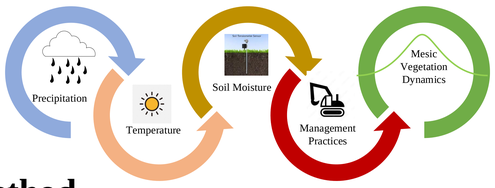
Enabling efficient monitoring of mesic vegetation dynamics in semi-arid United States

Nawaraj Shrestha [a], Nicholas Kolarik [a], Nancy Glenn [b], Jodi Brandt [a]
[a] Human-Environment Systems, [b] Department of Geosciences, Boise State University, 1910 University Dr., Boise, Idaho, 83725, USA
Contact: nawarajshrestha@boisestate.edu

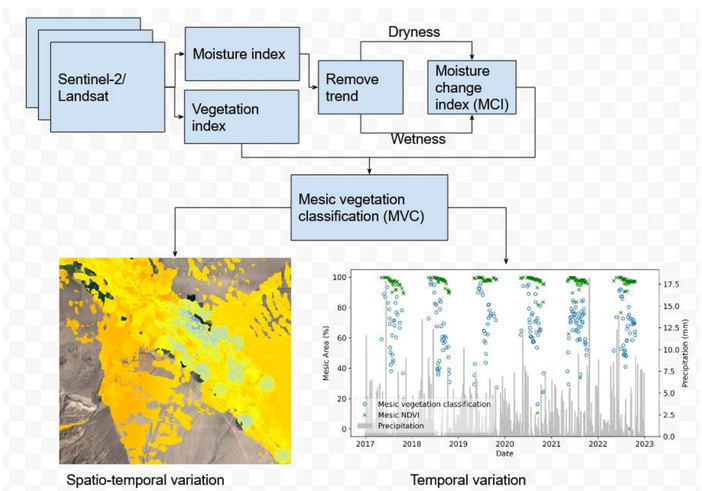
Introduction

- Mesic vegetation can be used as a proxy for water availability in dryland ecosystems
- Climate change and human practices pose a severe threat to water availability and wetland habitats in drylands
- To better manage water availability in drylands, a dense time-series of mesic vegetation is required
- We developed a mesic vegetation persistence (MVP) approach that provides spatial and temporal variation of dynamic mesic resources



Method

- Derive moisture change index (MCI)
- Mesic vegetation classification (MVC) combines MCI and modified chlorophyll absorption ratio index (MCARI2) to differentiate mesic vegetation
- Calculate mesic vegetation persistence (MVP)

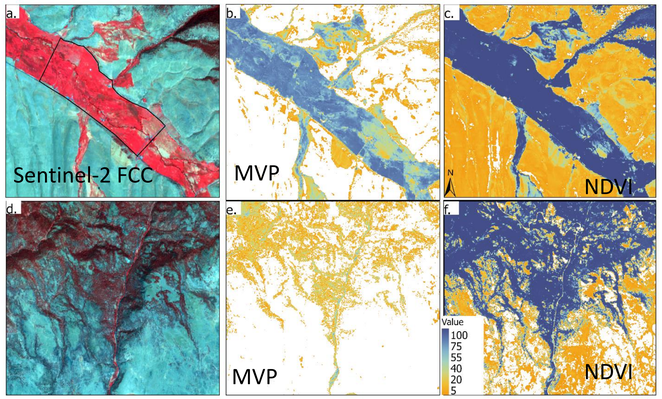


Result

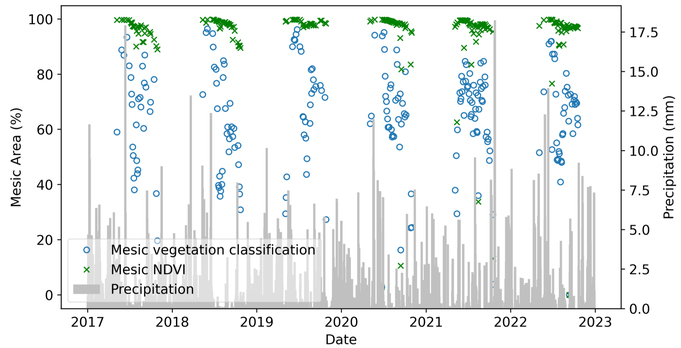
- Accuracy varies with space and time
- The user accuracy is 77% and producer's accuracy is 80%

MVP vs NDVI

- MVP product shows spatio-temporal variation while NDVI saturates



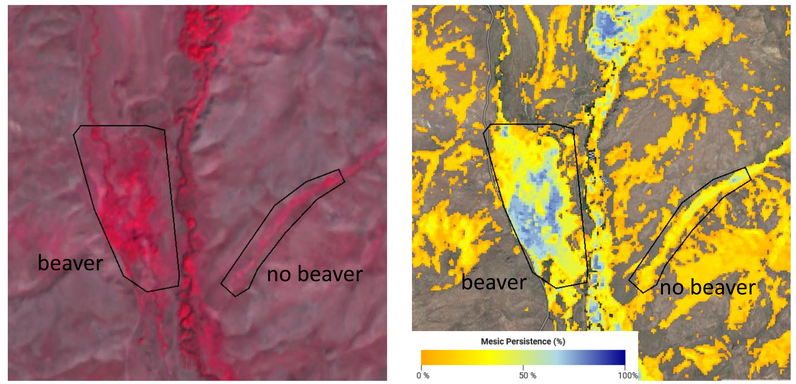
- MVP product shows better characterization of mesic vegetation esp. in forested areas as compared to NDVI



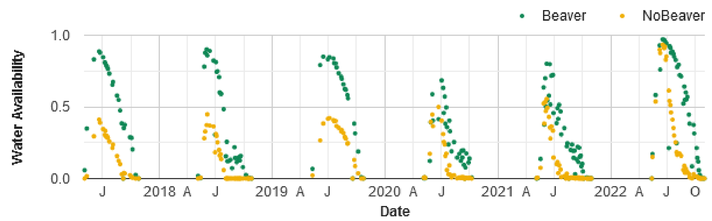
- NDVI saturates and does not provide temporal variation
- MVP shows temporal variation associated with mesic vegetation

MVP in action

- Case study: monitoring beaver impact on resilience to wildfire



- Beaver area has consistent water availability
- Non beaver area has intermittent water availability



- Increased water availability esp. at end of summer (dry season)
- Consistent presence of water

Conclusion

- MVP provides high temporal resolution mesic vegetation dynamics throughout western, semi-arid U.S.

Acknowledgement

- This work is supported by NASA

Mesic Vegetation Persistence App

- Use following workflow and QR Code for MVP app developed in google earth engine