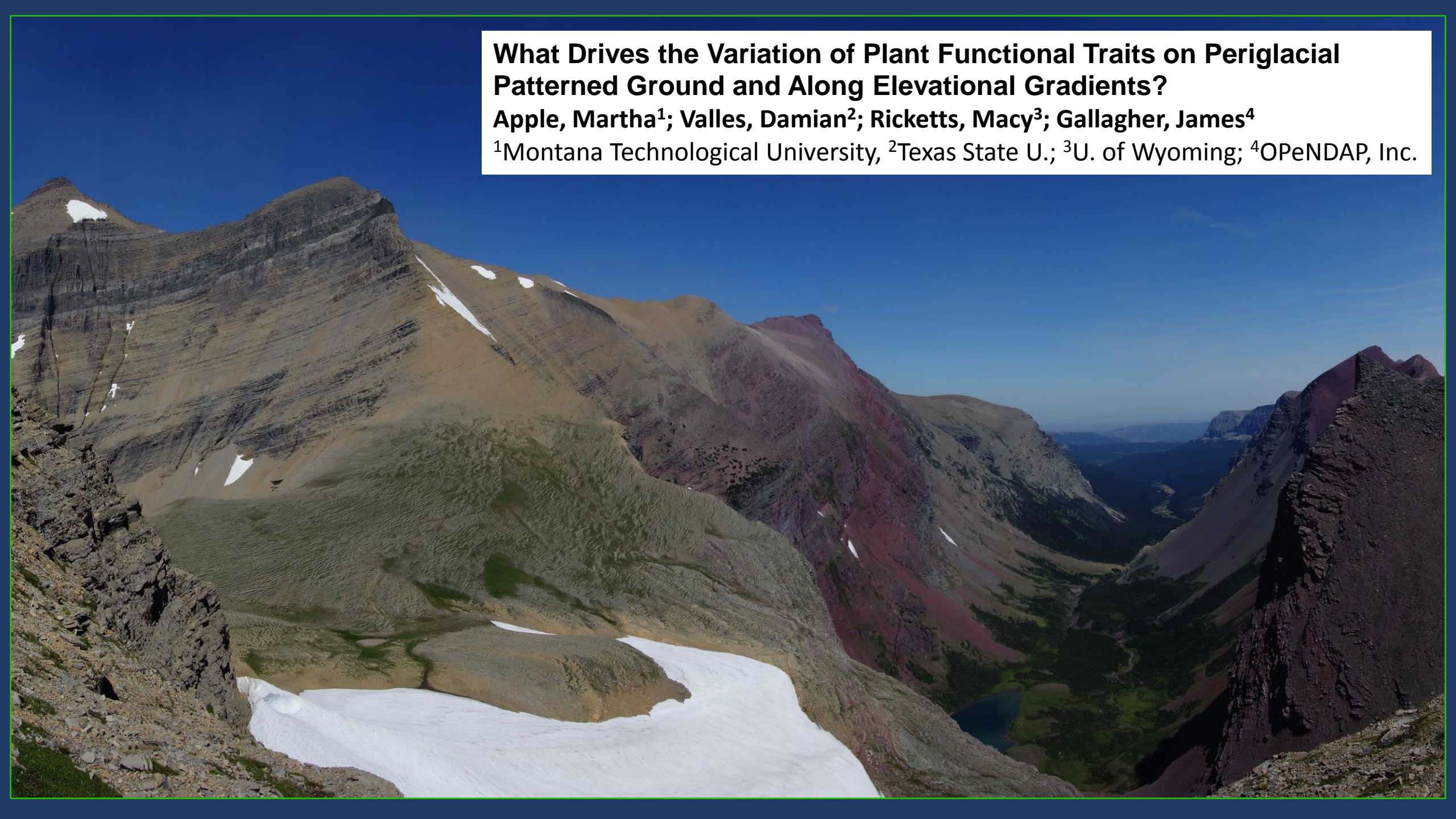


# What Drives the Variation of Plant Functional Traits on Periglacial Patterned Ground and Along Elevational Gradients?

Apple, Martha<sup>1</sup>; Valles, Damian<sup>2</sup>; Ricketts, Macy<sup>3</sup>; Gallagher, James<sup>4</sup>

<sup>1</sup>Montana Technological University, <sup>2</sup>Texas State U.; <sup>3</sup>U. of Wyoming; <sup>4</sup>OPeNDAP, Inc.





STRIPED PERIGLACIAL PATTERNED GROUND AT SIYEH PASS, GLACIER NATIONAL PARK, MONTANA

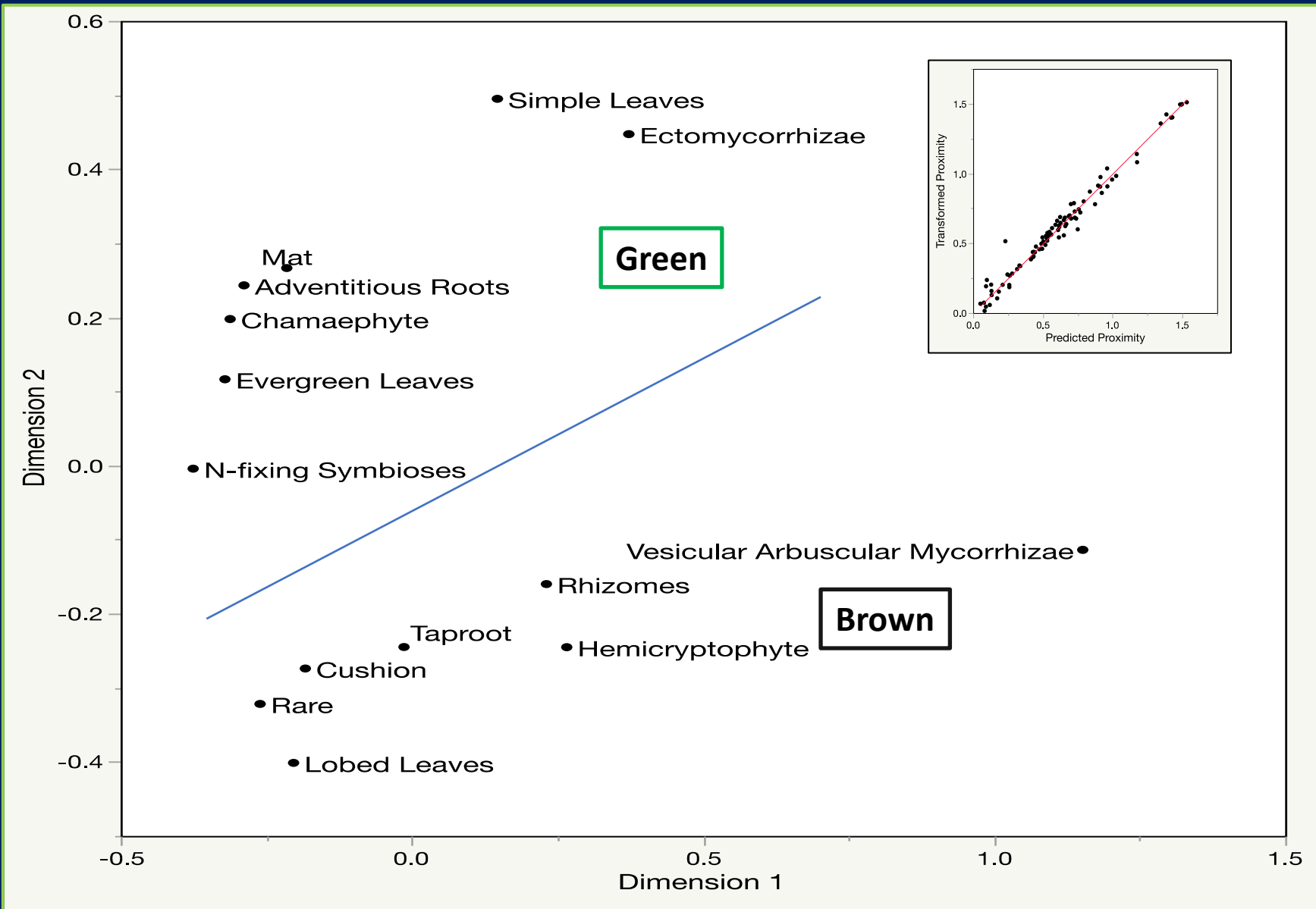




Apple *et al.* 2019.  
Plant Functional Traits and  
Microbes Vary With Position  
on Periglacial Patterned  
Ground at Glacier National  
Park, Montana.  
*J. Geogr. Sci.* 29(7): 1127-1141



*Aquilegia jonesii*



**Multidimensional scaling plot of the relative percent cover of plant functional traits on striped periglacial patterned ground. Green stripes: Chamaephyte, Mat, Evergreen Leaves, Simple Leaves, Adventitious Roots, N-fixing symbioses, and Ectomycorrhizae). Brown stripes: Rare, Hemicryptophyte, Cushion, Lobed Leaves, Rhizomes, Taproots, and Vesicular Arbuscular Mycorrhizae. Stress = 0.075, and  $R^2 = 0.977$  (Shepard Diagram).**



Goat Flat: Striped Patterned Ground, Pintler Mountains of Southwestern Montana  
2845 m, 46°02'47.03" N, 113°16'41.68"W, On the Continental Divide

Green Stripes: *Dryas octopetala*, *Salix arctica*, *Phyllodoce empetriiformis*,  
(Adventitiously Rooted Dwarf Shrubs), Coniferous Tree seedlings, Herbaceous plants

Brown Stripes: Herbaceous, Rhizomatous, Taprooted Species  
*Astragalus sp.*, *Carex*, Grass, *Sedum sp.*, *Gentiana calycosa*

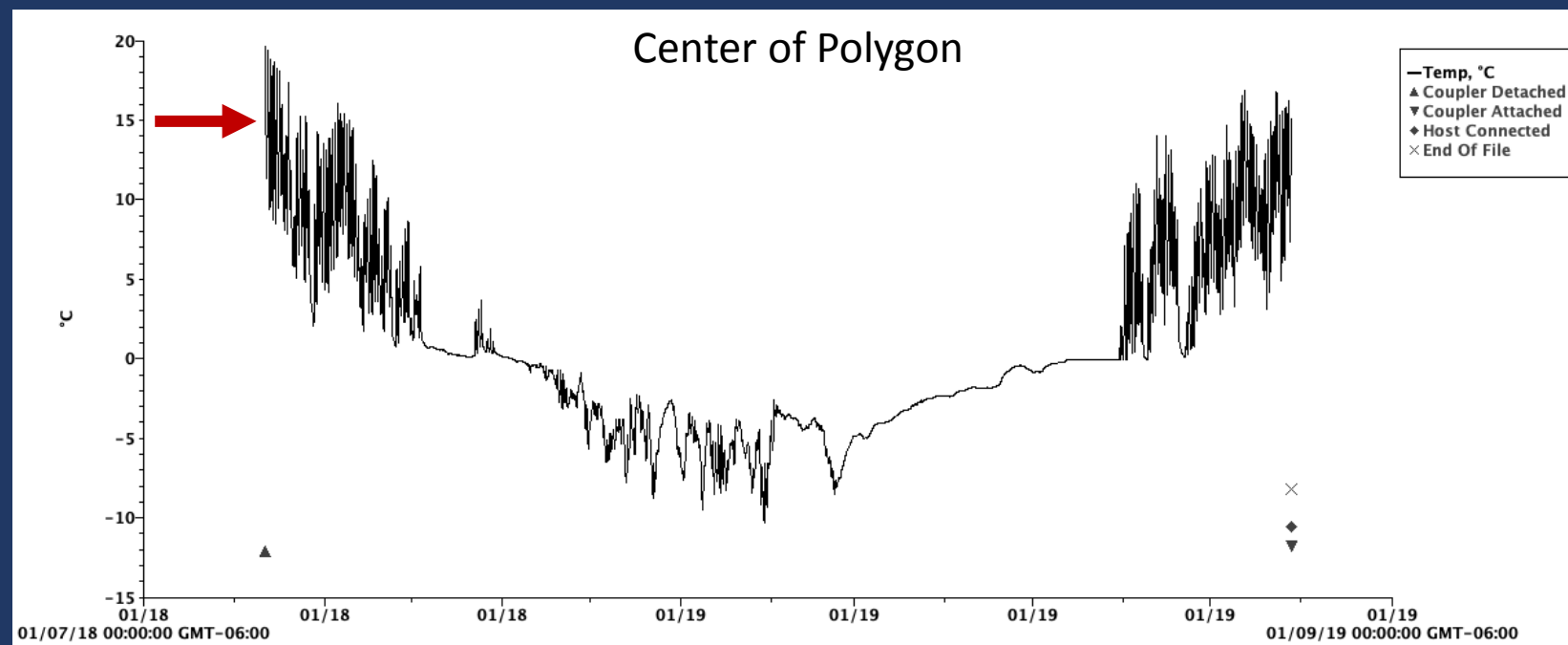
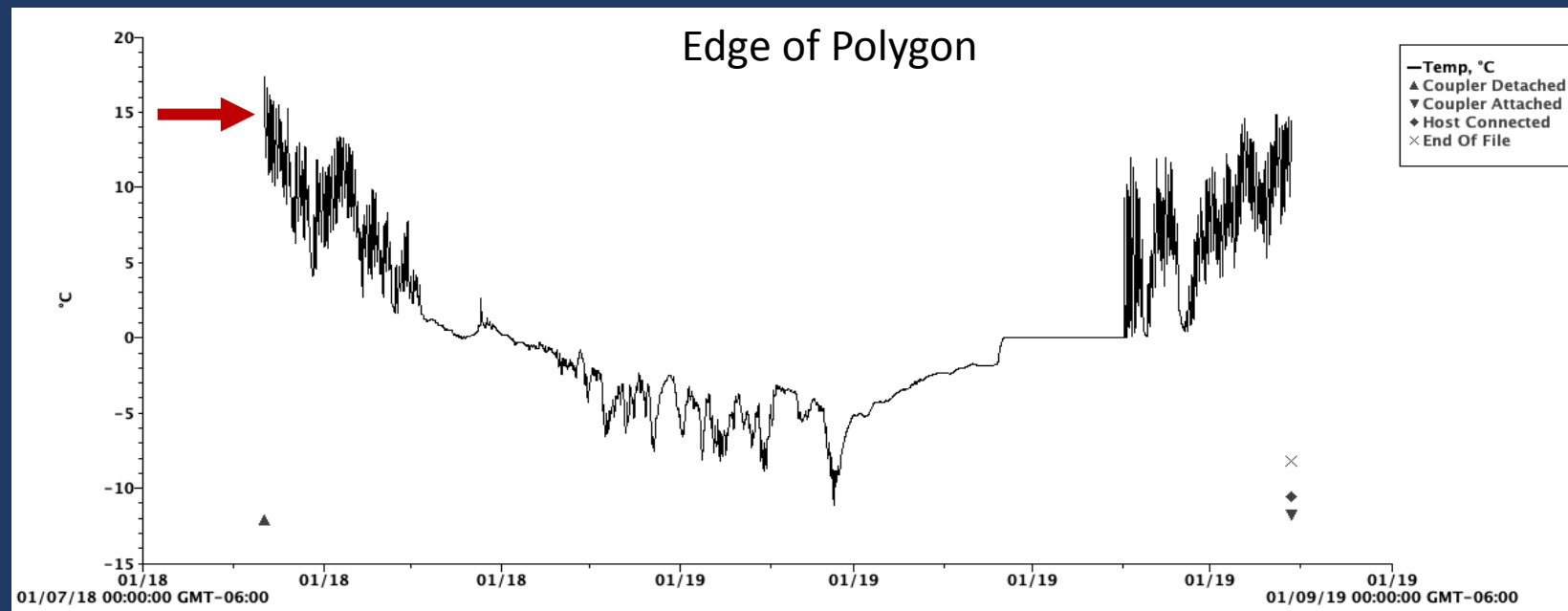


## What Drives the Variation of Plant Functional Traits on Periglacial Patterned Ground?

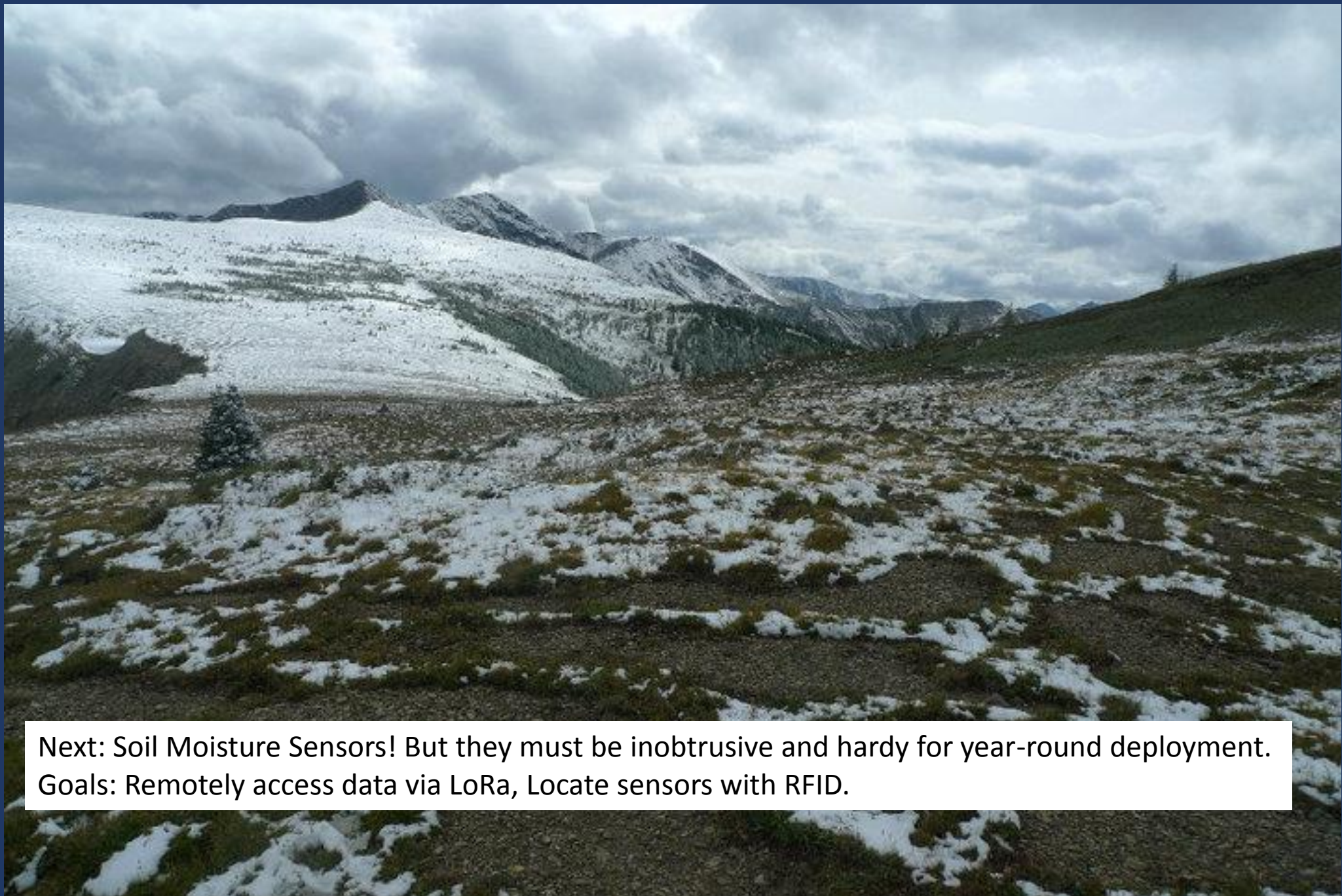


### At Goat Flat, Montana

- Surveyed the distribution of plant species and functional traits
- Installed 36 ONSET Hobo TidbitV2 #UTBI-001 Temperature Sensors at 4 sites, 5-10 cm in soil,
- 18 sensors in center of polygons or brown stripes, 18 on edge of polygons or green stripes
- Sensor data link environmental factors to the distribution of plant functional traits.





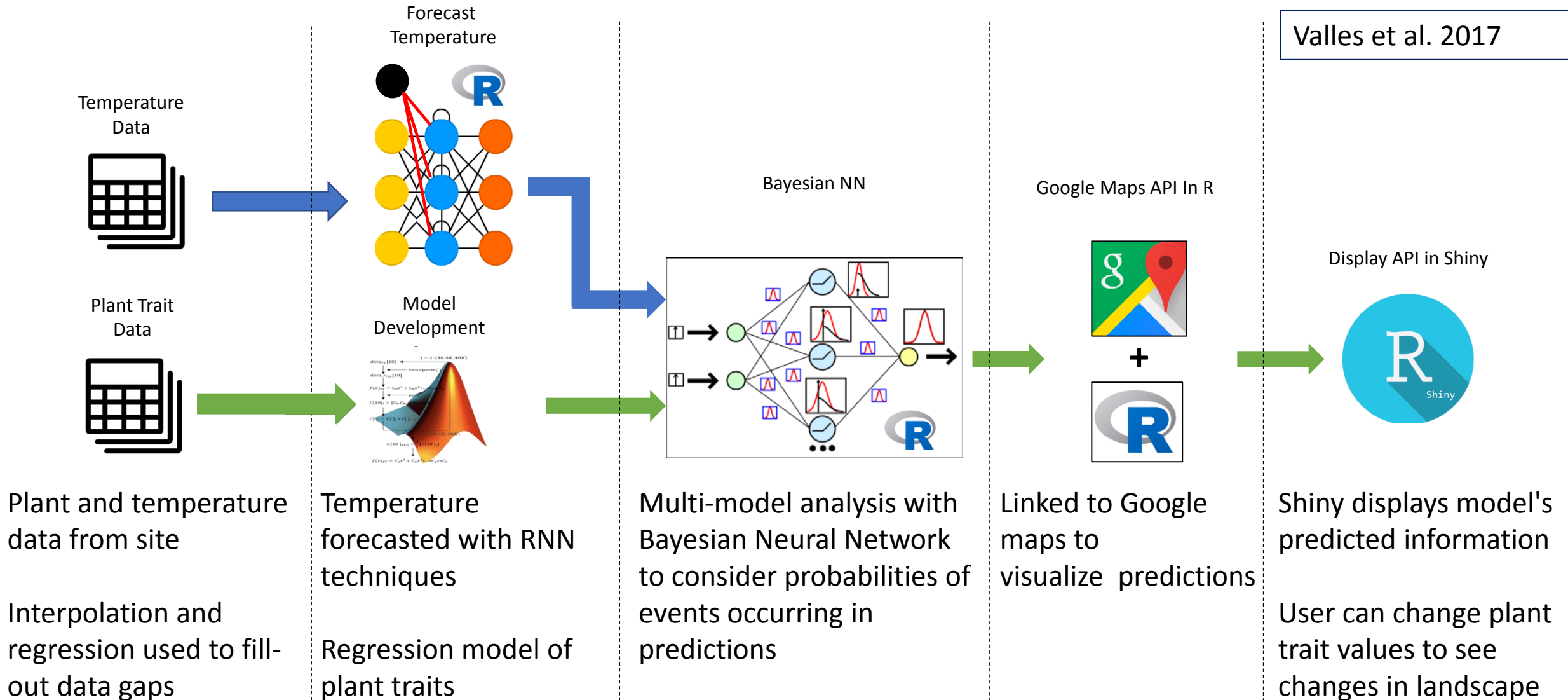


Next: Soil Moisture Sensors! But they must be inobtrusive and hardy for year-round deployment.  
Goals: Remotely access data via LoRa, Locate sensors with RFID.



# Researching Alpine Plant Traits (RAPT) Along an Elevational Gradient Downslope from the GLORIA Target Region in the Cairngorm Mts. of Scotland

Valles et al. 2017







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