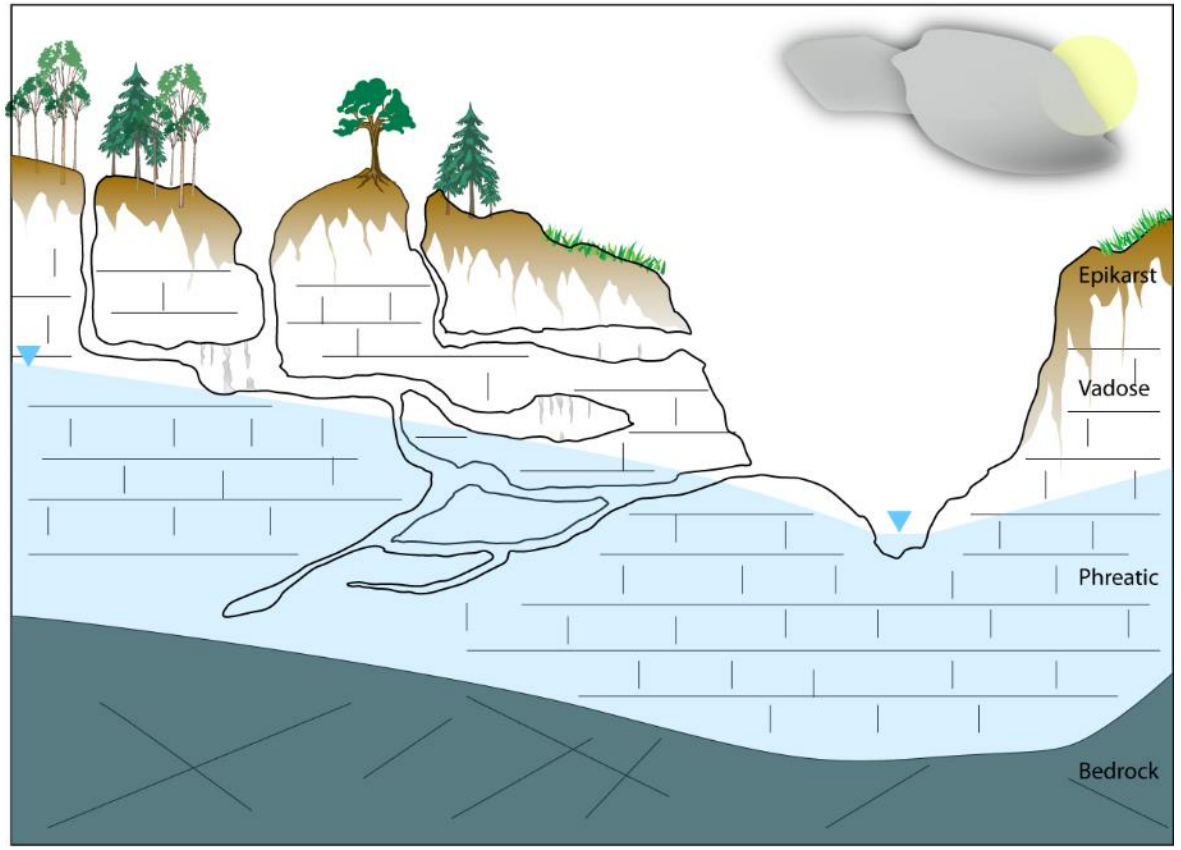
The New NSF Critical Zone Network

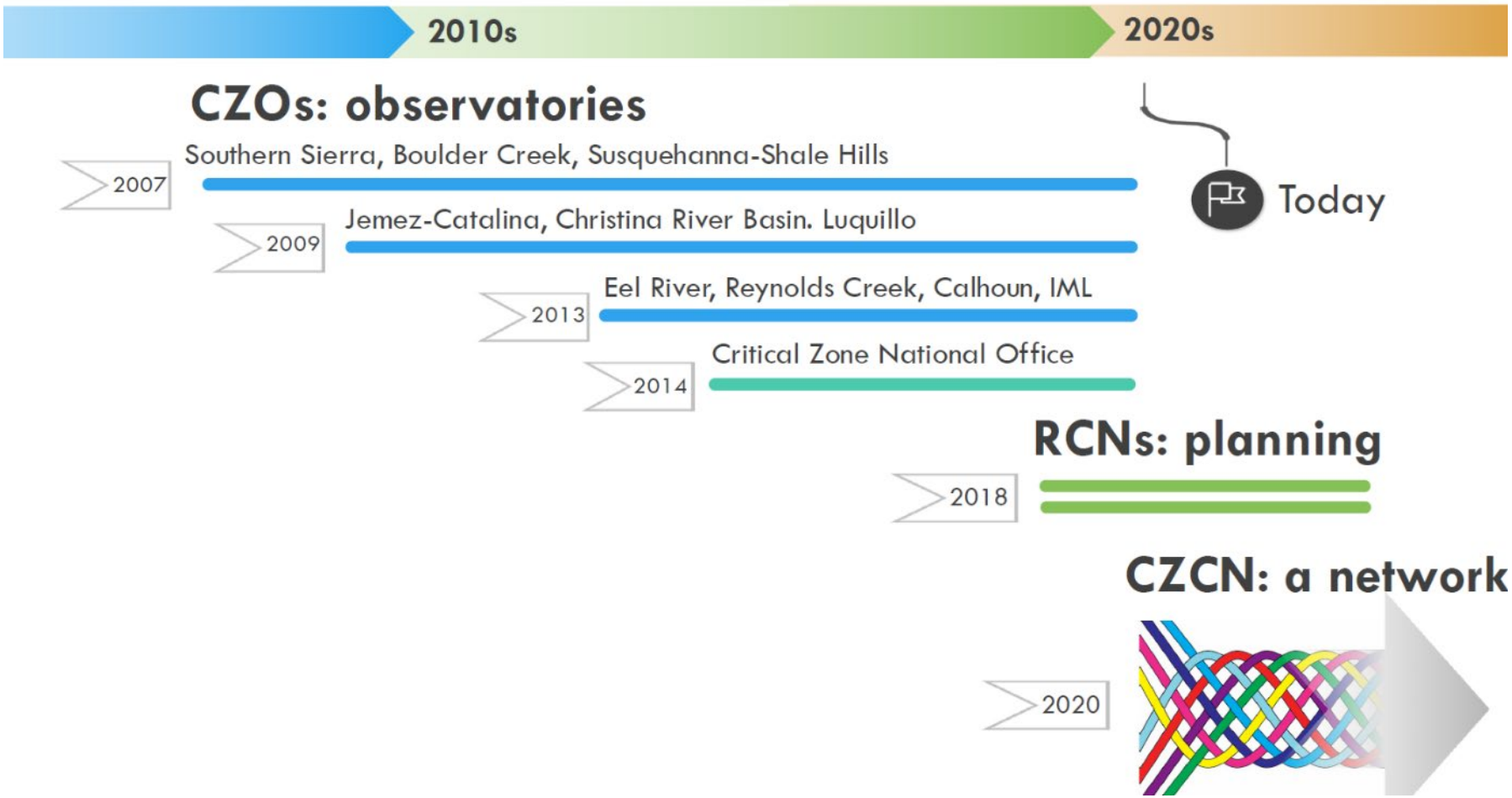
- Differences between the old and new CZs
- Brief description of each CZ
- Description of the Hub
- Tips on how to get involved

Laura Toran

Pam Sullivan

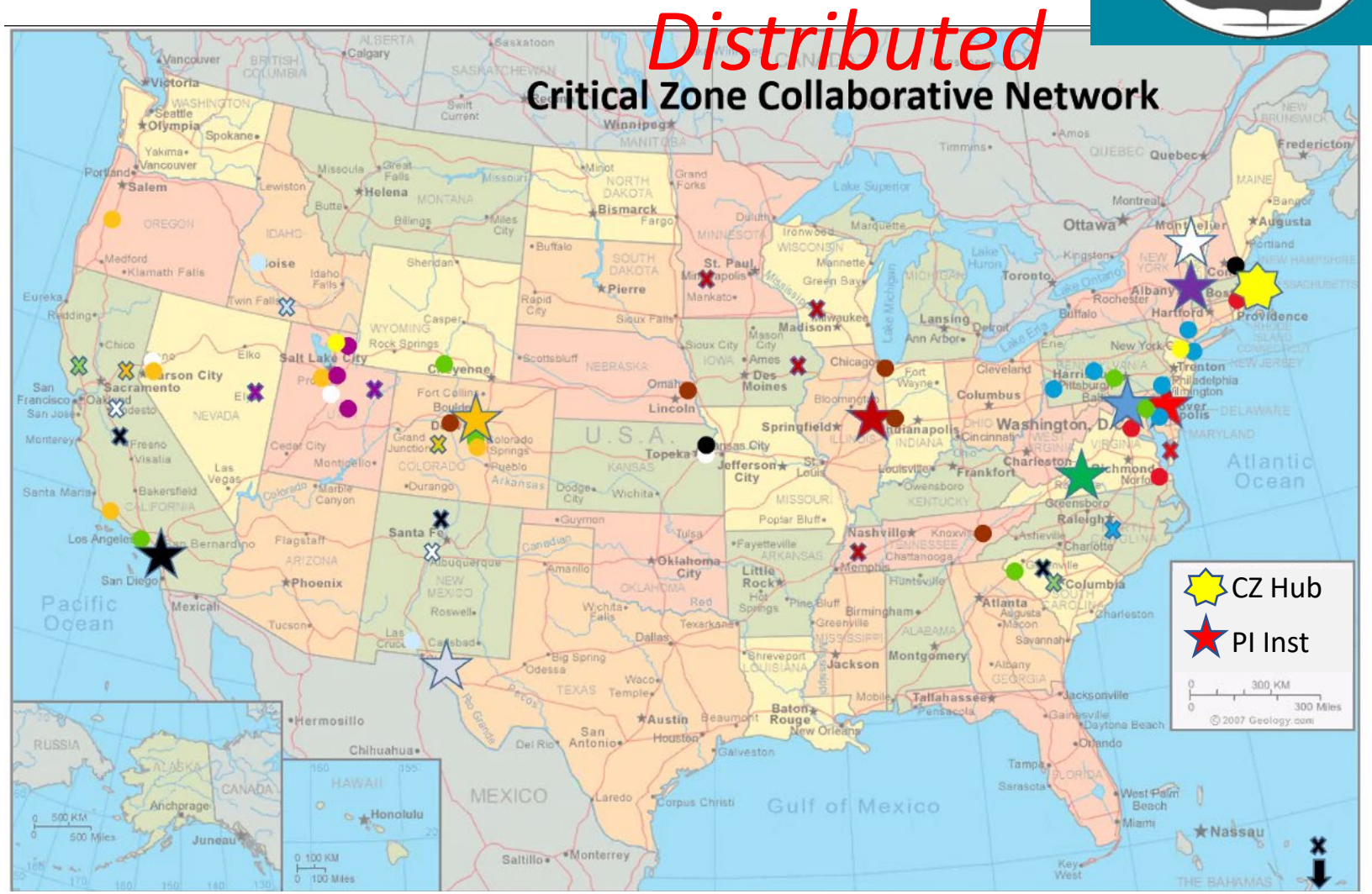


NSF Timeline



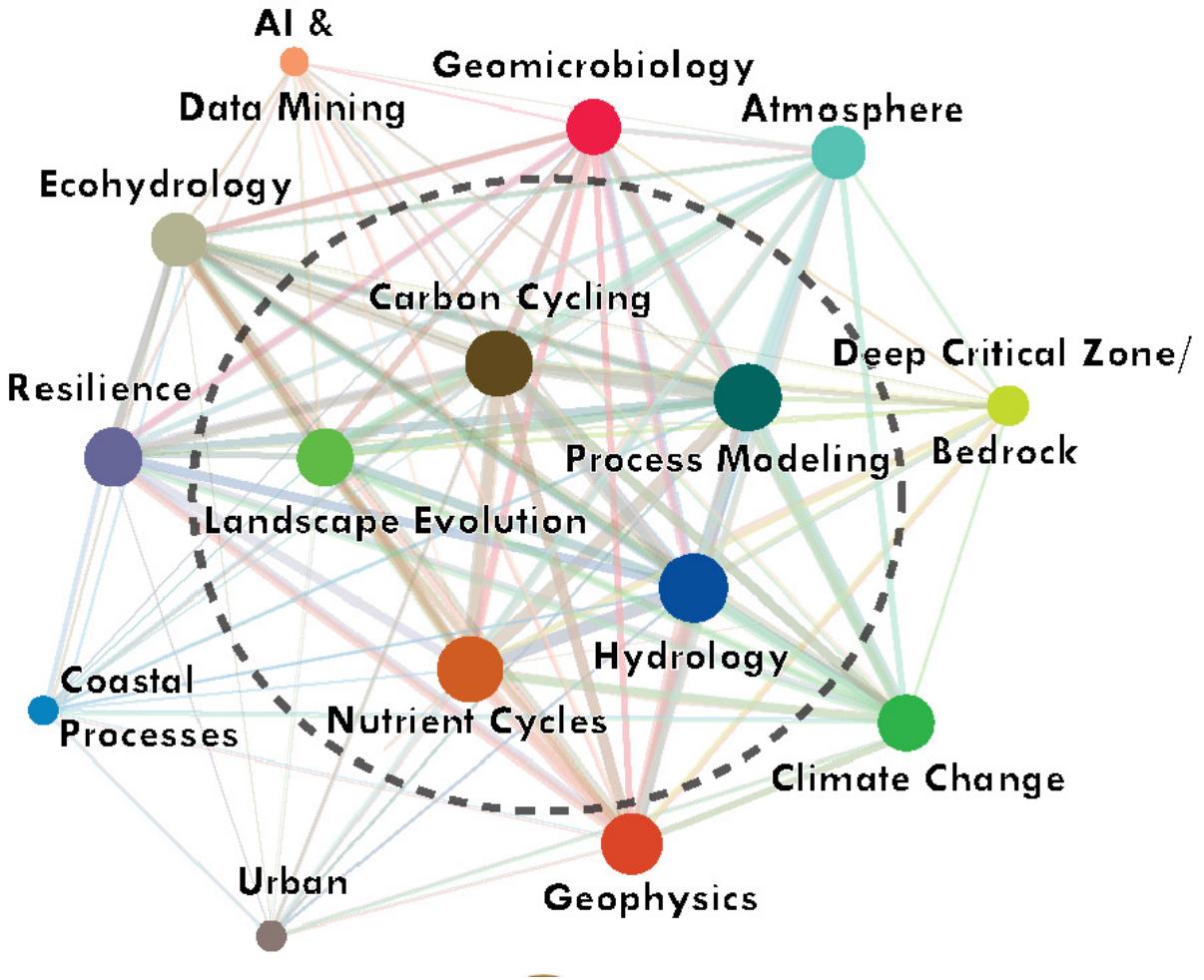
9 newly funded networks plus CUAHSI Hub

- Big Data
- Dust
- Coastal
- Urban
- Bedrock
- IML (intensely managed landscapes)
- Dynamic storage (Montane)
- Dryland
- Geomicrobiology



Differences between the old and new CZs

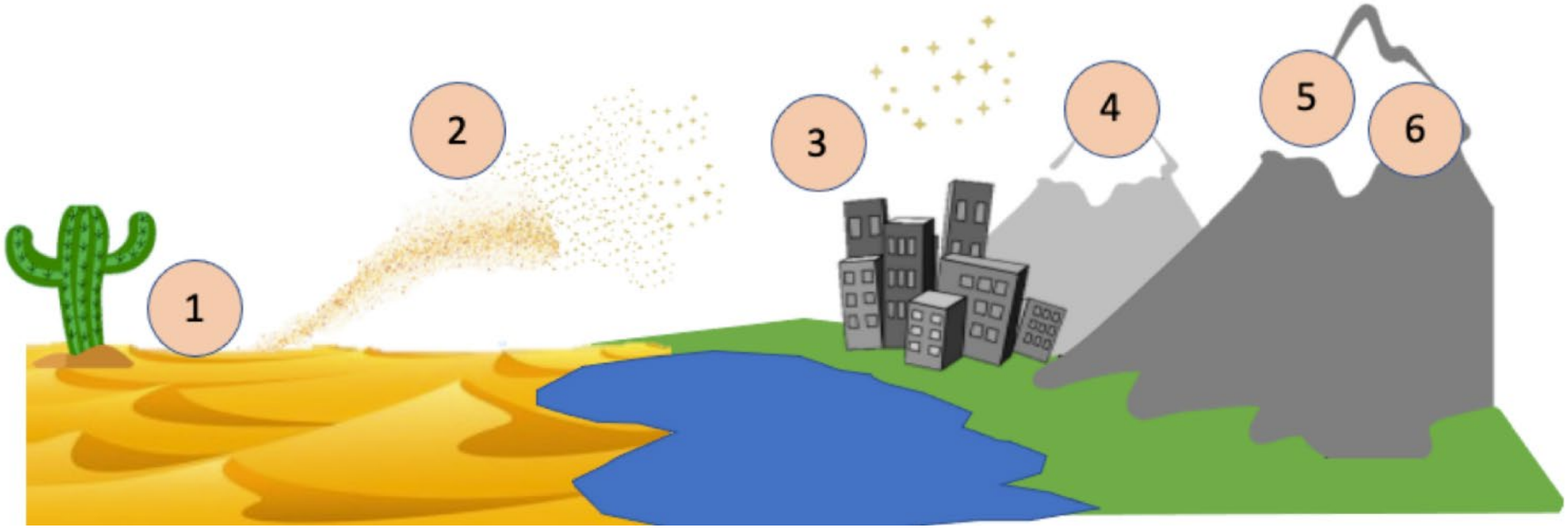
- All of the new CZs are observing across a gradient, distributed sites
- No longer called CZO's or Observatories
- Only one site carried over from previous funding (IML)
- Some overlap with previous sites but different PIs
- New data hub is CUAHSI



Dust in the Critical Zone from the Great Basin to the Rocky Mountains

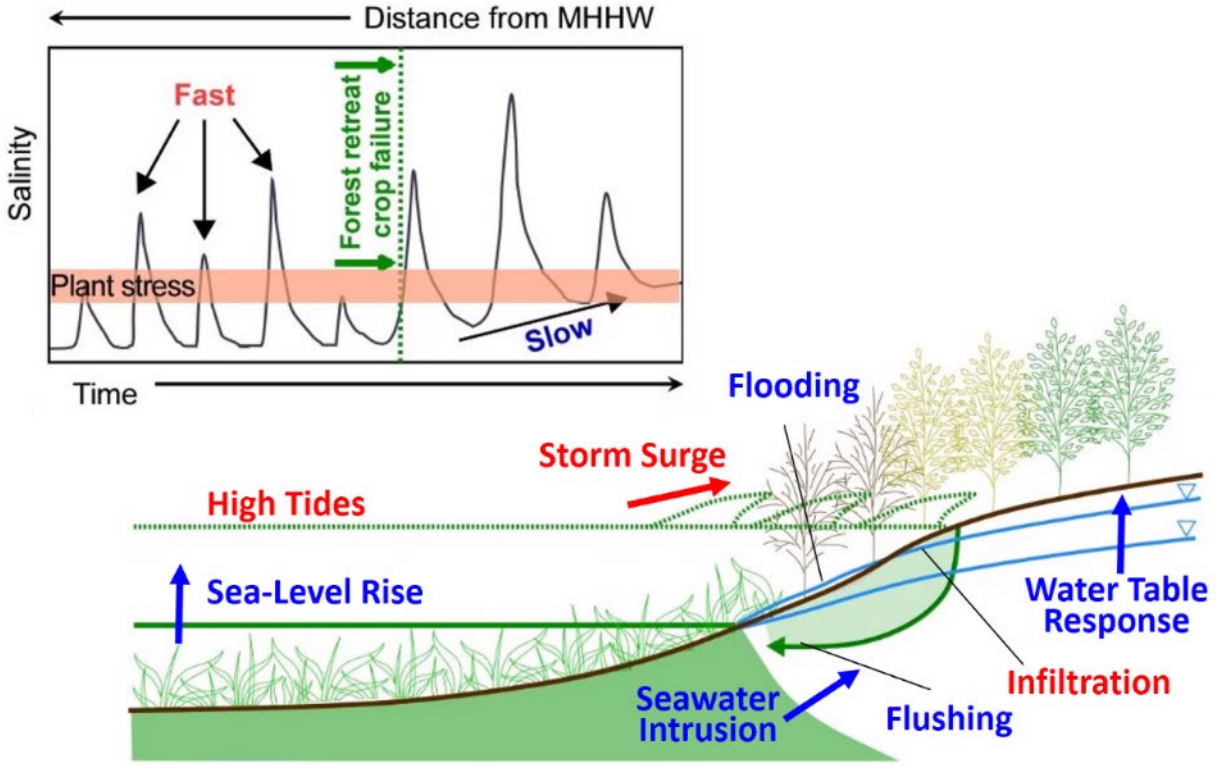
- *Jeffrey Munroe , Middlebury College*

- Dust transport
- Nutrients and trace metals on dust



Salinization of the Coastal Critical Zone: Drivers and Feedbacks that transform landscapes and fluxes between land and sea

- *Holly Michael, U Delaware*
- Fast and slow processes (e.g. storms versus sea level)
- Impacts of salinization and redox on N, P, and C cycles

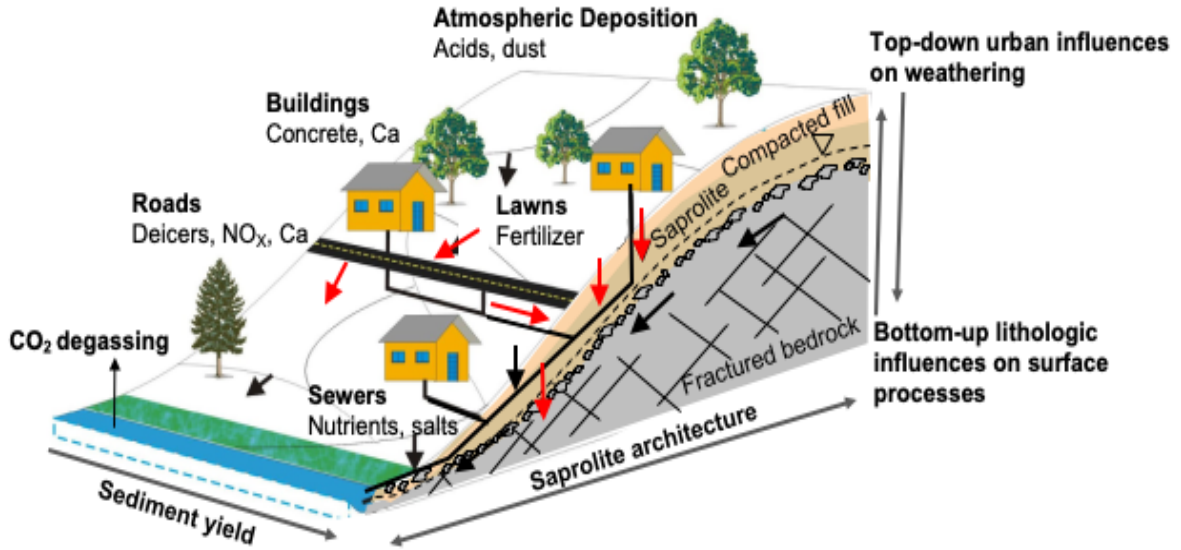


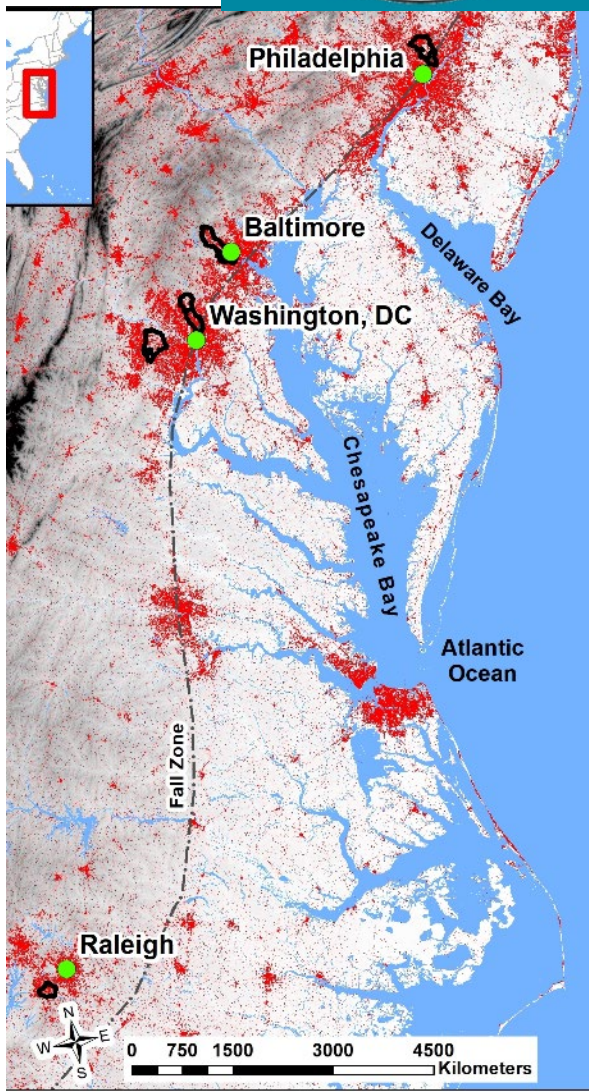
Urban Critical Zone processes along the Piedmont-Coastal Plain transition

- *Claire Welty, University of Maryland-Baltimore County*

- Biweekly samples
- Synoptics
- Geophysics

The Urban Critical Zone





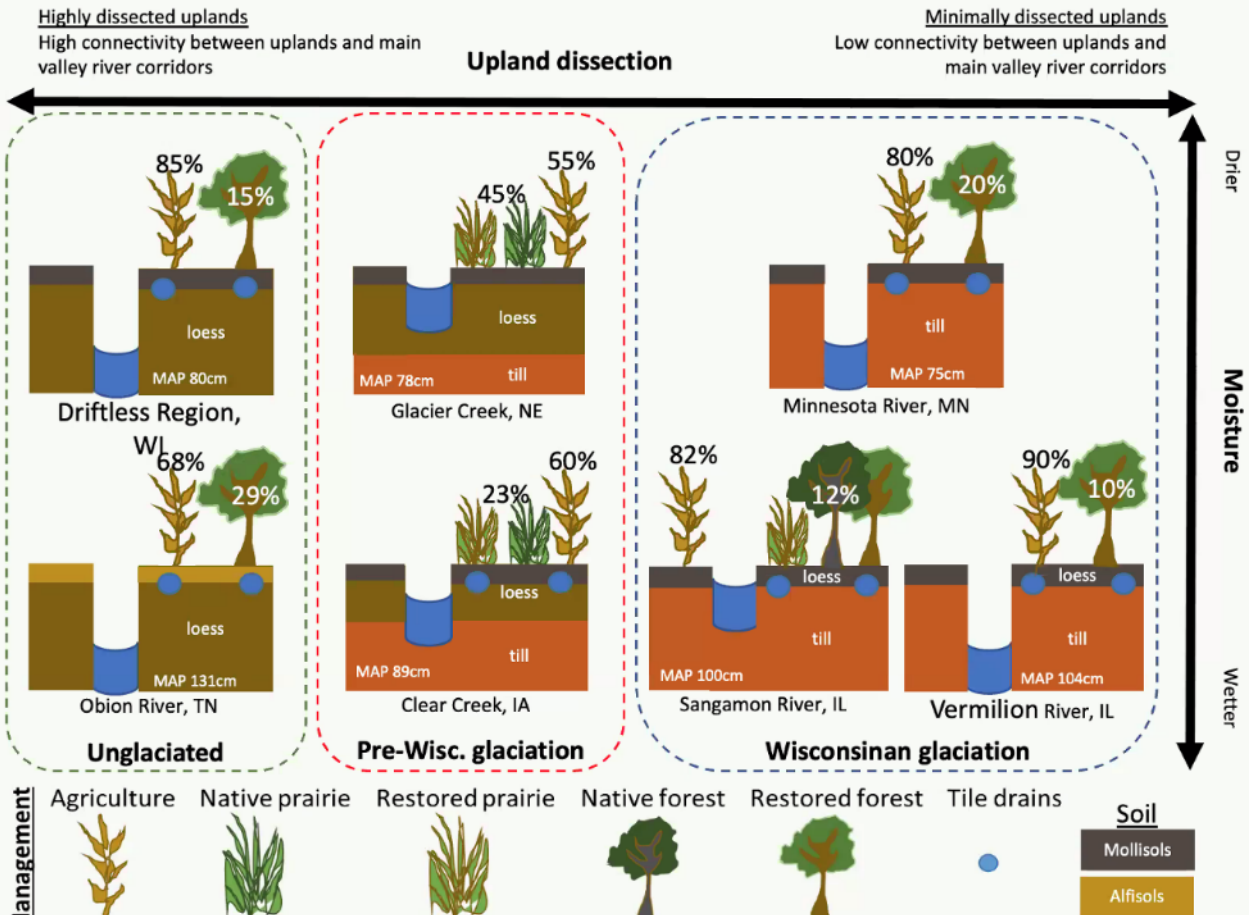
https://urbancz.umbc.edu/

CINet: Critical Interface Network in Intensively Managed Landscapes IML

- *Praveen Kumar, University of Illinois Urbana-Champaign*

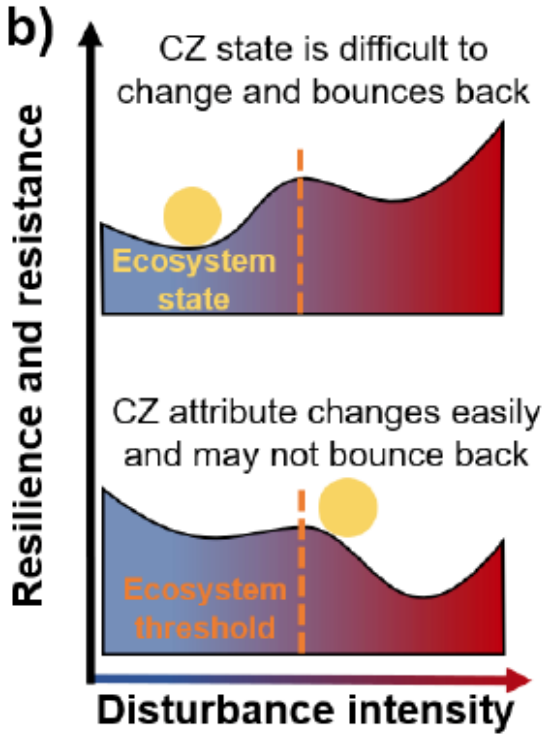
- Critical interfaces are undergoing rapid transition
- Dynamics need to be measured to understand human impacts

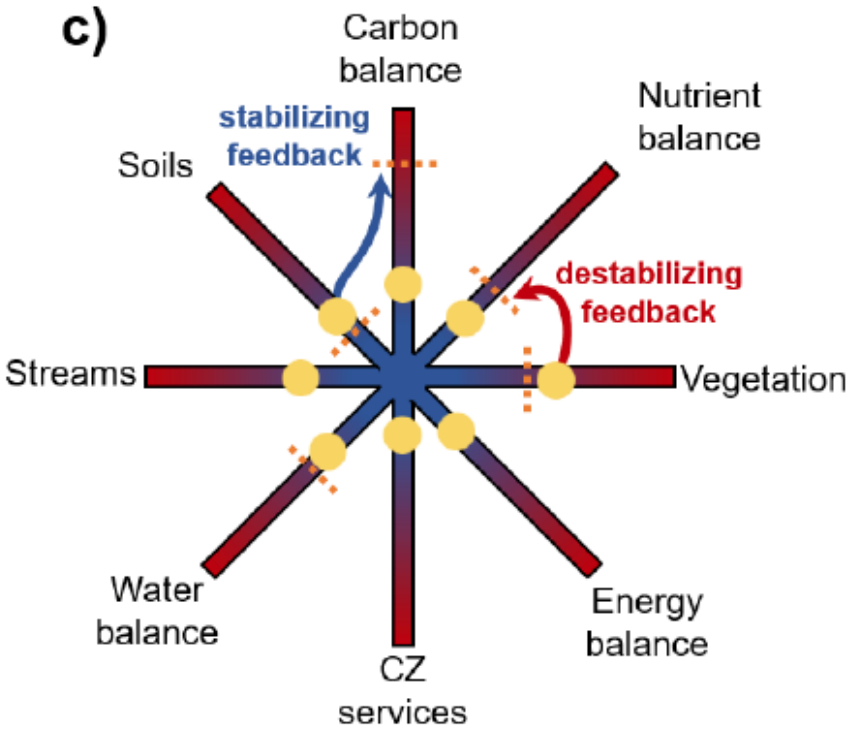
Gradients: Geology, Geomorphology, Climate, Landuse and Human Impact



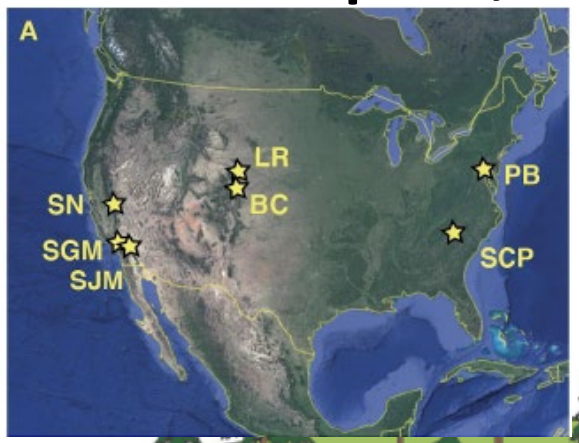
Using Big Data approaches to assess ecohydrological resilience across scales

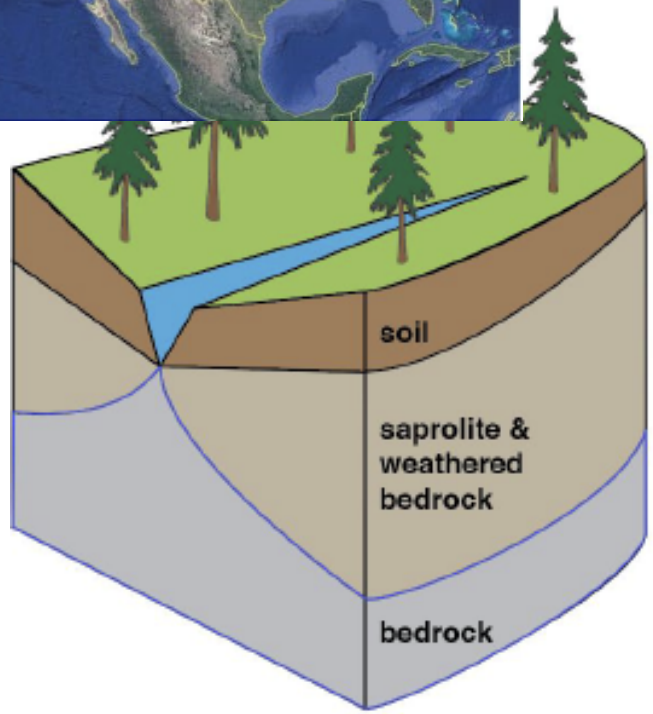
- *Julia Perdrial, University of Vermont*
- CZ structure controls the fluid and material fluxes at Earth's surface and thus regulates an ecosystems resilience and resistance to disturbance
- Approach: Use existing big data sets and targeted data collection

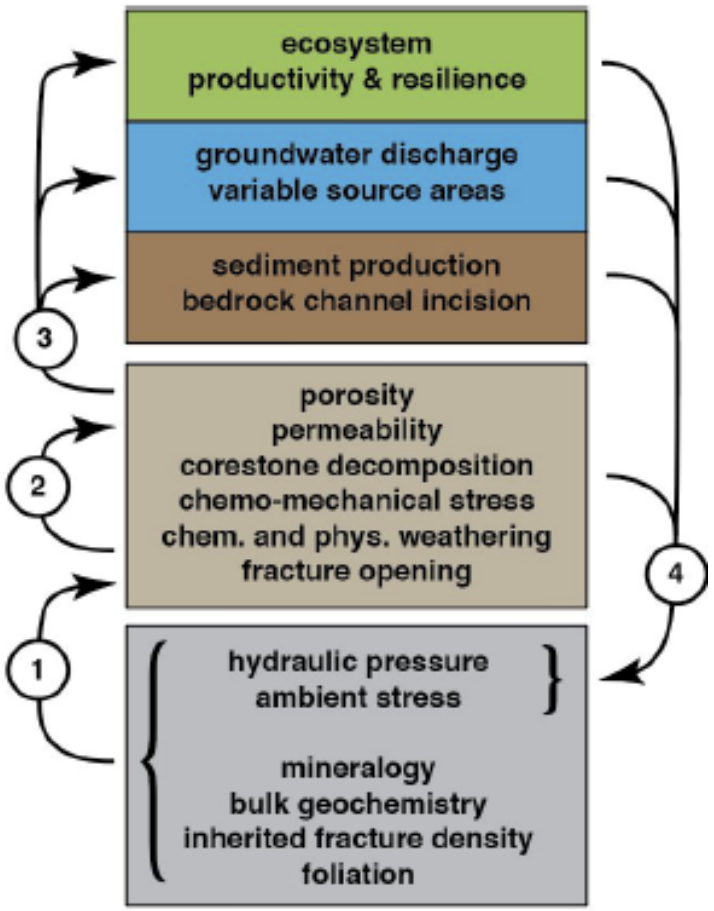




Bedrock controls on the deep critical zone, landscapes, and ecosystems





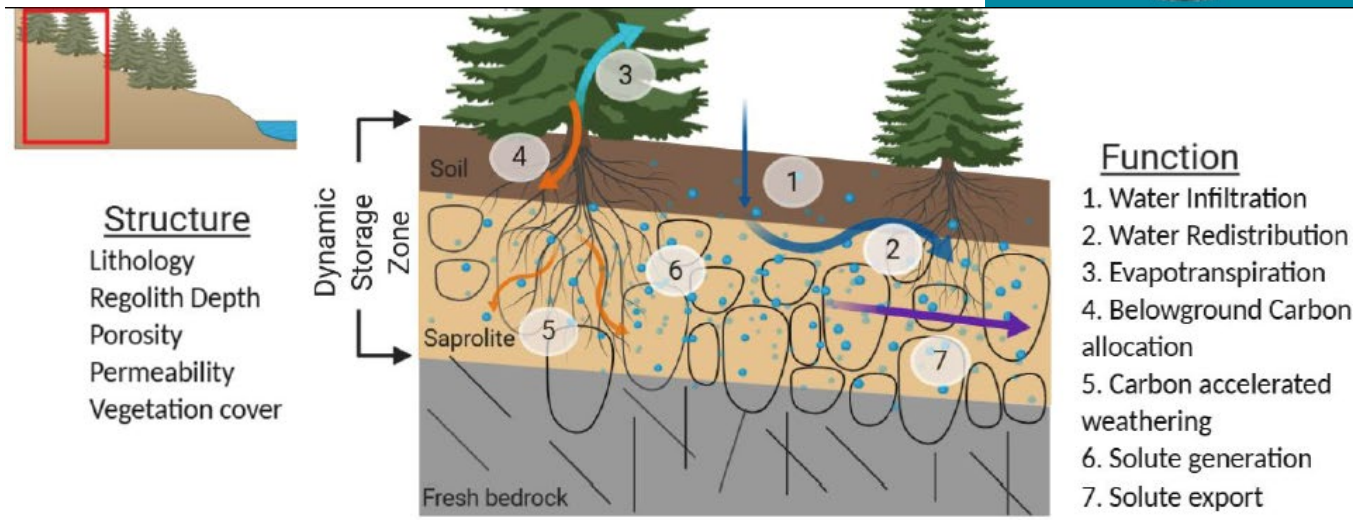


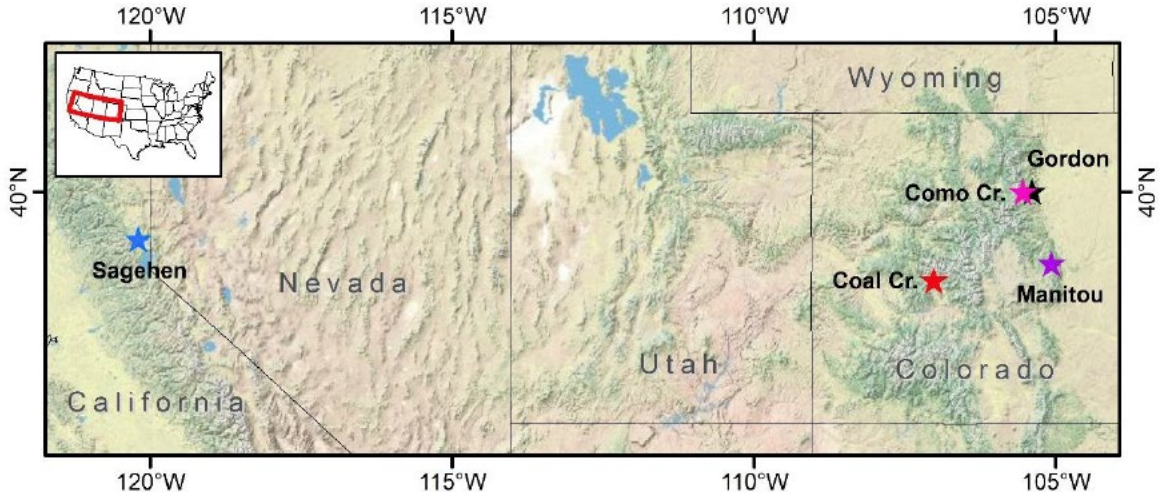
- *Steven Holbrook, Virginia Poltytechnic Institute*
- Understanding the cascading impacts of bedrock conditions affect mineral weathering, porosity development, the through-flow of reactive fluids and
- visa verse how near surface processes influence conditions at the base
- Approach: Heavily relies on geophysical tools

Quantifying controls and feedbacks of dynamic storage on critical zone processes in western montane watersheds

- *Holly Barnard, University of Colorado Boulder*

- Dynamic storage is unique in its bi-directional feedbacks with CZ surface processes and deeper processes
- Approach: Monitoring and intensive modeling (reactive transport and ecosystem)

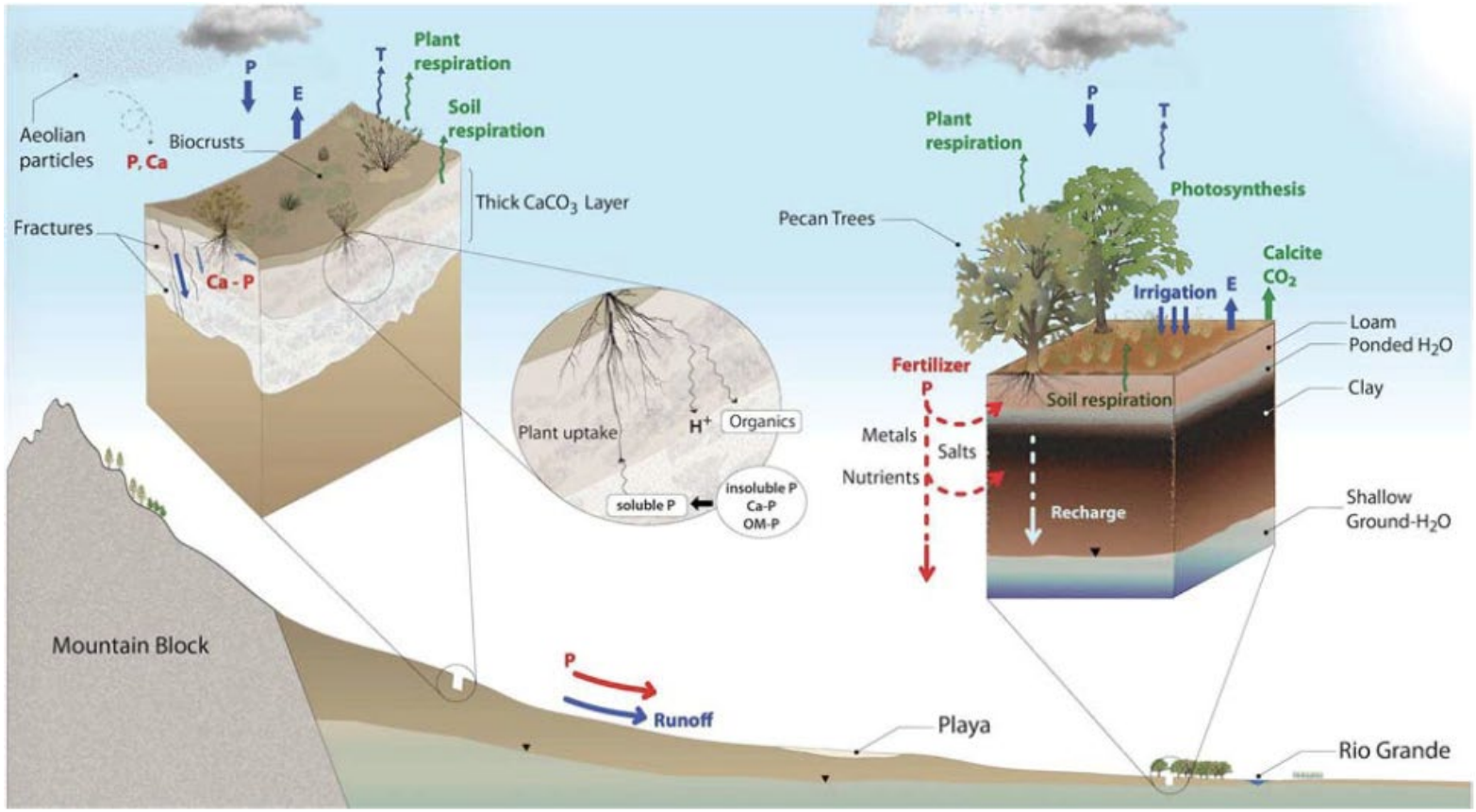




Patterns and controls of ecohydrology, CO2 fluxes, and nutrient availability in pedogenic carbonate-dominated dryland critical zones

- *Lixin Jin, University of Texas El Paso*

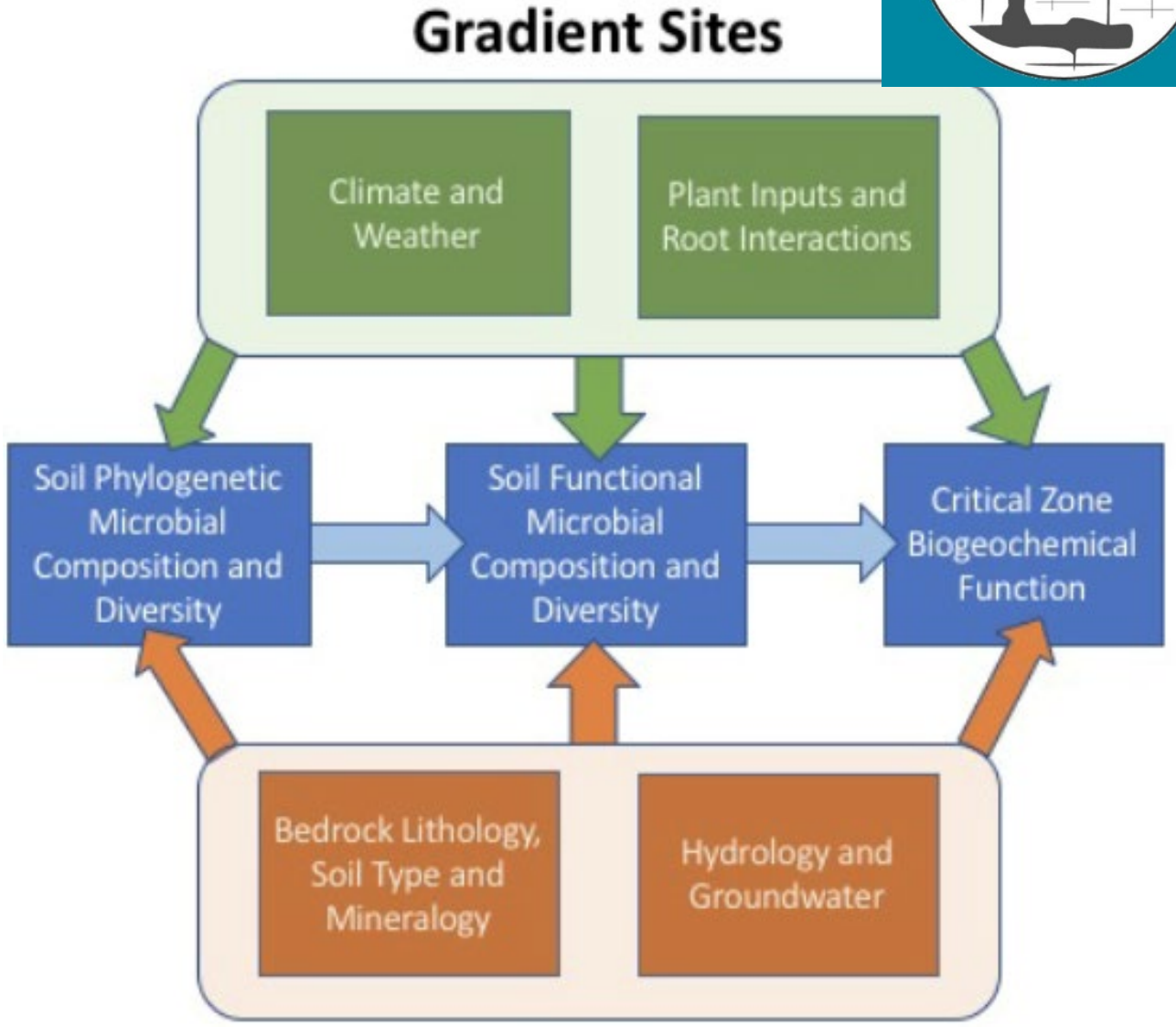
- Limited but highly variable rainfall inputs controls the dryland CZ architecture where the vadose zone is thick and groundwater table is deep.



Geomicrobiology and Biogeochemistry in the Critical Zone

- *Emma Aranson, University of California Riverside*

- Soil type, hydrology, and lithology are critical in determining the depth to which surface influences drive microbial community composition, diversity, and activity.



Coordinating Hub for the CZ Network

- *Jerad Bales, CUAHSI*

Task 1. Enhance and integrate existing data services operated by CUAHSI and EarthChem to support the CZ community. (Lehnert, Horsburgh, Calloway, Tarboton)




Task 2: Support scientific discovery through community synthesis activities. (Baron, Boyer)


Coordinating Hub for the CZ Network

- *Jerad Bales, CUAHSI*

Task 3: Broaden the CZ community through outreach and educational activities. (Boyer, Bales)


Task 4: Enhance collaboration among the CZ Thematic Clusters through community meetings and outreach. (All)





CUAHSI
UNIVERSITIES ALLIED FOR WATER RESEARCH

- *The HUB is still getting up and running*

International CZs

- There are some carbonate study sites
- France, Germany, Canada

  https://sites.google.com/lbl.gov/2020-agu-international-critica/resources/important-links
- China http://www.czo.ac.cn/program/

PROJECT 1

The transmissive critical zone: understanding the karst hydrology-biogeochemical interface for sustainable management

PROJECT 2

Using Critical Zone Science to Enhance Soil Fertility and Improve Ecosystem Services for Peri-Urban agriculture in China

PROJECT 3

SPECTRA: Soil Processes and Ecological Services in the Karst Critical Zone of SW China

PROJECT 4

Red Soil CZ: From Natural to Anthropogenic Evolution of Red Soil and its Impact on Ecosystem Function in the Critical Zone

PROJECT 5

Modelling and managing critical zone relationships between soil, water and ecosystem processes across the Loess Plateau

How to get involved

- Keep track of Hub announcements and activities

  https://criticalzone.org/
- Propose complementary work to CZ
- Propose complementary work to NSF (Hydrology, GLD, GGB) or other funding agency
- Learn about international CZs
- NAGT/RCN CZ office hours (coming soon)

  https://nagt.org/nagt/profdev/workshops/index.html

- Get involved in synthesis → next slide

Synthesis opportunities

- USGS Powell Center

  https://www.usgs.gov/centers/powell-ctr

  Annually in Jan

  CZ call due Feb 26 2021
- NSF AccelNet
  https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505584

  Jan and Oct deadlines
- RCN: Expanding CZ Science
  https://sites.google.com/view/czrcn

  Small meeting grants until funds run out

Upcoming webinars

- Collaboration at Cave Conservancies: Todd Rasmussen

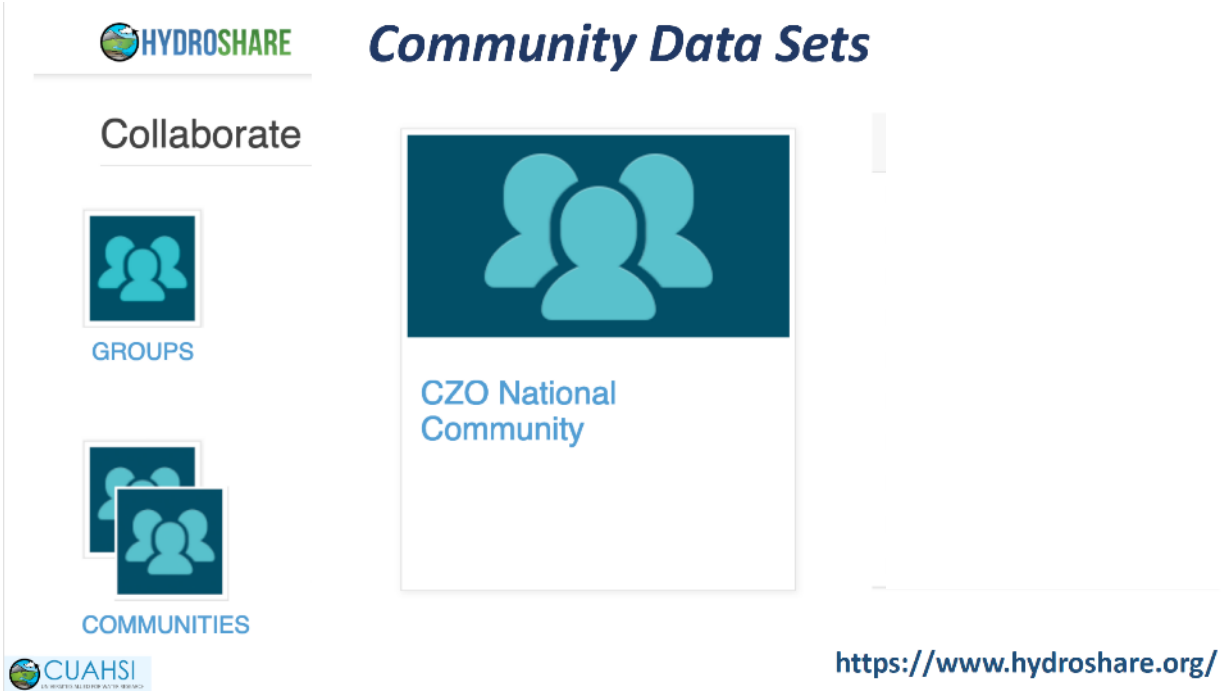
  (Feb 11, 2021 1PM EST)

Allen Spring Gap Cave, Lookout Mountain, Walker County, Georgia

http://www.hydrology.uga.edu/karst/

- Hydroshare

  (probably March 2021)



Short Title	PI	Co-PIs
Dynamic water storage in the CZ of the western montane	Barnard (CU Boulder)	Navarre-Stichler (CO Sch of Mines), Sullivan (OR State U), Harpold (UNR), Tague (UCSB)
Geomicrobiology and biogeochemistry in the CZ	Aronson (UC Riverside)	Billings (U of Kansas), McDowell (UNH)
Urban CZ processes along the Piedmont – CP transition.	Welty (UMBC)	Berkowitz (Cary Inst.), Duncan (Penn State), Toran (Temple), Groffman (CUNY), Moore (Towson St), Bain (Pitt), Prestegaard (U of MD)
Dust in the CZ from the Great Basin to Rocky Mts.	Munroe (Middlebury)	Carling (BYU), Perry (U of UT), Brahney (USU), Hahnenberger (Salt Lake Comm College)
Bedrock controls on the deep CZ	Holbrook (VA Tech)	Singha (CO Sch of Mines), Hayes (Dickinson), Flinchum (Clemson), Riebe (U of Wy), Harman (Johns Hopkins), Moon (UCLA)
Big data to assess eco-hyd resilience across scales	Perdrial (UVM)	Seybold (U of KS), Harpold (UNR), Boisrame (DRI), Abbot (BYU)
The coastal CZ	Michael (U of DE)	Tully (UMBC), Gedan (GWU), Fagherazzi (Boston U), Kirwan (VIMS)
Intensively managed landscape	Kumar (UIUC)	Papanicolaou, Schaeffer (UT-Knox), Filley (Purdue), Dere (Nebraska), Goodwell (UC-Denver), Kratschmer (National Great Rivers), Roads, Anders, Druham, Cai (UIUC), Neal (Northwestern), Muste (Iowa), Ill State Water Survey
Processes in pedogenic carbonate dryland CZ	Lin (UTEP)	Ma, Darrouzet-Nardi, Loughleed, Mclaren (UTEP), Pierce (Boise State), Zhu (U Wyoming), Pietrasiak (NM State)