Springtime

ITC – eScience symposium – 17 Nov 2022

Peter Kalverla & Mahdi Khodadadzadeh

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Springtime

Spatiotemporal phenology research with interpretable models

Image source: https://stock.adobe.com/images/sunflower-growing-process-vector-illustration-flat-design-planting-process-of-sunflowers-growth-stages-from-seed-to-flowering-and-fruit-bearing-plant-with-yellow-flowers-isolated-on-white-background/242172818

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Why?

- Phenology $\Leftarrow$ climate change
- Clustered, spatiotemporal phenomena
- Heterogeneous data sources

- How to derive meaningful insights and make most of the available data?

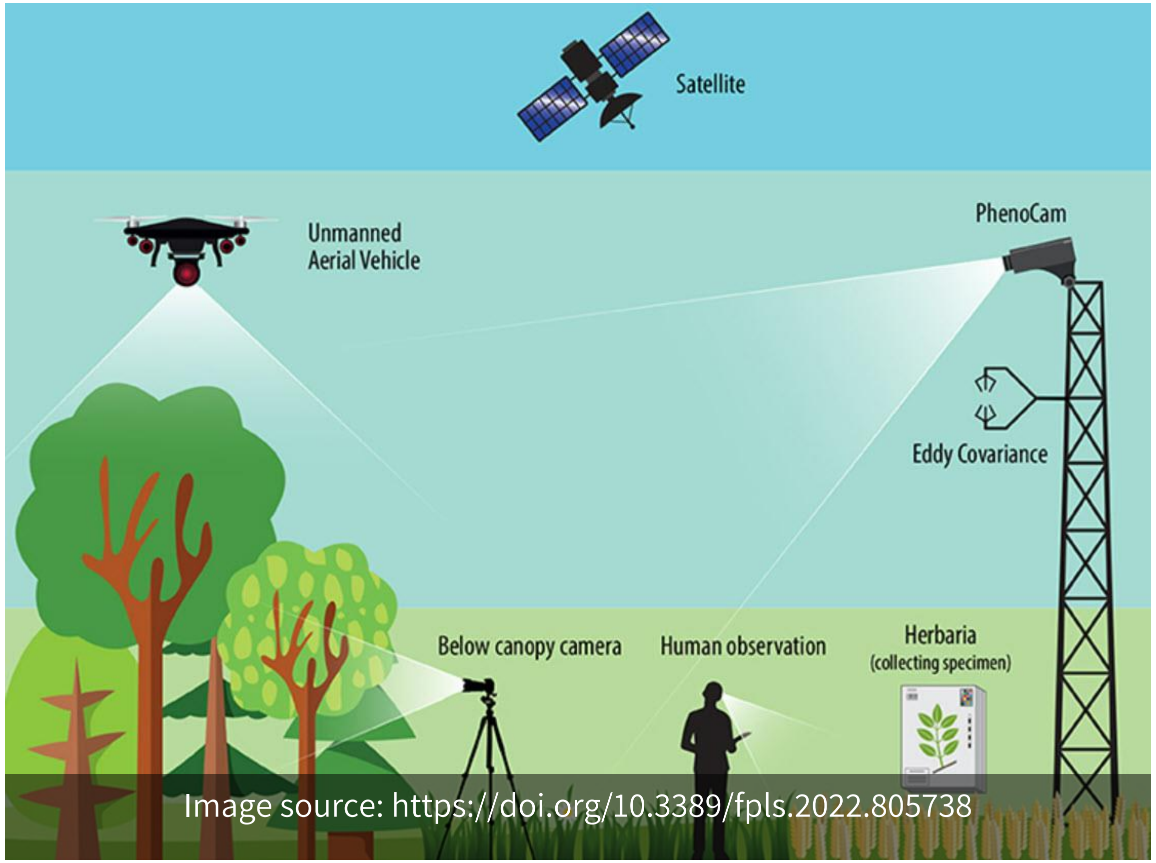

Image source: https://doi.org/10.3389/fpls.2022.805738

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How?

Image source: https://xkcd.com/1838/

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Example task

Given:

- Indirect observations (e.g. satellite data)
- Indicators (e.g. sunshine and temperature)

Predict:

- Day of first bloom of the common lilac

Image source: https://plants.ces.ncsu.edu/plants/syringa-vulgaris/

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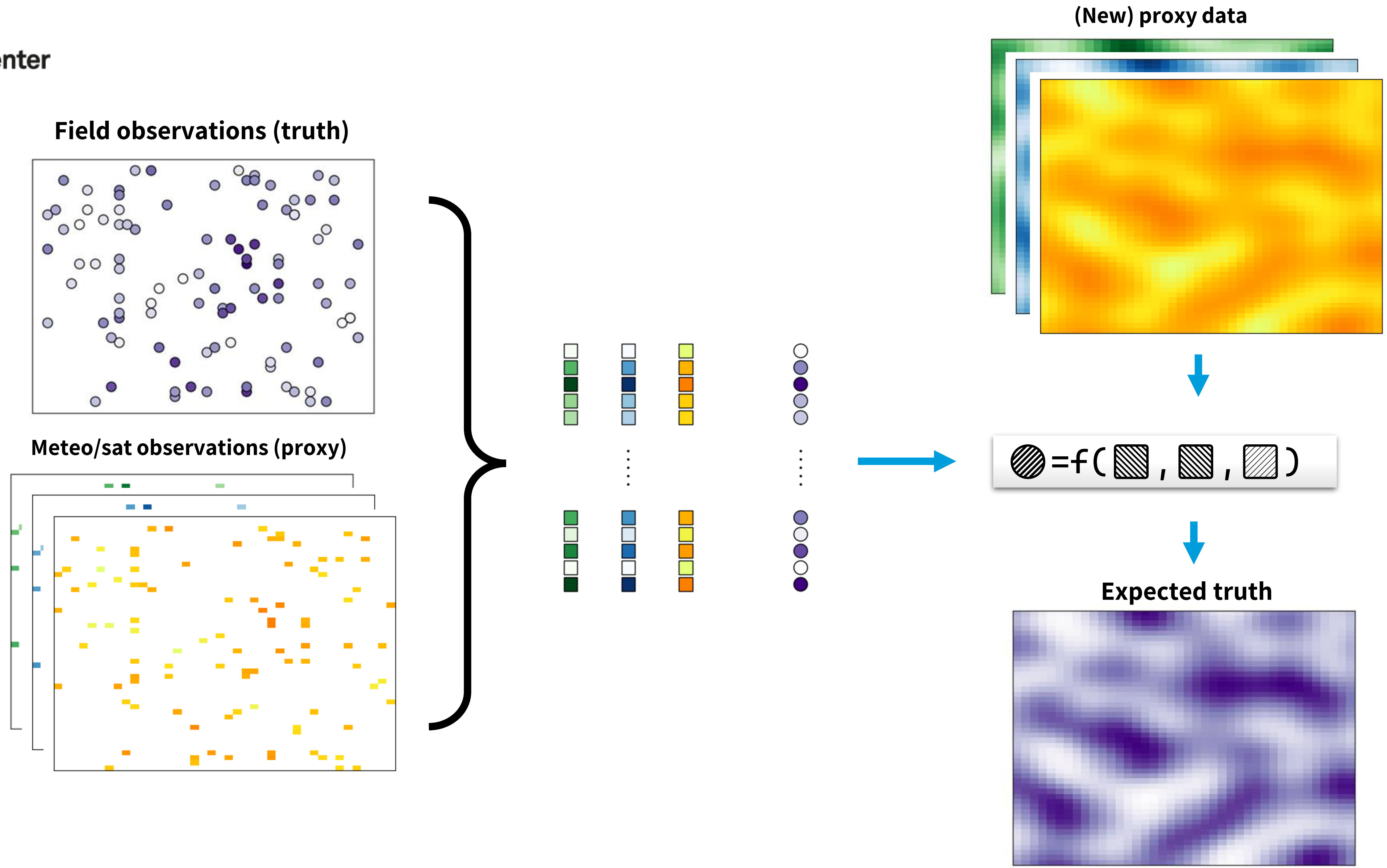
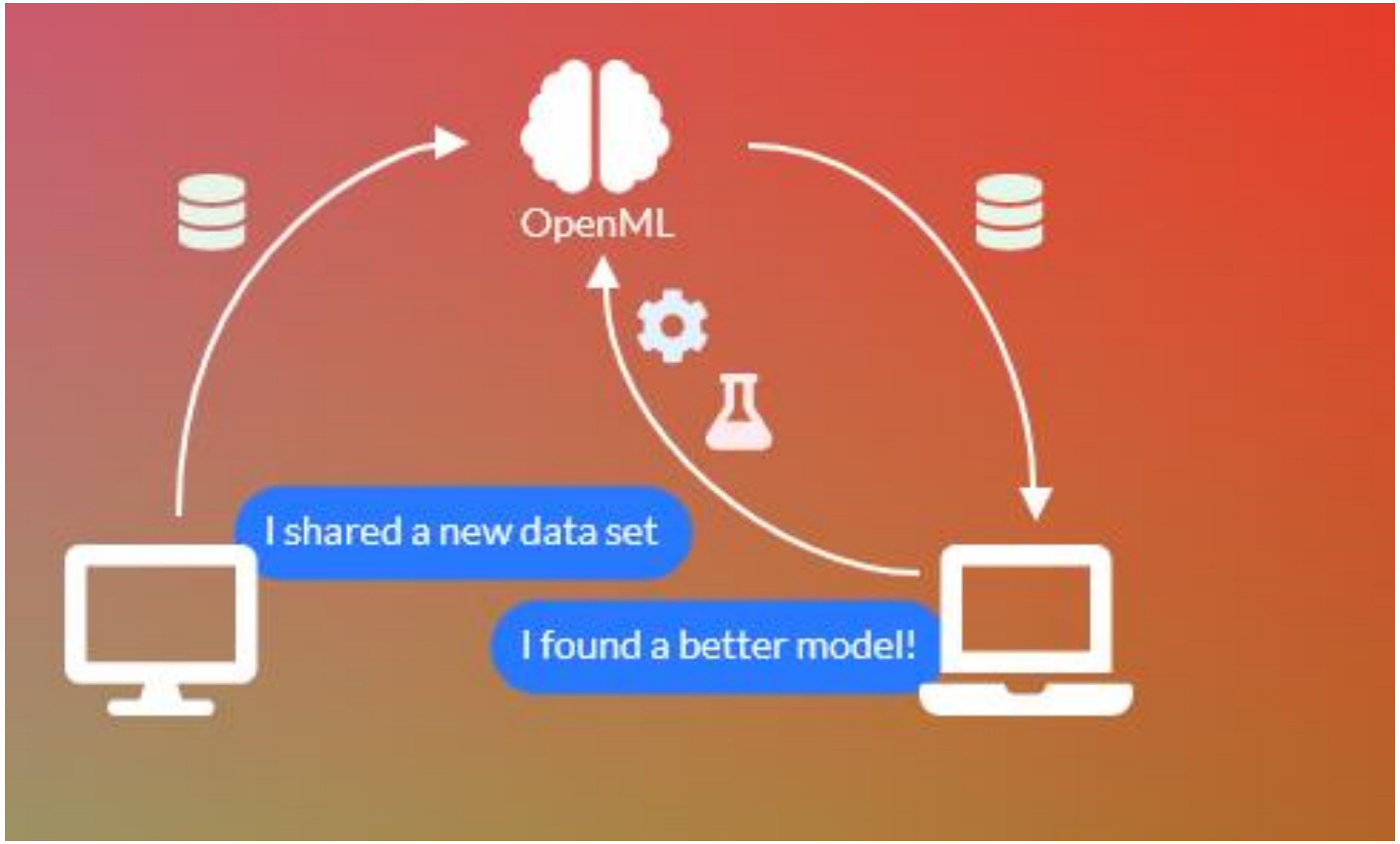


Streamline analytical workflows

- Fetch, clean, and prepare **datasets** from various sources
- Formulate **tasks**
- Clarify performance **measures** and **procedures**
- Standardize **flows**
- Execute and track **runs**
- Automate **benchmarks**
- Develop **visualizations**



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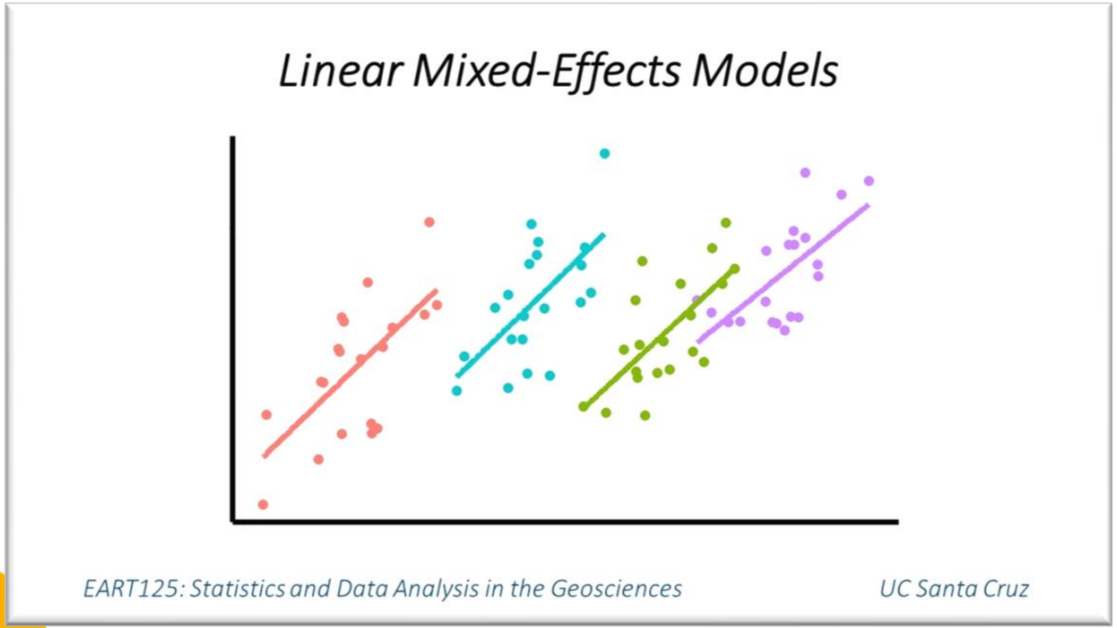
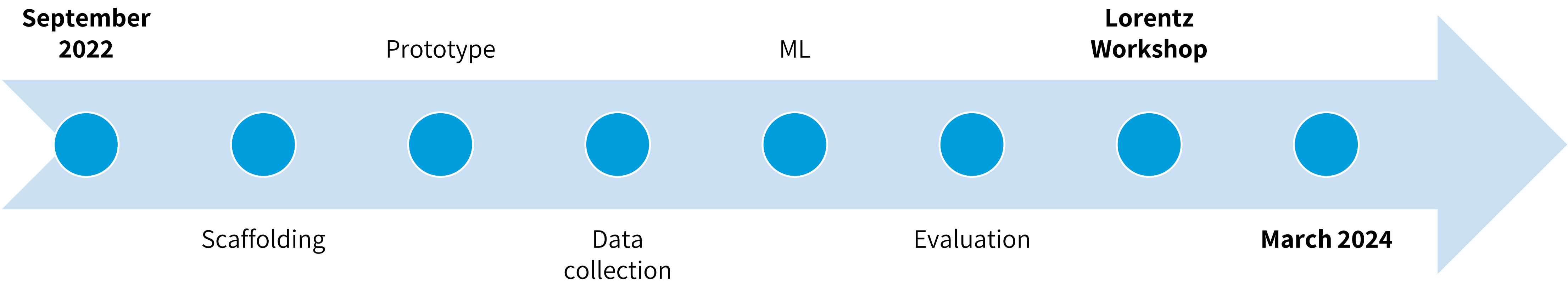
Develop interpretable models

- Mixed effects models: useful for clustered data
- Explainable boosting machines: transparent and accurate



Timeline


September 2022
Scaffolding
Prototype
Data collection
ML
Evaluation
Lorentz Workshop
March 2024

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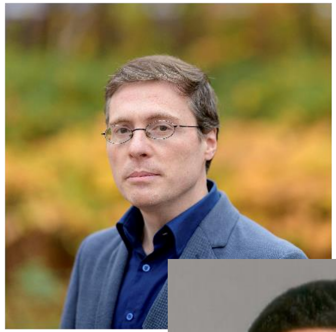
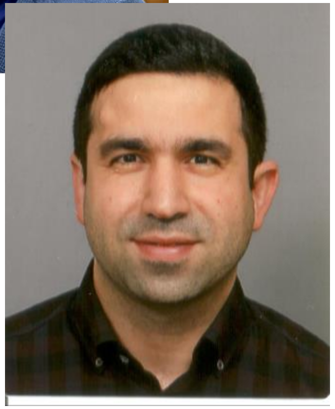
Team



Raúl Zurita-Milla



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GitHub **https://github.com/phenology/springtime/**

Let’s stay in touch

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