

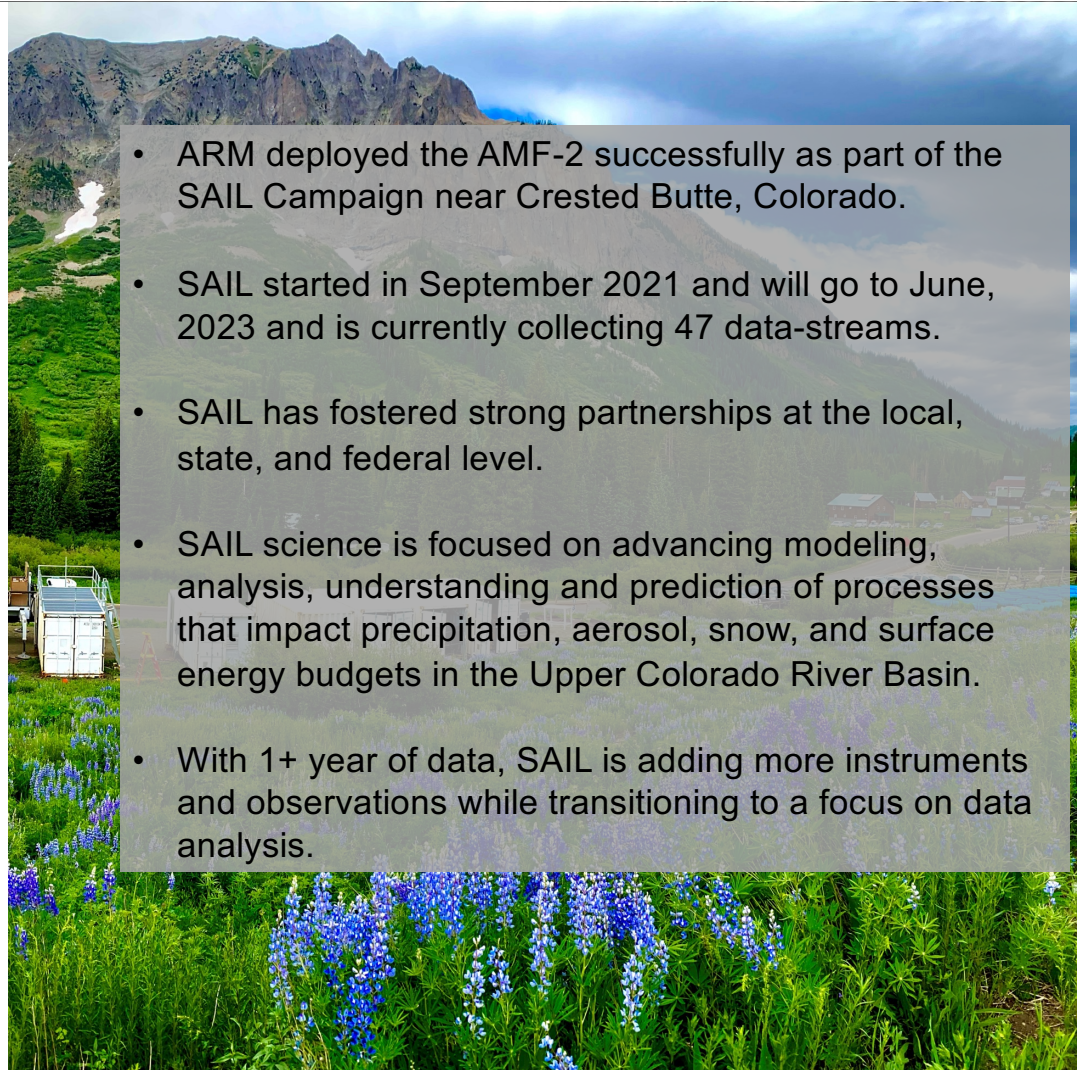


A year in the Colorado Rockies -- Perspectives on science opportunities from the first half of SAIL

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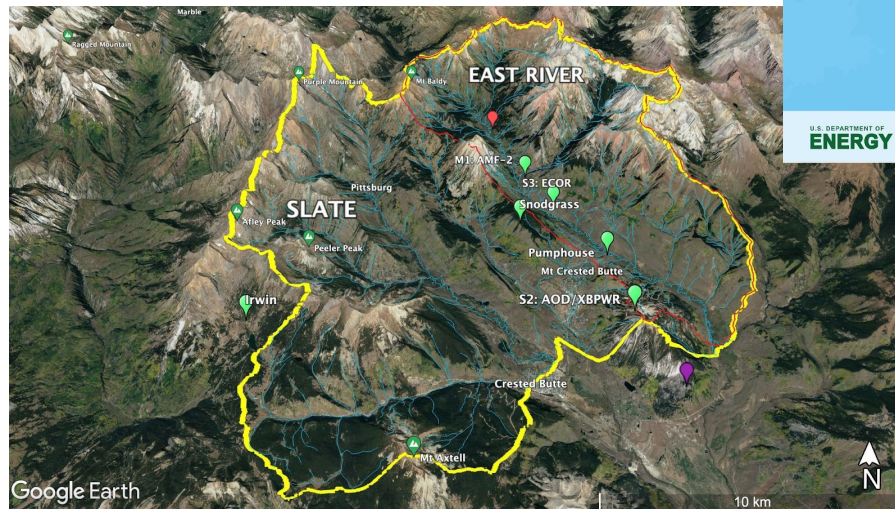
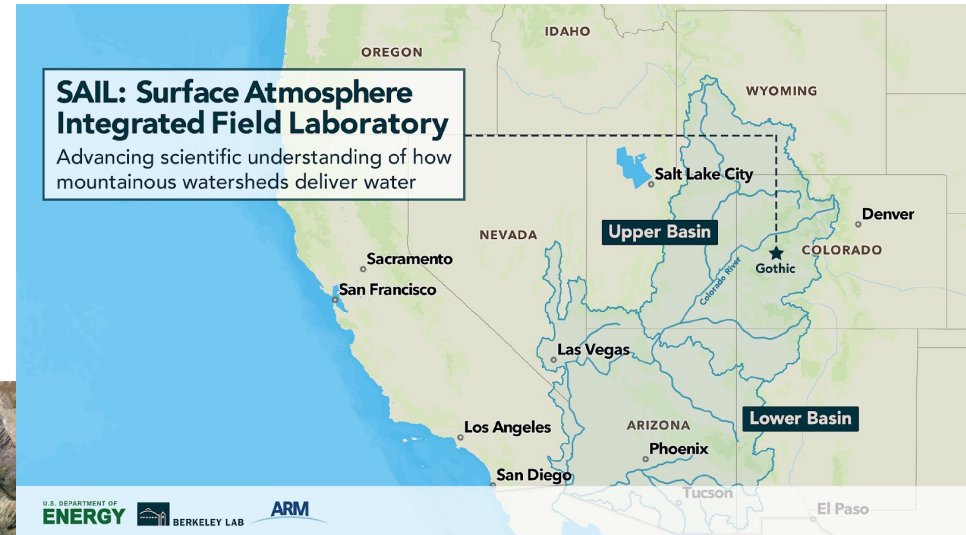
With many contributions from SAIL, SPLASH and SOS



- ARM deployed the AMF-2 successfully as part of the SAIL Campaign near Crested Butte, Colorado.
- SAIL started in September 2021 and will go to June, 2023 and is currently collecting 47 data-streams.
- SAIL has fostered strong partnerships at the local, state, and federal level.
- SAIL science is focused on advancing modeling, analysis, understanding and prediction of processes that impact precipitation, aerosol, snow, and surface energy budgets in the Upper Colorado River Basin.
- With 1+ year of data, SAIL is adding more instruments and observations while transitioning to a focus on data analysis.

Introduction

- Water resources from the Upper Colorado River are changing rapidly.
- Surface energy and mass budgets in high-altitude complex terrain are driving this change.
- Precipitation, aerosols, snow and surface energy are under-observed.



- For SAIL, the AMF-2 has been deployed across an Upper Colorado River watershed from 9/21 to 6/23.
- SAIL seeks to advance understanding of under-observed atmospheric processes that impact water resources.

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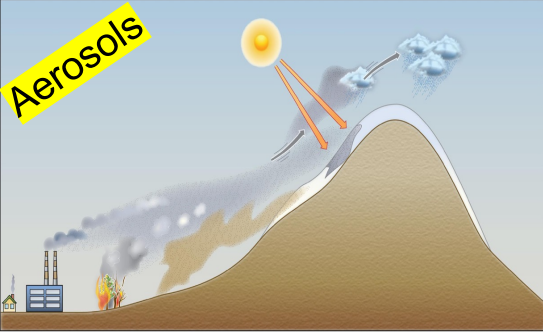
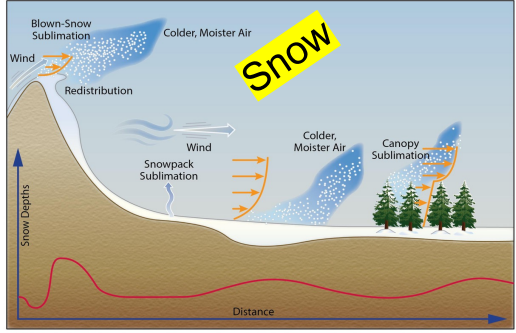
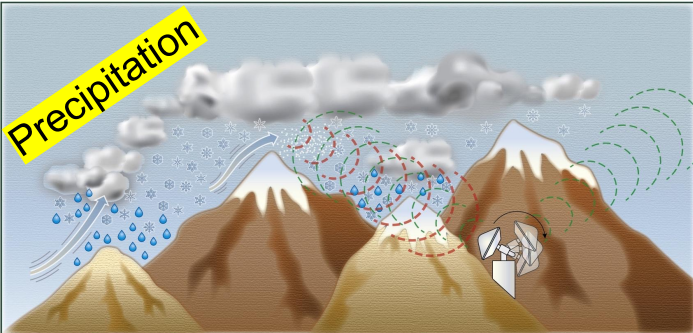
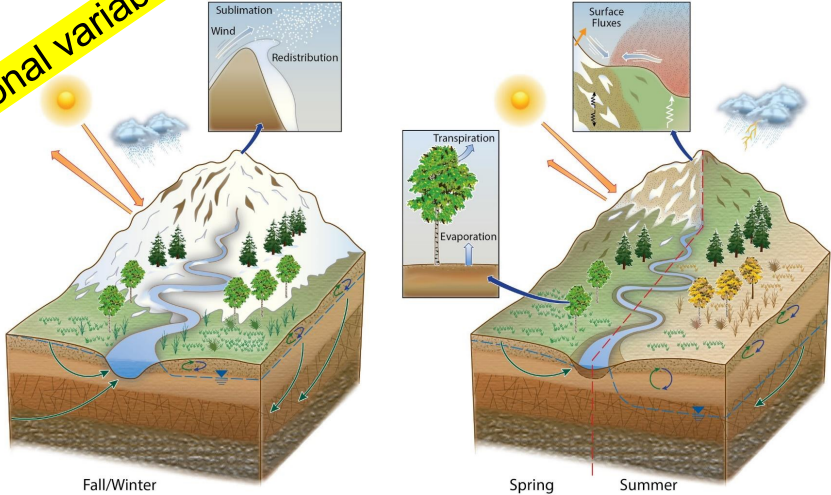
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Goals and Objectives

- With the AMF-2, SAIL explores, across seasons, the following:
 - Dynamic and microphysical processes impacting precipitation.
 - Aerosol impacts on atmospheric and surface energy budgets, clouds, and precipitation.
 - Energy/mass budget impacts from sublimation, radiation, sensible, and latent heat fluxes.
 - Atmospheric and surface processes setting net radiative absorption to drive monsoons.

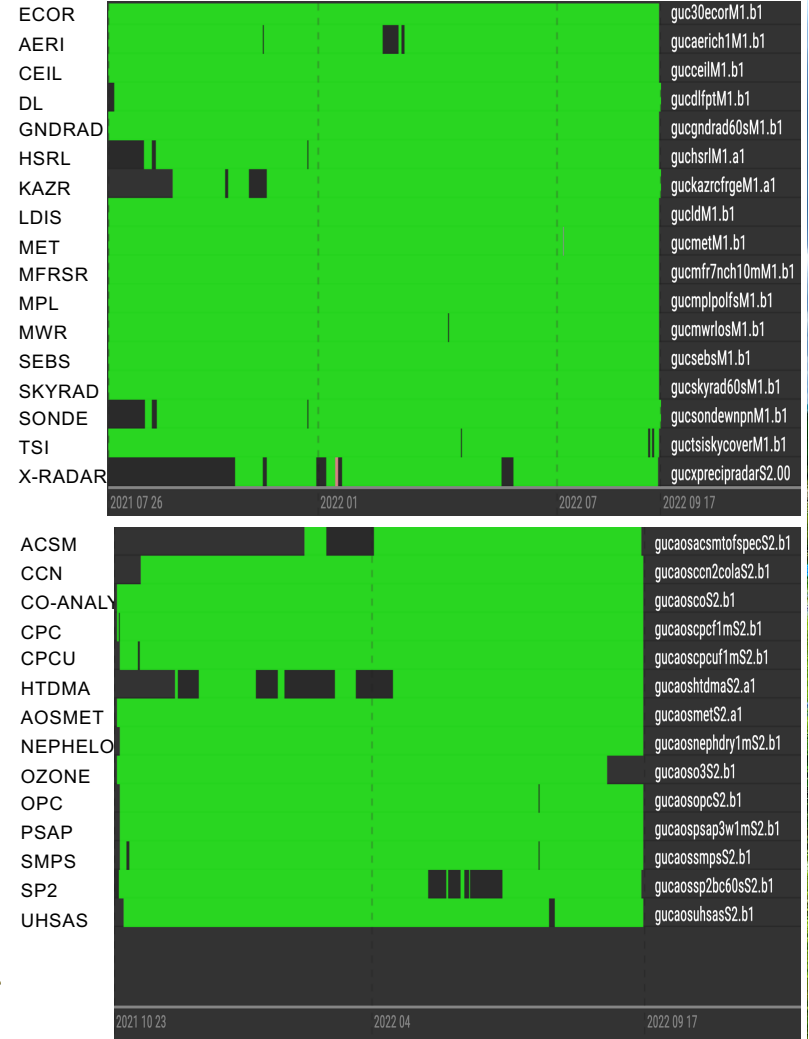
Seasonal variability





Results

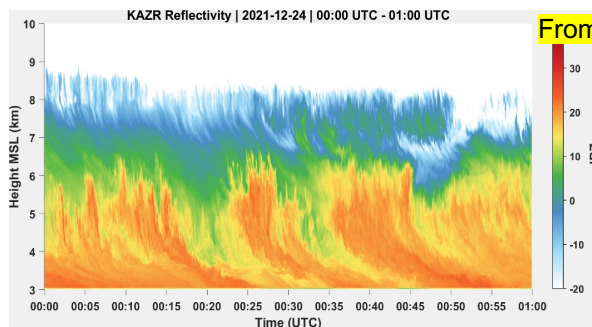
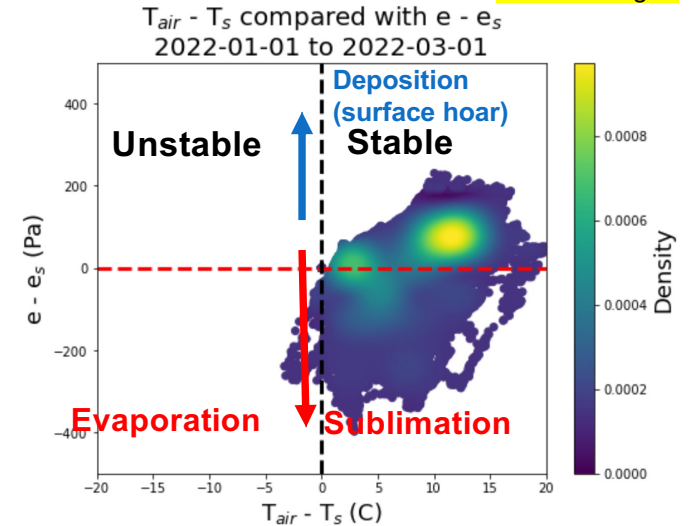
- SAIL deployed most instruments to a mountain valley and the AOS and an X-band scanning radar
- SAIL data have few outages to date.
- SAIL has established strong partnerships with:
 - DOE-sponsored Watershed Function SFA
 - NOAA-sponsored SPLASH
 - NSF-sponsored SOS
 - The Rocky Mountain Biological Laboratory
 - Numerous guest instruments.



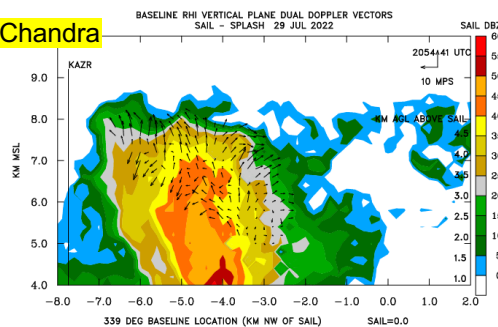
Results

- The first year of SAIL saw:
 - A climatologically-average snowpack achieved with a strong early-winter storm and an extended mid-winter break in snow.
 - One of the most dusty and windiest spring season in the last 10 years.
 - One of the strongest summer monsoons in the last 20 years.
- Science opportunities include:
 - Determining the microphysical and kinematic structure of winter and summer storms.
 - Quantifying atmospheric phase-change thermodynamics across seasons.
 - Evaluating how aerosol regimes influence surface radiation and precipitation.

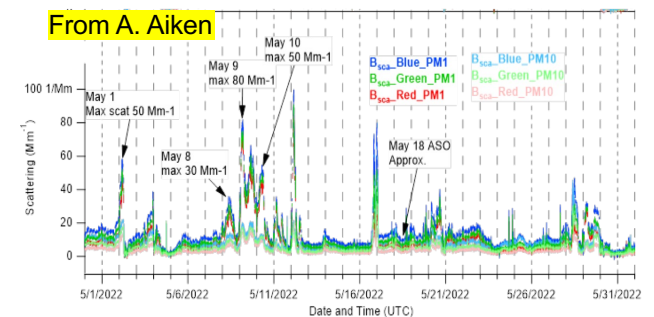
From D. Hogan



From Chandra



From A. Aiken





Summary, Next Steps and Acknowledgements

- SAIL is focused on making a wide range of atmospheric observations to address persistent uncertainties in atmospheric and land-atmosphere processes that influence the hydrology of the Upper Colorado River Basin.
- There is a lot of SAIL data in the ARM Data Discovery to explore and more coming in all the time.
- During the second half of the SAIL, additional datasets from TBS and guest instruments will produce greatly augmented observations of snow sublimation, snow microphysics, and aerosol evolution across the SAIL study area.
- SAIL partnerships with DOE's Watershed Function SFA, NOAA SPLASH, NSF's SOS and others enable highly-detailed determination, across an entire watershed, of how the atmosphere impacts water resources in complex terrain.

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