Mean water vapor mixing ratio profiles for each 2 h period for (a) non-monsoon and (b) monsoon. The dark dashed line in Fig 1a is the median of water vapor profile at the SGP taken from Turner et al. [2014] and the solid dark lines are the median profiles in monsoon and non-monsoon.

- Profiles are nearly constant from 0.3-0.8 z_i, and decreases above 0.8 z_i due to mixing.
- Profiles in the non-monsoon cases decrease fast above z_i, unlike in monsoon cases.
- Median of water vapor from the non-monsoon cases is more similar to the SGP.

The variance and the coefficient of the structure function profiles in the monsoon is larger.

- Variance of the non-monsoon & the SGP are equal between 0.3-0.75 z_i.
- Variance of the monsoon & the SGP are equal between 0.9-1.1 z_i.
- Skewness profiles show a transition from negative to positive just below z_i.

Assuming that the atmospheric variance, \( q^2 \), is mainly as a result of isotropic turbulence within inertial subrange (Monin and Yaglom 1979), the ACF at lag \( \tau \), \( M_z(\tau) \), can be approximated as

\[
M_z(\tau) = q^2 - C \tau^{2/3}
\]

where \( C \) is a parameter that contains both the eddy dissipation and scalar variance dissipation.

The slope of the monsoon is larger than the slope during the non-monsoon.

- Larger variance leads to larger destruction rate of variance [Wulfmeyer et al. 2016].
- The relationship between the atmospheric variance and the coefficient of the structure function for the median profiles shown above for non-monsoon (a, b) and monsoon (c, d) events.

To understand the reason behind the discrepancy between temporal and spatial, we look at two artificial scalars:

1) Bottom up: No initial value, just a surface flux; emphasizes thermal updrafts
2) Top down: No surface flux, just an initial value above the BL; emphasizes entrainment events

Any scalar (water vapor, temperature) behaves as a linear combination of these two scalars.