Climatology of ShCu bulk entrainment at the SGP observatory

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ARM/ASR 2020 PI meeting
Method 1: Jensen and Del Genio (2006)

• 2021 individual ShCu clouds
  ➢ Surface-based, cloud tops < 5 km, depths > 250 m
  ➢ Computes fractional entrainment rate ($\varepsilon$) required for parcel LNB to match cloud-top height

• Notable sensitivities: CAPE (+), RH (+), shear (+), cloud-base mass flux (-)
  ➢ No sensitivity to cloud width (not shown)
Method 2: Drueke et al (2019; TKE)

- 128 1-h ShCu periods
  - Surface-based, cloud tops < 5 km, depths > 250 m
  - Use scaling of equilibrium TKE budget to estimate $\varepsilon$
    \[ \varepsilon \sim \frac{\text{CAPE}^{1/3}}{m_{b}^{2/3}z_{\text{cld}}} \]

- Strong dependence on RH (+), $m_{b}$ (-) and cloud-layer depth (-)
Preliminary conclusions and future work

• Two simple bulk entrainment retrievals give different perspectives on ShCu entrainment
  ➢ Individual clouds vs cloud ensembles

• Robust positive sensitivity to environmental CAPE and RH, negative sensitivity to $z_{\text{clld}}$ and $m_b$
  ➢ Also, positive sensitivity to vertical wind shear in JDG parcel method

• Future work:
  ➢ Other environmental sensitivities?
  ➢ Dimensional analysis: nondimensional controlling parameters
  ➢ ERICA retrieval (Wagner et al 2013)
  ➢ Repeat climatology at ENA site