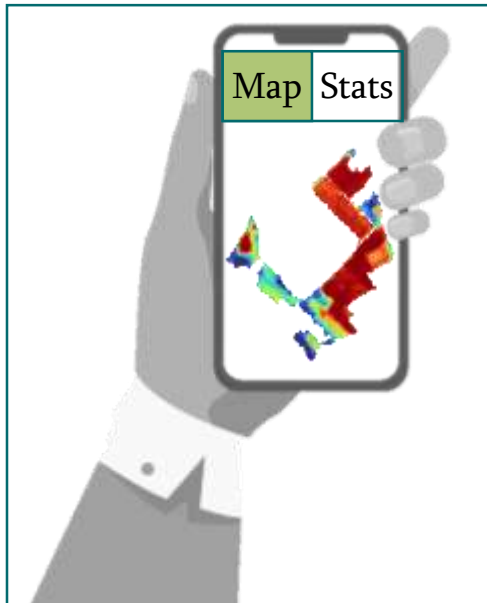# Deployment of models predicting compressed sward height on Wallonia: results and feedback

Nickmilder, C., Tedde, A., Dufrasne, I., Lessire, F., Tychon, B., Curnel, Y., Bindelle, J., Soyeurt, H.

27 June 2022

Decision support system to help manage feed wedge

Image source: Technologie vecteur créé par pch.vector - fr.freepik.com

Map	Stats

Parcel id:

123456

Mean available CSH:

XX mm

Theoretical biomass:

YY kg

Cattle load:

XX cows

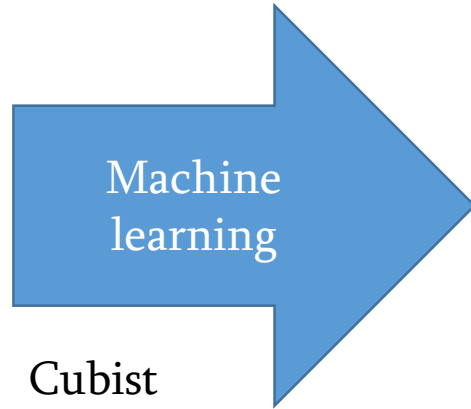Feed need:

XX kg/cow/day

Need for diet complement?

YES	NO

What lies behind?

Sentinel-1
Sentinel-2

Machine learning

Cubist
Neural network
Random forest

Meteorological data

Compressed sward height

Objective

Problem

Solution

Result

Trust

Study
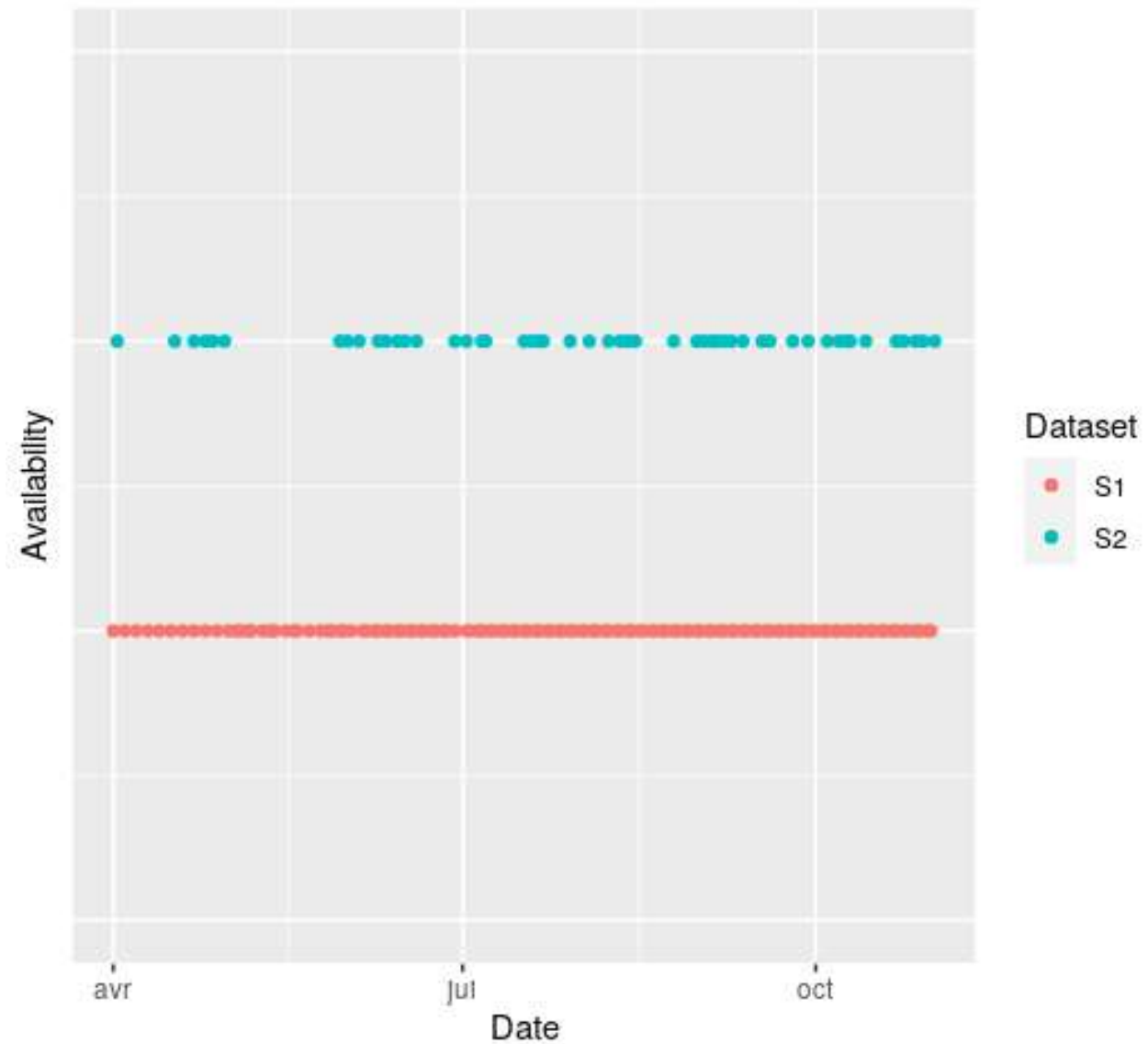
How to provide regular predictions to consumers?

➢ Asynchronous acquisition between data sources

Problem:

How to provide regular predictions to consumers?

➢ Asynchronous acquisition between data sources

➢ Asynchronous acquisition within data sources
- Acquisition window width => whole spatial extent not covered each time

Sentinel-2A acquisition plan from 7th to 25th April 2022
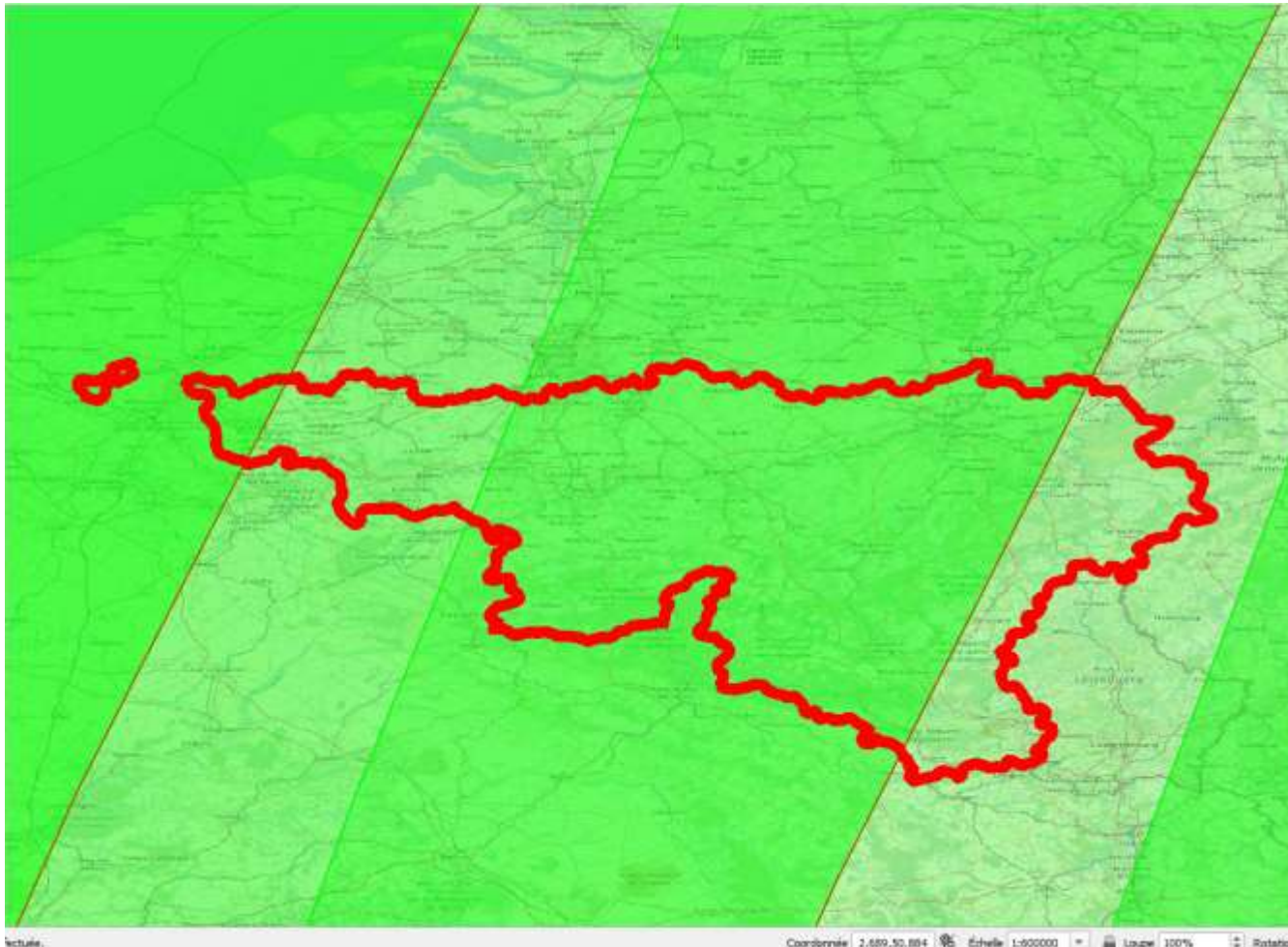
Objective

Problem

Solution

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Trust

Study

How to provide regular predictions to consumers?

➢ Asynchronous acquisition between data sources
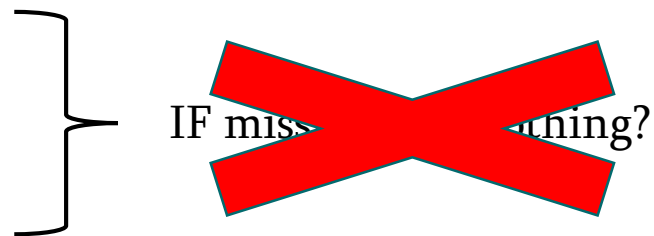
➢ Asynchronous acquisition within data sources

➢ Formally put

  ▪ Each day:

    use the daily meteorological data

    use the Sentinel-1 data

    use the Sentinel-2 data

    IF mis~~sing someth~~ing?

Not OK for us: objective = deliver as much info as possible to the consumer
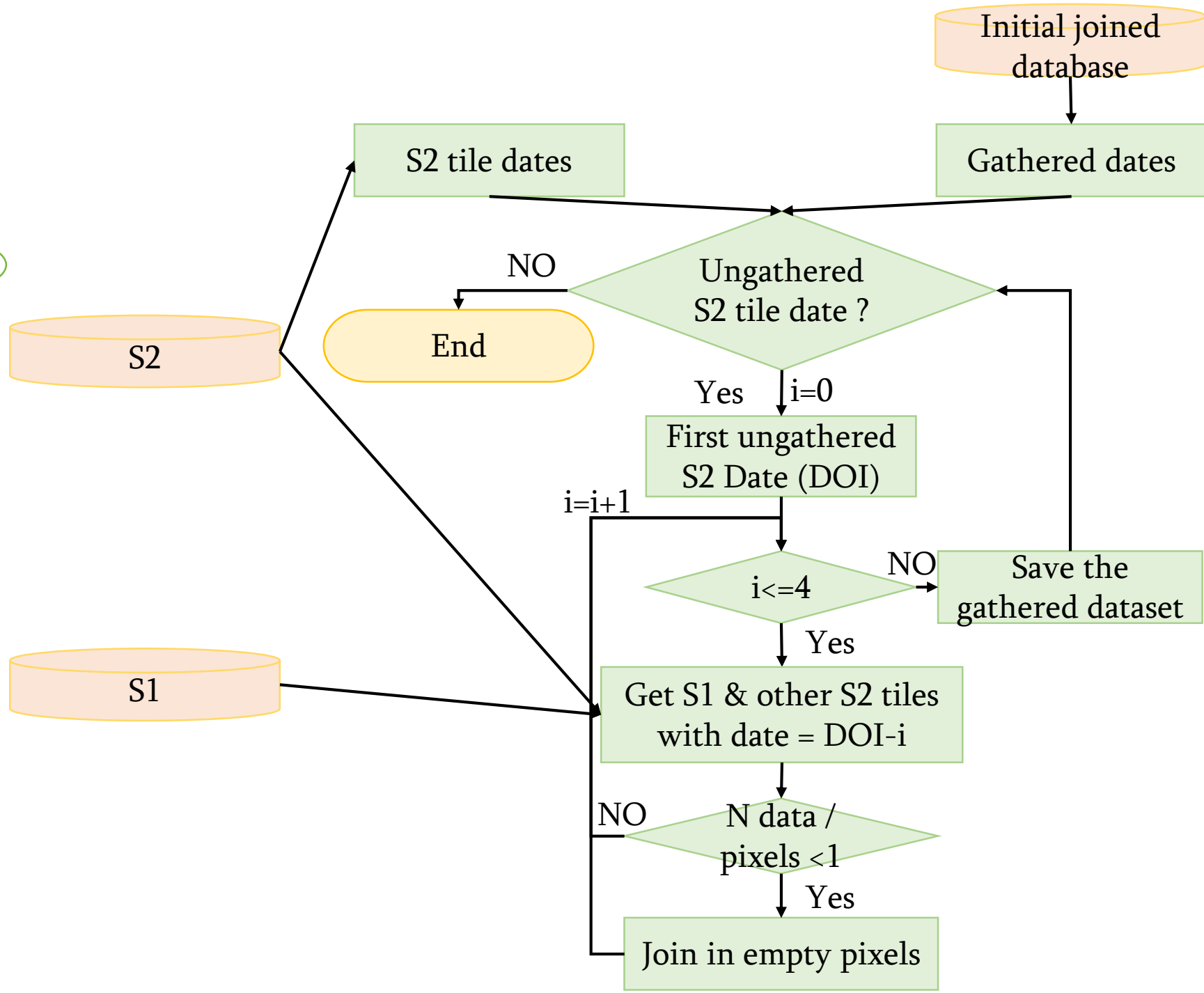
Solution:
Impute data

Possibilities:

➢ Last valid value

Objective

Problem

Solution

Result

Trust
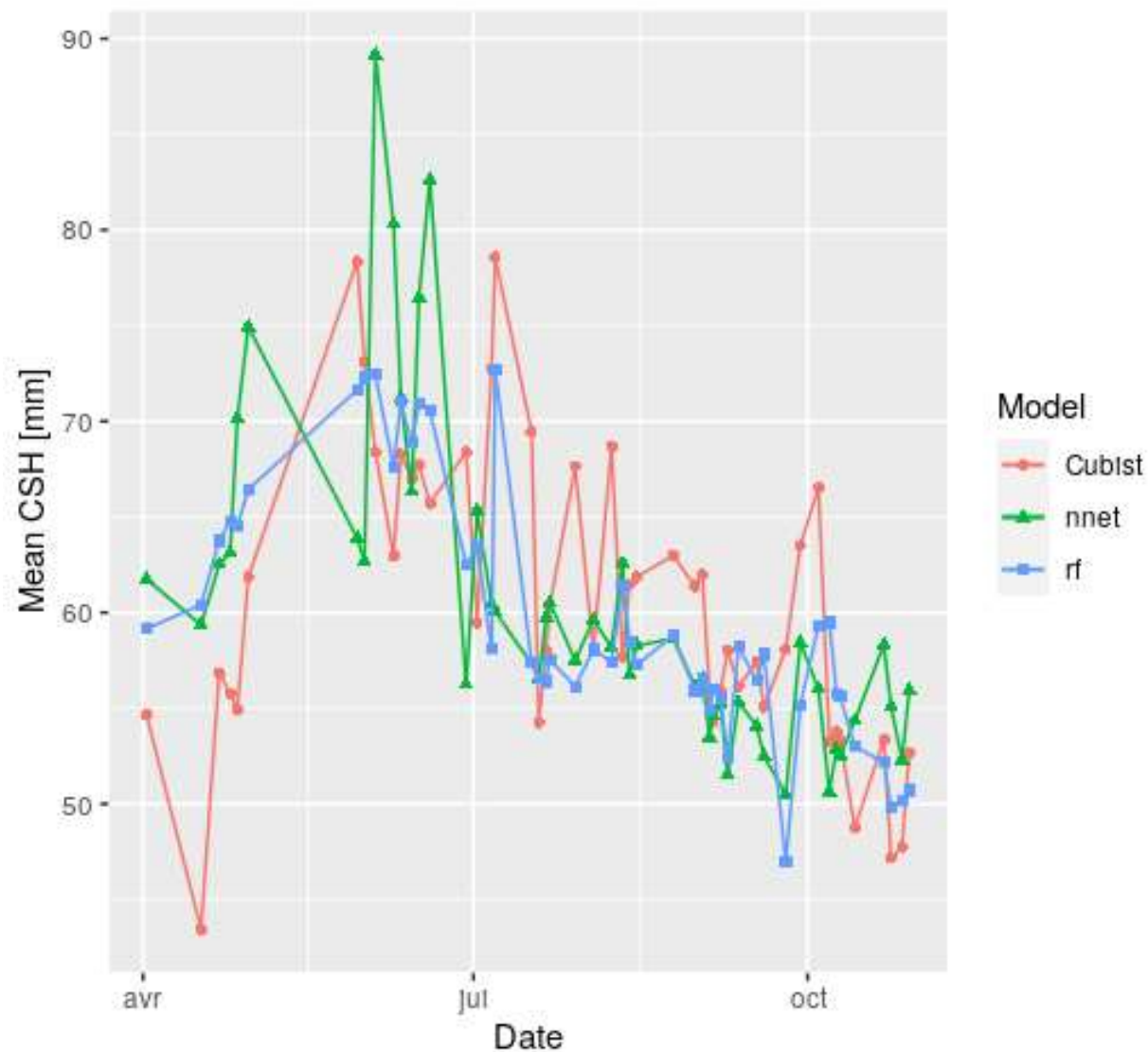
Study

Use imputed data

➤ Mean CSH over the year 2021 over all Walloon parcels (N>194,000)

➤ Can we trust it?

Did the use of data without
transformation induce bias?

Objective

Problem

Solution

Result

Trust

Study

Use imputed data

➢ Cumulative amount of dates covered and percentage of data added per timelag

Plateform	Timelag
Sentinel-1	0
	1
	2
	3
	4
Sentinel-2	0
	1
	2
	3
	4

Objective

Problem

Solution

Result

Trust

Study

Use imputed data

➤ Cumulative amount of dates covered and percentage of data added per timelag

Plateform	Timelag	% data added
Sentinel-1	0	44
	1	32
	2	21
	3	0
	4	3
Sentinel-2	0	60
	1	13
	2	5
	3	22
	4	0

NB: Sentinel-1 B not working anymore => probable decrease for S1 acquisition frequency

Use imputed data

➤ Cumulative amount of dates covered and percentage of data added per timelag

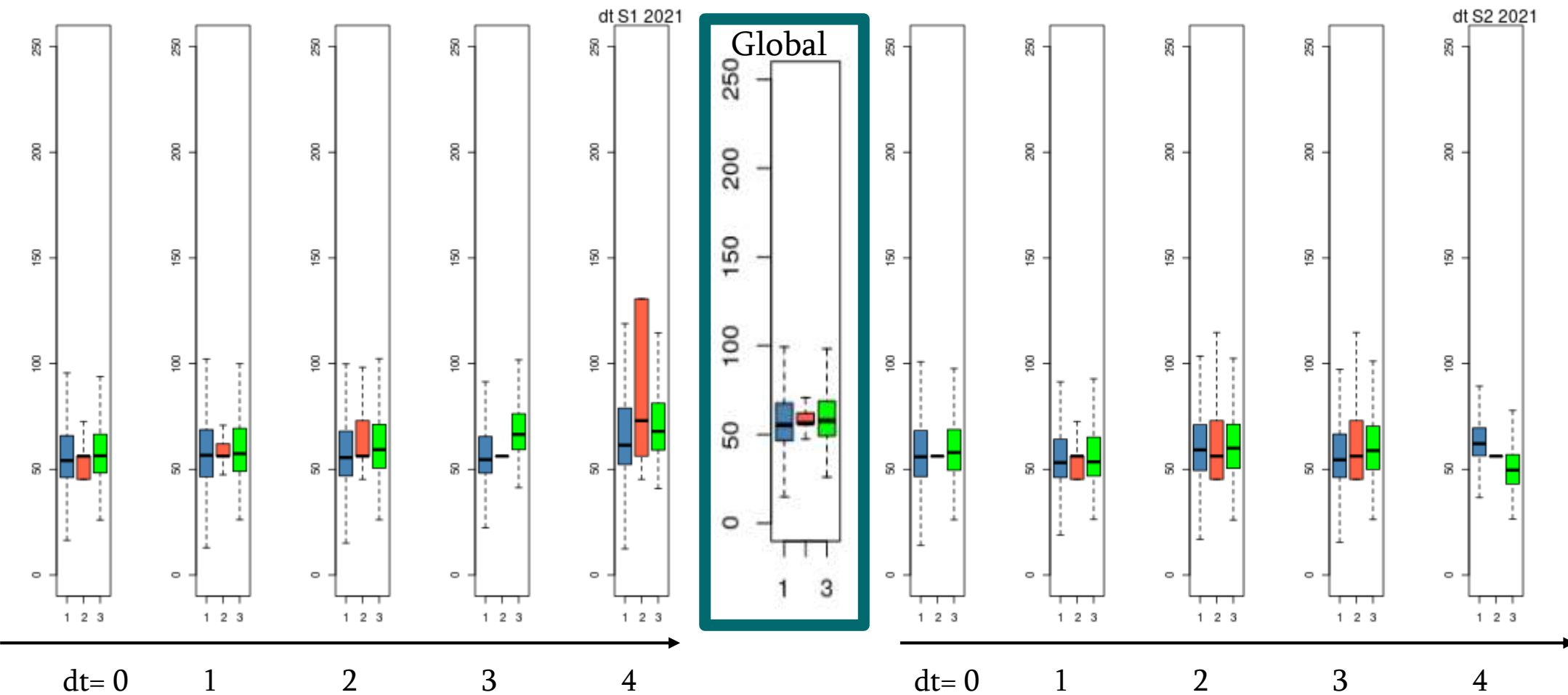| Plateform	Timelag	% data added	N dates
Sentinel-1	0	44	35
	1	32	48
	2	21	50 (Full)
	3	0	
	4	3	
Sentinel-2	0	60	46
	1	13	46
	2	5	46
	3	22	50 (Full)
	4	0	

NB: Sentinel-1 B not working anymore => probable decrease for S1 acquisition frequency

Use imputed data

➤ Impact of the Timelag (dt) tolerance on the distribution of the CSH

dt= 0   1   2   3   4   dt= 0   1   2   3   4

Objective

Problem

Solution

Result

Trust

Study

ML models number correspondance: ML1=Cubist, ML2=nnet & ML3=rf

It worked…

… but be cautious to:

➢ The temporal regularity of the data acquisition

➢ The amplitude of the time window considered
  ▪ Study on other years => decrease in stability with increase in time window

➢ The sensitivity of the model
  ▪ One of the model shown did not work great on this year data

➢ Perform multi-year analysis

Take home message

Thank you for your attention

Questions?

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