FAIRSenDD: FAIR workflow for Sentinel-1 based Deforestation Detection

Big Data from Space 2025

Riga Latvia

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Overall objective

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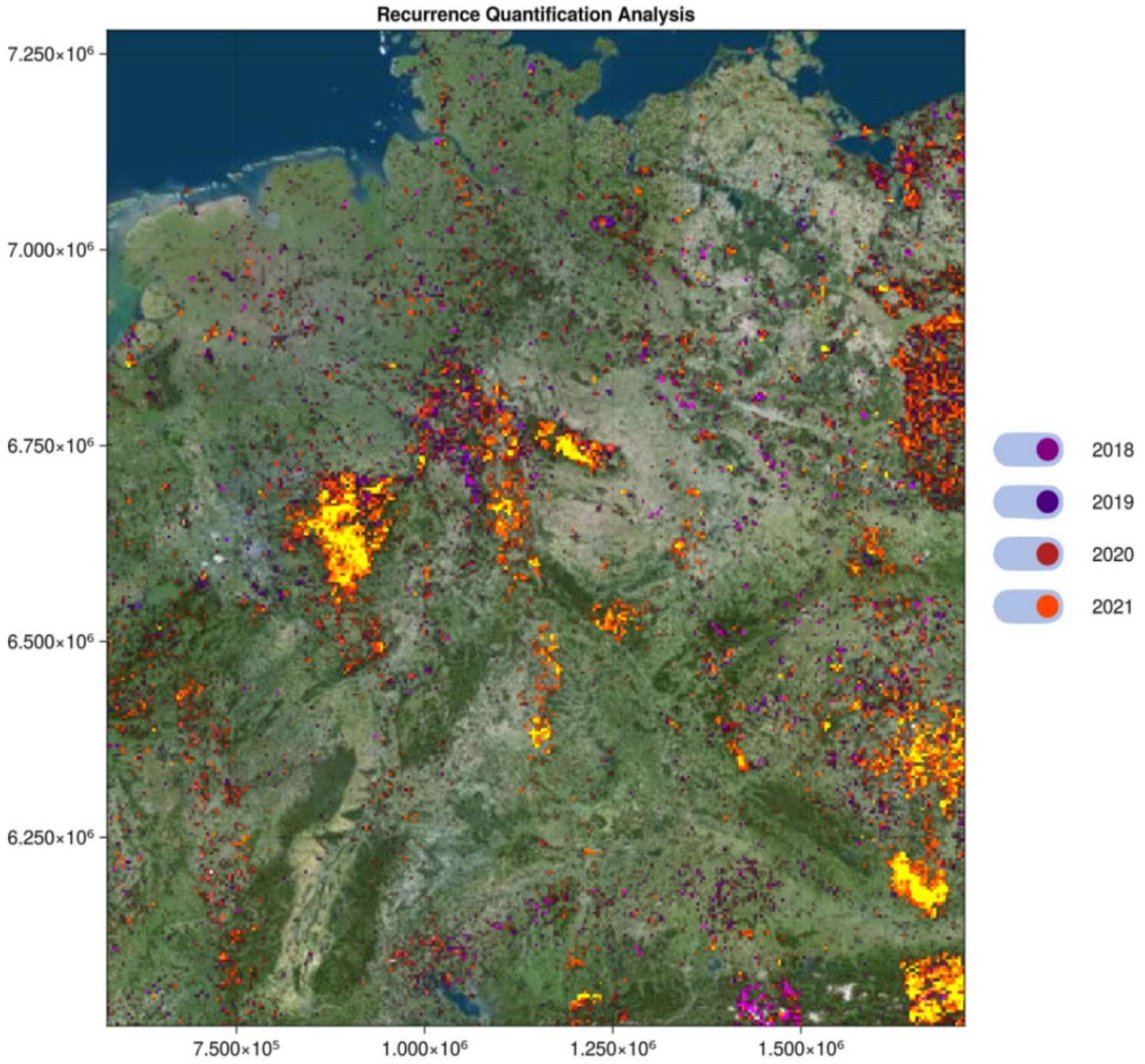
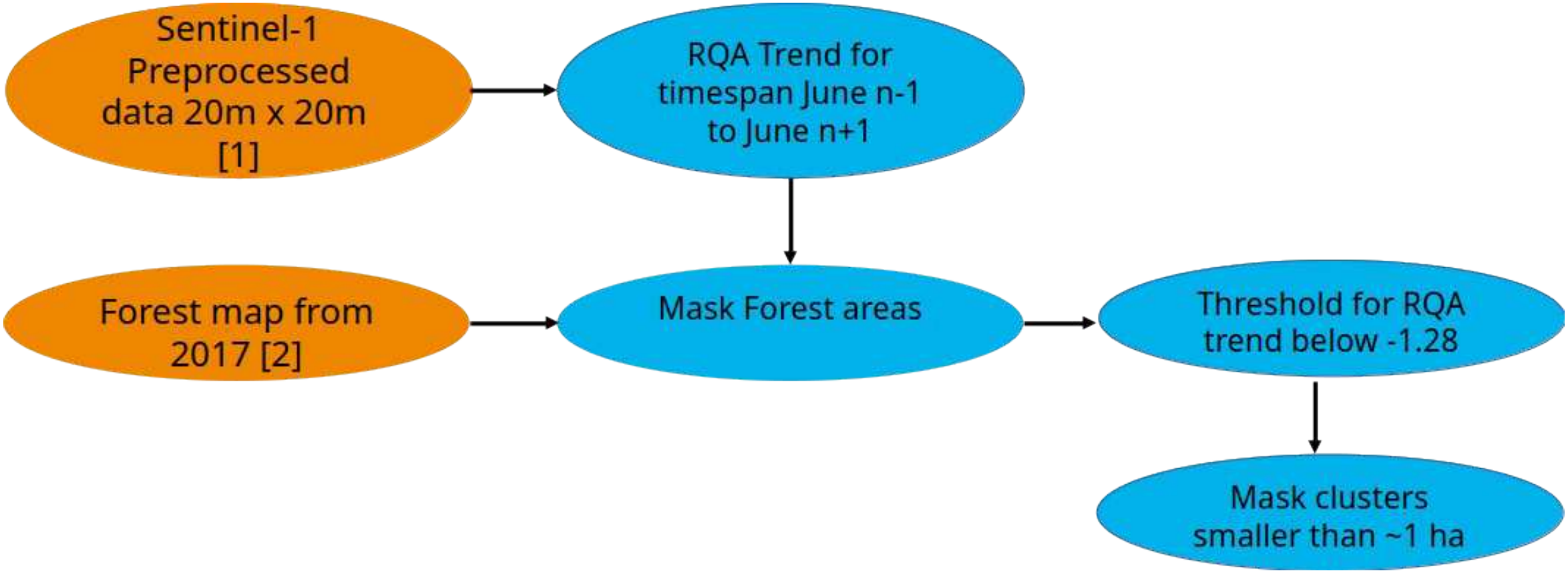
Make an existing workflow for detecting deforestation events based on Sentinel 1 time series FAIR



Start: Workflow of the Processing

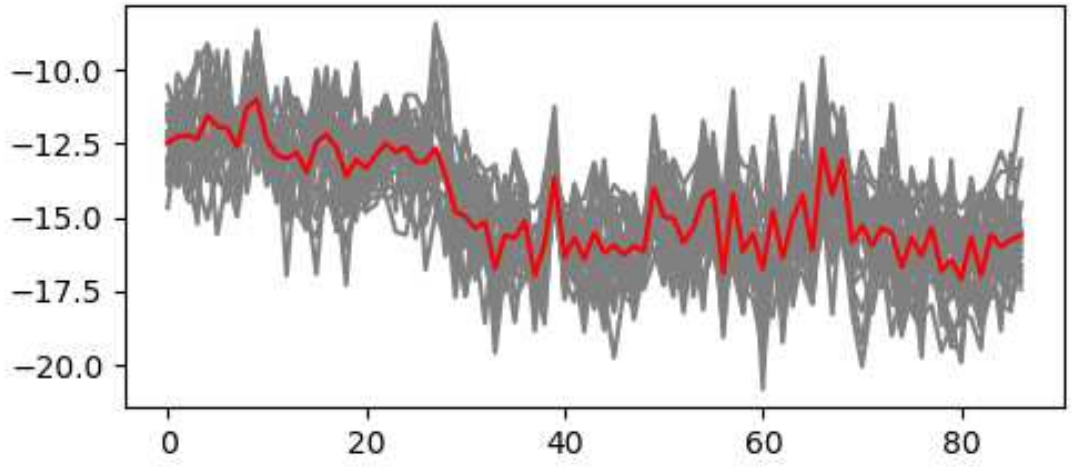


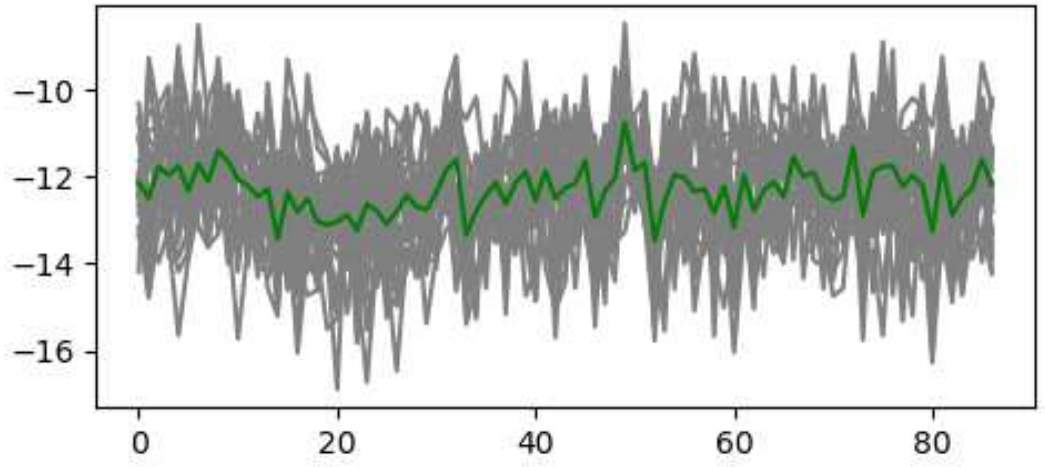
https://ieeexplore.ieee.org/document/9186165

The algorithmic challenge

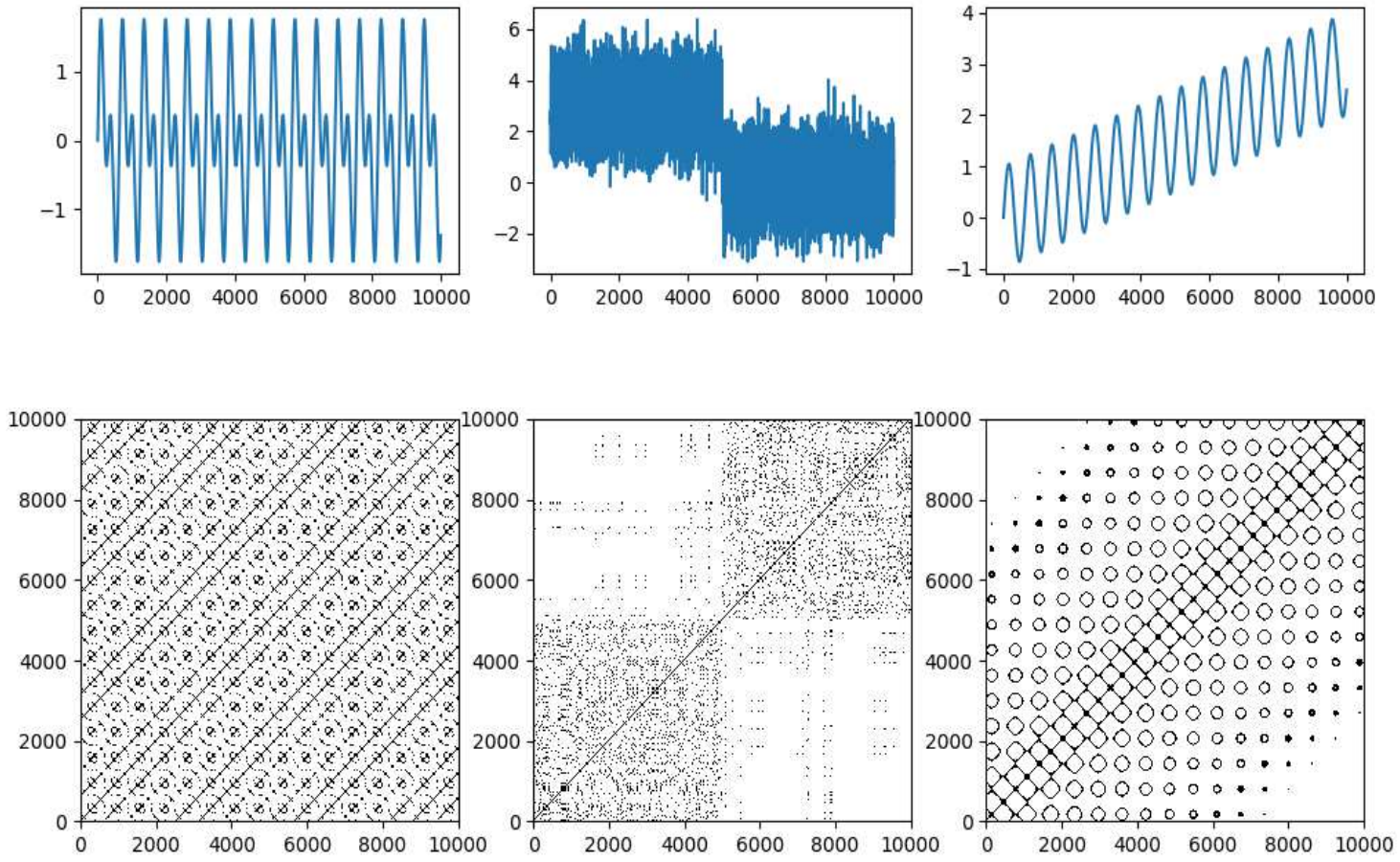
How to reliably detect change in a time series in the presence of

Noise and (potentially) a seasonal cycle



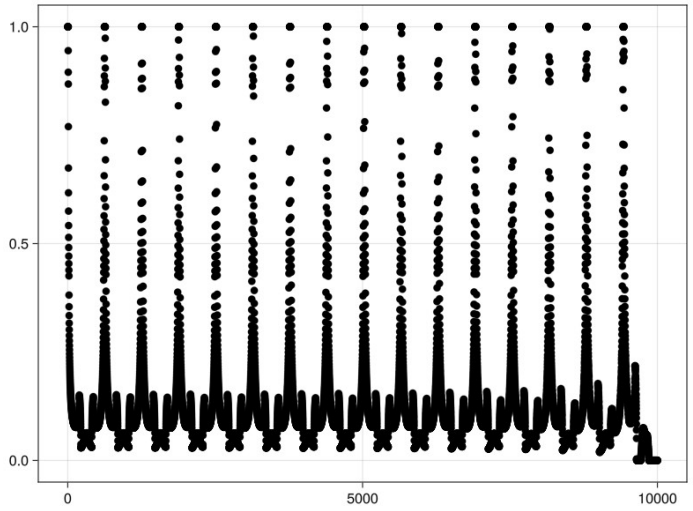


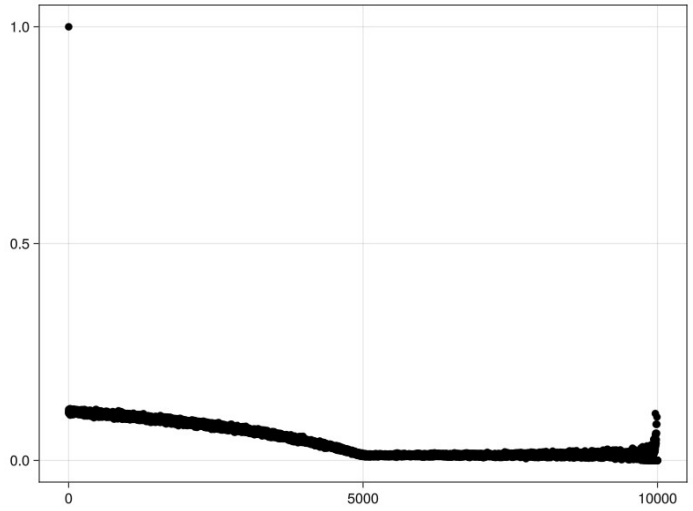
RECURRENCE PLOTS

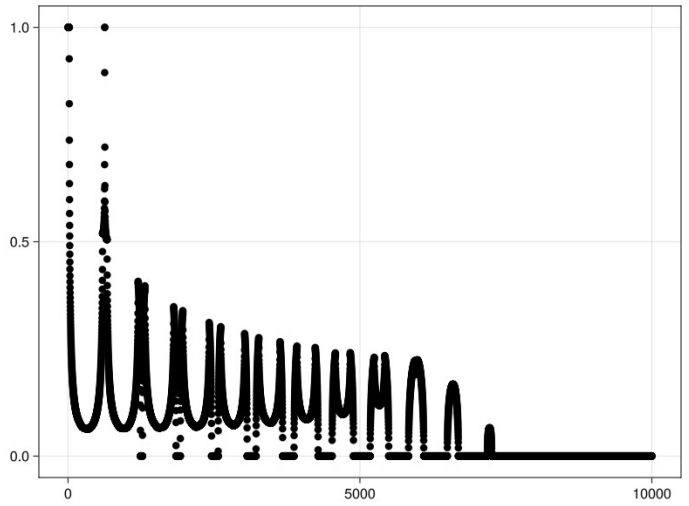


Cremer et al (2018)

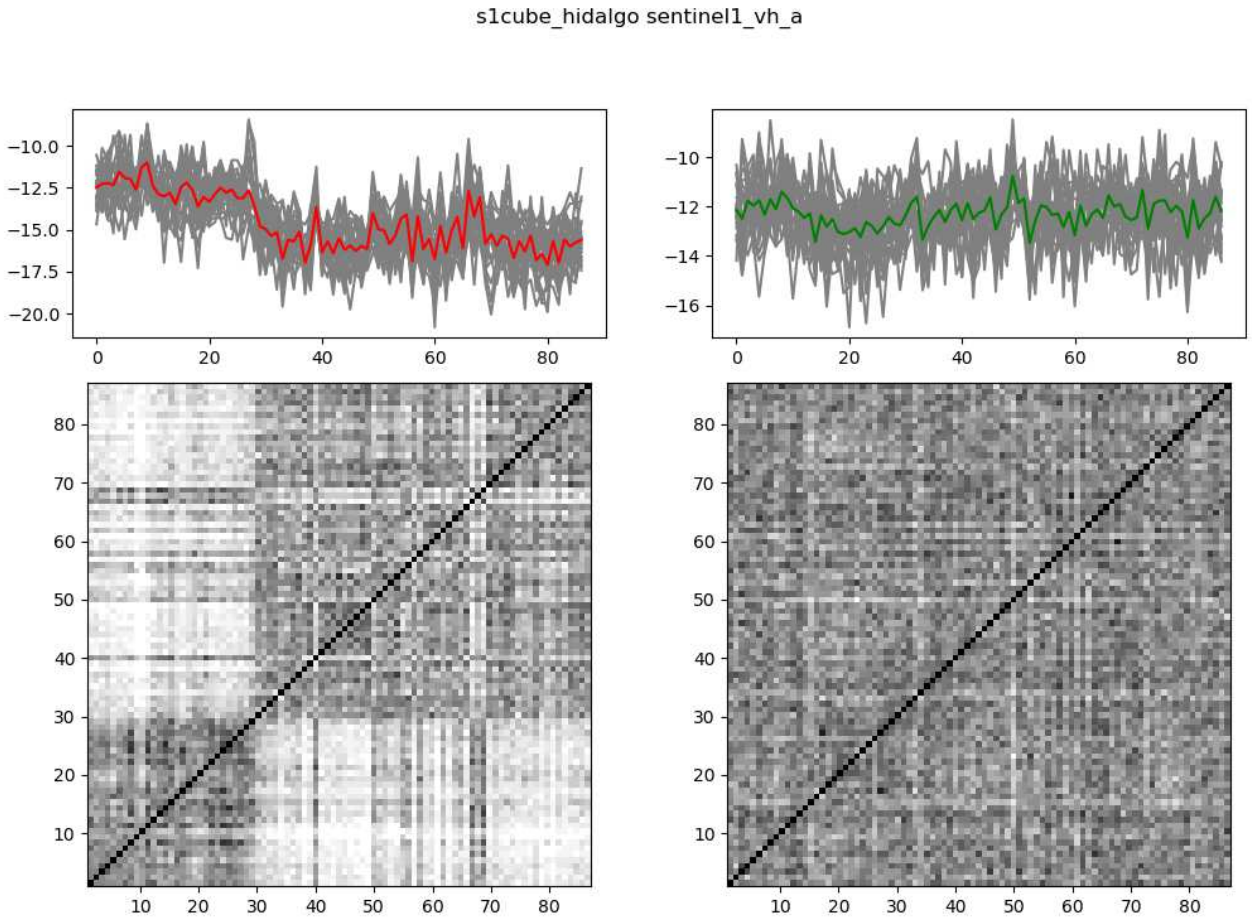
RECURRENCE QUANTIFICATION ANALYSIS
TREND COMPUTATION

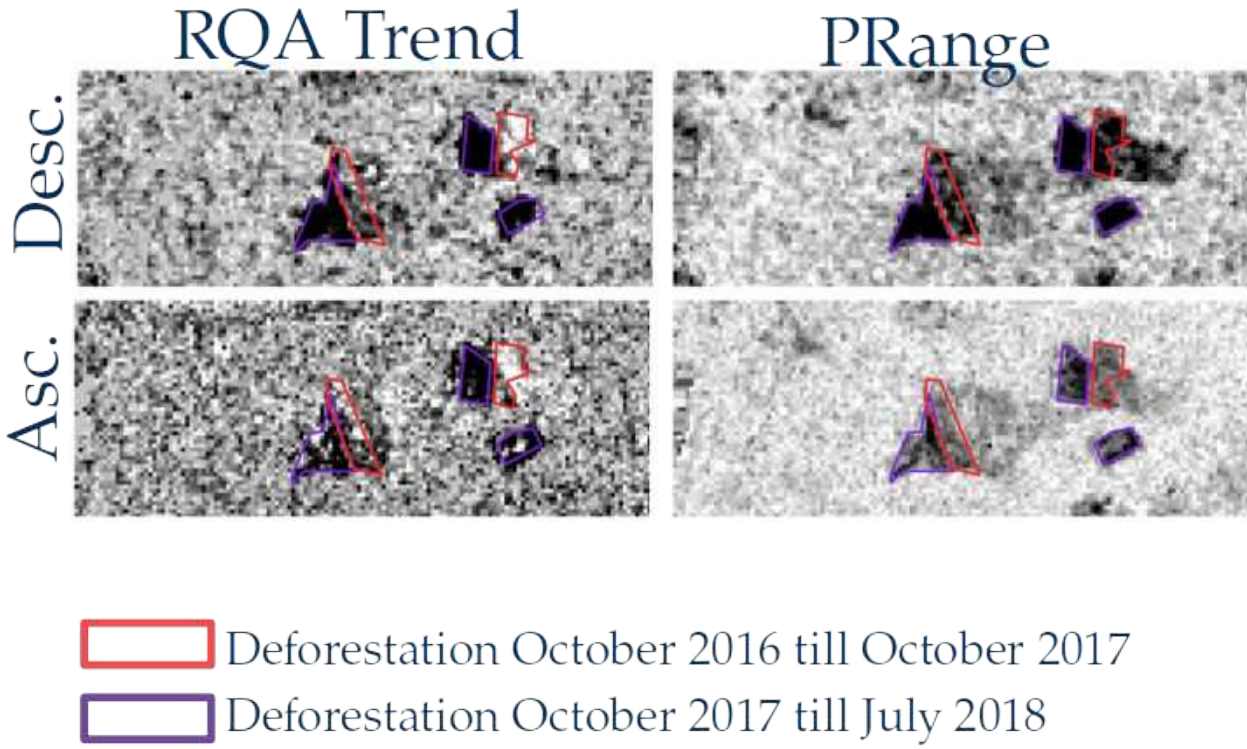






RQA Forest Change Detection

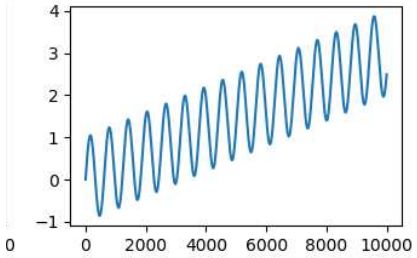


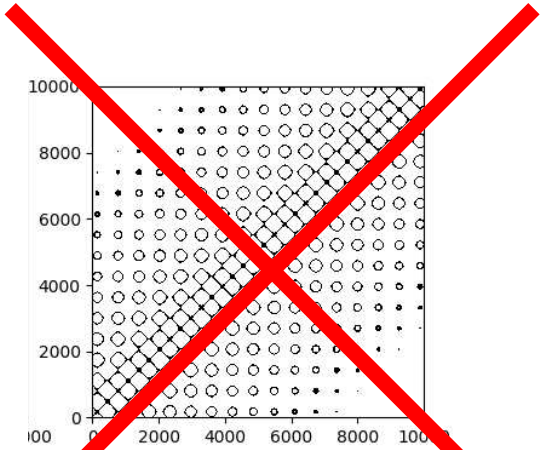


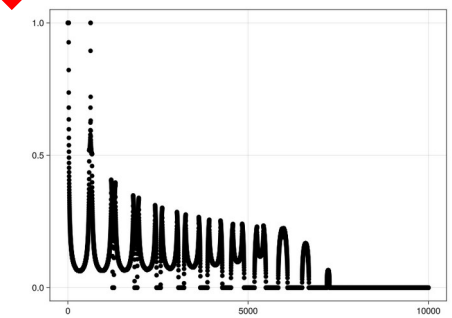
Deforestation October 2016 till October 2017

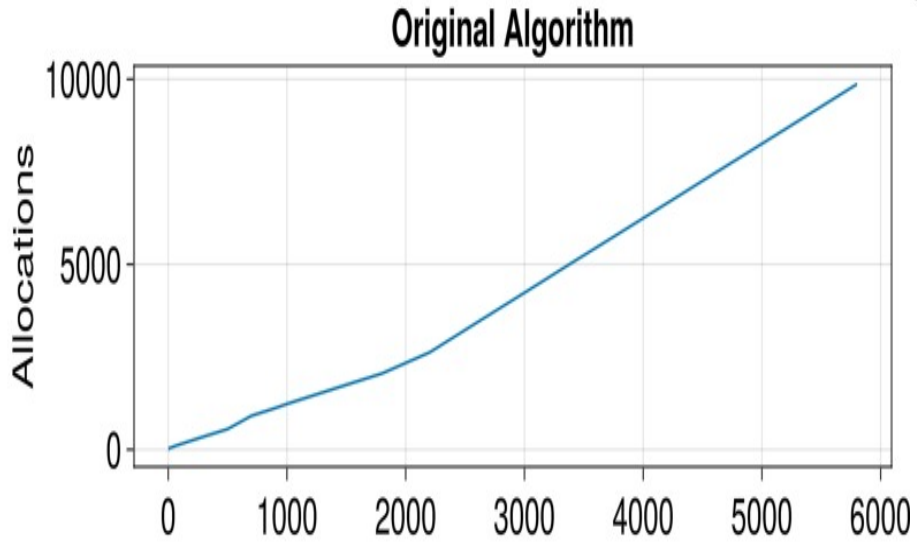
Deforestation October 2017 till July 2018

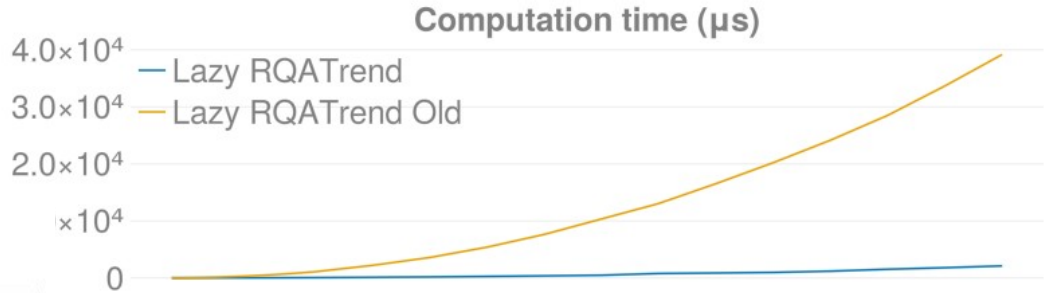
Changes to RQA Computation

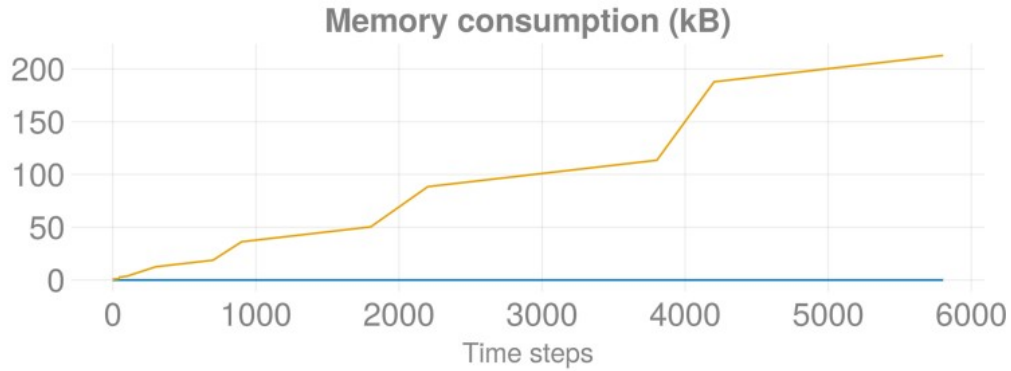


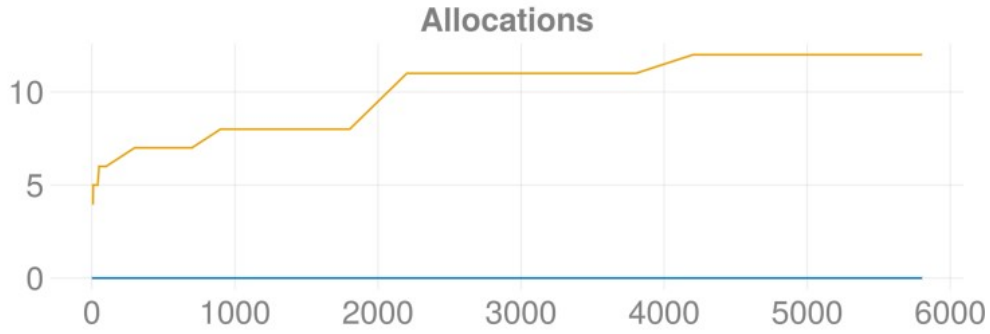




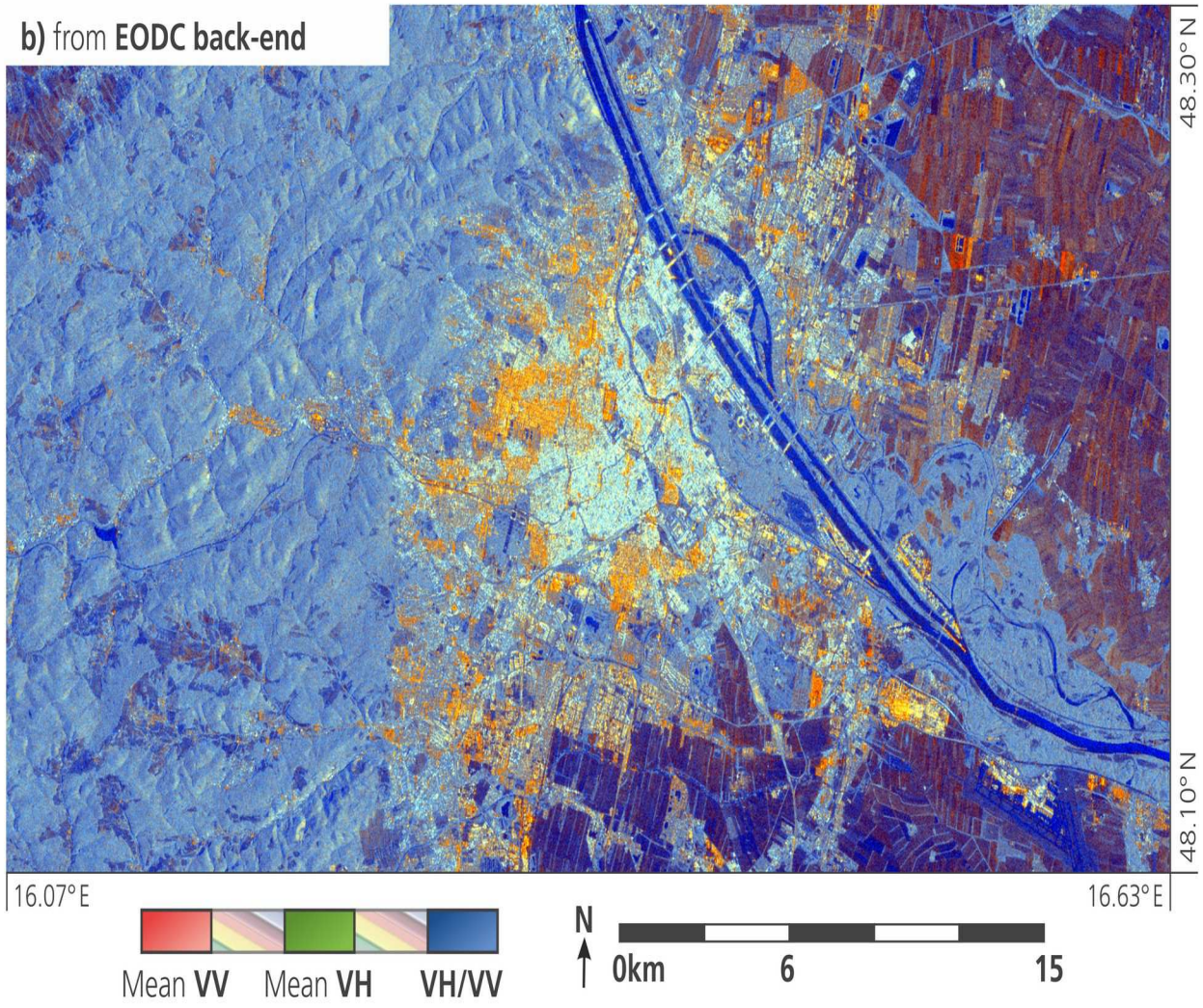




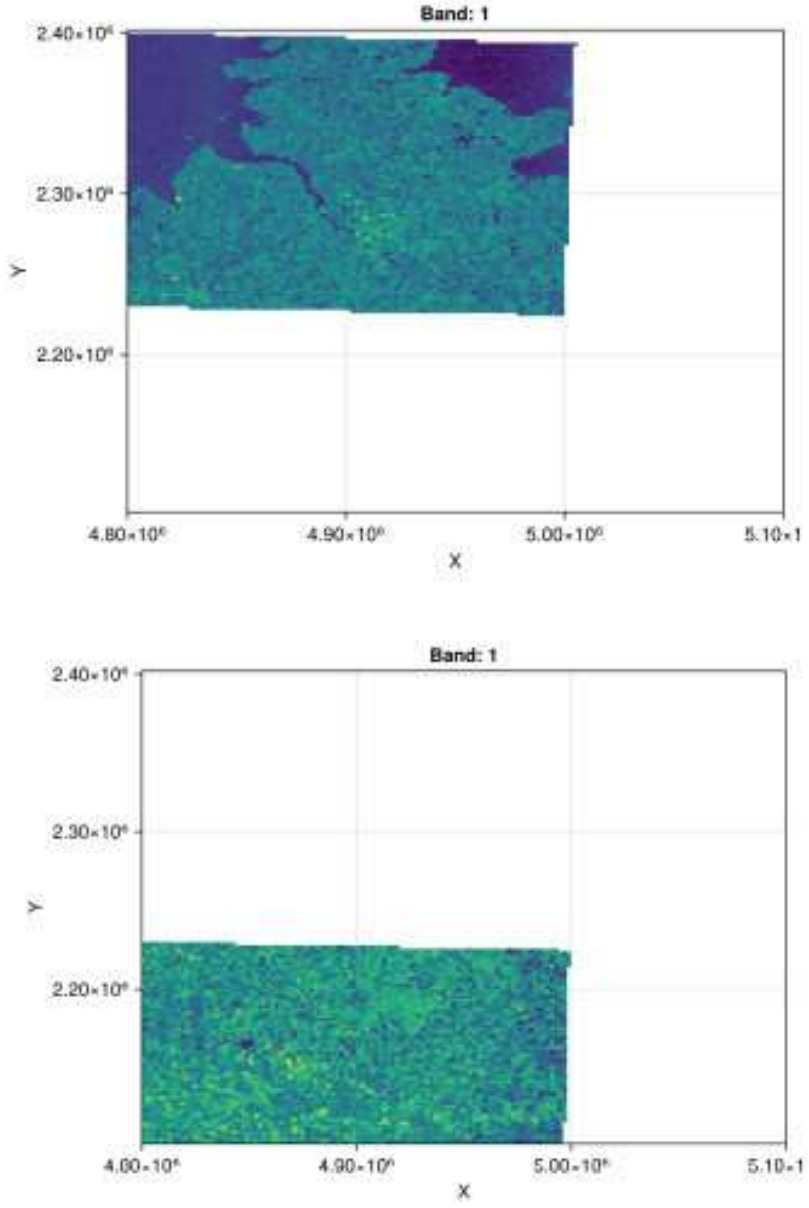


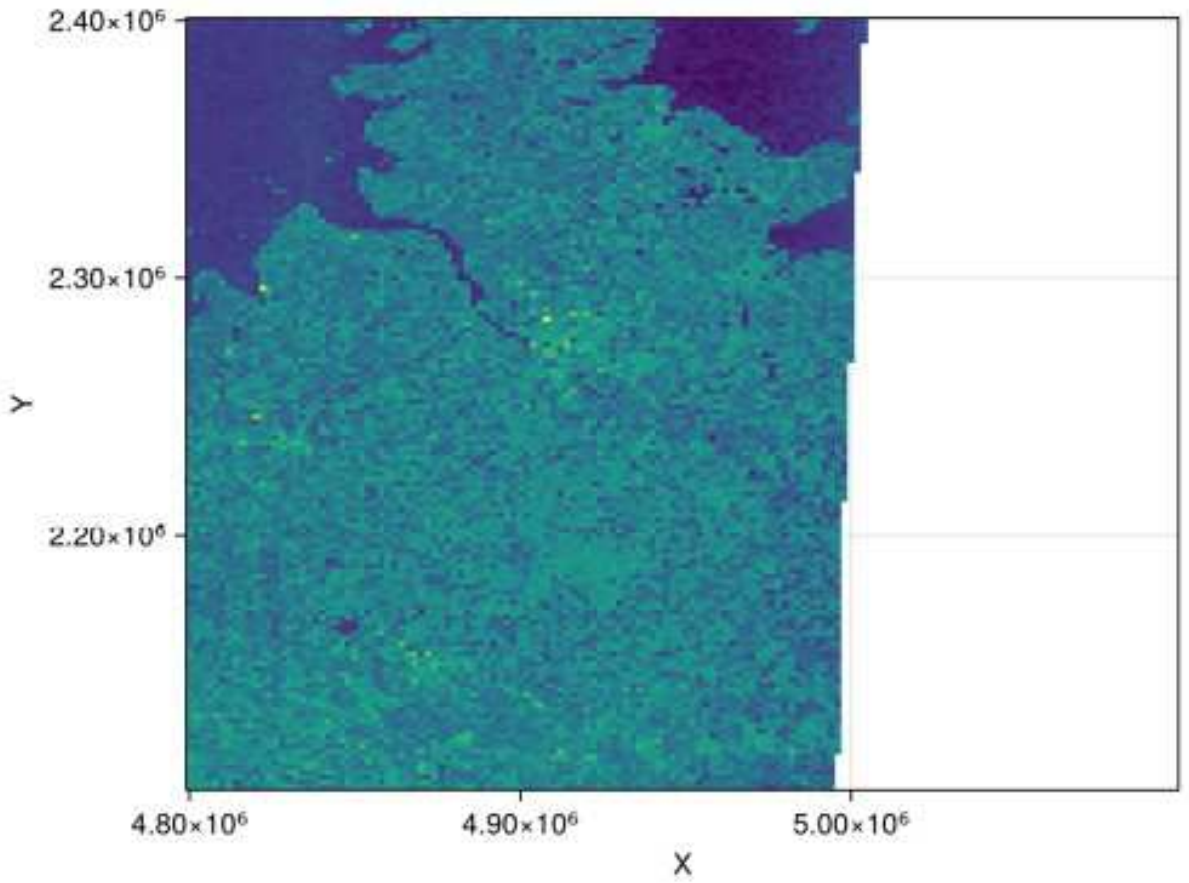


Cloud hosting provider



Build spatial mosaic of relative orbits





Benchmark results

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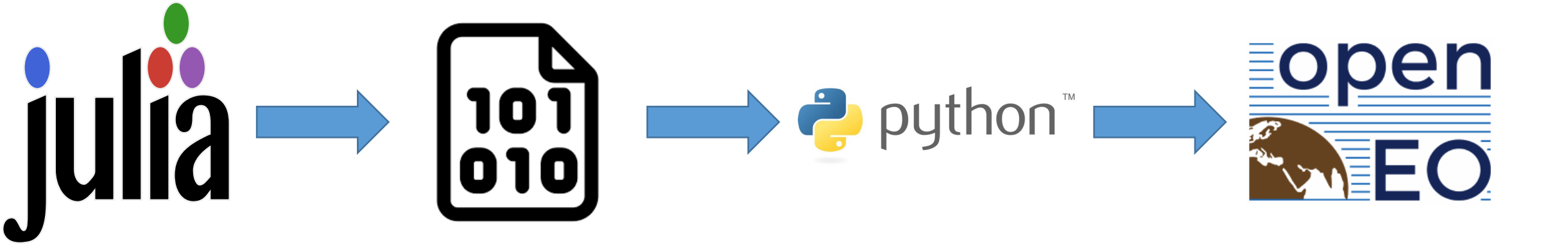
indicator	v0.1	v0.2	improvement
Duration (tile) [s]	884	649	27%
Duration (point) [µs]	12.77	1.13	91%
Memory usage (tile) [GiB]	606	223	63%
Memory usage (point) [KiB]	3.75	0	100%
Memory allocations (tile)	1e10	8e6	99.94%
Memory allocations (point)	8	0	100%

Explore ways to extend openEO



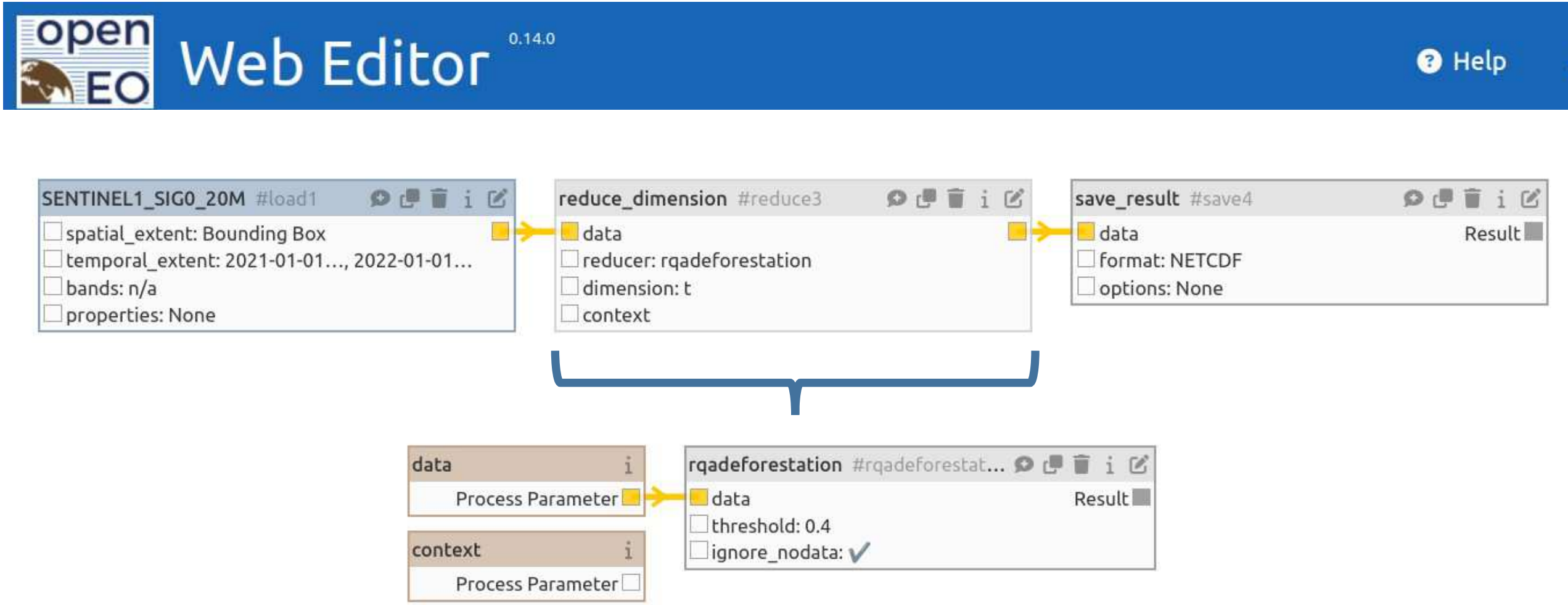
RQADeforestation.jl

Executable using StaticCompiler.jl

Python Bindings

openEO dask backend as experimental process

Explore ways to extend openEO



https://editor.openeo.org/?server=openeo.eodc.eu%2Fopeneo%2F1.2.0%2F

Thanks to our team

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