

Multi-Sensor Assessment of Changes in Seasonal Snow Cover Persistence in the Columbia River Basin Using Cloud Computing Platforms

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1. Introduction

Background:

- Snow is melting earlier than in previous decades¹ and is particularly susceptible at low-mid elevations and in warmer (e.g. maritime) snowpacks
- Less work has been done on the spatial and temporal distribution of changes across a water year

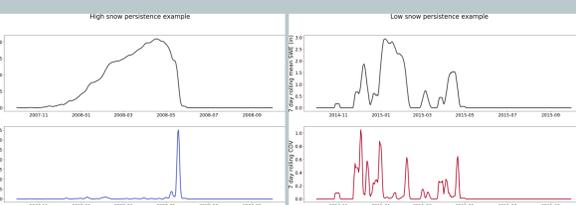
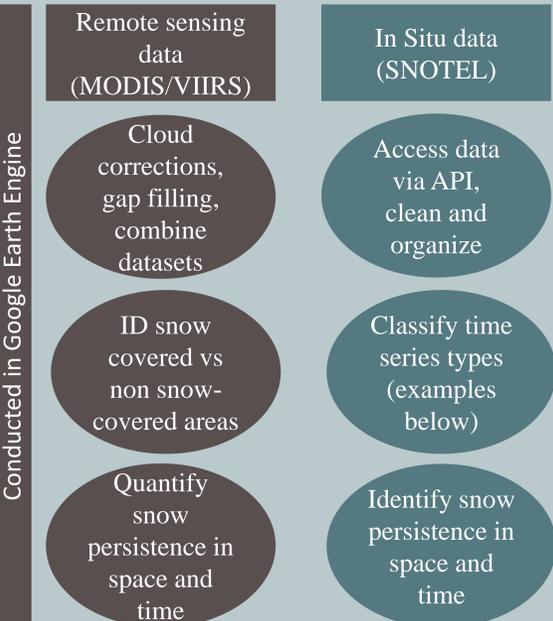
Primary Research Objective:

- Build on existing work² to identify areas of decreasing snow persistence in the Columbia River Basin and Pacific Northwest

Definition of Snow Persistence:

- Distribution of accumulation/ablation (melt) cycles in space and time

2. Methods

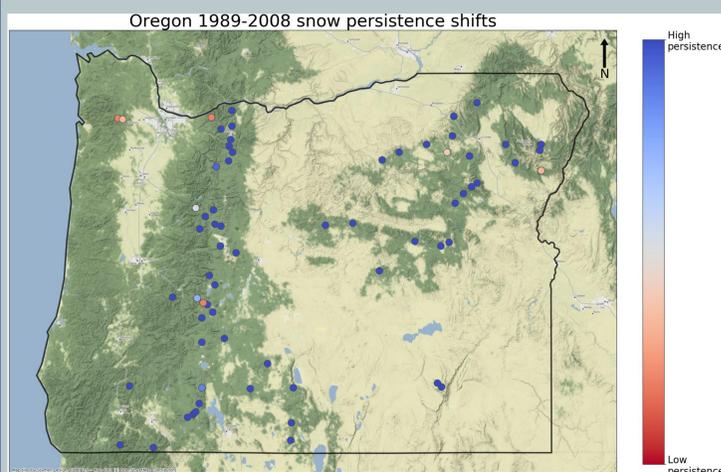


Integrate and analyze findings

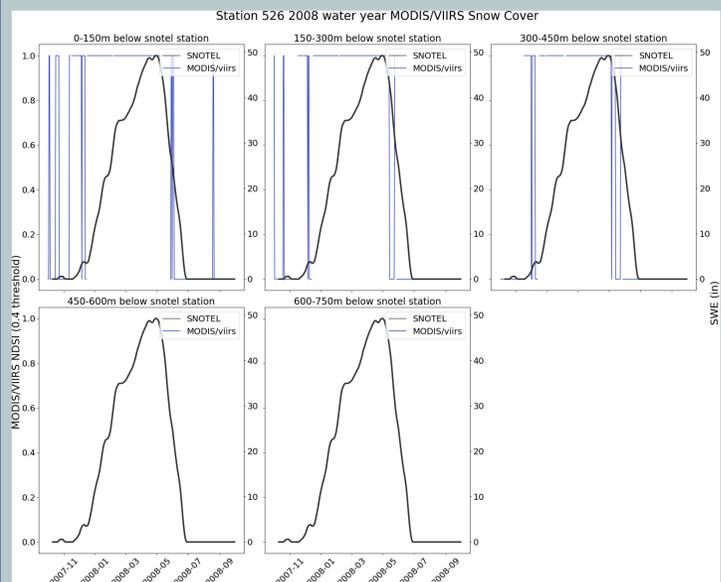
3. Results

- SNOTEL data shows decreases in persistence across the winter season when comparing wetter/cooler to warmer/drier years. This is particularly evident in the Cascades.
- The weather/climate factors matter year to year as well as the geographic location of the station
- Snow cover persistence does not seem to show a long-term linear trend
- MODIS/VIIRS remote sensing product shows a similar signal but is limited in temporal resolution by clouds

High water years comparison

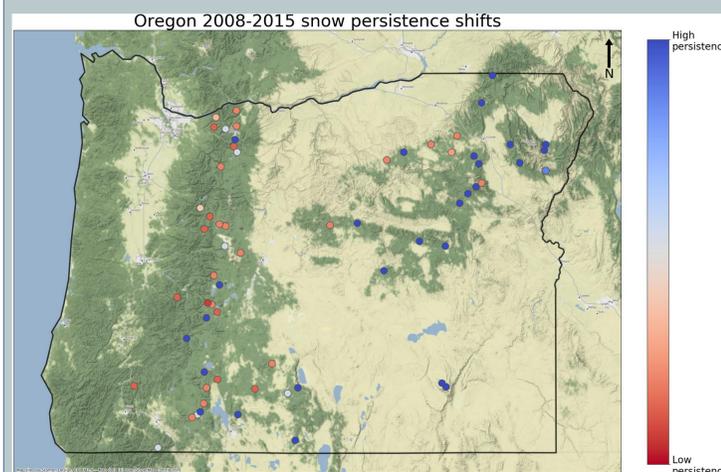


Widespread high snow persistence

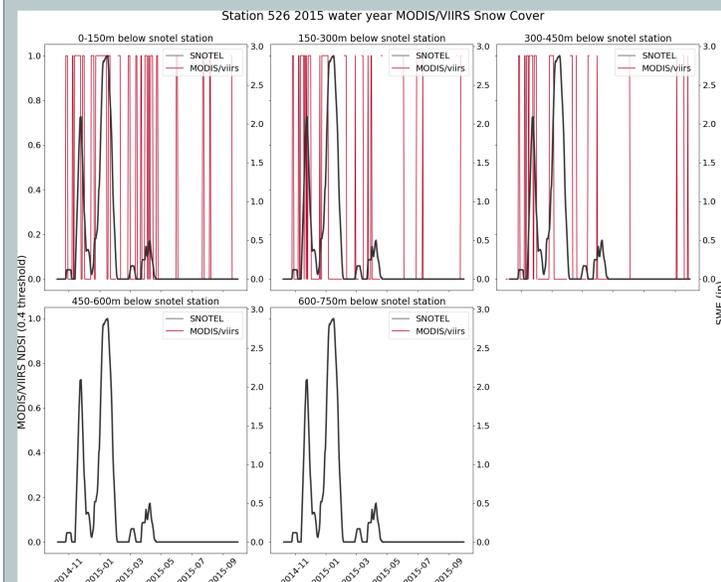


Higher duration of snow cover, especially at higher elevations (Central Oregon Cascades)

High and low water years comparison



High snow persistence remains in Eastern Oregon but goes down in the Cascades



Lower duration of snow cover (higher frequency of accumulation/melt) (Central Oregon Cascades)

4. Conclusion

- Changes in snow persistence have important implications for human and ecosystem water use/availability
- Persistence is lower to much lower in warmer/drier years, conditions which could become more frequent or extreme in the future
- Additional stations and years show similar trends
- More work is required to better understand trends across space using remote sensing and modeled data

5. References

1 non exhaustive)

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