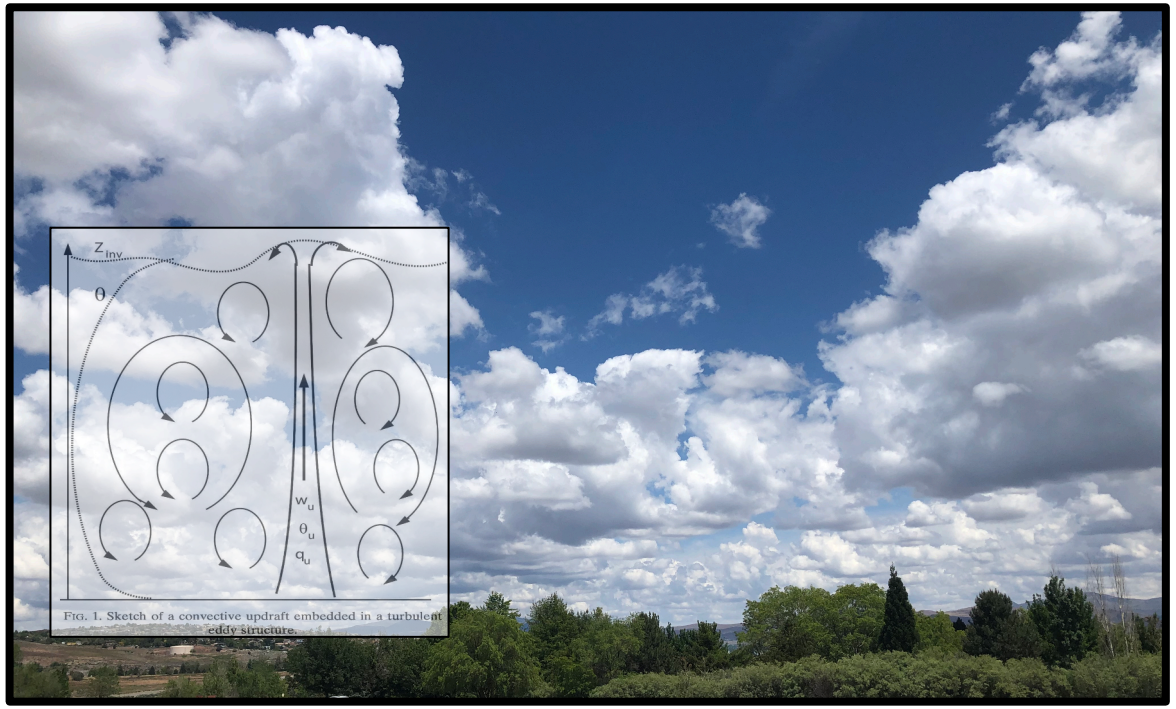
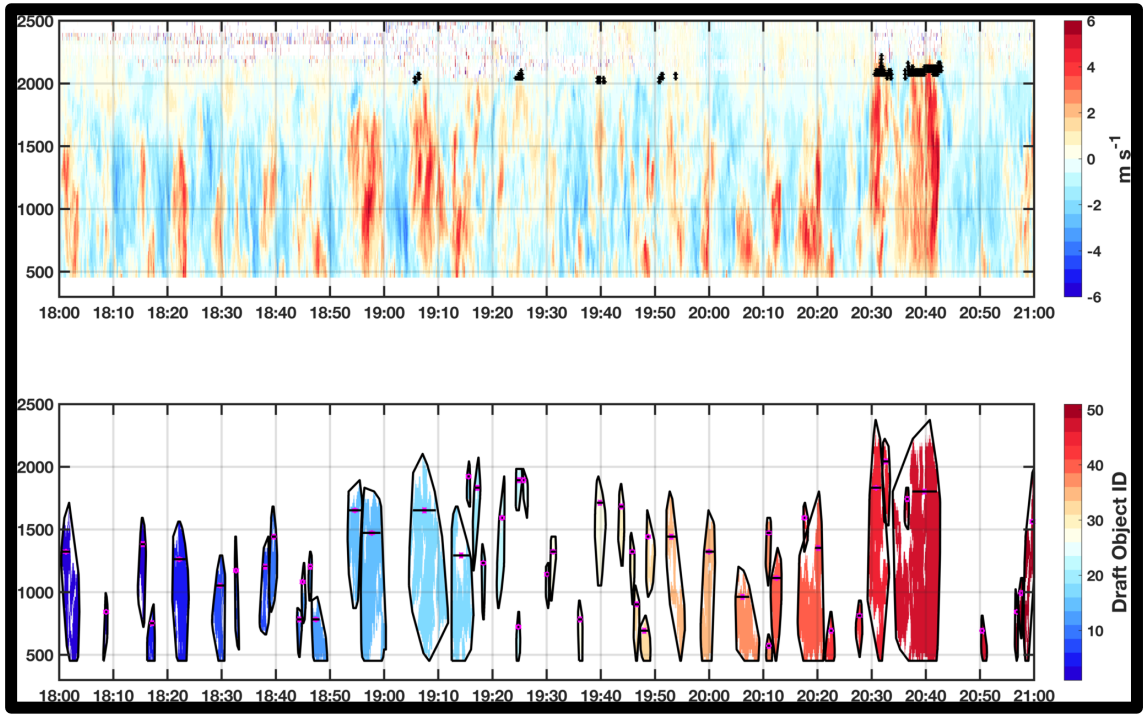
How do updrafts vary with height in the subcloud layer?





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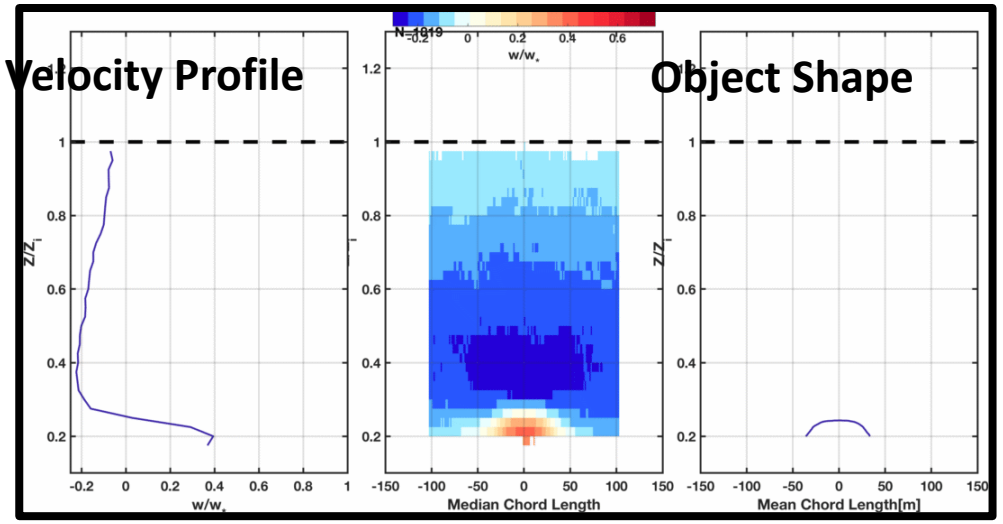
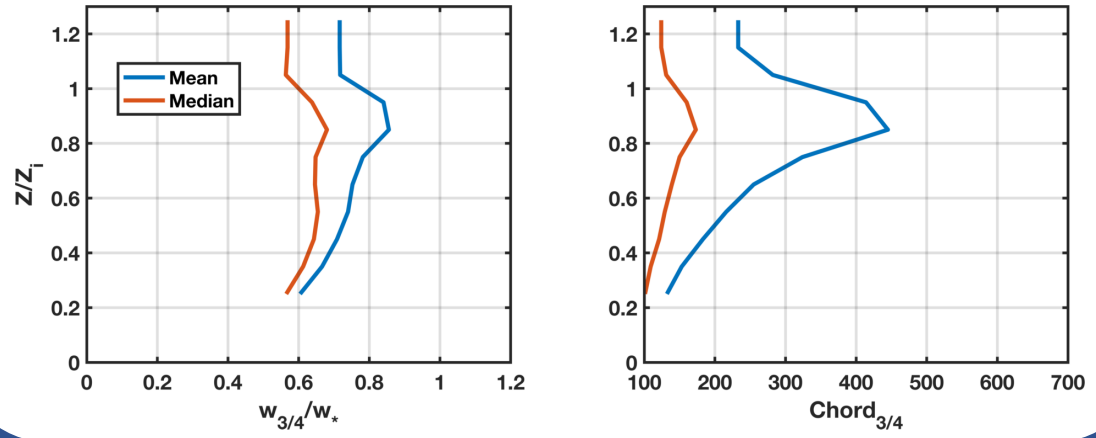
ASR Atmospheric System Research

26 June 2020

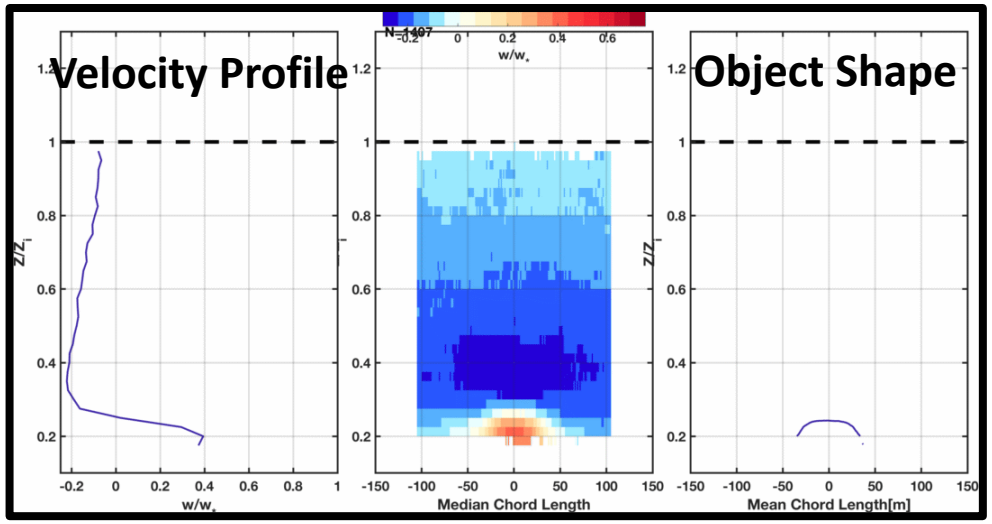
Variation of intensity and width with height

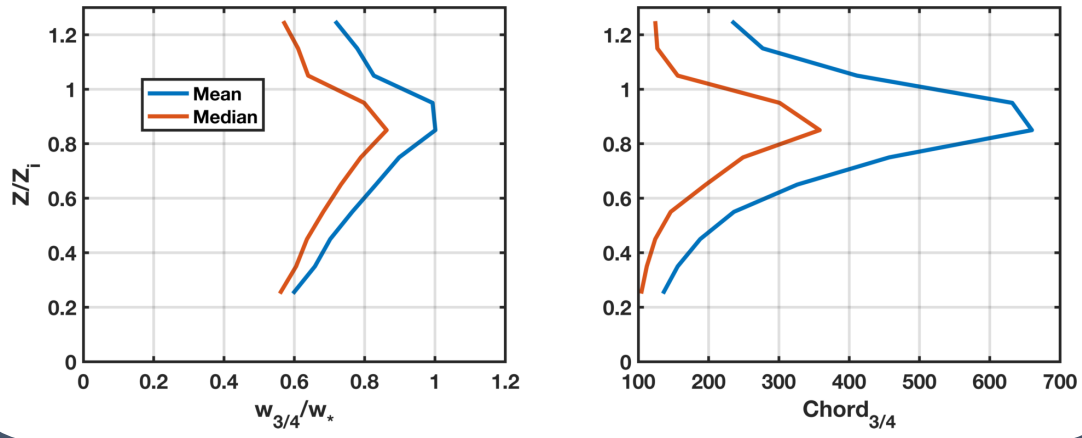
All Objects





"Rooted" objects





"Flatten the curve" -> as updrafts ascend the occurrence of wide strong updrafts increases

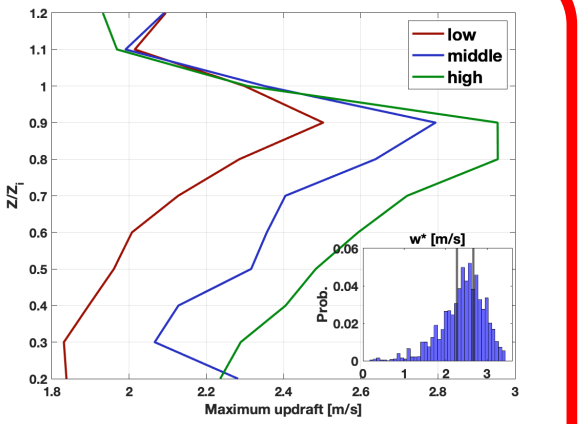
- Rooted updrafts are stronger and wider, varying less linearly with height.

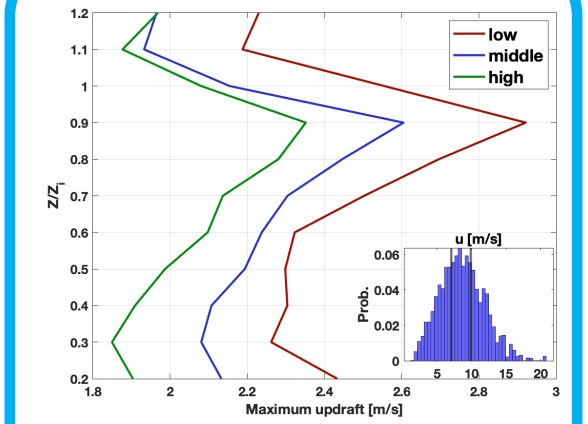
How sensitive are updraft properties to environmental factors?

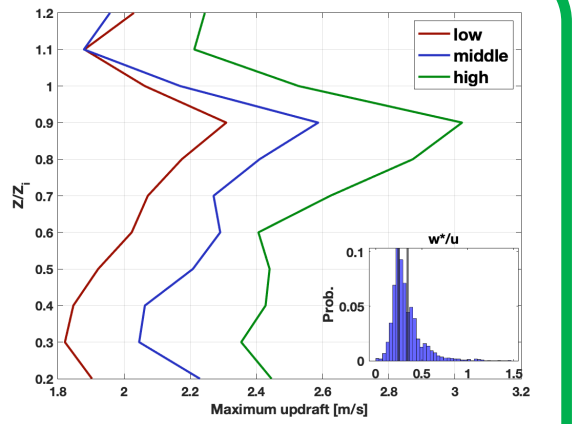
Convective Velocity (w_*) **Horizontal Wind (U)** **w_* /U**

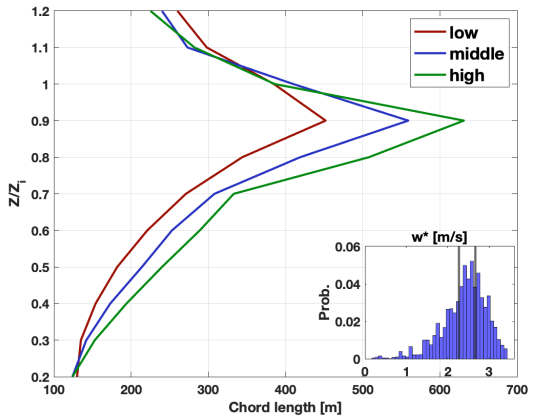
Updraft

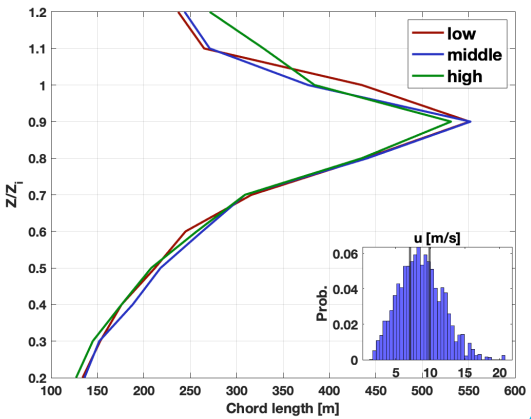
Chord Length

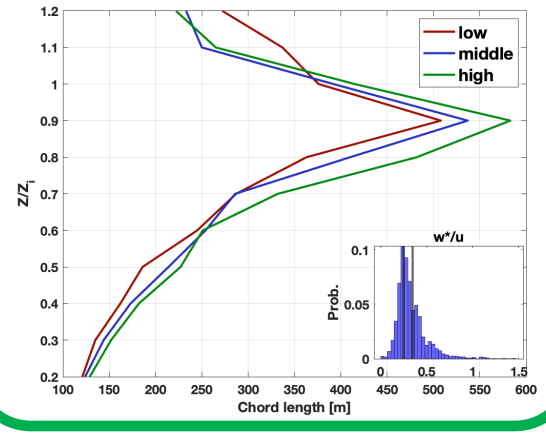






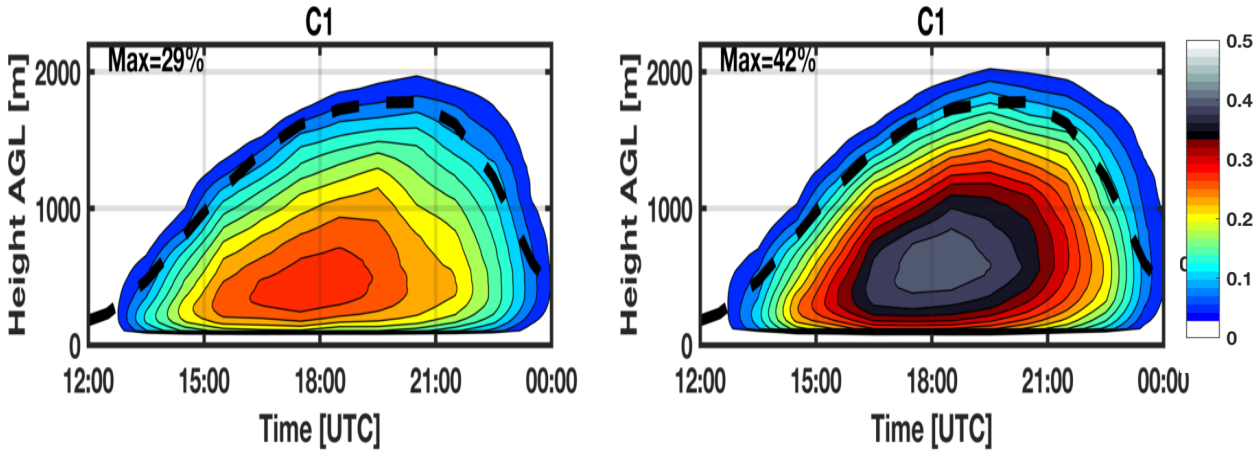


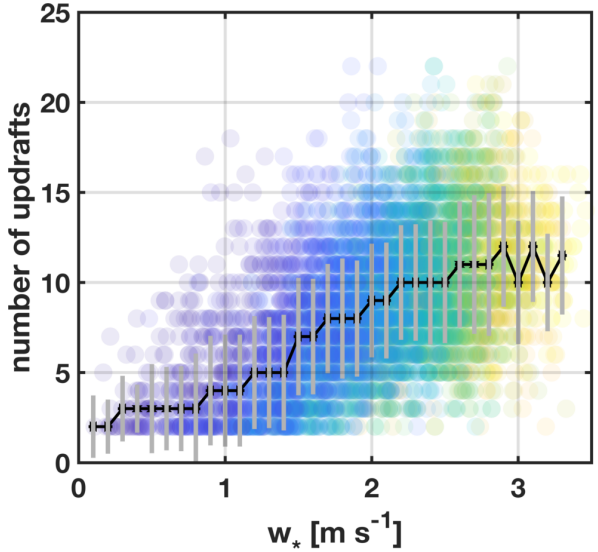


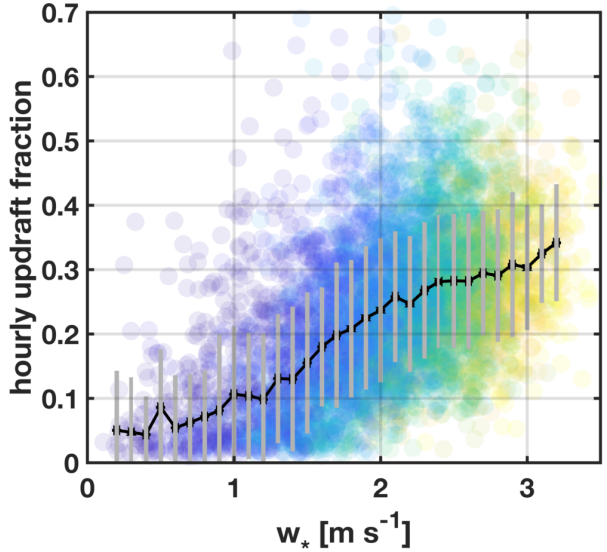


- *Updraft intensity is sensitive to both the cross wind and the buoyancy forcing*
- *Updraft width is primarily sensitive to the buoyancy forcing.*

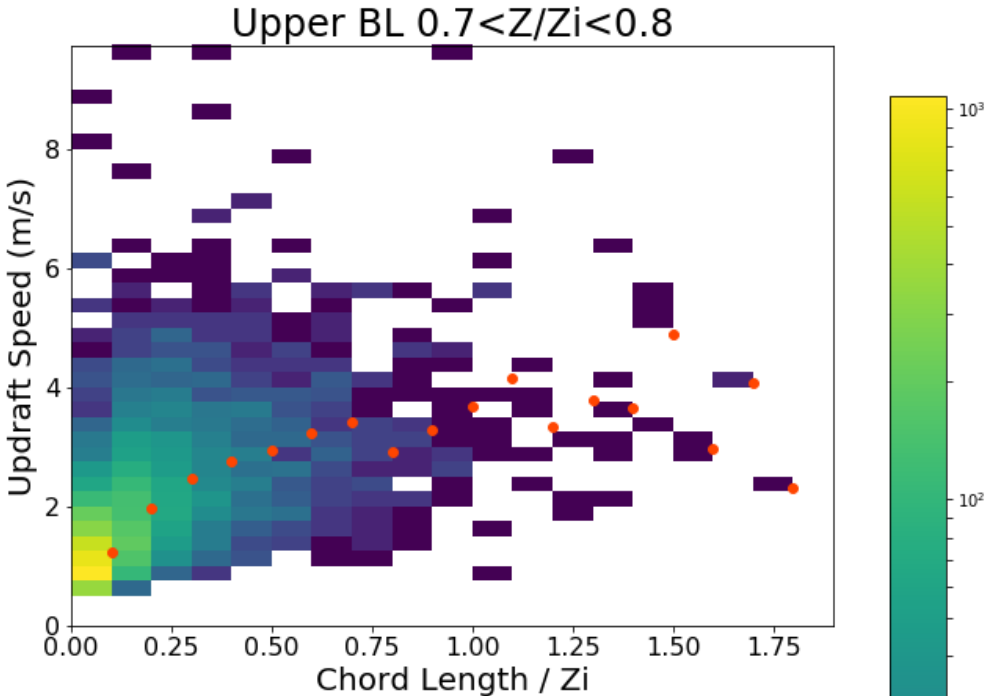
What Predicts Updraft Fraction?







What is the relationship between updraft size and strength?



VECTOR: Vertical Exchange and ConvecTive Initiation over ORography

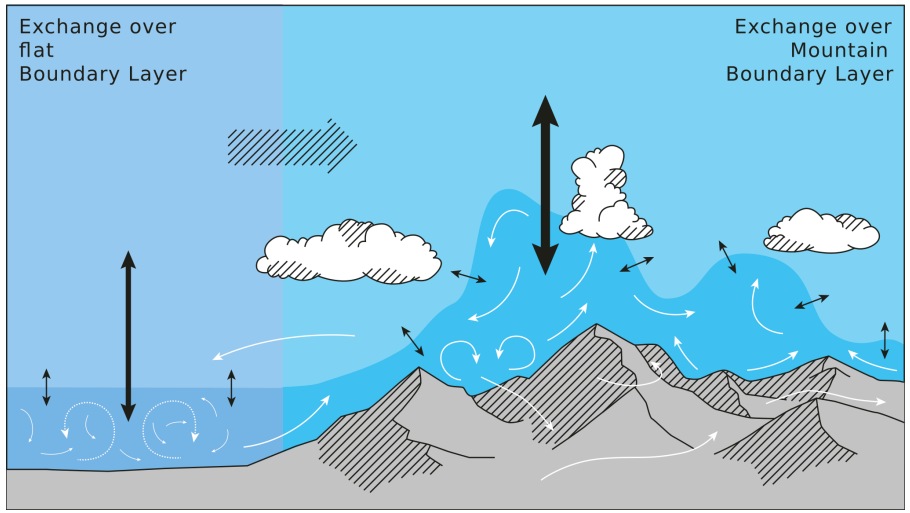
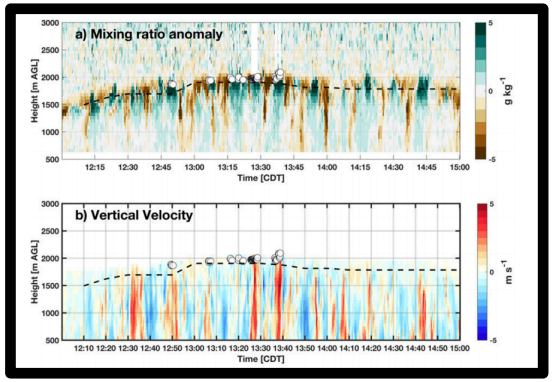
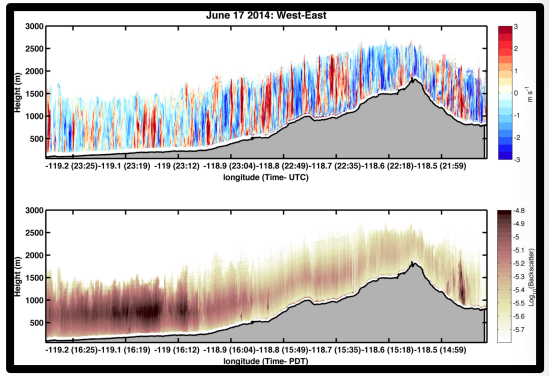


Image courtesy of TEAMX





Why? Improve our understanding of how

1) Turbulent exchange processes in complex terrain vent water vapor and aerosols from the boundary layer to the free troposphere, and how this venting feeds back on surface and near-surface radiation and thermodynamics.
2) Mountain boundary layer processes, including thermals and thermally driven flows, control convective preconditioning and initiation.
3) Complex terrain boundary layer and convective processes are represented in numerical models.

VECTOR is aligned with the **T**ransport and **E**xchange processes in the **A**tmosphere over **M**ountains – programme and e**x**periment (**TEAMx**).

TEAMx

***When/Where*:** Proposed AMF1 deployment to the European Alps in summer 2023 or 2024.

***Funding*:** Associated NSF proposal in development (Stephan De Wekker).

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