SAIL: The Surface Atmosphere Integrated Field Laboratory

Land-atmosphere Interaction Study Opportunities

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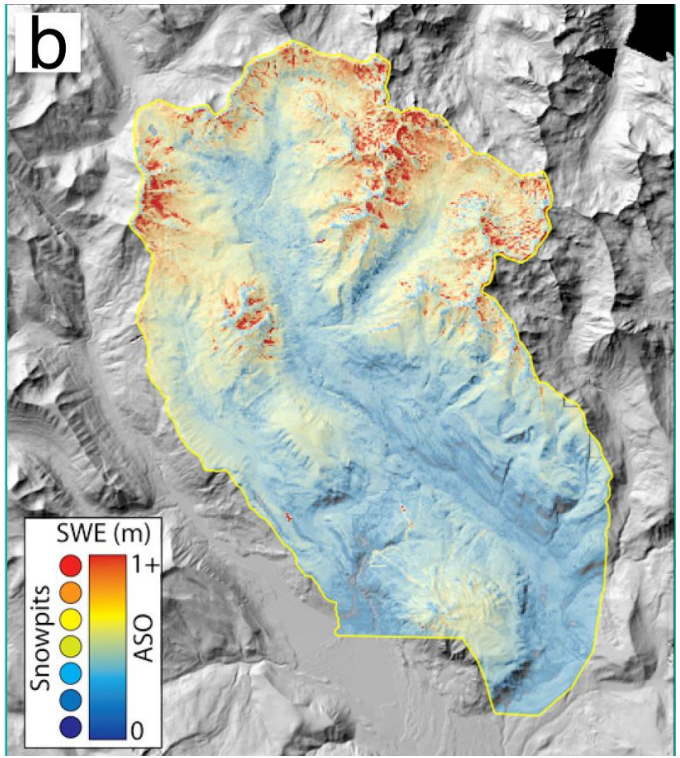
Why study land-atmosphere interactions?

- Impact on cloud development and precipitation frequency/intensity
  - Source for atmospheric water vapor
  - Source convective buoyancy
  - Modify static stability
- Aid in prediction of extreme events (floods, droughts, heatwaves)
- Wildfire, agriculture, and water resource management

Unique opportunities with SAIL

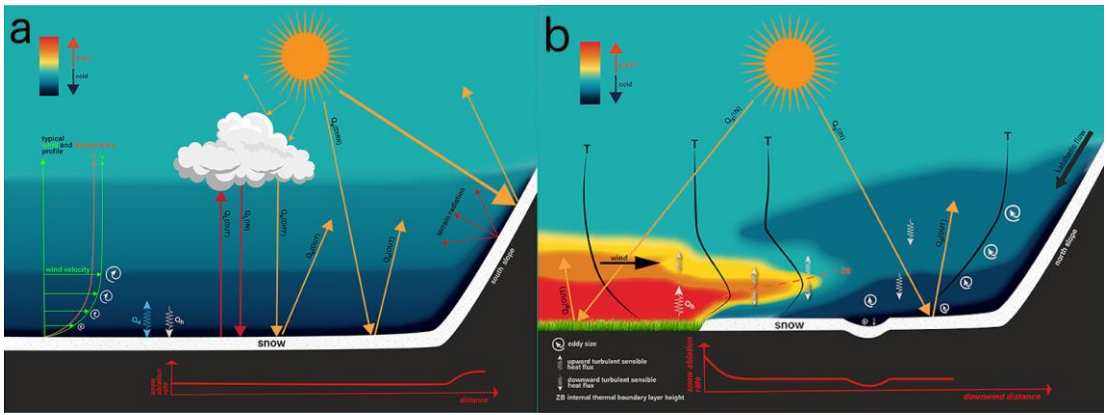
- Mountainous, heterogeneous terrain
  - Extreme heterogeneity in mass and energy fluxes
  - Poorly modeled in ESMs; huge impact on mountain hydrology
  - Limited comprehensive datasets
  - Scale mismatch
- DOE's Watershed Function Science Focus Area (SFA) ongoing surface and subsurface hydrologic observations



Example of heterogeneity in snow water equivalent. Image from SAIL proposal

SAIL science goals

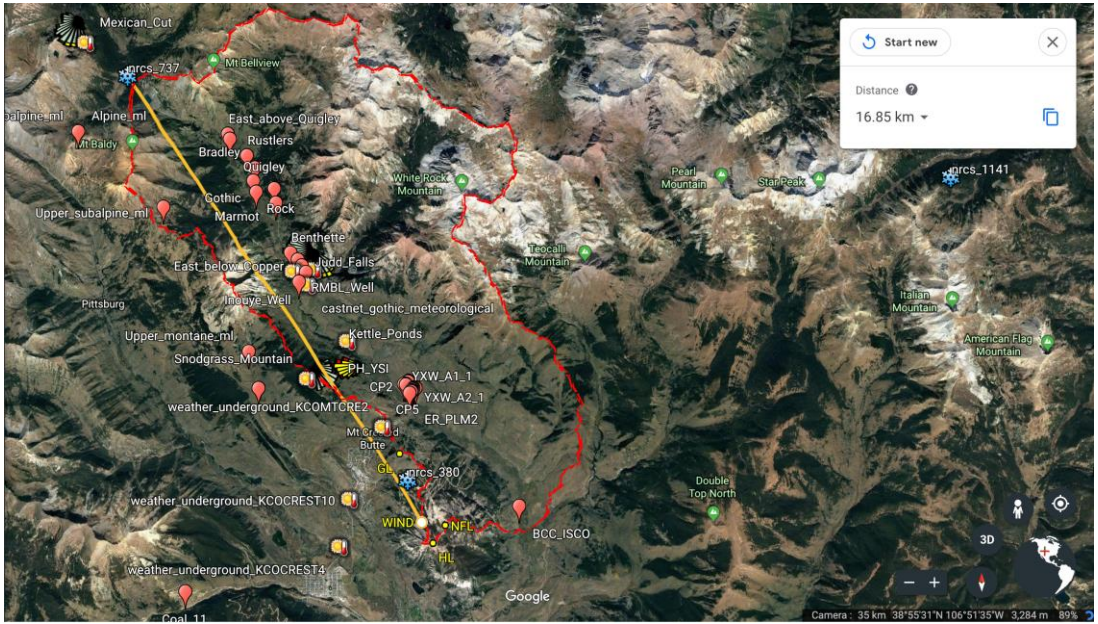
- Understand seasonally variably land-atmosphere interaction processes that control surface energy and water budgets
  - Controls on winter latent and sensible heat fluxes
  - Changes in energy balance from snow wind redistribution/sublimation
  - Impact of aerosol on surface albedo and energy balance
  - Advective fluxes from heterogeneous unfrozen and frozen surfaces
  - Impact of surface processes to regional/continental scale flow of water



From Mott et al. 2018

SAIL instrumentation

- ARM measurements: ECOR/SEBS, GND/SKYRAD, IRT, MET
- Hydrology obs. (red)
- Met stations (sun/thermometer), with associated wind-rose
- SNOTEL stations (snowflakes)
- Airborne Snow Observatory
- Secondary ECOR/SEBS?



Existing measurement networks in the E. River Watershed. Image from SAIL proposal.