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Campaign Updates from The Surface Atmosphere Integrated Field Laboratory (SAIL)

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- SAIL is a field campaign that will deploy the AMF2 and an X-band scanning radar to the Upper Colorado River Basin from 09/21 to 06/23.
- SAIL is collocated with the Berkeley Lab's Watershed Function SFA to achieve atmosphere-through-bedrock observations.
- The goal of SAIL is to establish the minimum-but-sufficient information from the atmosphere through the bedrock to accurately predict fluxes of water from mountainous watersheds.

Introduction, Background, and Motivation

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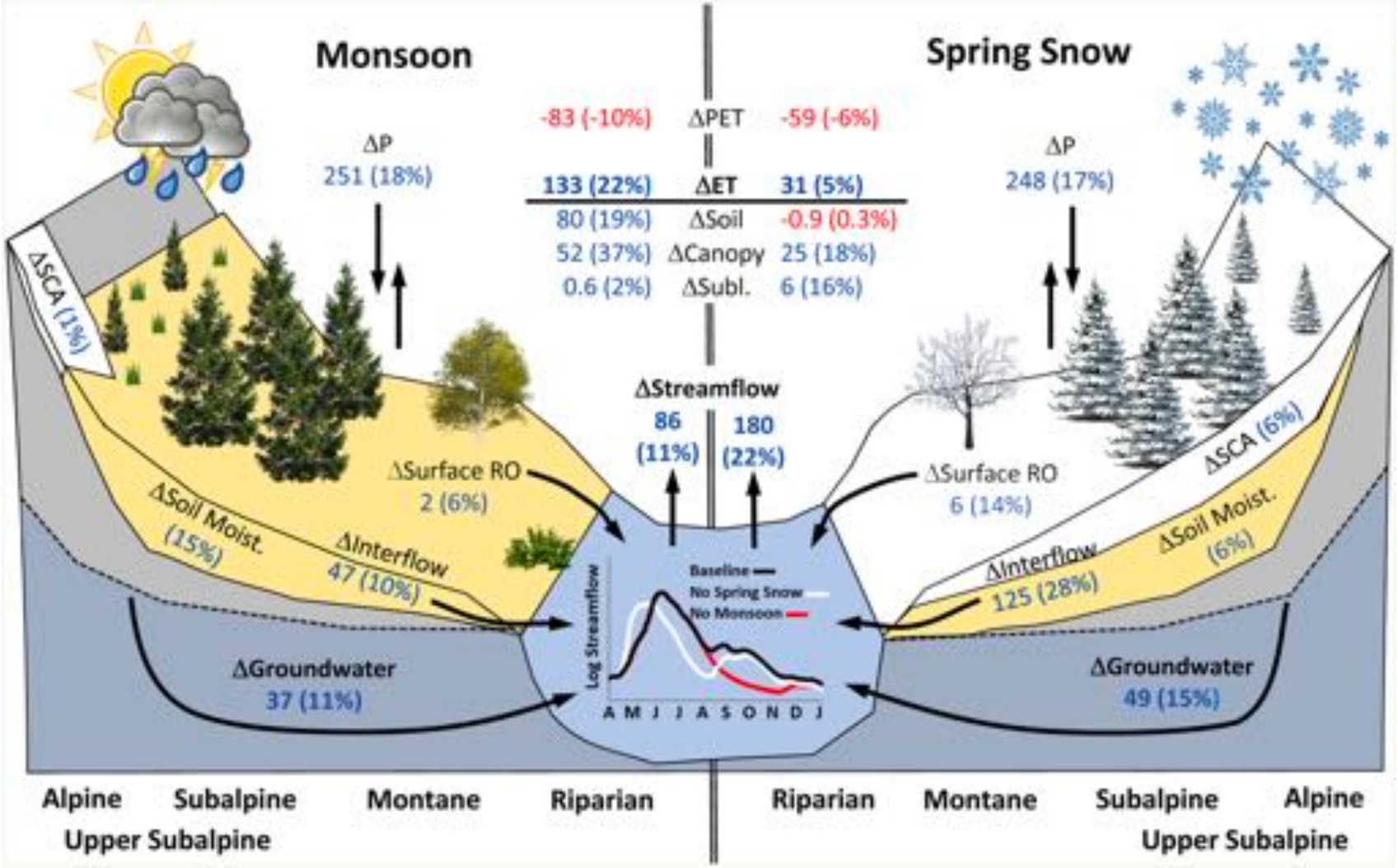
- The processes that impact hydrology in the Mountain West vary dramatically across seasons.
- Changing precipitation and evapotranspiration are thought to dominate historical water losses.
- Measurements of both of these quantities are highly limited, which challenges traditional model-observation intercomparisons.



Carroll et al, GRL, 2020

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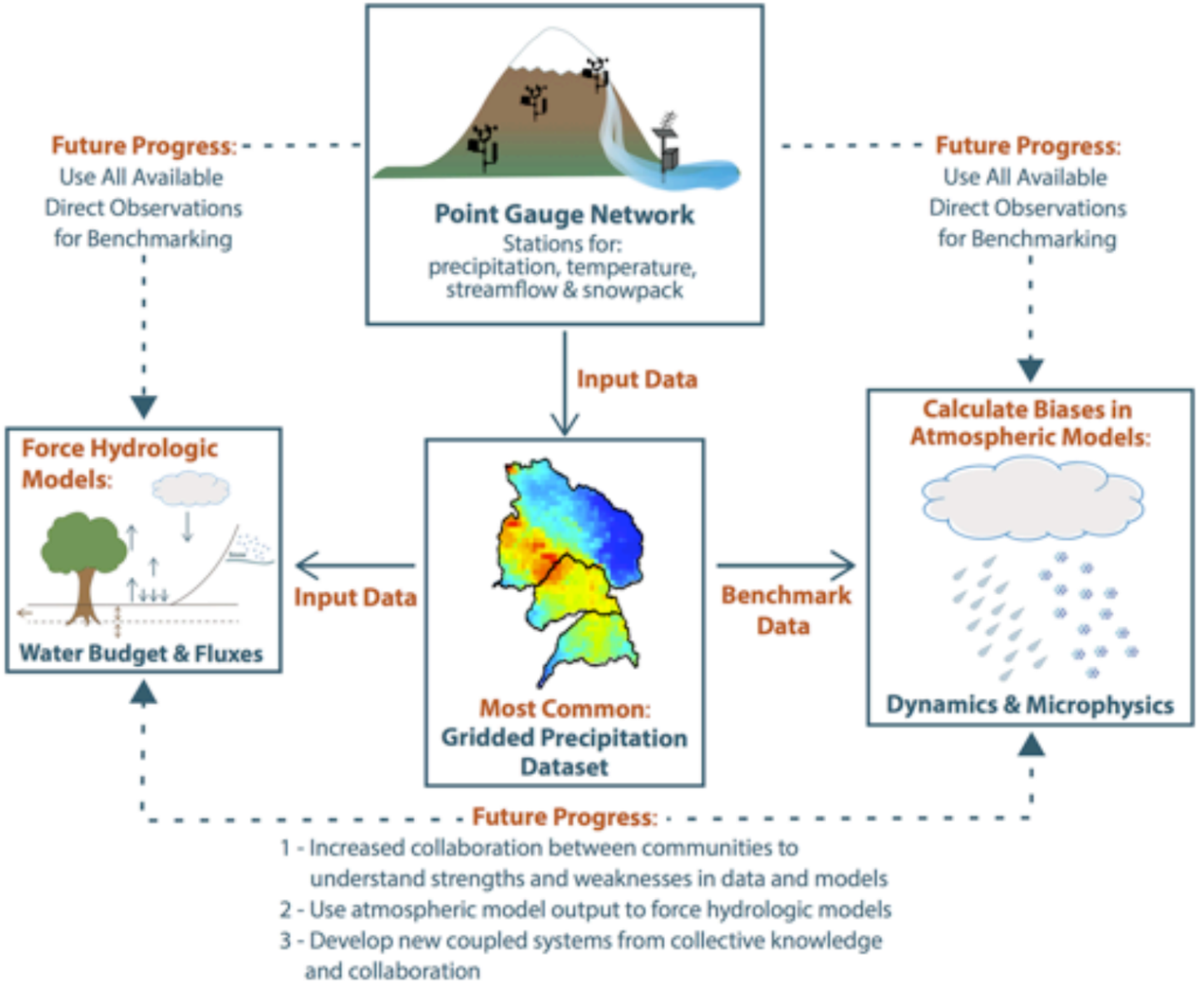
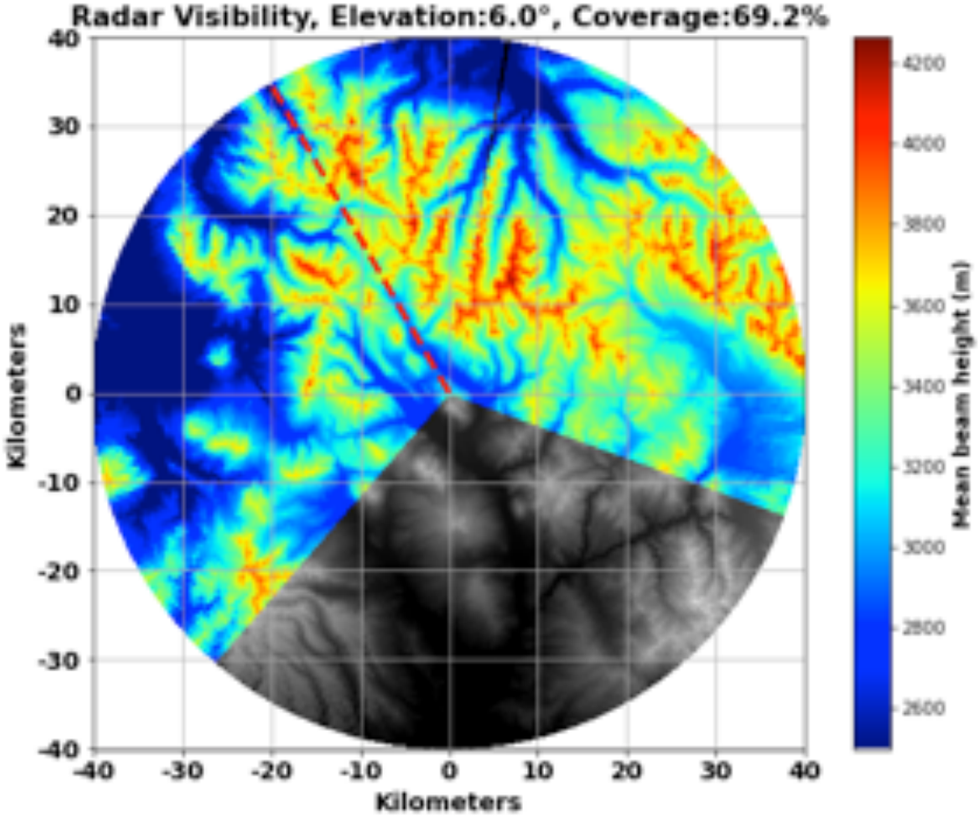
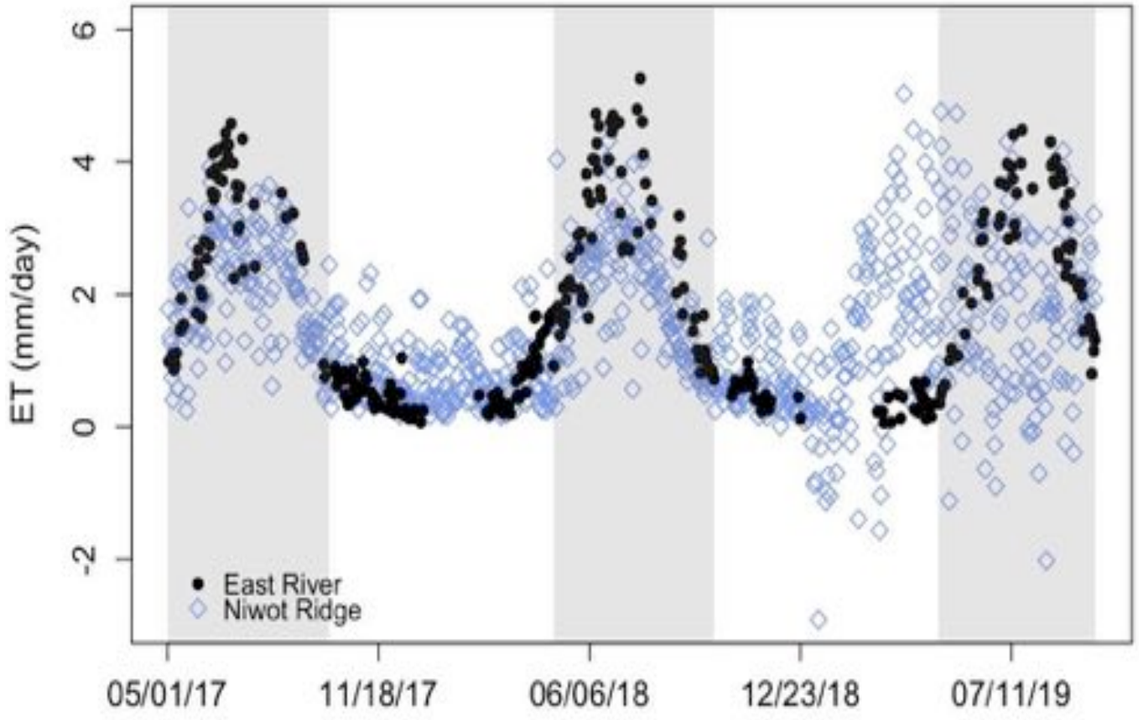


Lundquist et al, BAMS, 2020

SAIL Observations of Precipitation and Evapotranspiration

- SAIL + partners seeks to establish the minimum-but-sufficient process understanding to enable unbiased prediction of the processes that impact water resources. The warm-season is critical!
- X-band radar will measure convective precipitation within 40 km of the AMF2.
- Two eddy-covariance systems will enable estimates of ET near the AMF2.
- Atmospheric profiling capabilities e.g. from sondes, AERI, MPL, HSRL, DL, and TBS(?)

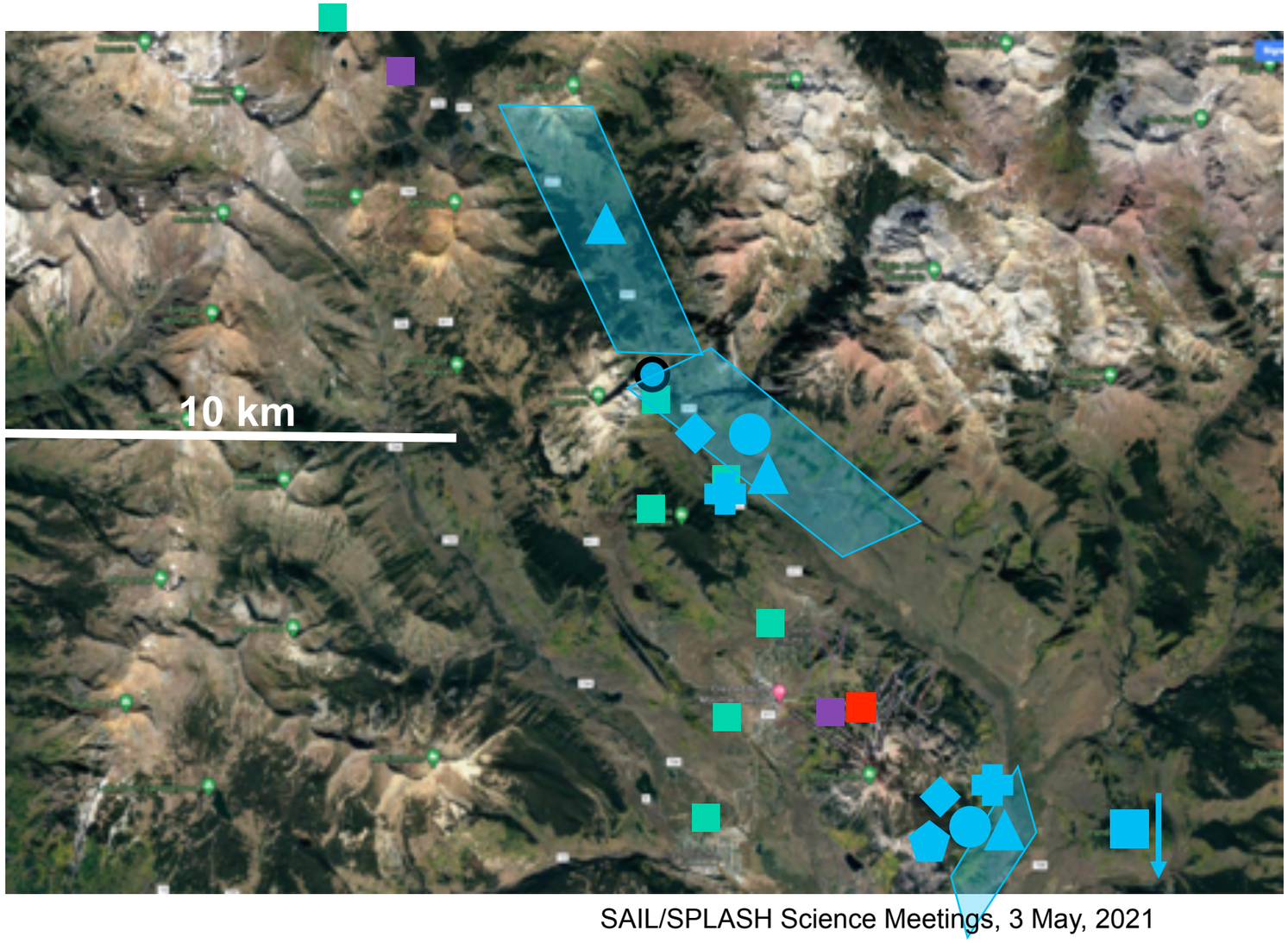




Gochis et al, 2020

‘Nucleating’ Watershed-Wide Measurements

- NOAA is launching a simultaneous collocated campaign: SPLASH.
- Distributed, complementary measurements of precipitation, evapotranspiration, surface and boundary layer processes.
- Sub-alpine, montane, and riparian end-members will be sampled simultaneously.
- SPLASH brings additional atmospheric profiling capabilities.



Existing Infrastructure

- SNOTEL
- Existing surface Met

Sep 2021-May 2023 (SA

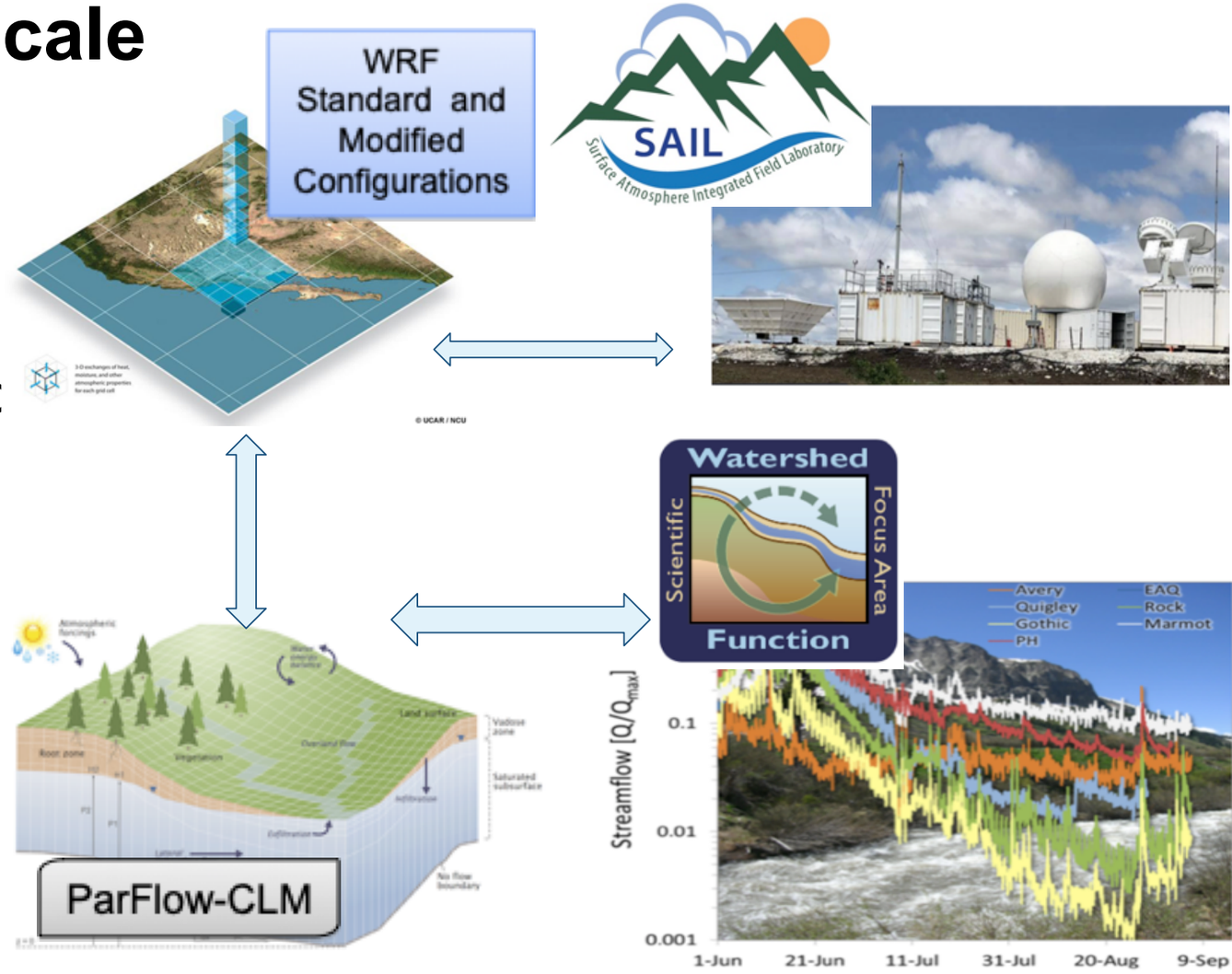
- DOE AMF-2
- DOE-funded X-band

Sep 2021-Aug 2022 (SP

- Second X-band
- Snow Level Radar
- Surface Flux Stations
- CLAMPS
- UAS Operations Areas
- Surface precip gauges
- Disdrometers

Connections to the Large-Scale

- SAIL is at the bleeding edge of the North American Monsoon.
- Monsoonal precipitation has collapsed in recent years with interseasonal impacts on timing and amount of watershed discharge.
- Targeted observations of SAIL, SPLASH and Watershed Function SFA reveal where, when, and how much convection in the East River and its impact on discharge.
- Integrated process studies that include modeling atmospheric, surface, and subsurface processes can use these data to guide investigations into the source(s) of model biases.



Summary and Acknowledgements

- Data from the SAIL campaign are imminent. Go to ARM Data discovery in September, 2021.
- SAIL seeks to nucleate exciting science opportunities to advance atmosphere and land-atmosphere interaction studies in complex terrain to study water resources. Studies of connections between the boundary layer and convection in this area support SAIL Science!
- Campaign details? Visit https://sail.lbl.gov and https://www.arm.gov/research/campaigns/amf2021sail
- Consider joining/presenting at biweekly SAIL/SPLASH teleconference. Email drfeldman@lbl.gov for details.
- This material was based upon work supported by the U.S. Department of Energy, Office of Science, Office of Biological and Environmental Research and the Atmospheric System Research under U.S. Department of Energy Contract No. DE-AC02-05CH11231