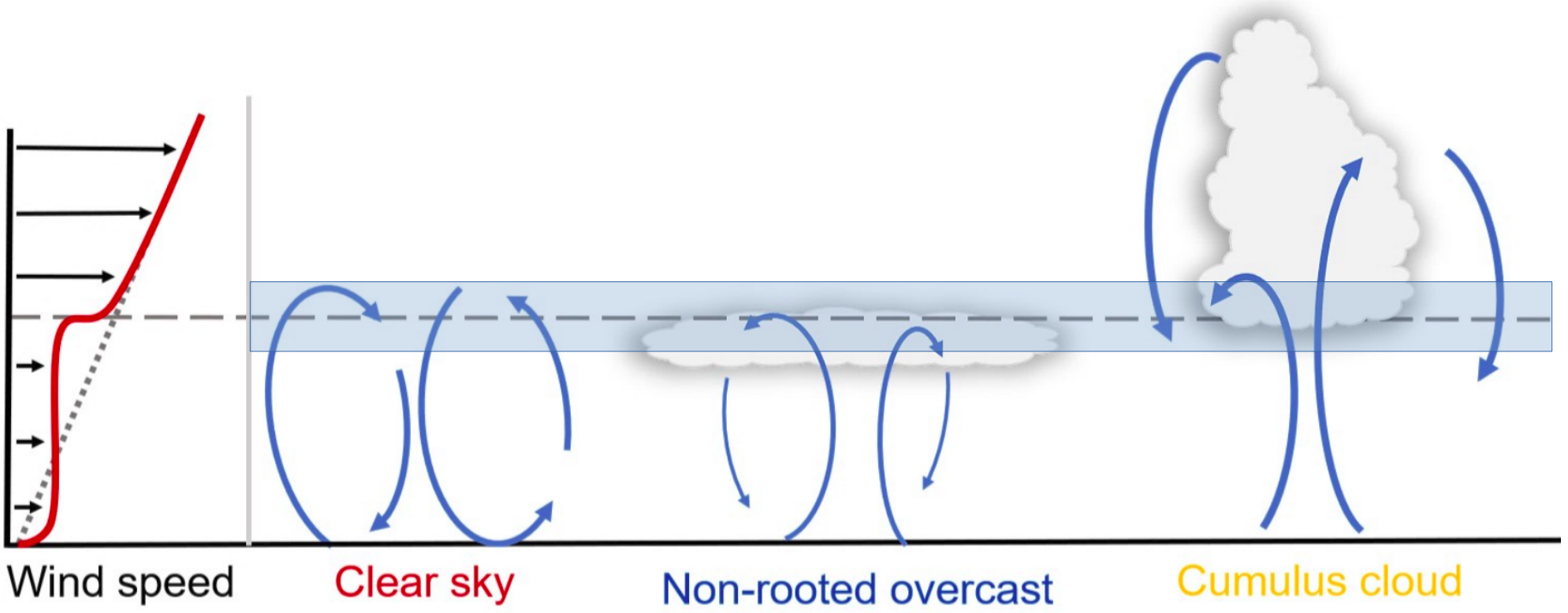
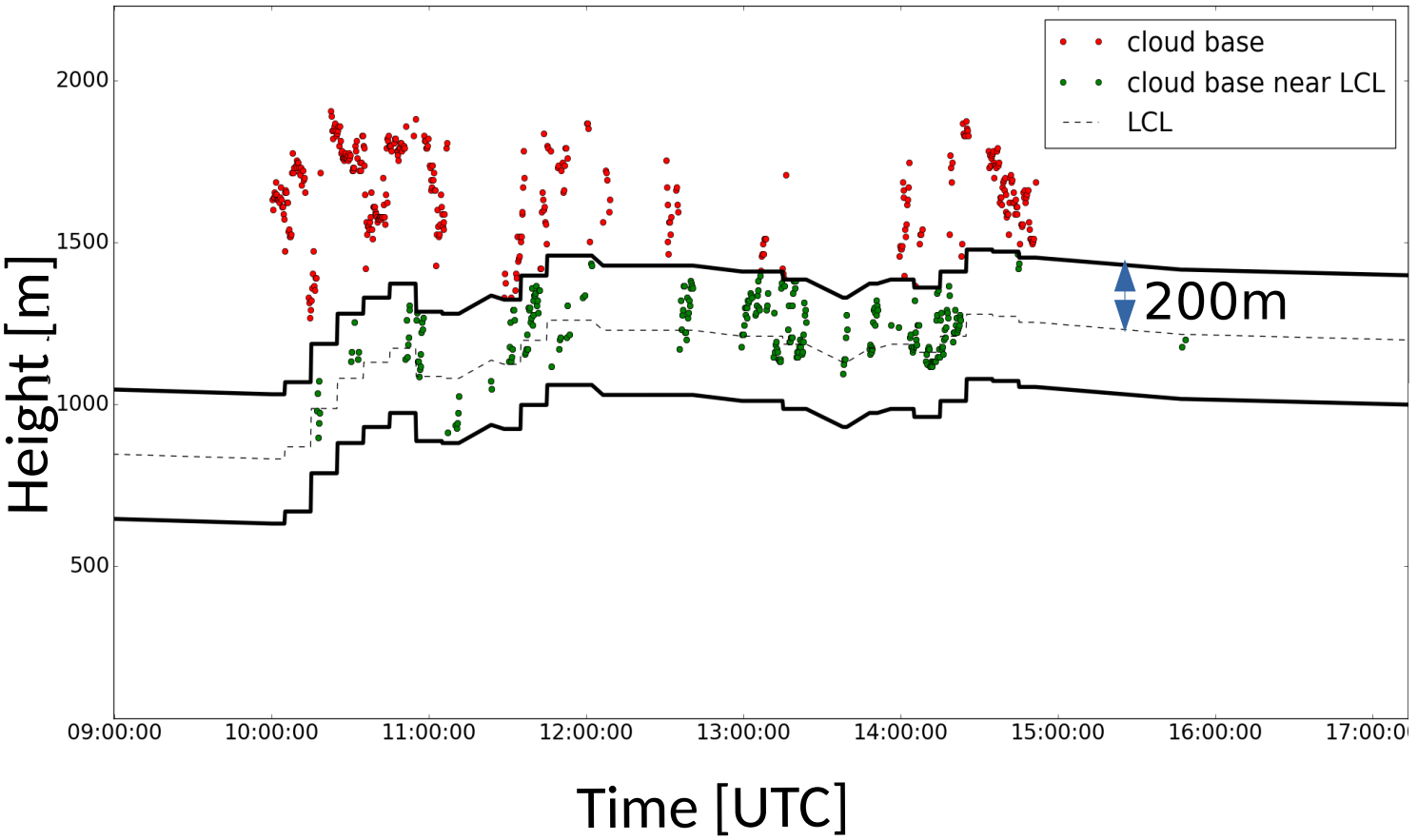


Image Courtesy: R. Sluiter

What are differences in the character of vertical wind mixing and momentum transport for different cloud regimes?



Selection of rooted cloud days



A rooted cloud day has:

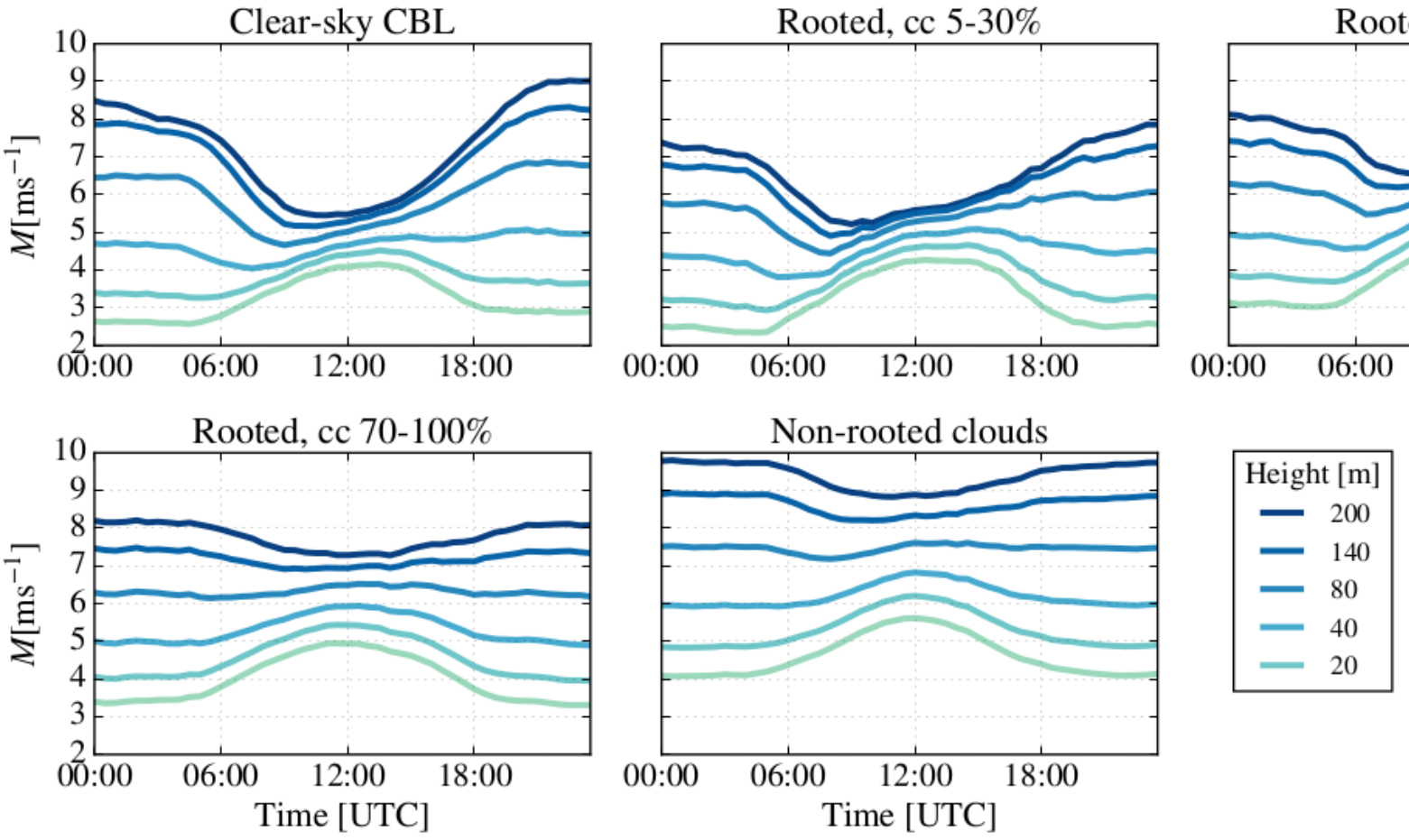
1. $\frac{\bullet}{\bullet + \bullet} \geq 30\%$

   (cloud base near LCL)

2. $\langle w'\theta_v' \rangle_{10\text{-}16h} > 0$

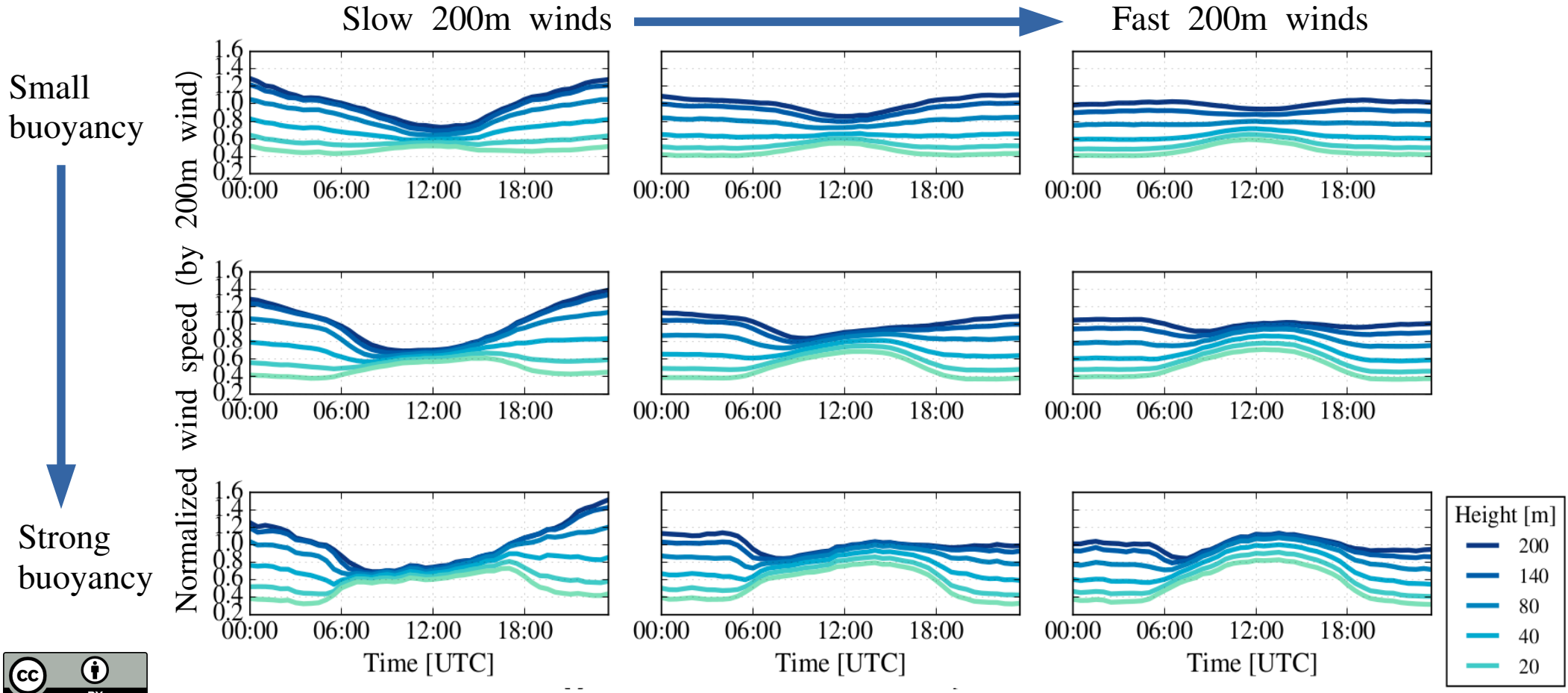
Clear-sky CBL
Rooted, cc 5-30%
Rooted, cc 30-70%
Rooted, cc 70-100%
Non-rooted clouds

Better wind mixing in the surface layer and wind acceleration during shallow convective days

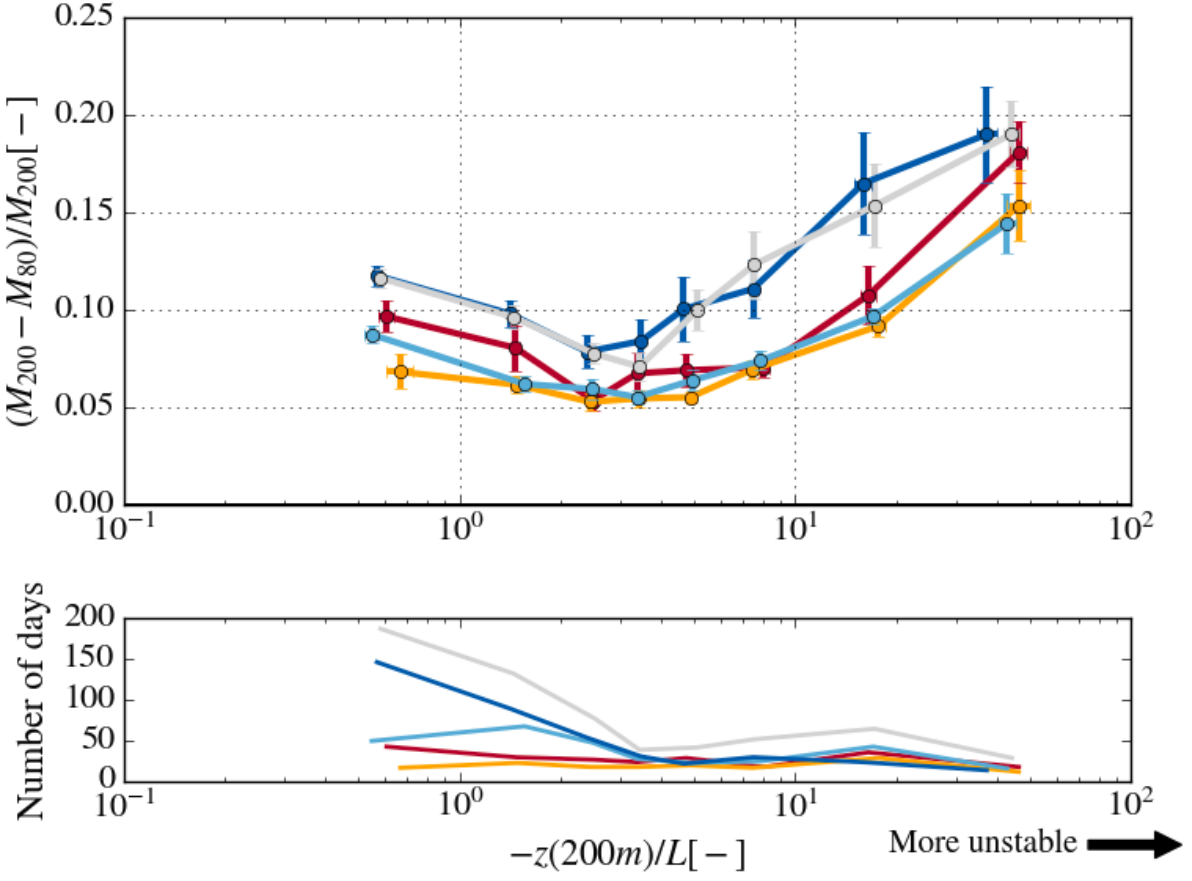


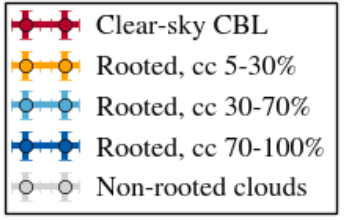
Slower winds and stronger buoyancy have better mixed winds in lowest 200m

*(cloud influence **not** considered here)*



Correcting for wind and buoyancy effects through Obukhov length, non-overcast rooted clouds show better mixed winds





Errorbars show standard error