

A satellite map of a mountainous region, likely the Andes, showing a dense network of blue stream channels flowing down the slopes. The terrain is a mix of brownish-tan and green, indicating varying vegetation and elevation. The ocean is visible on the left side of the image.

SnowCloud

Cloud-based
computing for
predicting streamflow
in snowmelt dominated
watersheds

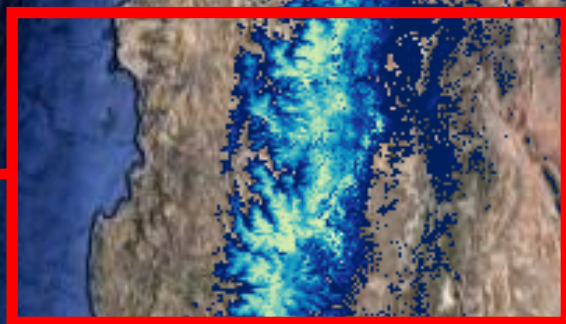
Ryan Crumley
Eric Sproles
Anne Nolin
Eugene Mar

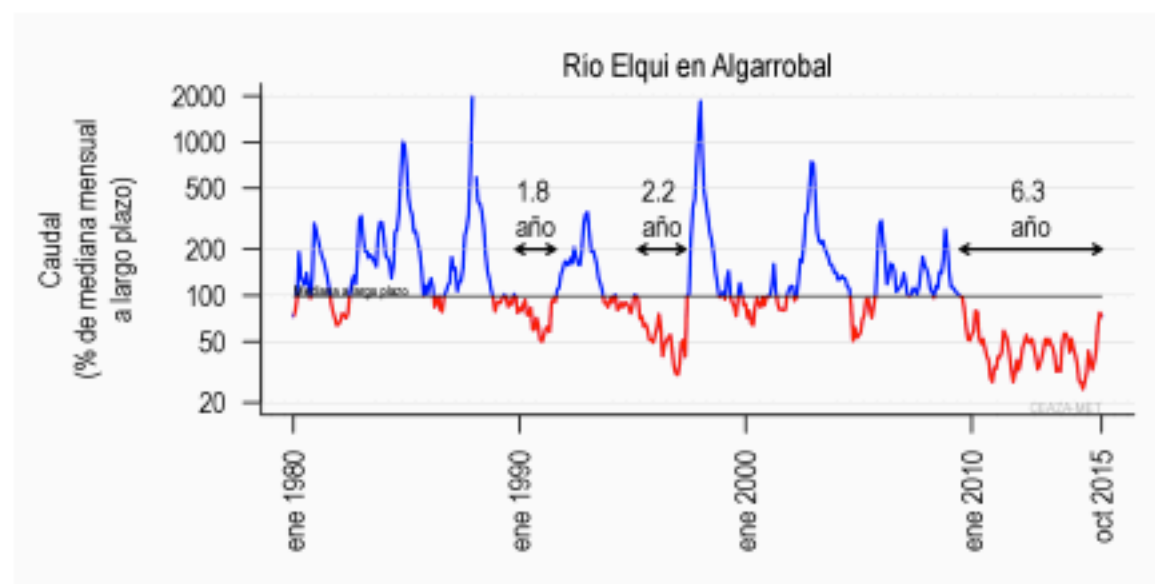


Why?

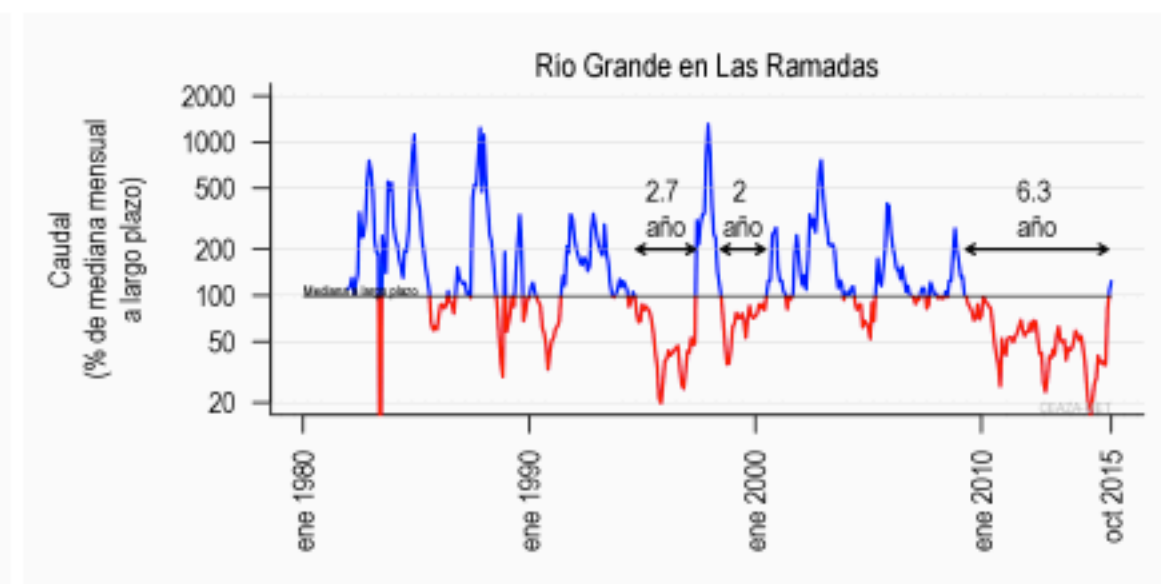


30°S

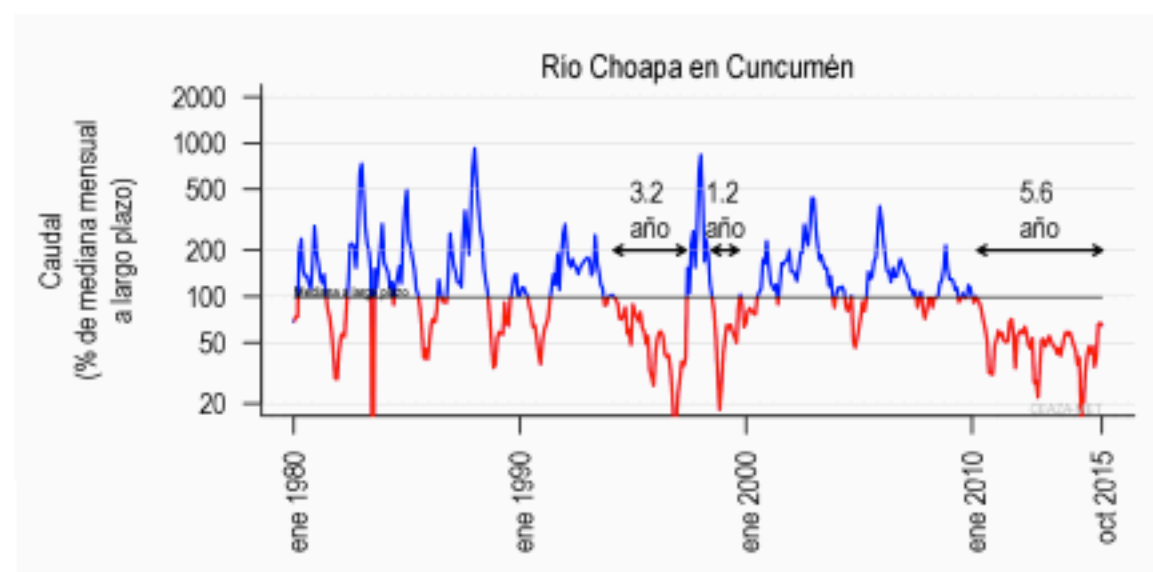


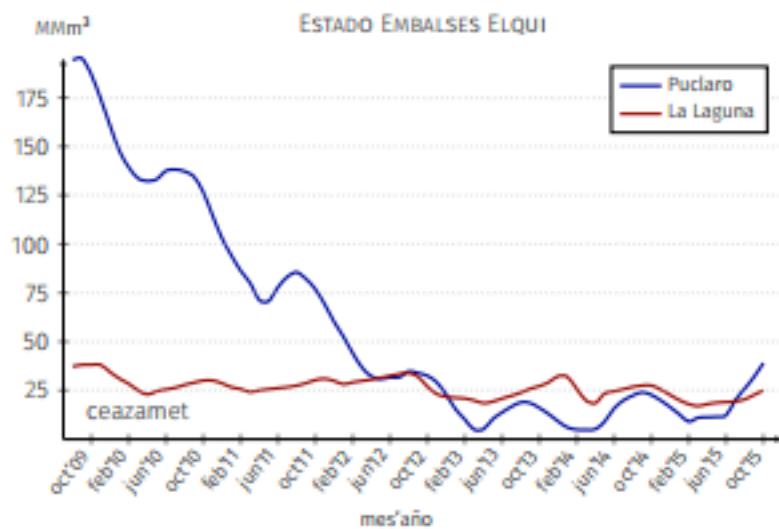


(a)

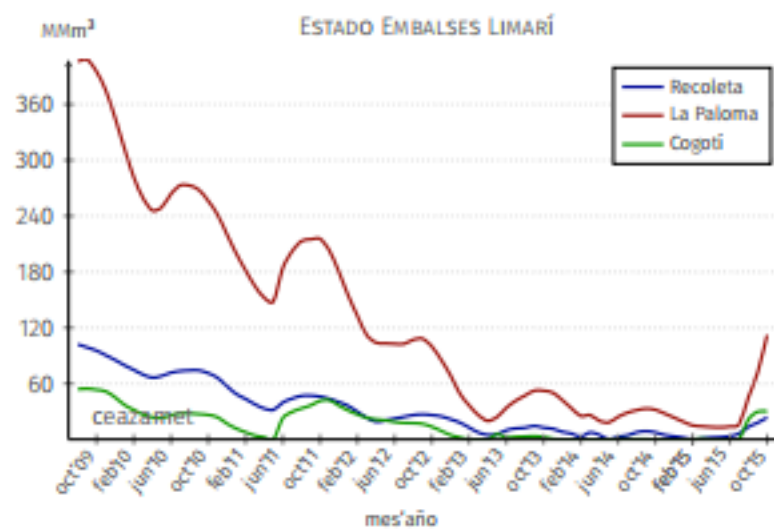


(b)

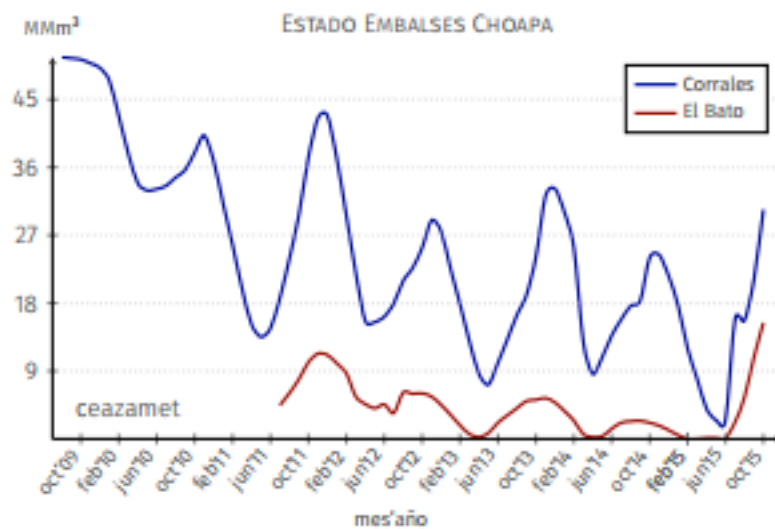




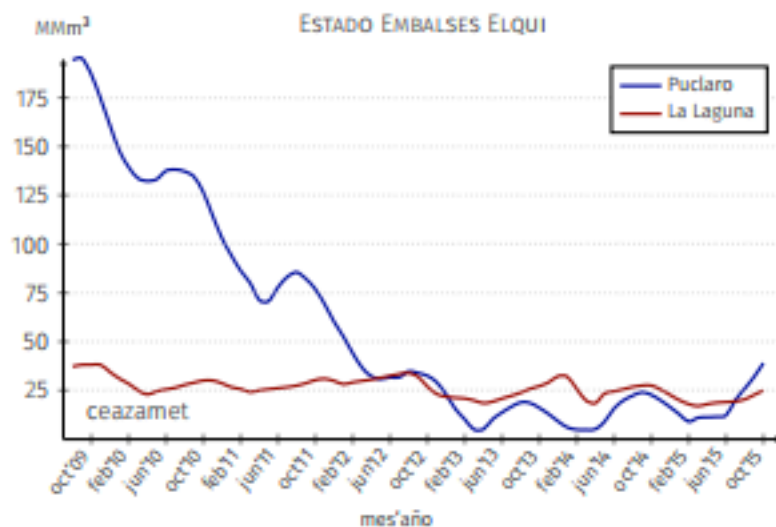
(a) Embalses Elqui



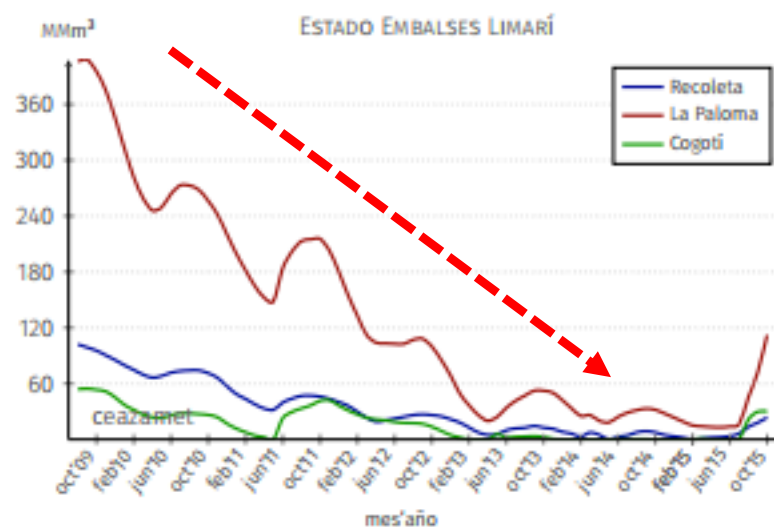
(b) Embalses Limarí



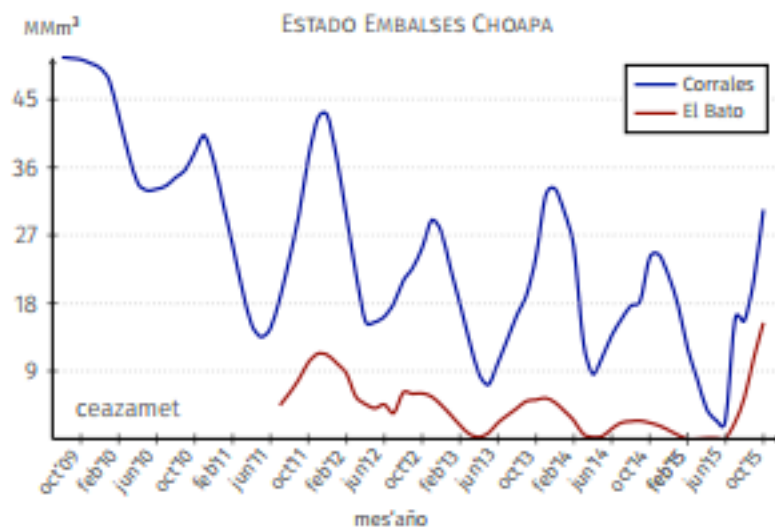
(c) Embalses Choapa



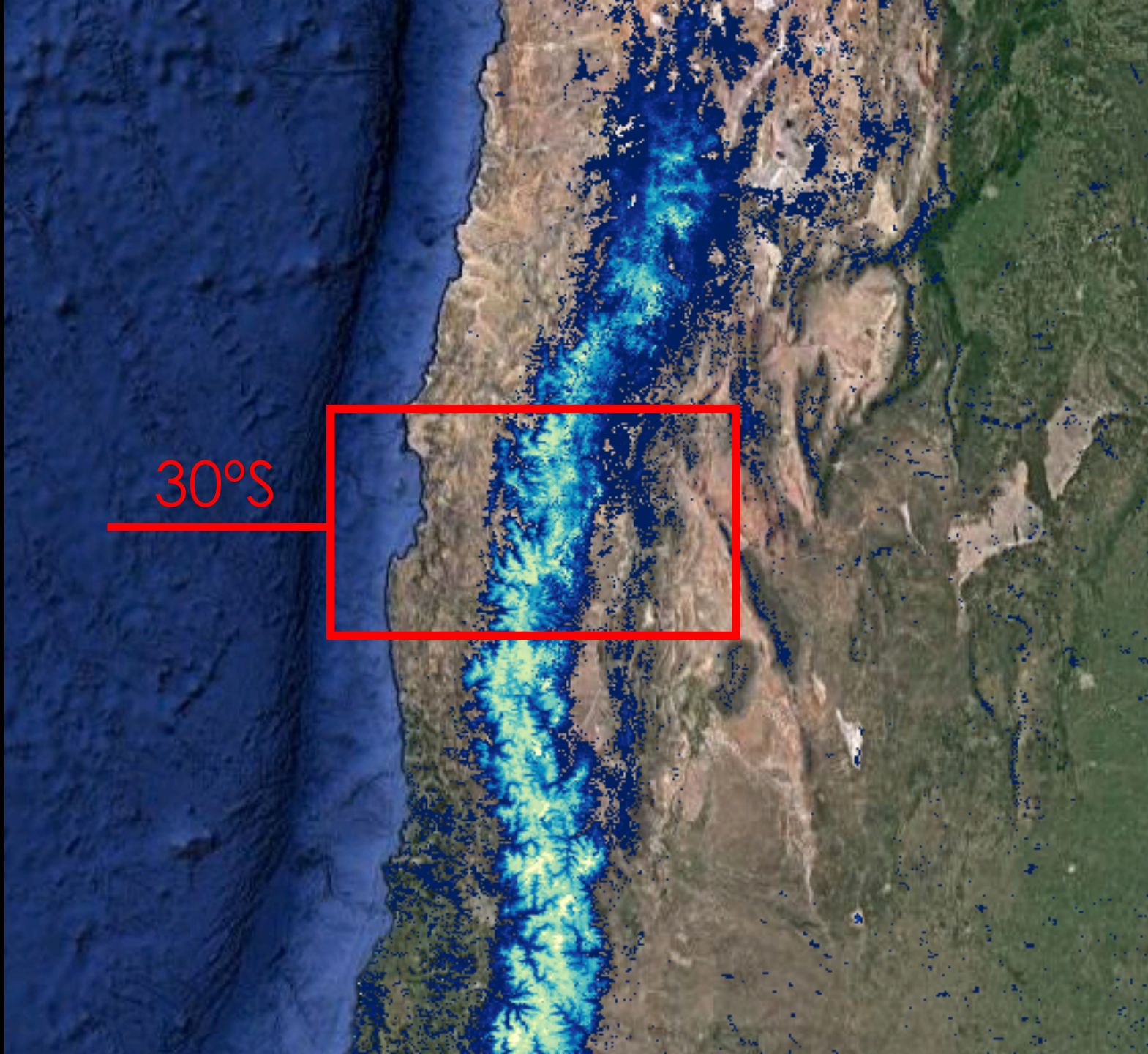
(a) Embalses Elqui



(b) Embalses Limarí



(c) Embalses Choapa

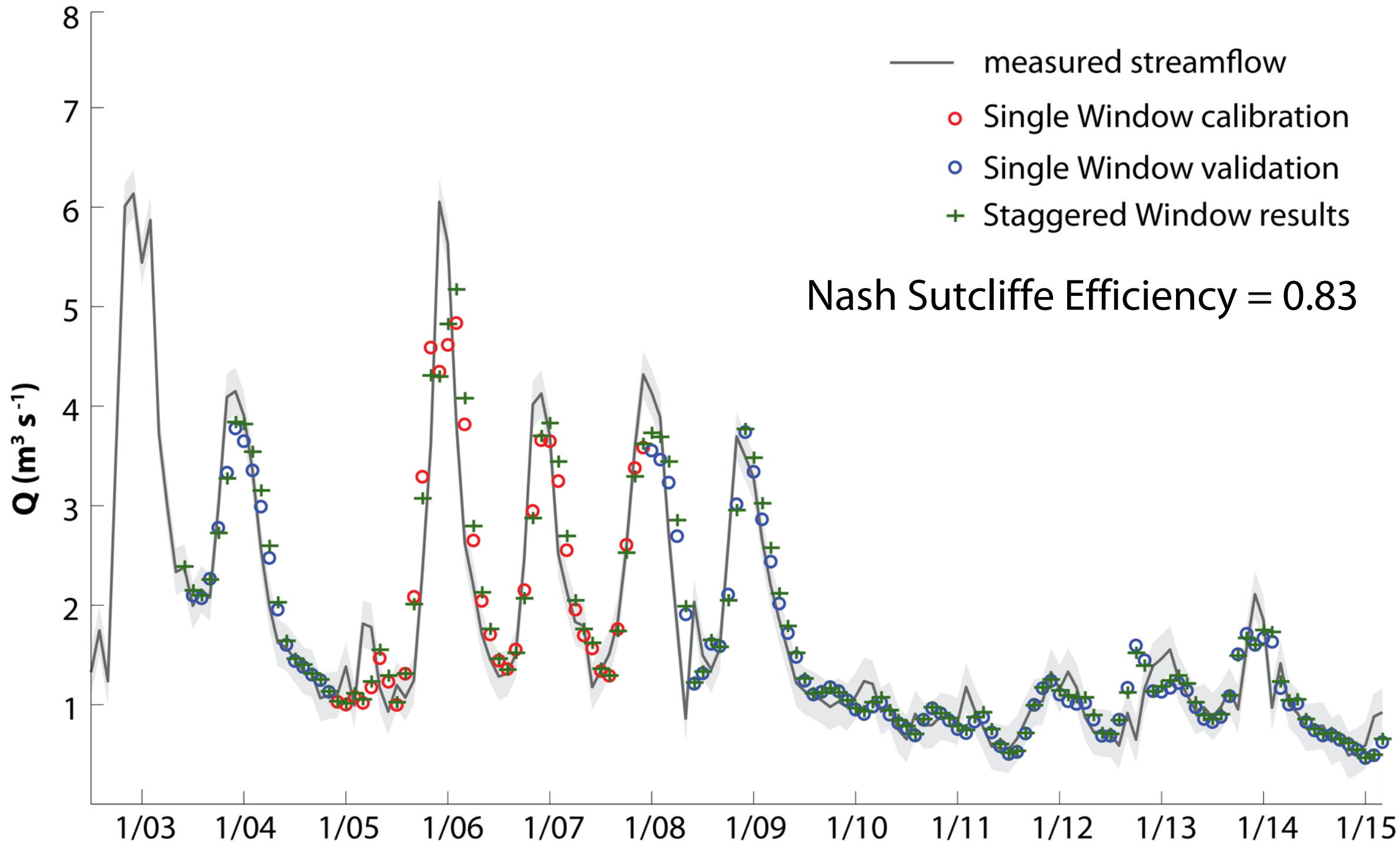


inputs

- Monthly snow cover
- Previous streamflow

output

- Next month's streamflow



analysis



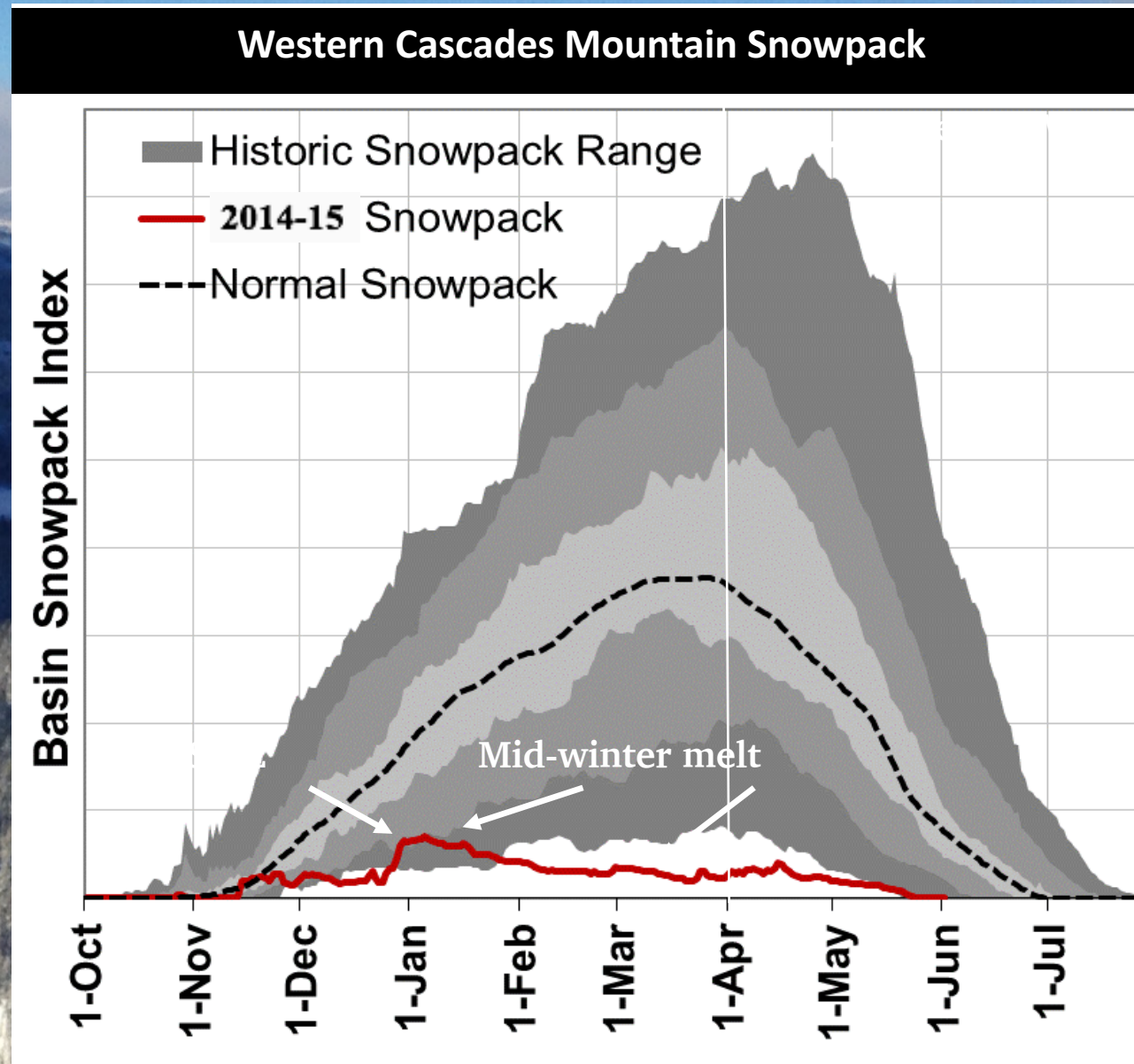
limitations



How?



Snow Water Eq.

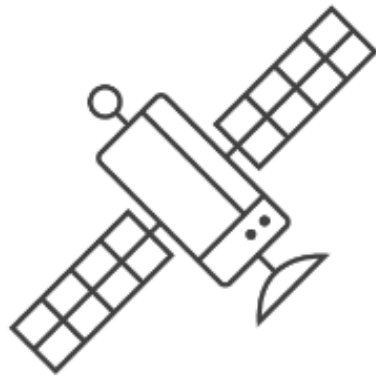


Snow Cover Frequency (SCF)

$$\text{SCF} = \frac{\# \text{ of snow observations}}{\# \text{ of valid observations}}$$

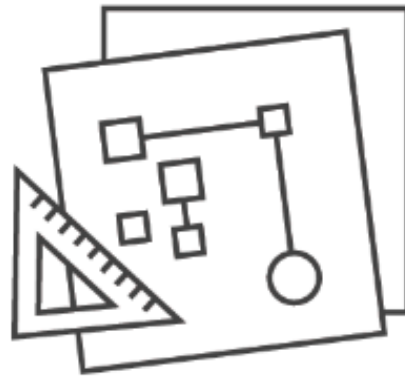
- A percentage (%) of days snow cover is detected on the land surface per date range.
- We've developed a cloud adjusted and non-adjusted SCF product.
- MODIS daily observations of snow cover (MOD10A1) at 500-m spatial resolution

Why Use Google Earth Engine (GEE)?



SATELLITE IMAGERY

+



YOUR ALGORITHMS

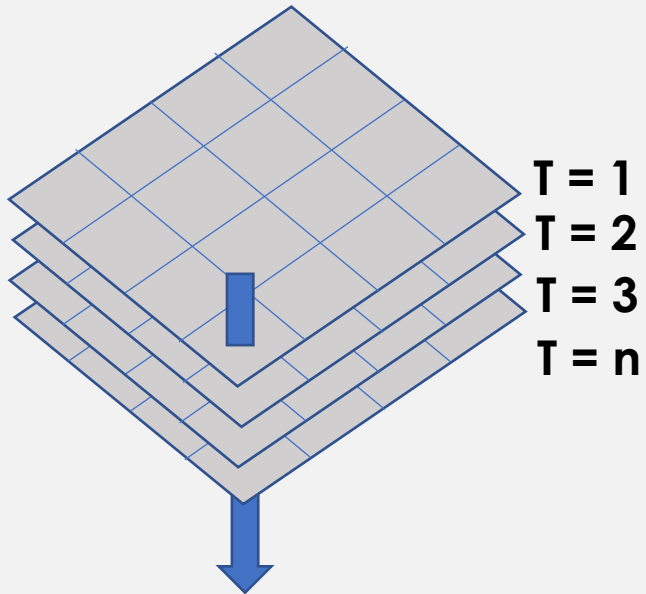
+



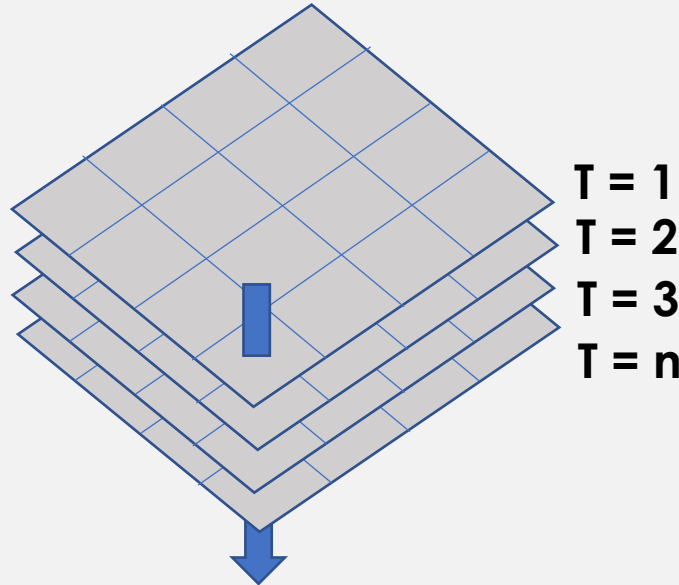
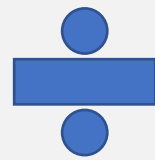
REAL WORLD APPLICATIONS

SCF Algorithm

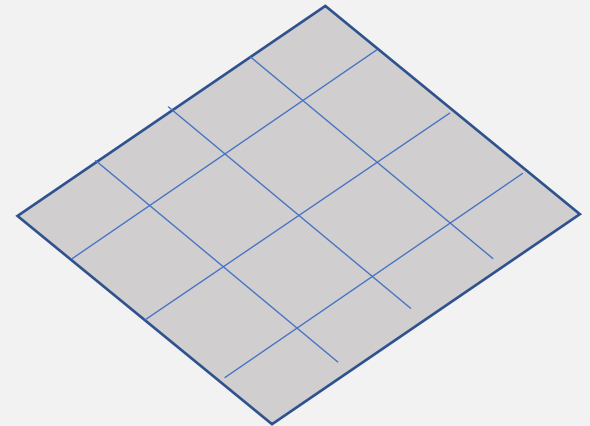
Snow



Valid
(Snow, No Snow, Cloud)



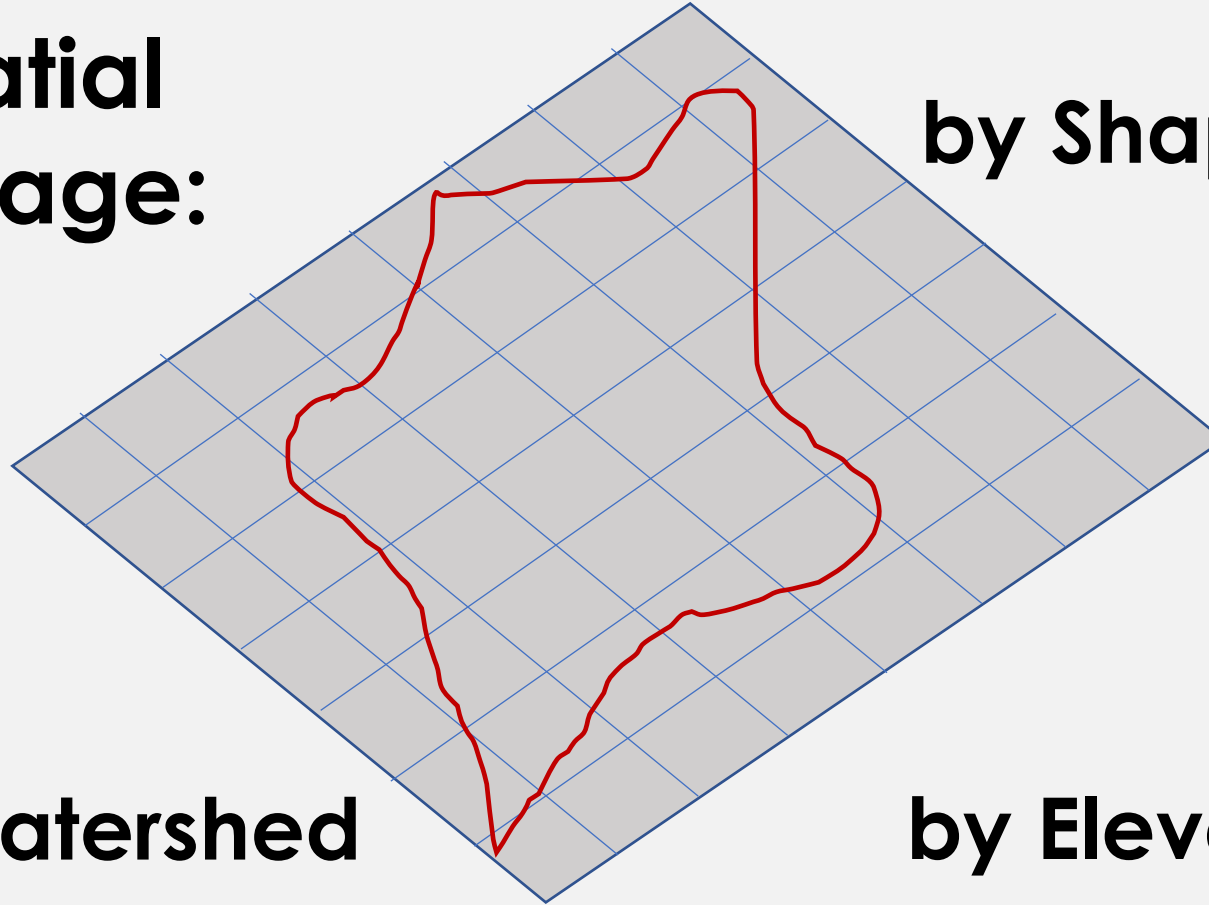
SCF
(ratio 0-1)
Time Average



SCF Algorithm

**Spatial
Average:**

by Shapefile



by Watershed

by Elevation

SCF Cloud Adjustment

1)

**Snow
Cloud
No Snow**

2)

**Snow
Cloud
Snow**

3)

**No Snow
Cloud
Snow**

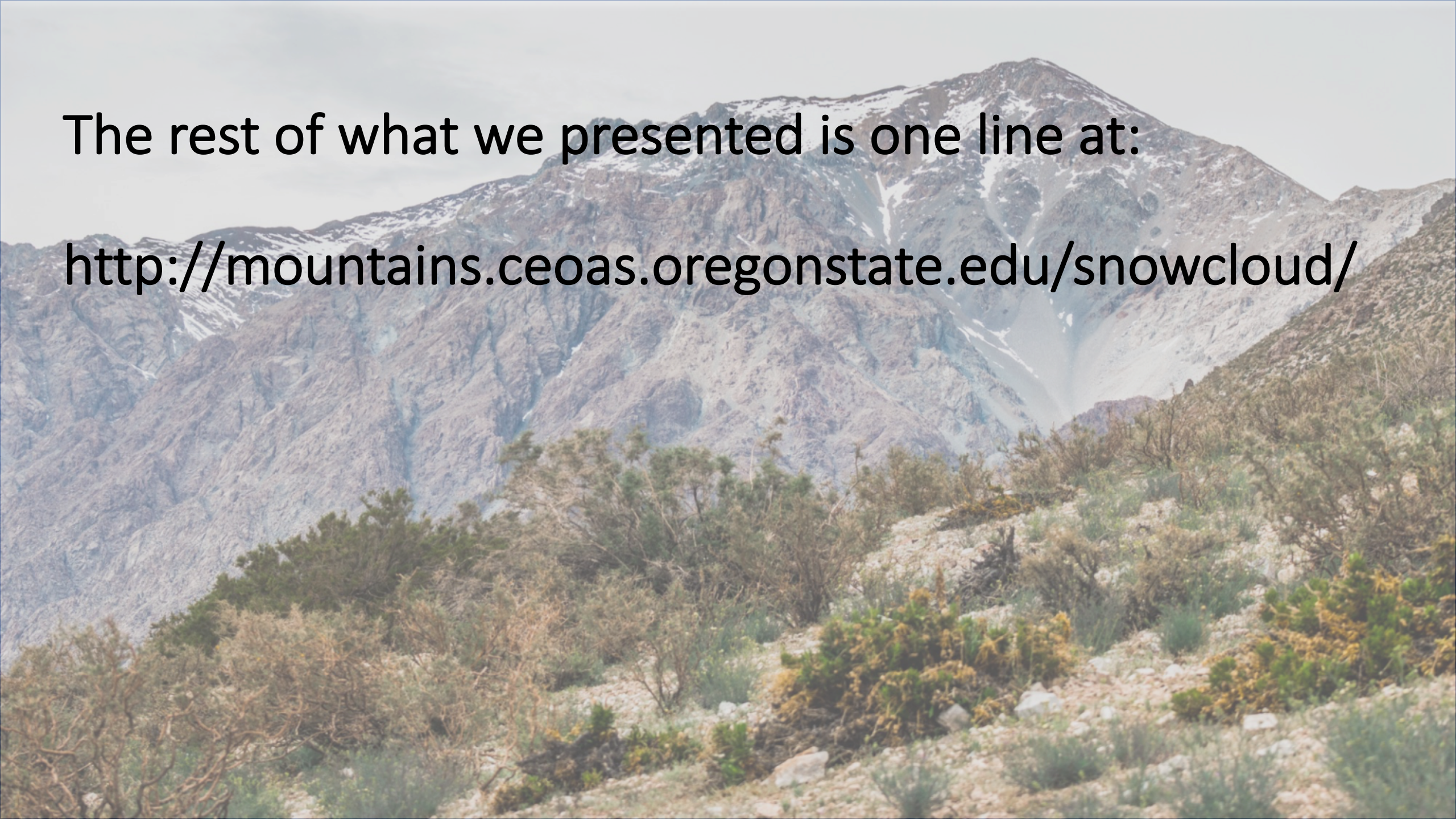
4)

**No Snow
Cloud
No Snow**

(Cloudy Period < 7days)

The rest of what we presented is one line at:

<http://mountains.ceoas.oregonstate.edu/snowcloud/>



analysis

