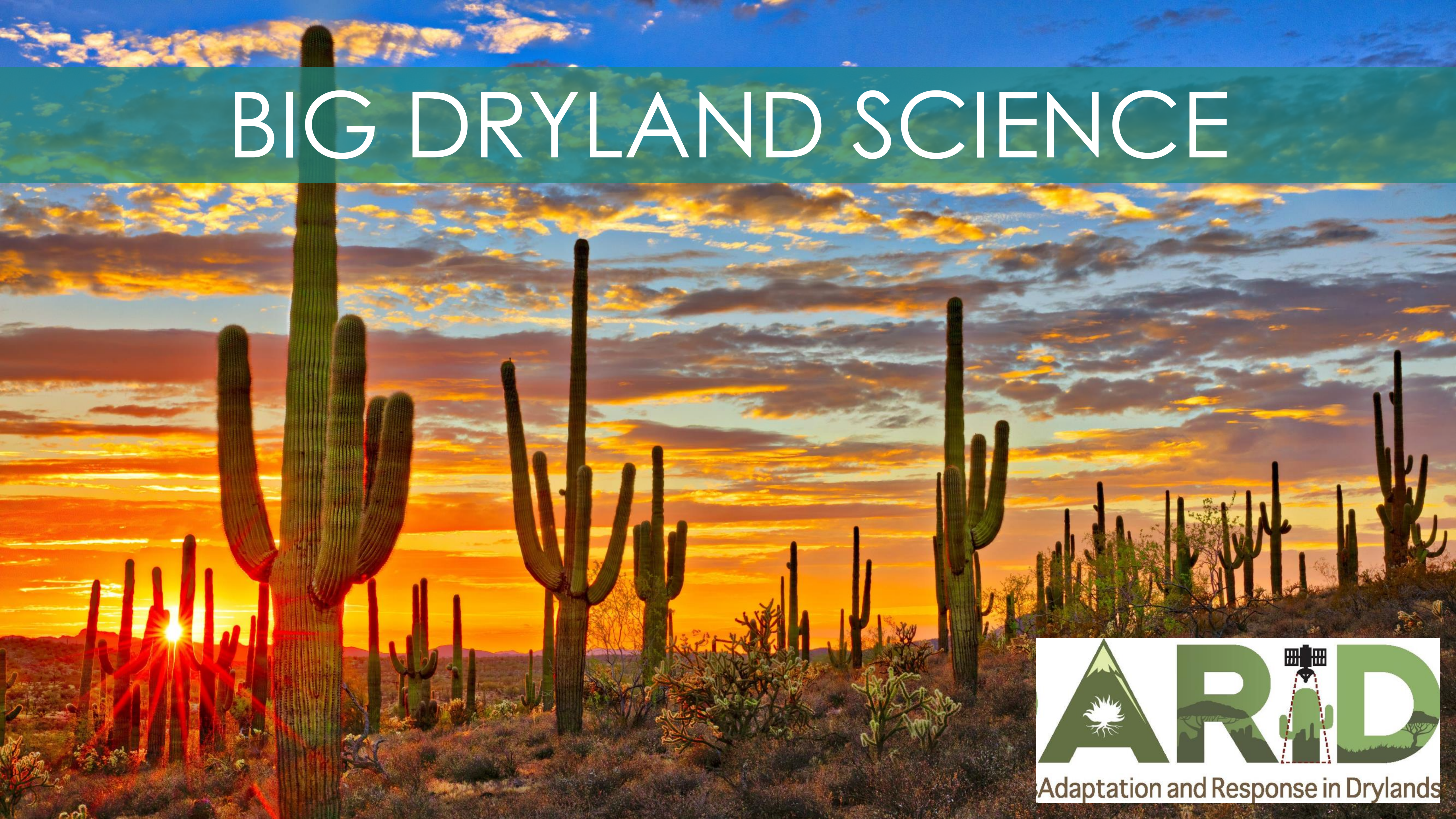
# BIG DRYLAND SCIENCE

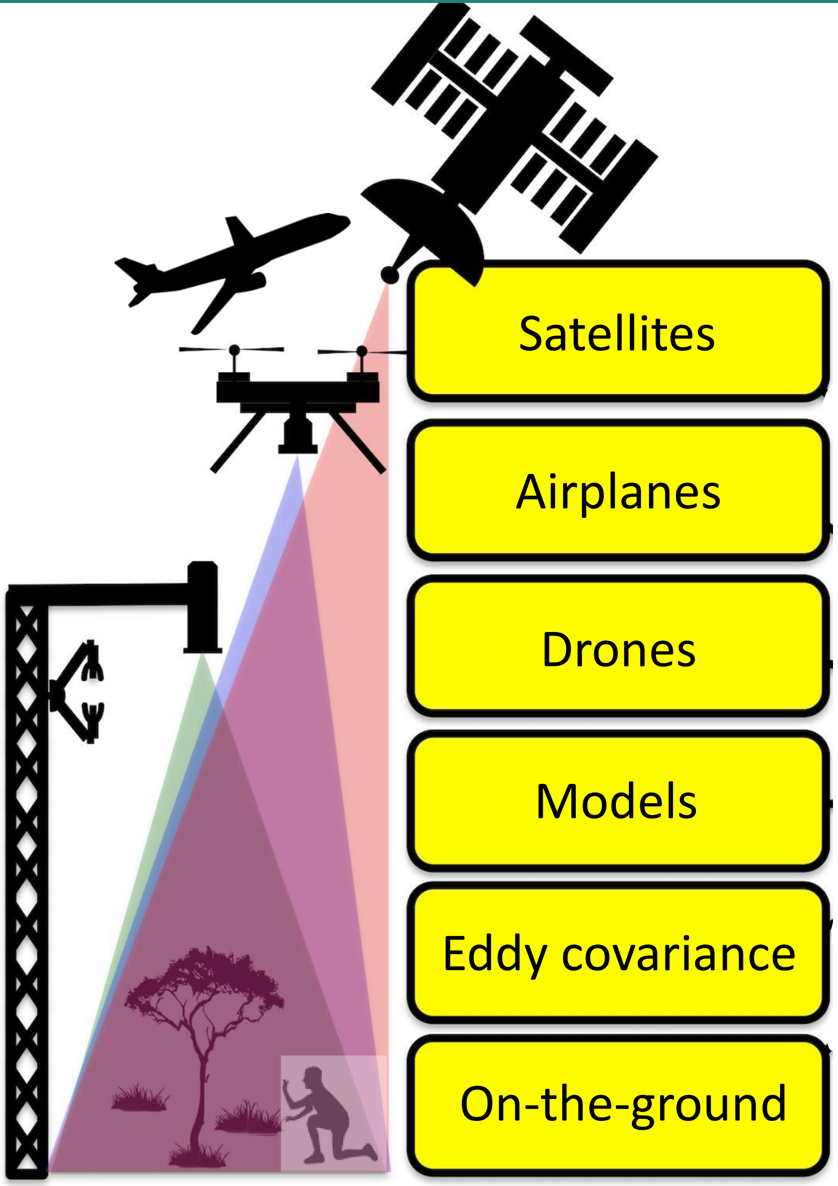


ARID
Adaptation and Response in Drylands

# NASA Terrestrial Ecology Field Campaigns are designed to build understanding for complex systems

NASA Terrestrial Ecology field campaigns focus the community's attention on:

(a) **answering big science questions** targeted on important regions or biomes
(b) enabling **more effective interpretation** and analysis of space-based measurements
(c) fostering **collaborative interactions** and building new relationships within the scientific community
(d) providing valuable opportunities for training and educating the **next generation of scientists**
(e) leaving a **legacy data** of great value for future research.



# The Terrestrial Ecology Field Campaign planning process

1. NASA puts out a call for scoping study proposals. Winter 2022.
2. NASA selects two scoping studies to advance. Spring 2023.
3. A year-long scoping study is conducted, where a plan for the larger field campaign is developed. NOW!! (report December 2024).
4. NASA selects one (or neither) of the scoping study plans to advance. 2025.
5. NASA sets up Science Definition Team. 2025 – 2027.
6. The potential for multiple years of NASA funding open to the scientific community. 2027/2028.

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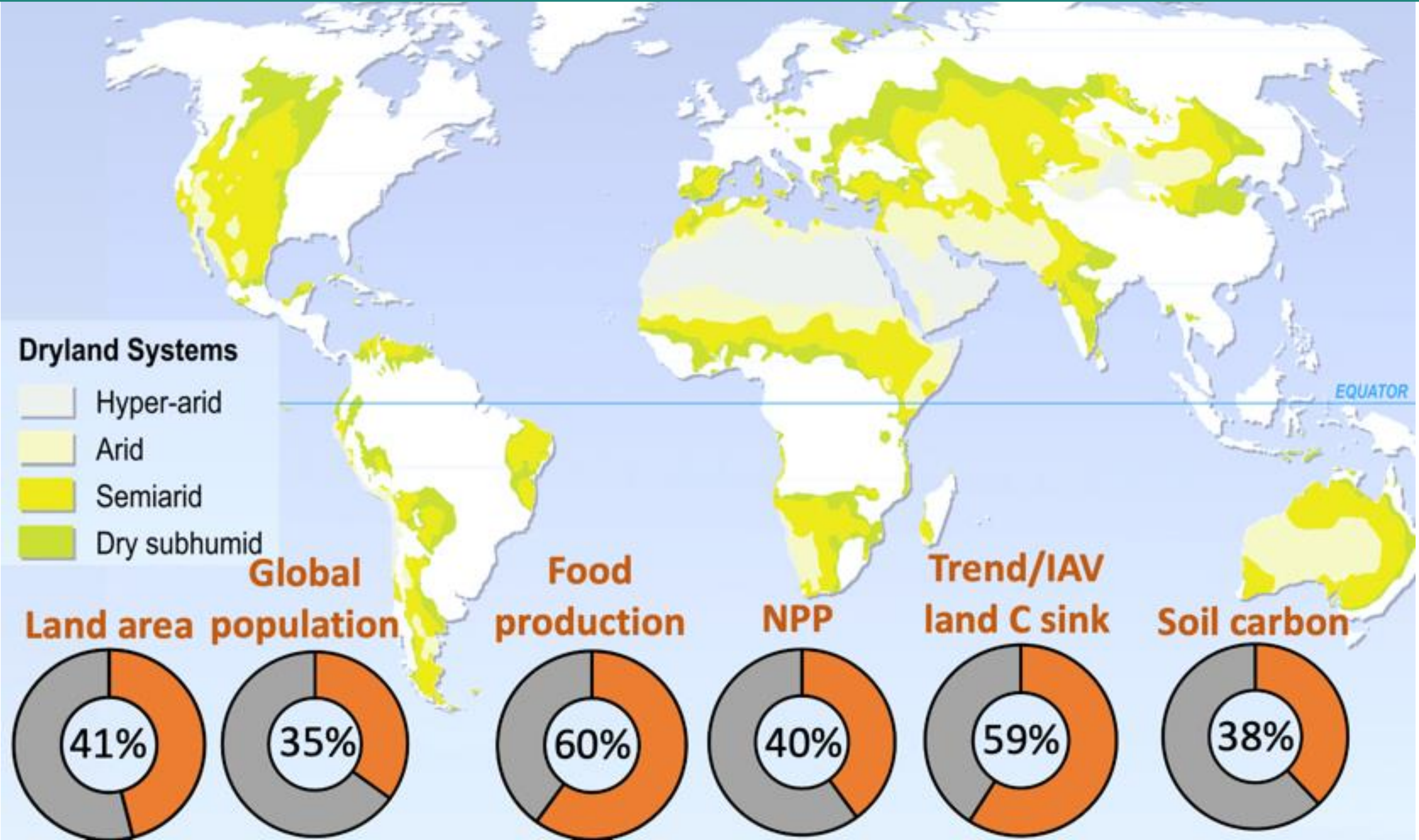
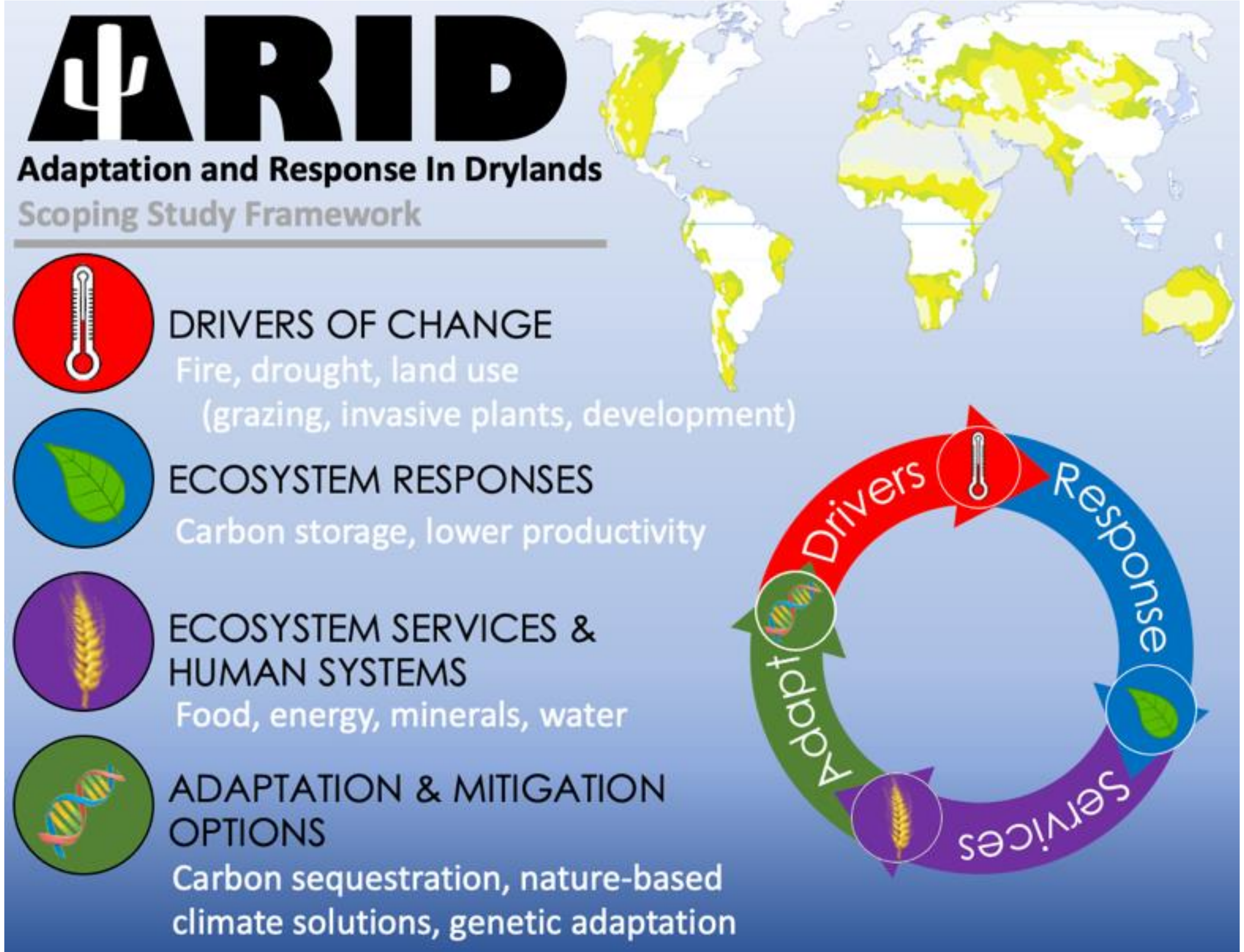
# Why focus on drylands?



# What is ARID?

## Adaptation and Response in Drylands (ARID)



# What is ARID?

## Focal Question

- What are the defining features in dryland systems that are driving changes in drought and aridity conditions affecting ecosystem dynamics and livelihoods?
- How do changes in arid landscapes contribute to local to global environmental changes?

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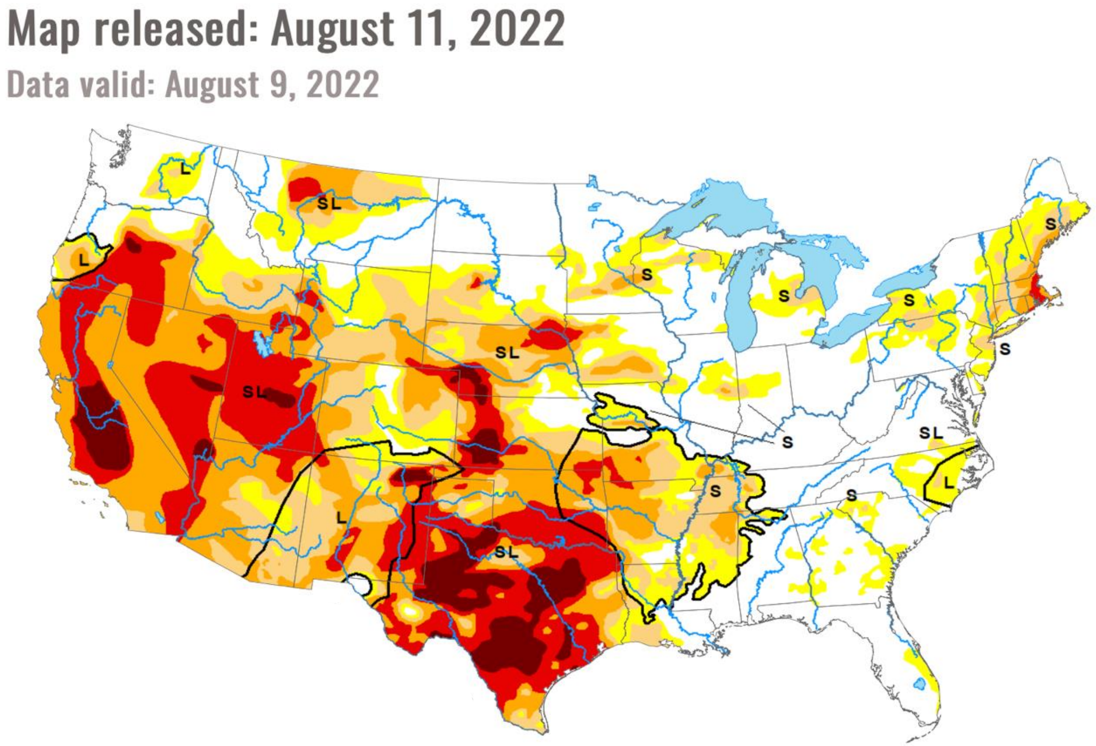
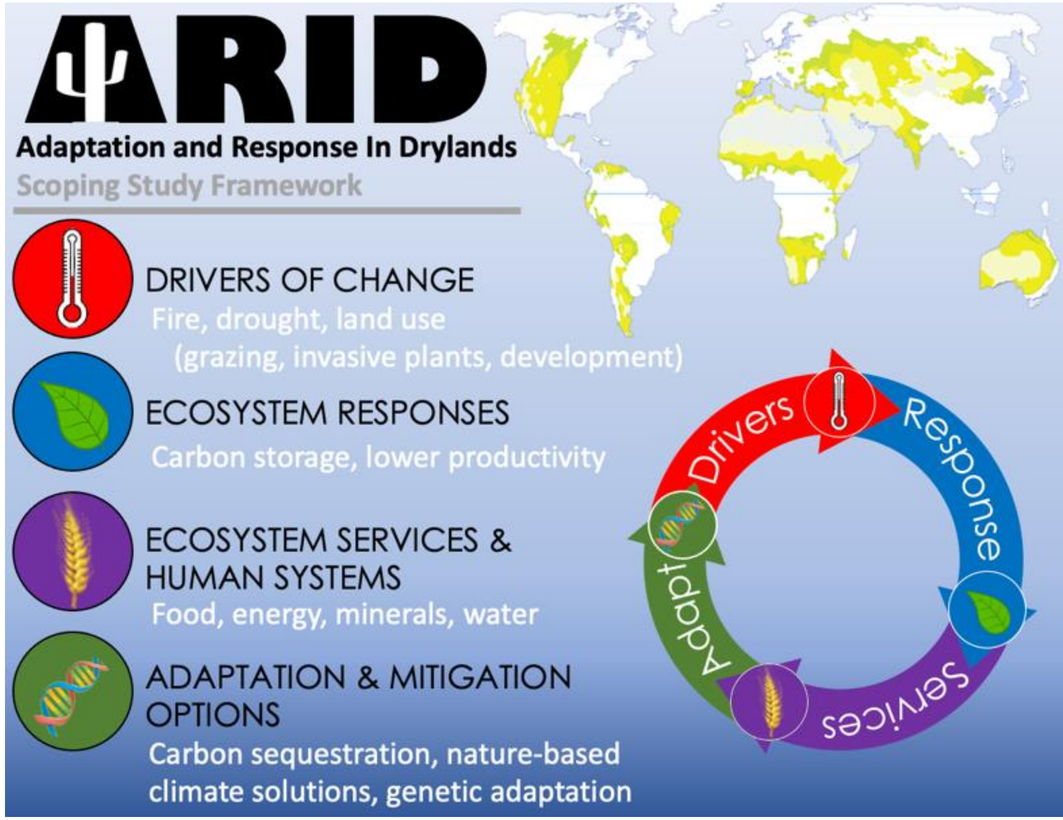
# What is ARID?

## Drivers of change

*e.g., altered frequency, intensity, timing, and temperatures of drought*




U.S. Drought Monitor

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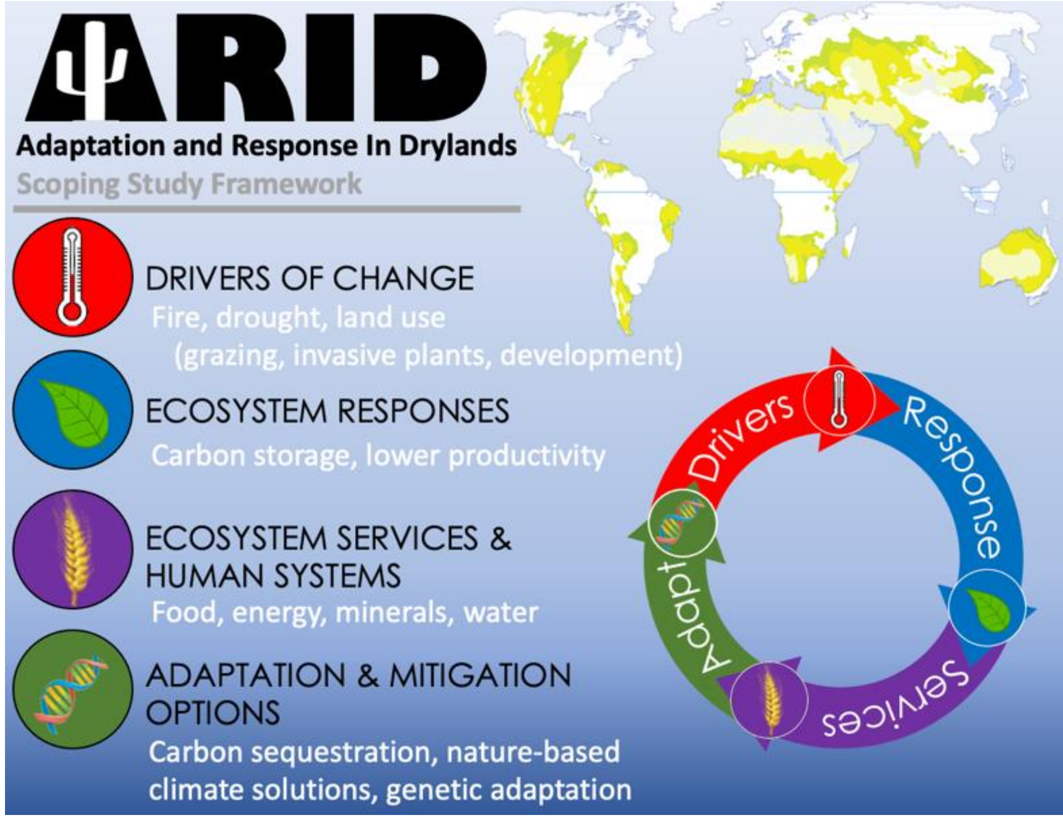
# What is ARID?

## Ecosystem responses

*e.g., lowered productivity and carbon storage, reduced success of restoration, increased exotic plant invasion*

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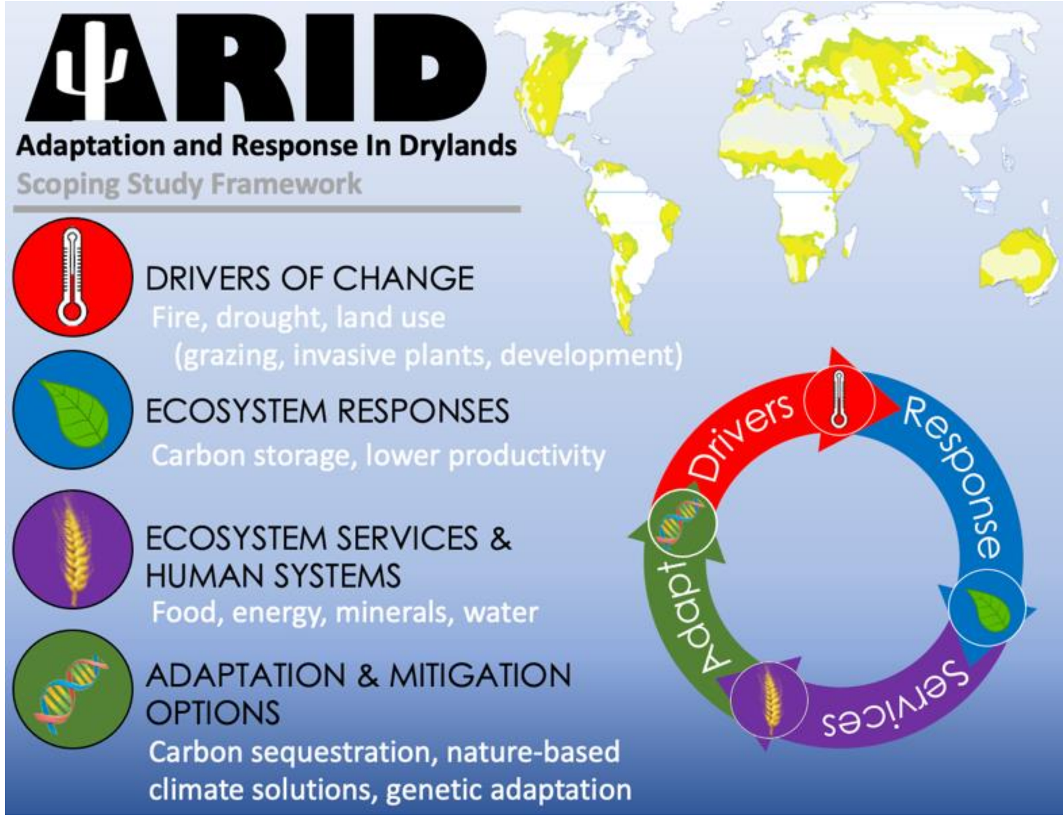
# What is ARID?

## Services and human systems

*e.g., potential for reduced food production, less water for life, lowered climate mitigation through carbon storage*

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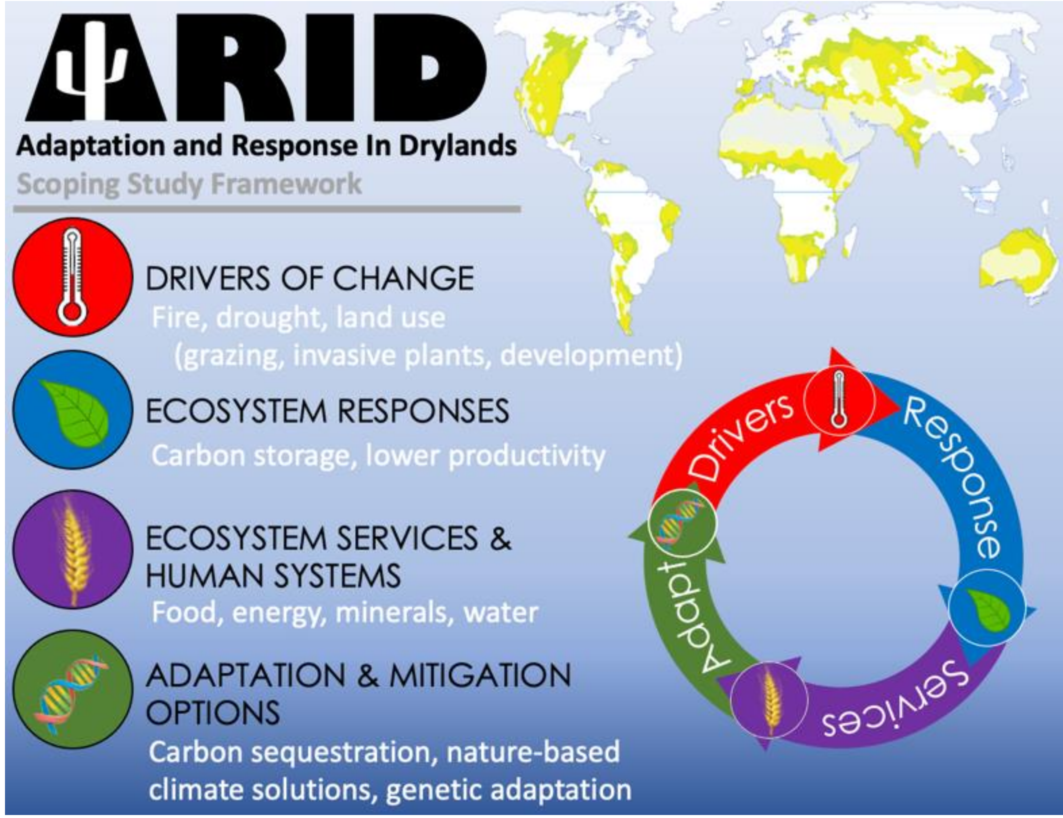
# What is ARID?

## Adaptation, mitigation, and management options

*e.g., what can we do about it?! What are our options for managing for drylands and their response to change*

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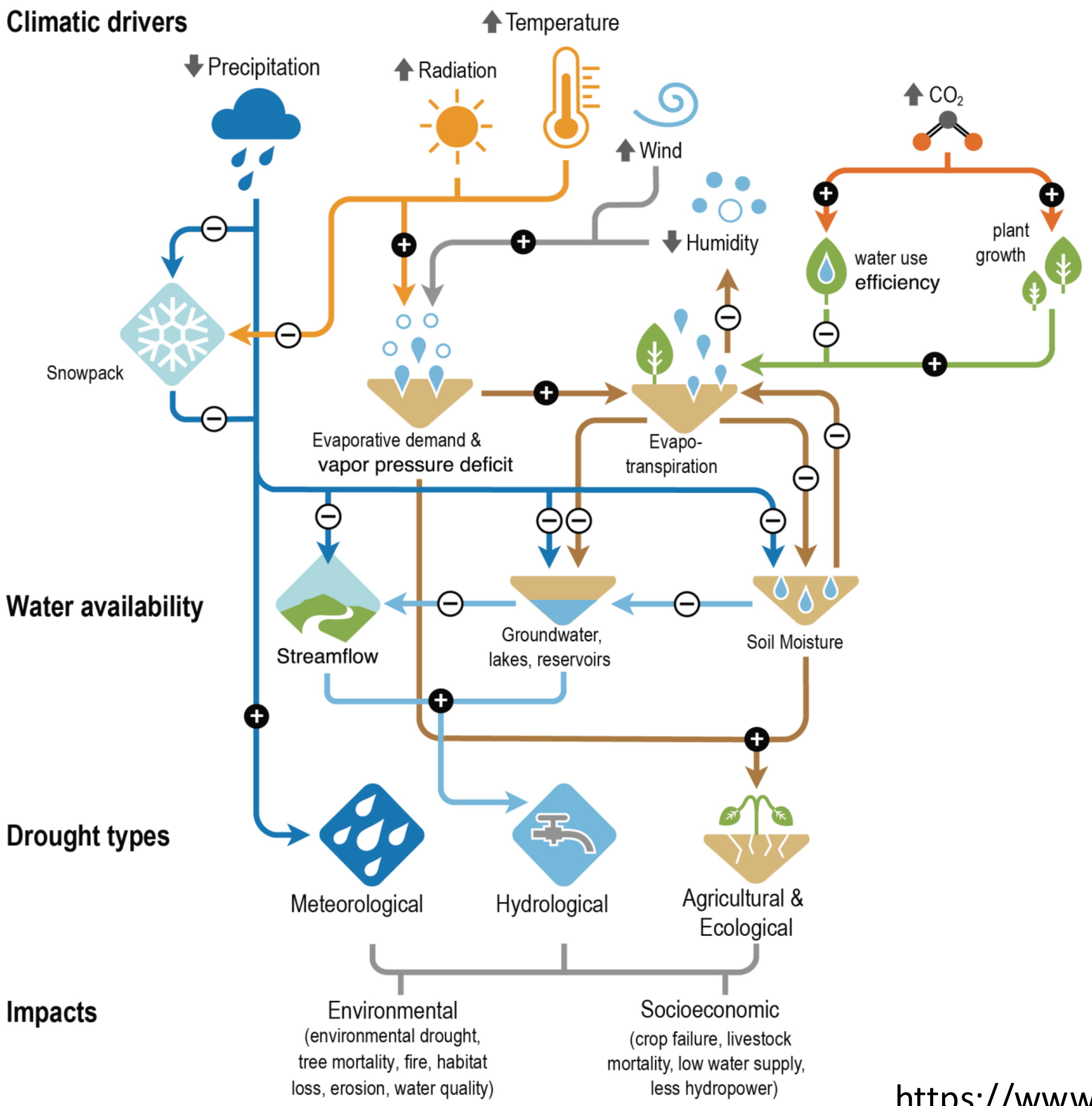



Atmospheric factors influencing drought include the amount of precipitation and associated effects of radiation, air temperature, and winds.

Biophysical functions influence the humidity and CO2 levels near the surface.

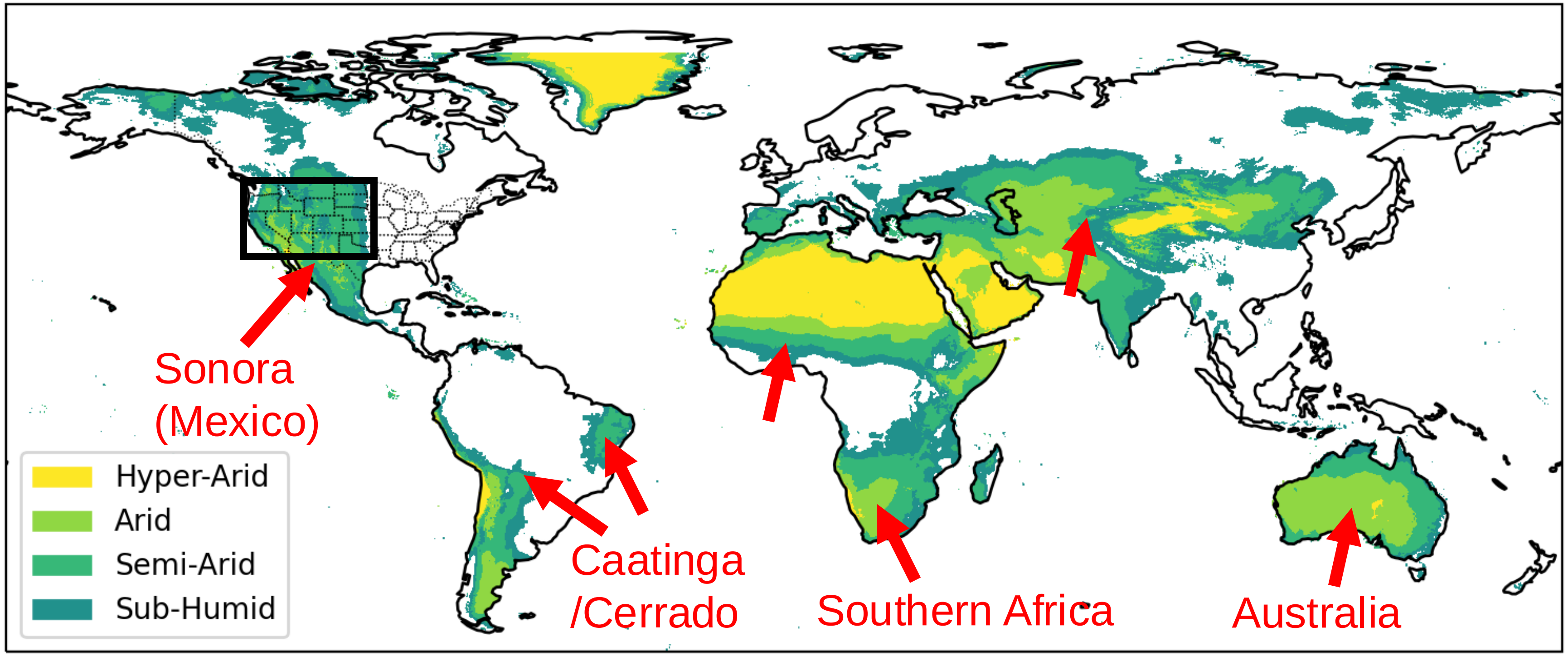
These factors influence water availability through modifications in the evaporative demand and ET from the ground surface.

These combine to affect different types of droughts.

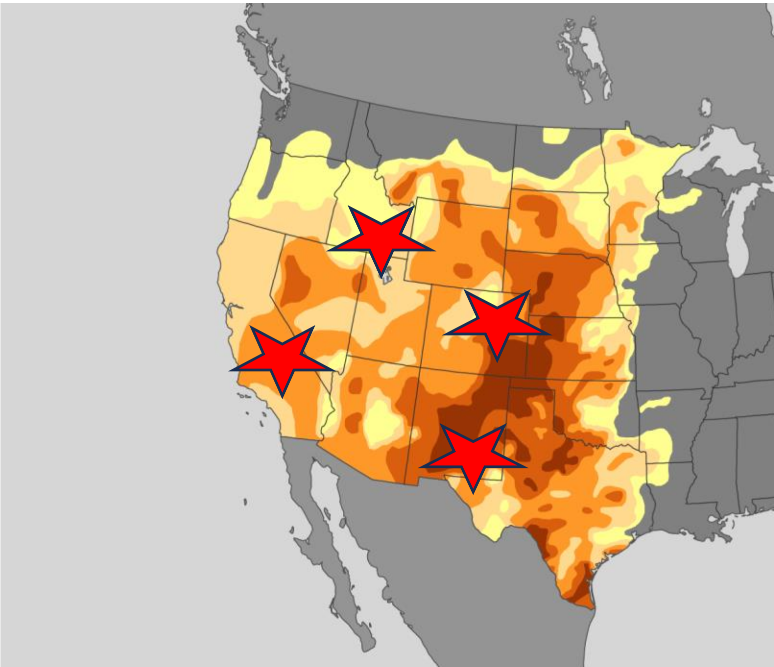
The drought events translate to impacts on ecosystem process and services and eventually impact resources essential to maintain various livelihoods of dryland systems

https://www.ipcc.ch/report/ar6/wg1/figures/chapter-8/figure-8-6

# Global approach but **West US focus**




International collaborations started
in Red locations
? Potential collaborations
: Potential Core Intensive sites



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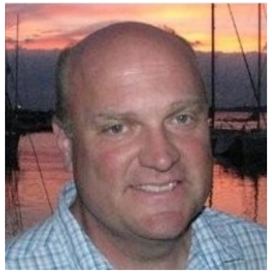

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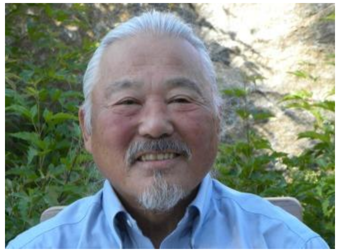

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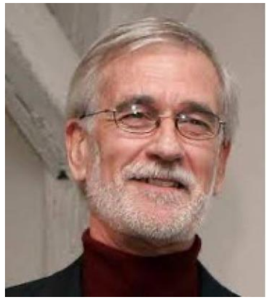

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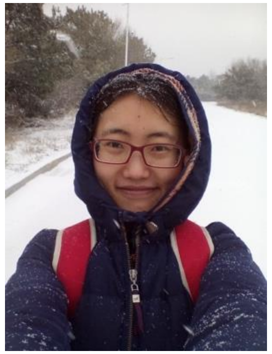

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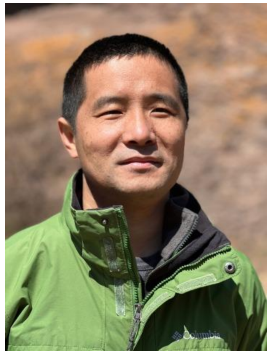

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# Get Involved!

- For questions, contact:
  - Sasha Reed, PI (screed@usgs.gov)
  - Andrew Feldman, Project Manager (andrew.feldman@nasa.gov)

- Please get involved with ARID:
  - Website: https://aridscoping.arizona.edu
  - Survey: https://aridscoping.arizona.edu/get-involved

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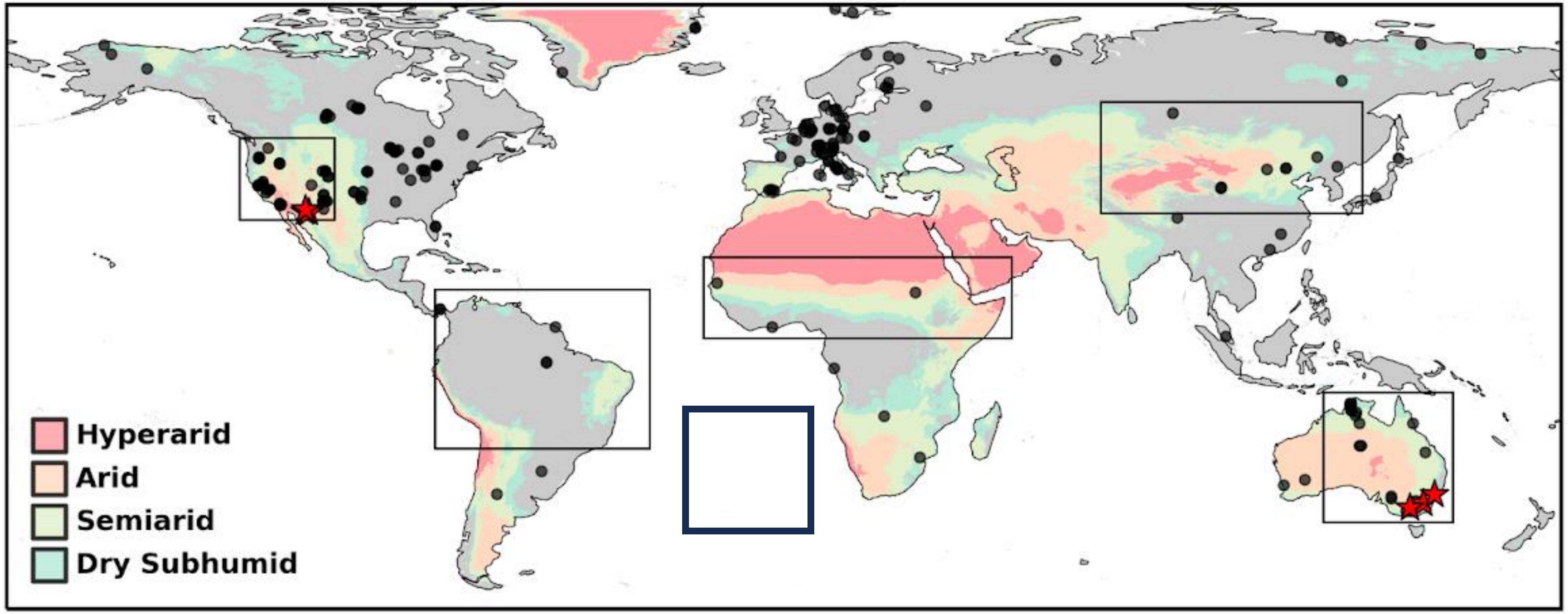
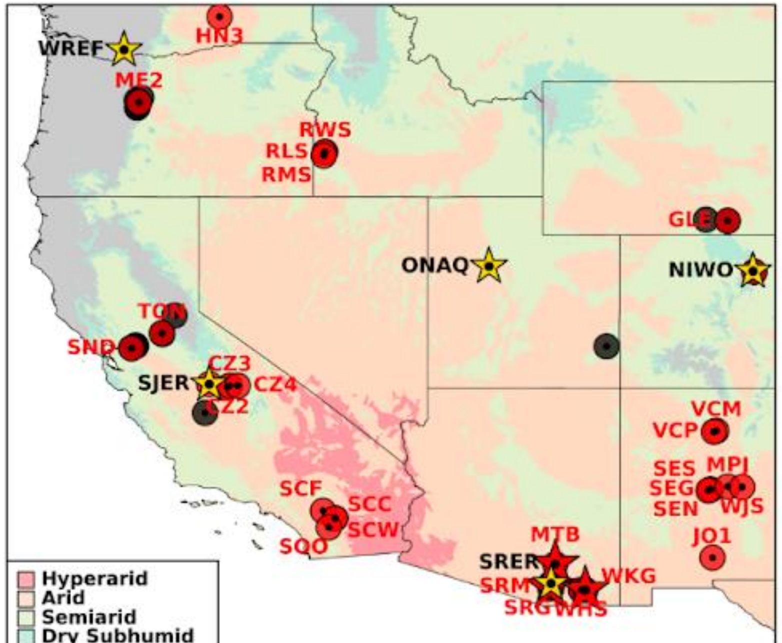
# Proposed Science Themes

- Water availability change (variability and trends)
- Carbon stocks and fluxes (variability and trends)
- Disturbance (drought, fire)
- Soil texture and health
- Ecosystem structure
- Land-atmosphere feedbacks
- Spatial heterogeneity
- Pulse dynamics
- Adaptation, mitigation, and management
- Human dimensions
- Surface minerals
- Biodiversity
- Degradation/land use change


Hyperarid
Arid
Semiarid
Dry Subhumid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SEG
WJS
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SCF
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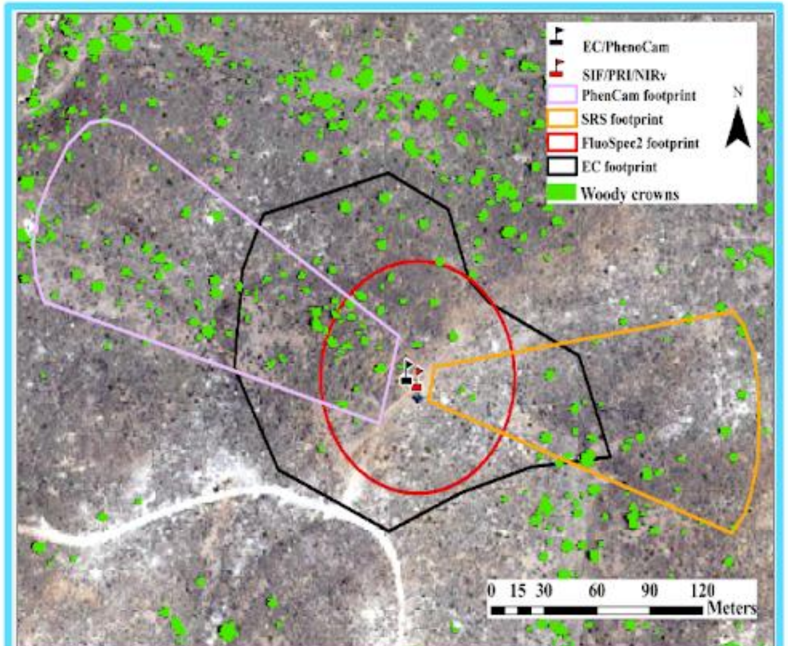
EC/PhenoCam
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SRS footprint
FluoSpec2 footprint
EC footprint
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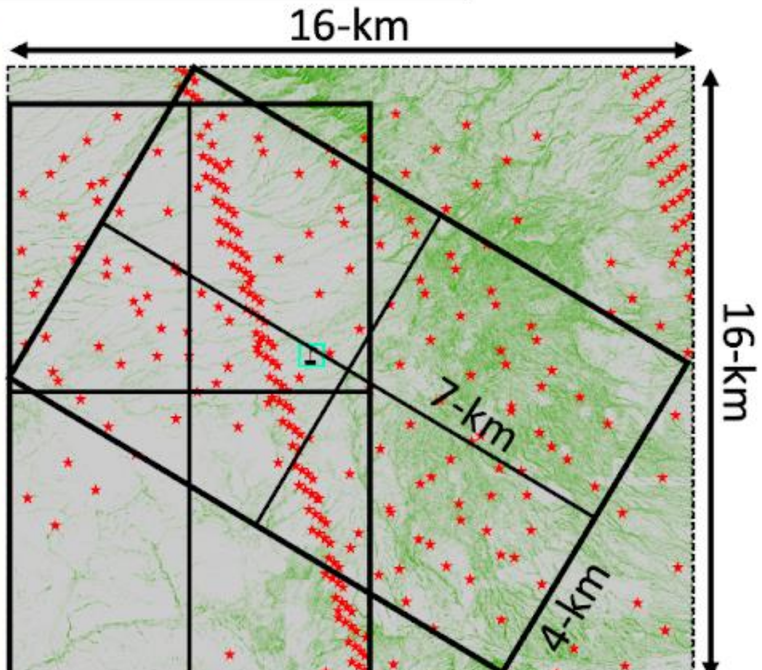
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