

Preregistration

# Impacts of experimental warming on alpine tundra plant flowering phenology

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*16 September 2022*

## STUDY INFORMATION

### 1. Title

1.1 Impacts of experimental warming on alpine tundra plant flowering phenology

### 2. Authors

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### 3. Description

This study uses data from Carbognani et al., 2018\* accessed from Dryad to plot phenological development of three alpine plant species as a function of air temperature. In this study, temperature was manipulated using experimental warming to simulate climate warming of 1-3 degrees C. Data was collected in the Italian Alps during the 2010-2014 growing seasons. An improved understanding of how species will react to warming is imperative in tundra environments where climate warming is driving rapid shifts in vegetation.

\*Carbognani, Michele, Marcello Tomaselli, and Alessandro Petraglia. "Different temperature perception in high-elevation plants: new insight into phenological de-

velopment and implications for climate change in the alpine tundra.” *Oikos* 127.7 (2018): 1014-1023.

#### **4. Hypotheses**

4.1 Phenological development will advance with warming, though responses will be species specific.

### **DESIGN PLAN**

#### **5. Study Type**

5.1 Experimental data.

#### **6. Blinding**

No blinding is involved in this study.

#### **7. Is there anything blinding in this study**

No.

#### **Study Design**

This study used a randomized blocked design.

### **SAMPLING PLAN**

#### **10. Existing data**

Registration prior to analysis of data.

#### **11. Explanation of existing data**

Data were accessed from Dryad (<https://datadryad.org/stash>). Data were not explored prior to this analysis.

#### **12. Data collection procedures**

N/A

#### **13. Sample size**

- *Cardamine alpina* = 687
- *Leucanthemopsis alpina* = 671
- *Veronica alpina* = 494

## **ANALYSIS PLAN**

I will use a linear model to examine the impact of air temperature on phenological development for three tundra plant species. Data will be plotted by species.