

A distributed time-lapse camera network on high-arctic Svalbard to track vegetation phenology with high temporal detail and at varying scales



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Camera network layout

Longyearbyen

Lindholmhøgda



6.

9.

7.

8.

10.

Bolternosa

1. 2. 4. 5. 3.

Breinosa

Instrumentation

- 10 racks across representative vegetation types (including dwarf shrubs such as *Cassiope tetagrona*, *Salix polaris*, *Dryas octopetala* as well as various grasses and sedges).
- Decagon NDVI and PRI sensors
- Timelapse RGB cameras (8 MP)
- Surface temperature from thermal IR
- Soil temperature and soil moisture sensors



Challenges



The guywire of our initial setup was sometimes loosened by Reindeer which led to unstable imagery

Rotation Issues



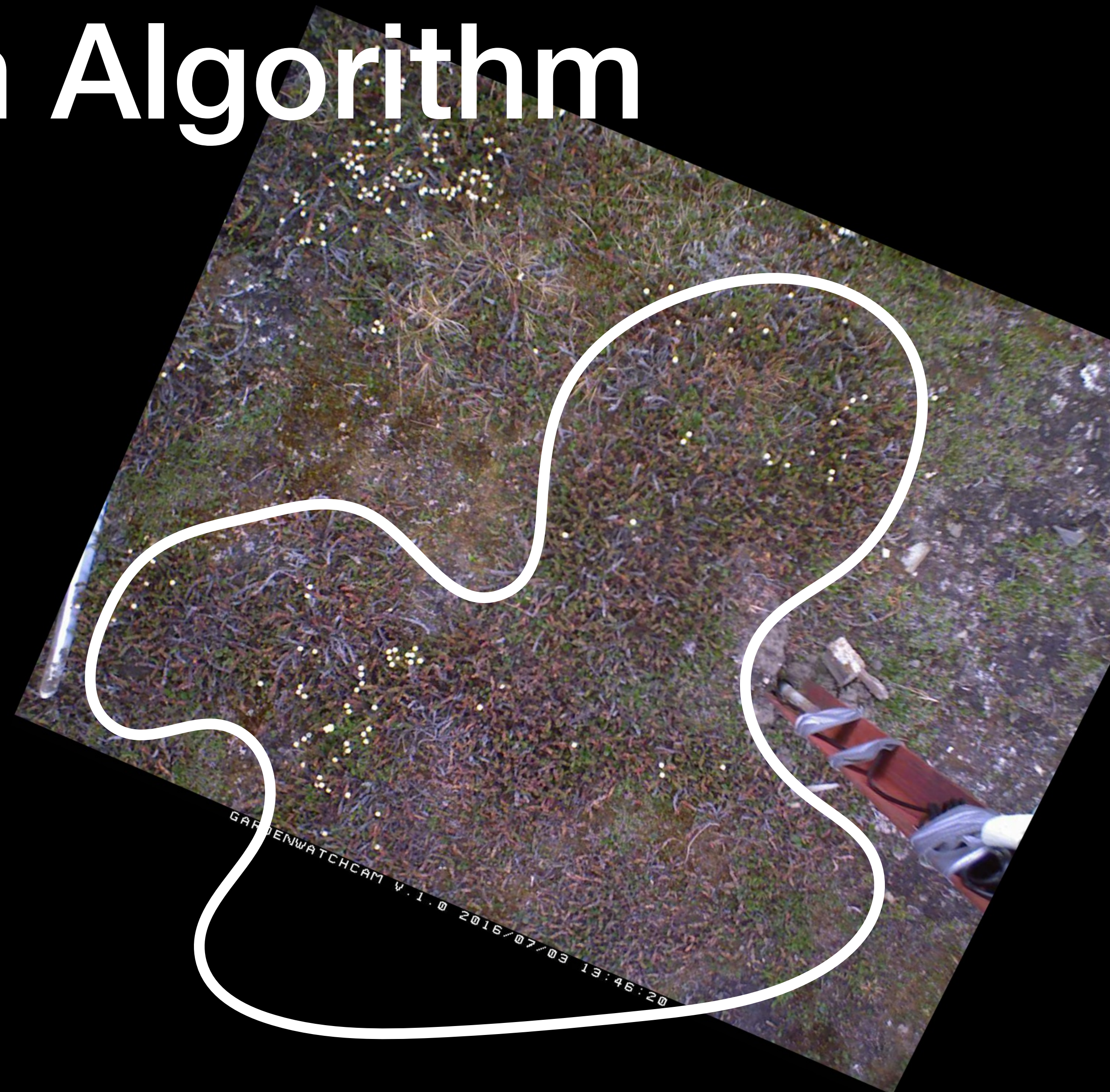
June 4th



July 3rd

In some extreme cases, photos were strongly rotated

Stablization Algorithm

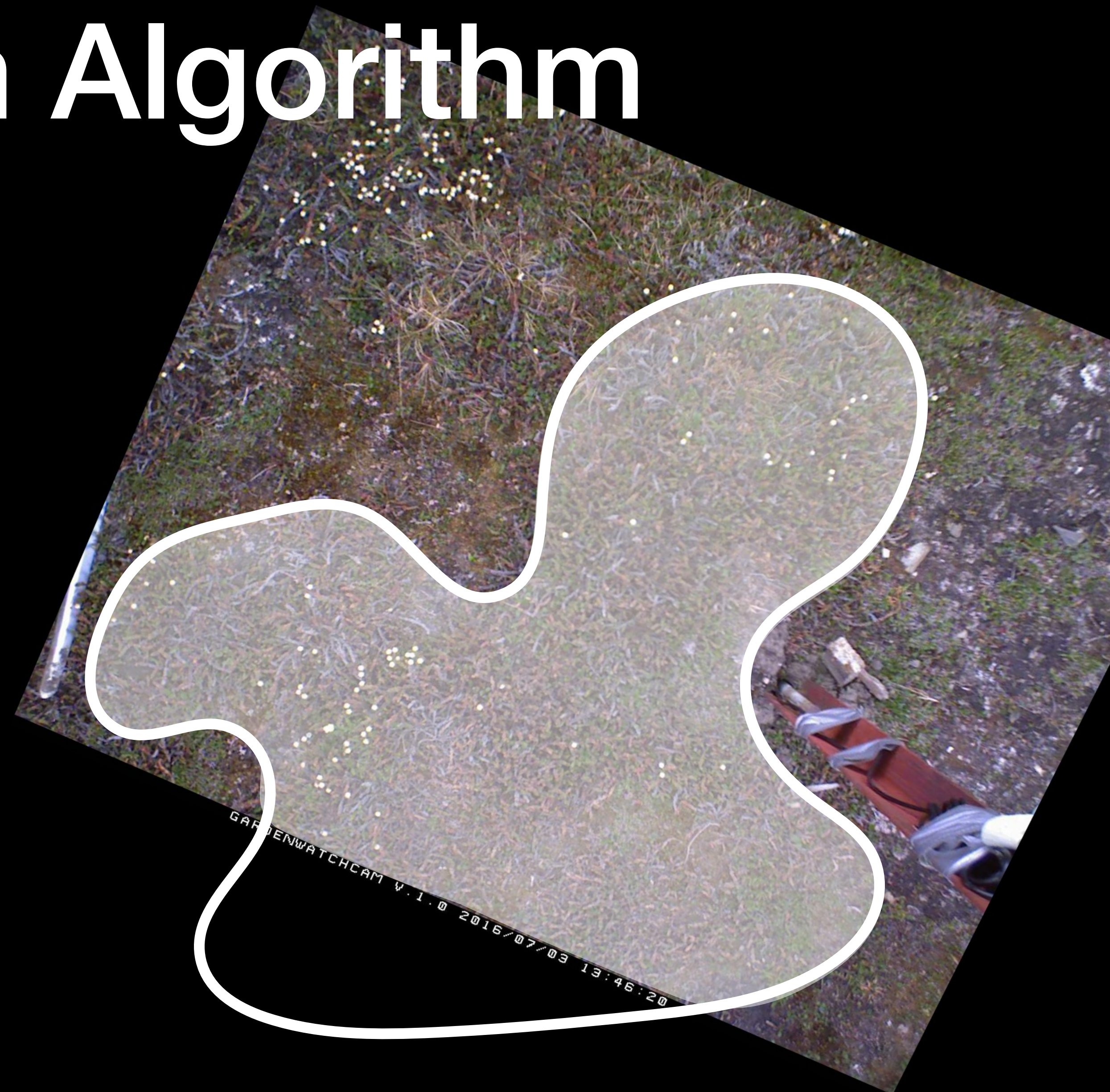


June 4th

By tracking features between frames, the photos can be aligned correctly.
This remained necessary even after firmly securing the racks due to freeze/thaw motions.

July 3rd

Stablization Algorithm



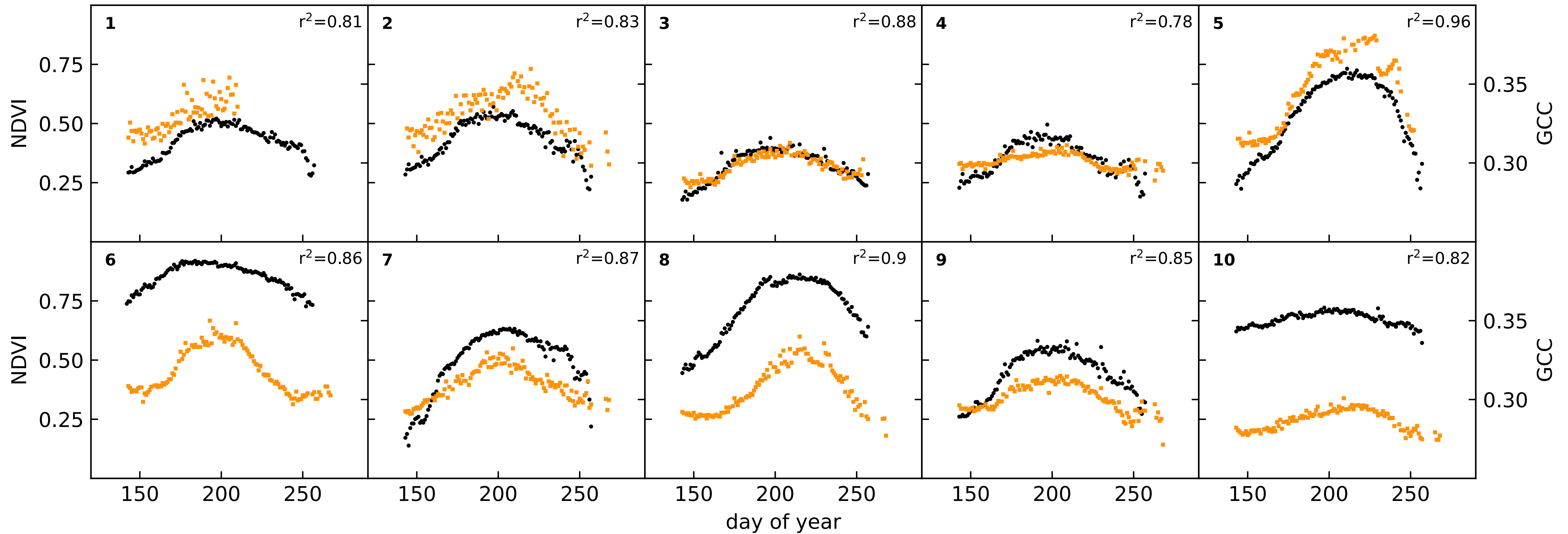
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July 3rd

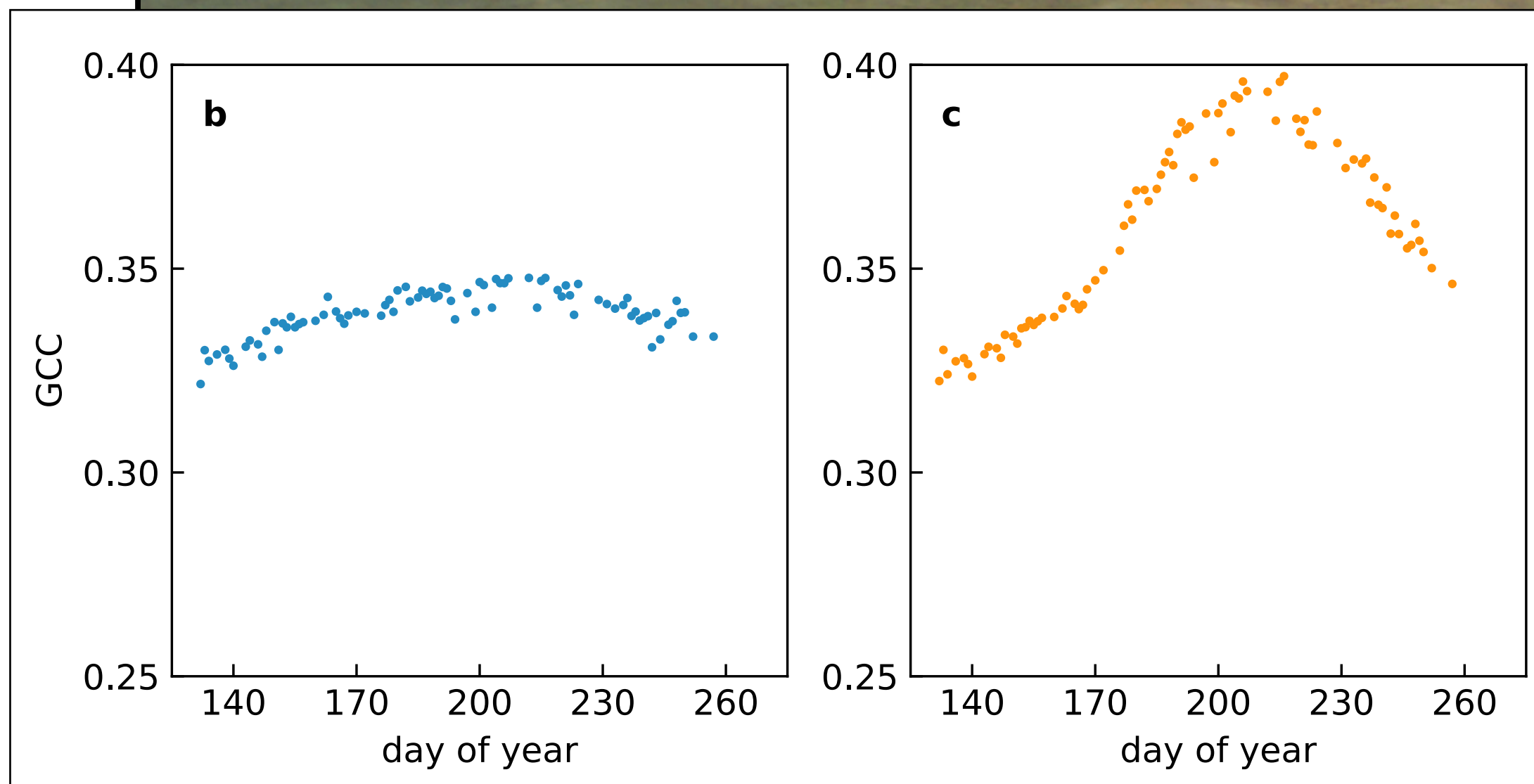
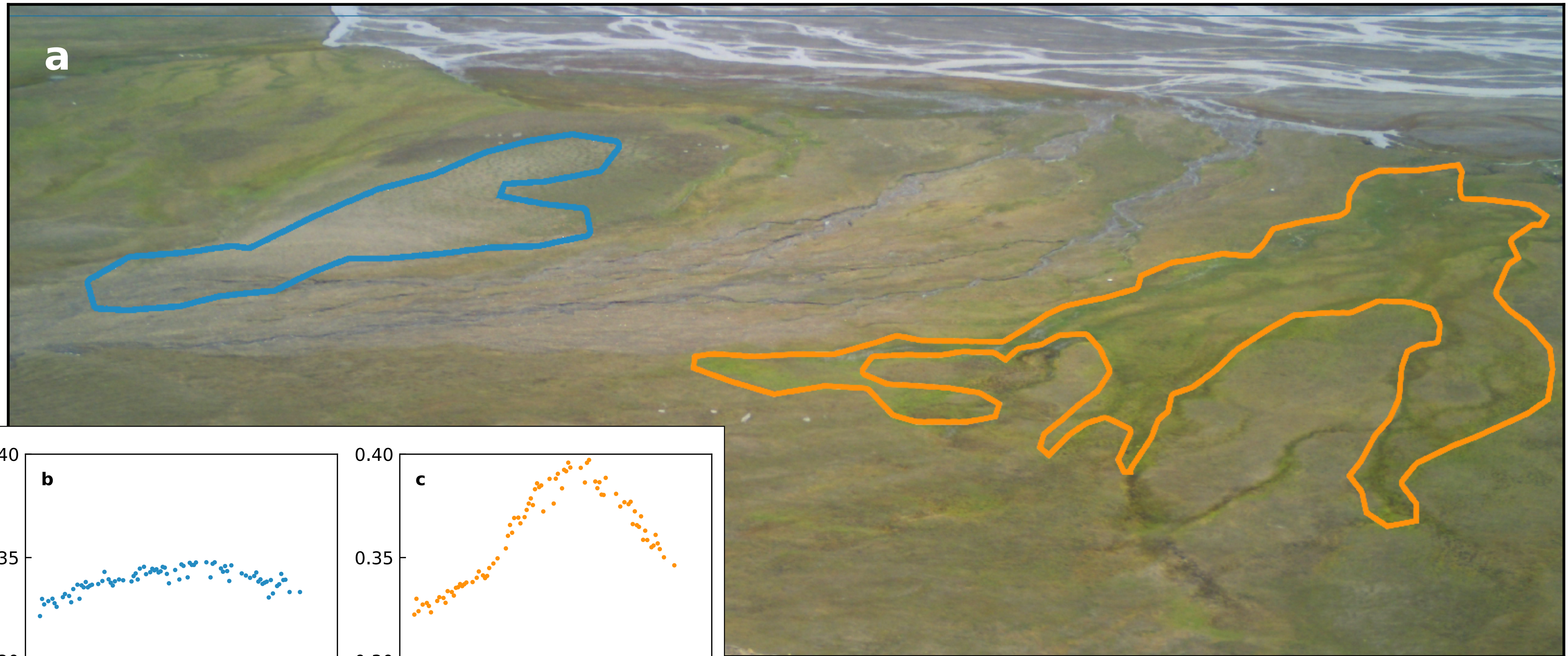
NDVI vs GCC

2018



Green Chromatic Channel ($GCC=G/(R+G+B)$) follows the same seasonal pattern as NDVI, but the magnitude differs among plots

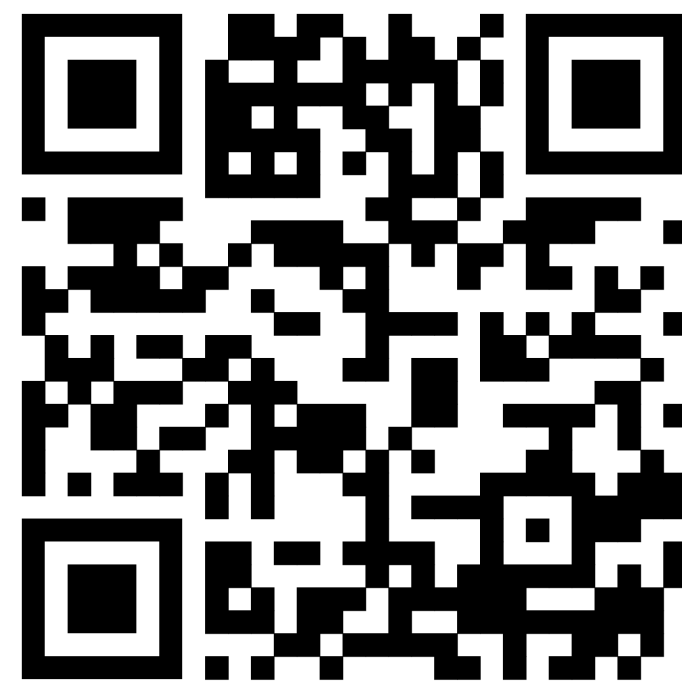
Landscape cameras



Landscape camera excellent to track large scale patterns
but GCC tends to be higher, due to low angle



**Download the
data from
adc.met.no**



**Get the algorithm
source code from
Github**



**Read the paper
at Earth System
Science Data
(Parmentier et
al. 2021)**