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

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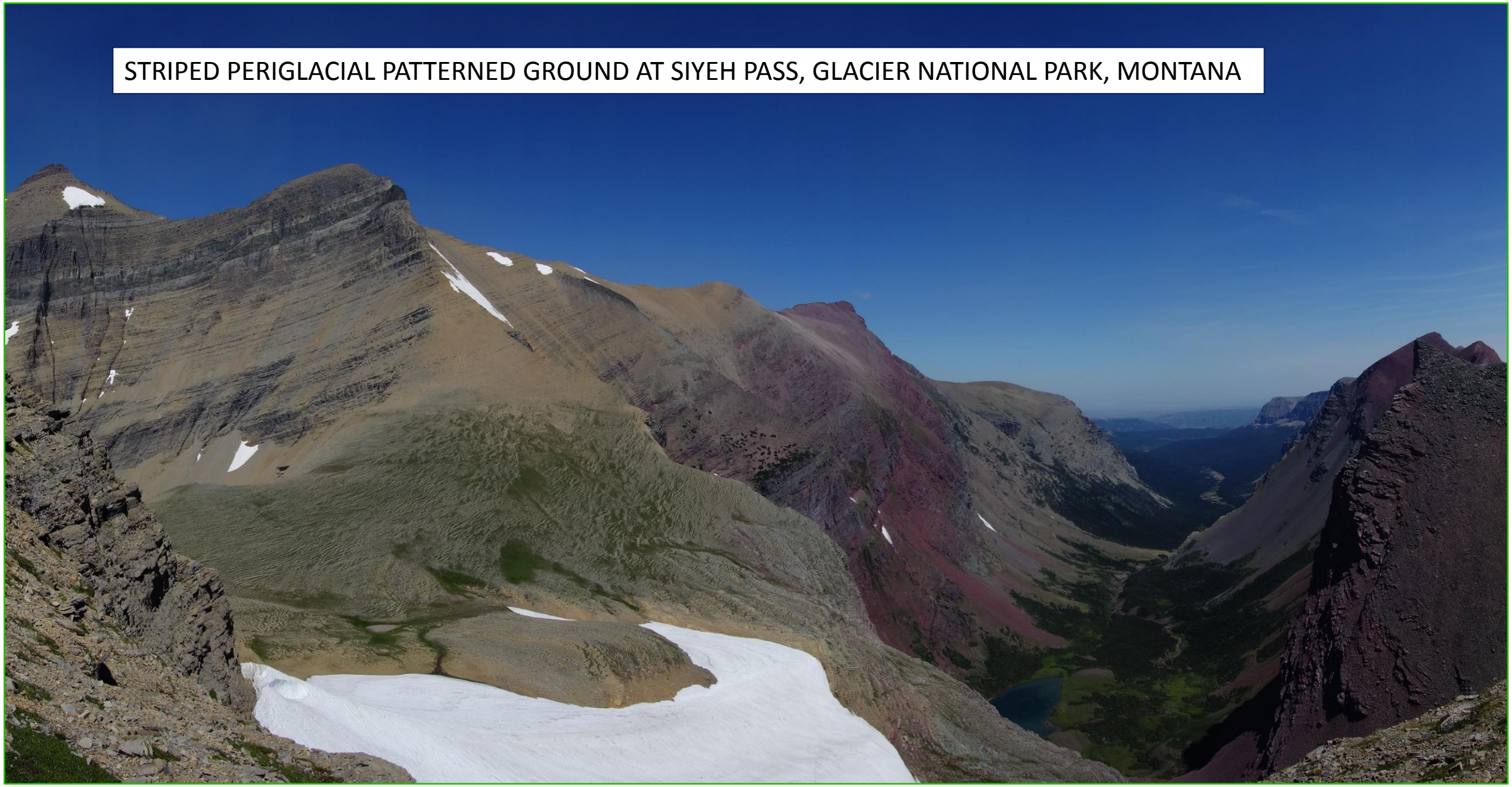
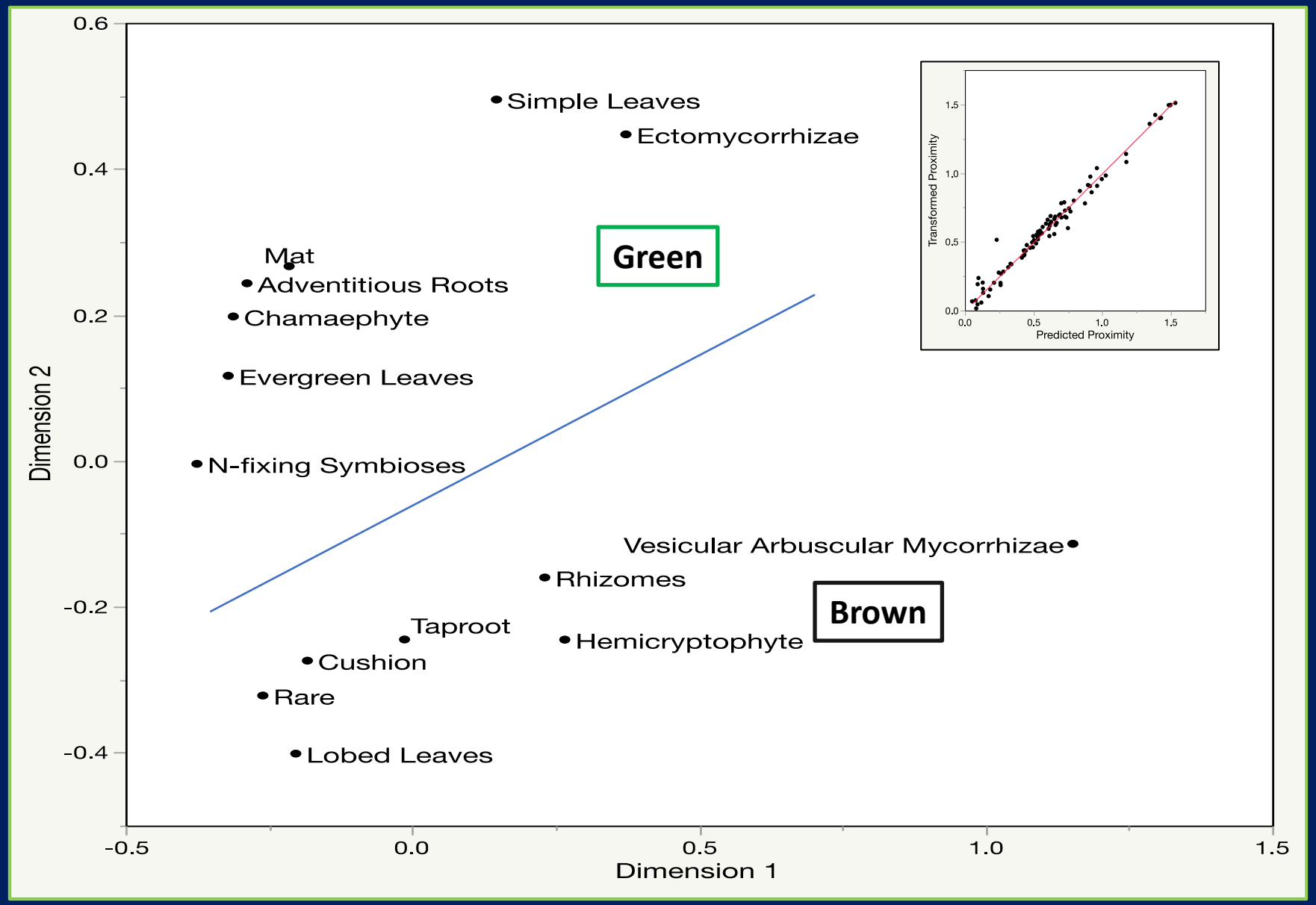
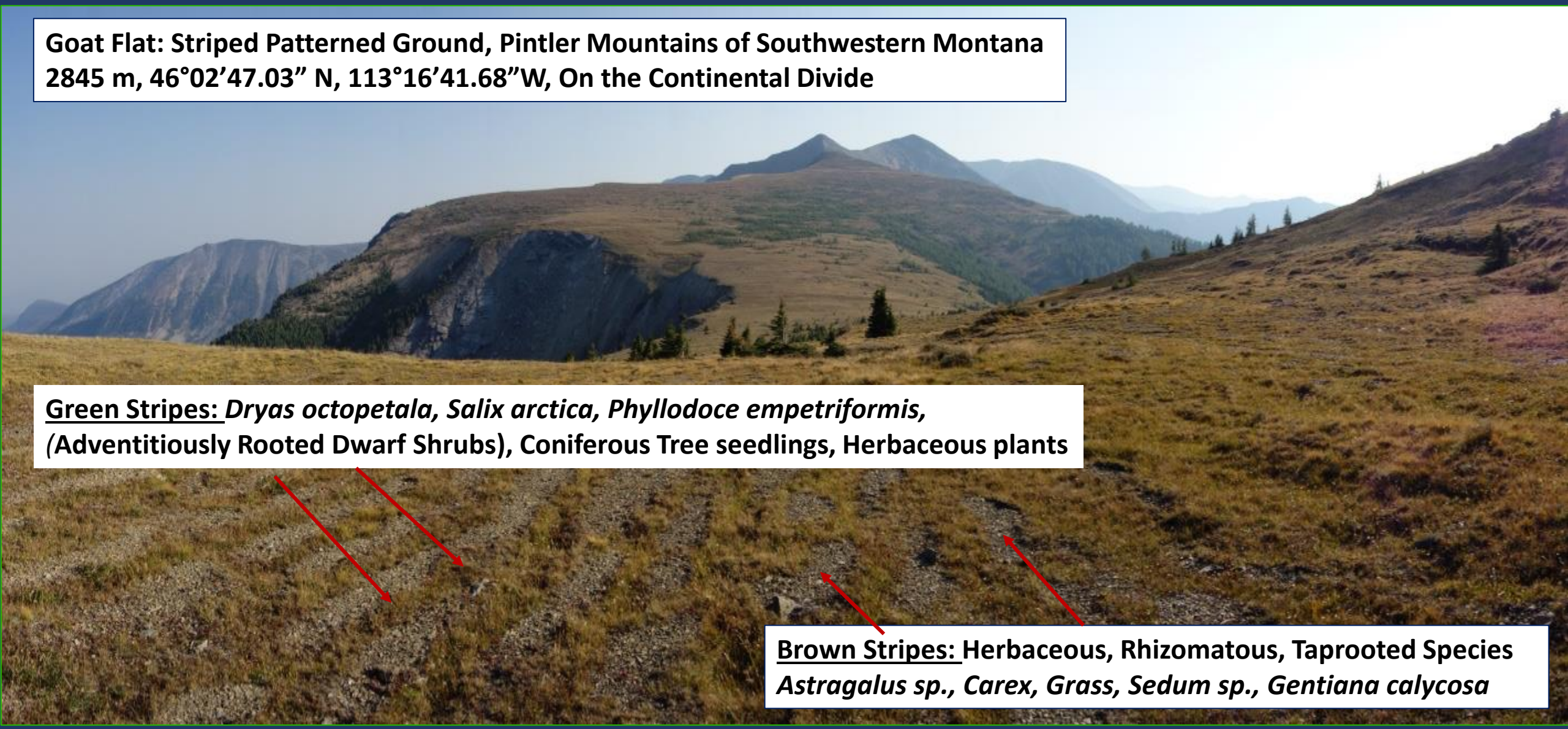
[1]Montana Technological University, [2]Texas State U.; [3]U. of Wyoming; [4]OPeNDAP, Inc.


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



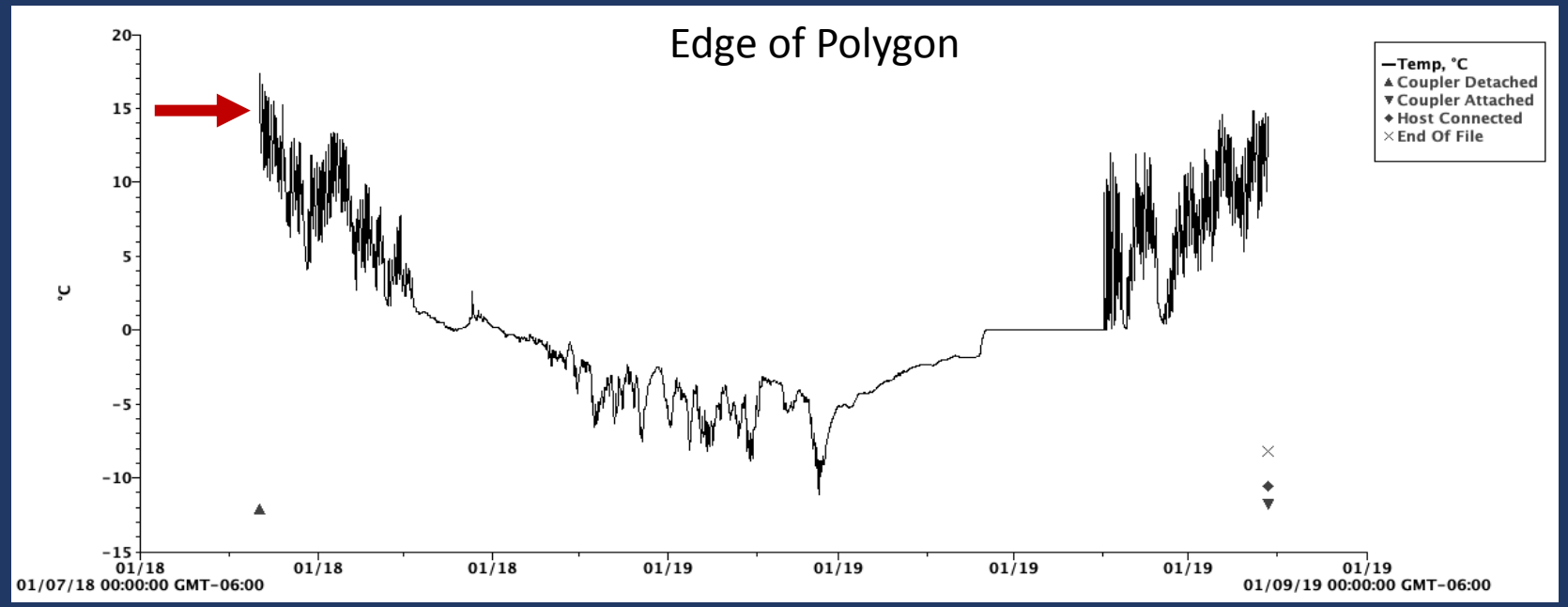
Multidimensional scaling plot of the relative percent cover of plant functional traits on striped periglacial patterned ground. Green stripes: Chamaephyte, Mat, Evergreen Leaves, Simple Leaves, Adventitious Roots, N-fixing symbioses, and Ectomycorrhizae). Brown stripes: Rare, Hemicryptophyte, Cushion, 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 empetriformis,*
(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.**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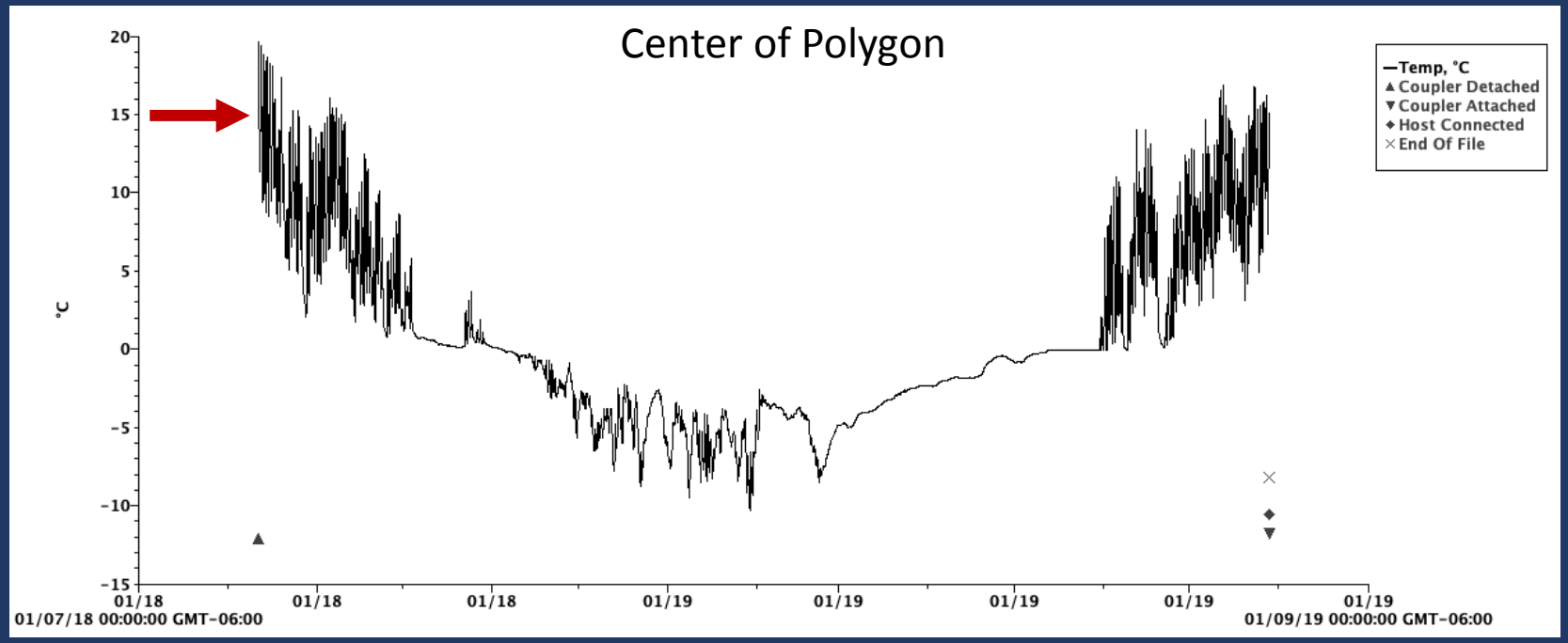
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Next: Soil Moisture Sensors! But they must be inobtrusive and hardy for year-round deployment.
Goals: Remotely access data via LoRa, Locate sensors with RFID.

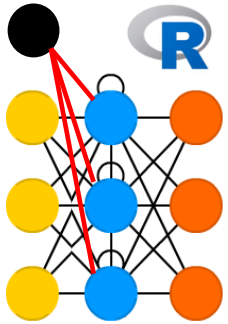
Researching Alpine Plant Traits (RAPT) Along an Elevational Gradient Downslope from the GLORIA Target Region in the Cairngorm Mts. of Scotland

Valles et al. 2017

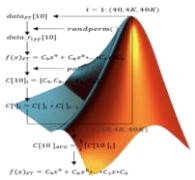
Temperature Data

Plant Trait Data

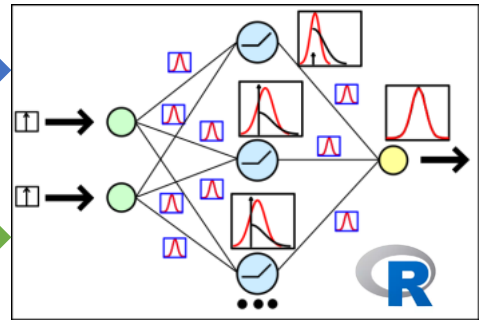
Forecast Temperature



Model Development



Bayesian NN



Google Maps API In R

Display API in Shiny

Plant and temperature data from site

Interpolation and regression used to fill-out data gaps

Temperature forecasted with RNN techniques

Regression model of plant traits

Multi-model analysis with Bayesian Neural Network to consider probabilities of events occurring in predictions

Linked to Google maps to visualize predictions

Shiny displays model's predicted information

User can change plant trait values to see changes in landscape

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