European Commission

European Big Data Hackathon 2025

Earth Observation: from Space to European Statistics

Brussels, 6–11 March 2025

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TEAM EMOS FRANCE/ENSAI

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EU policy purpose

Source: commission.europa.eu

Why is this EU Policy important ?

- **Food Security:** Constructing a vision of agriculture and food production at EU scale

- **Natural Protection:** Adapting to climate change and imagine future production

Role of our prototype

- **Earth Monitoring:** Offer a dashboard to visualize raw data and at an aggregated level

- **Econometric Analysis:** Construct spatial econometric models to understand the agricultural land share

- **Future Land Share Prediction:** Make prediction on future agricultural land share and establish a trend

Area of interest

- Project done on 2 NUTS3
  - Ille-Et-Vilaine (FR)
  - Osnabrück, Landkreis (DE)

- Project scalable to others NUTS3 regions

Time period

- Study of August, 2021 and 2023

Dashboard time !

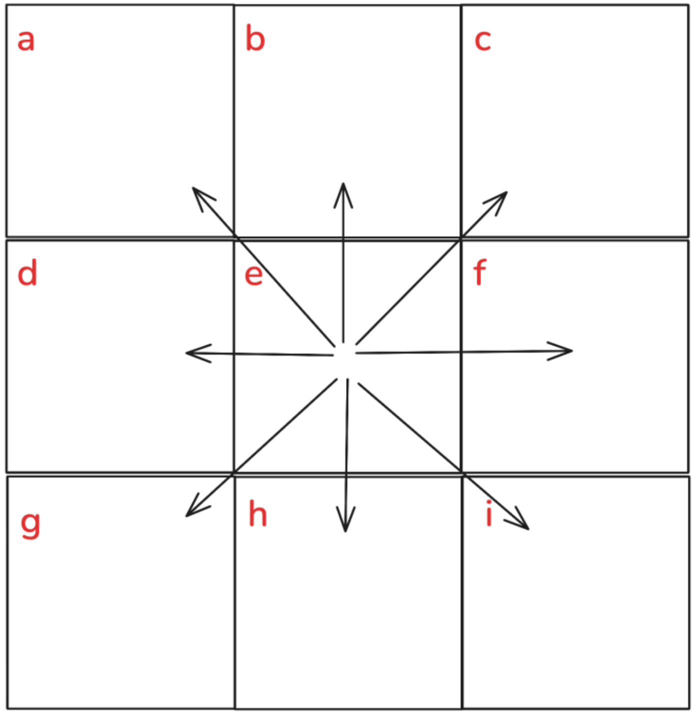
Modeling of Agriculture share

- Goals: Understand the influence of EO data on the share of land dedicated to agriculture and make predictions

- One model per NUTS3 region, built on 5 km grid cells

- Data from August 2021, used to predict for 2023

Spatial interaction



Queen contiguity

Grid cells

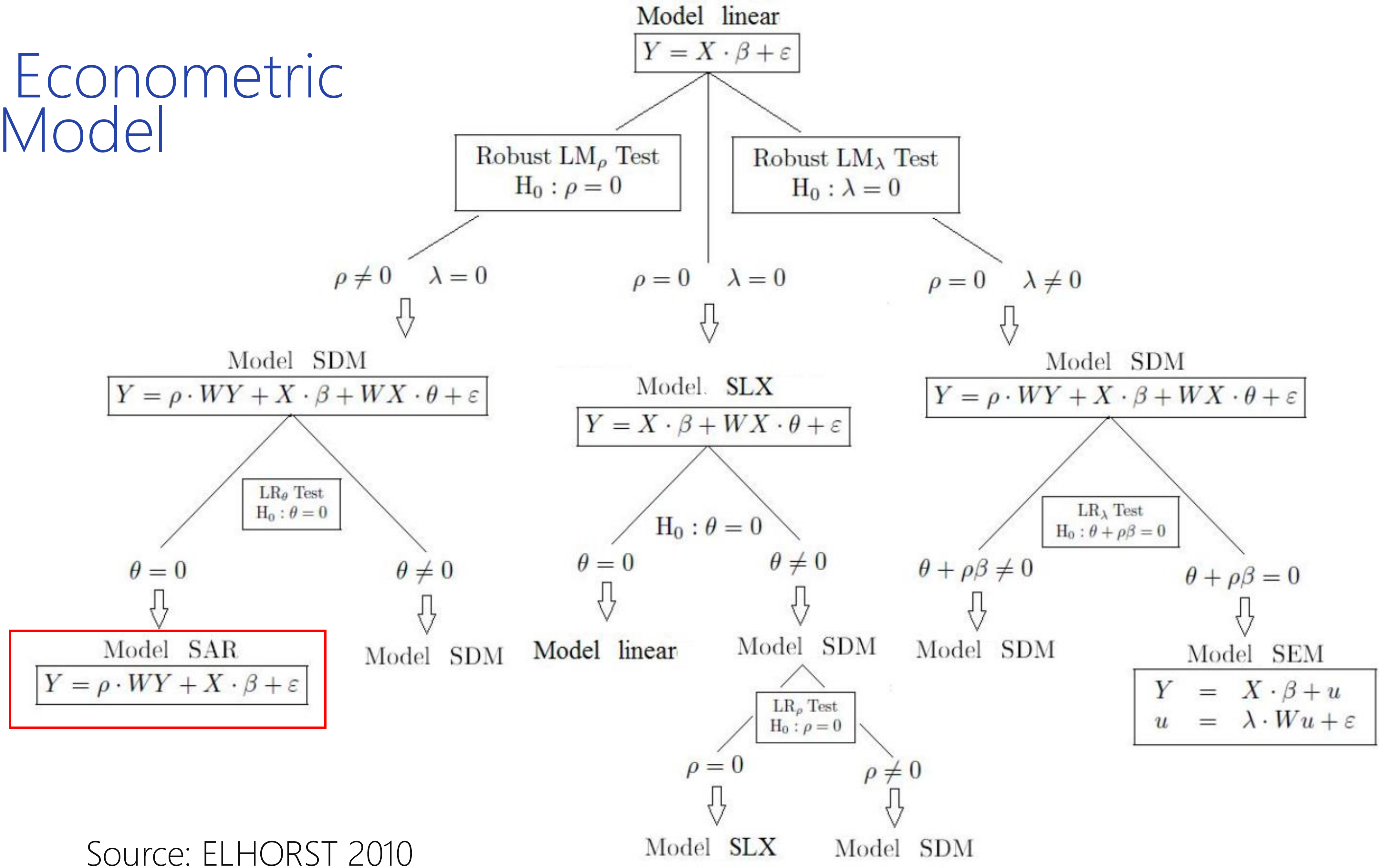
Neighborhood matrix

	a	b	c	d	e	f	g	h	i
a	0	1	0	1	1	0	0	0	0
b	1	0	1	1	1	1	0	0	0
c	0	1	0	0	1	1	0	0	0
d	1	1	0	0	1	0	1	1	0
e	1	1	1	1	0	1	1	1	1
f	0	1	1	0	1	0	0	1	1
g	0	0	0	1	1	0	0	1	0
h	0	0	0	1	1	1	1	0	1
i	0	0	0	0	1	1	0	1	0

Spatial weights matrix by normalizing per row

W

Spatial Econometric Model



Source: ELHORST 2010

SAR Model :

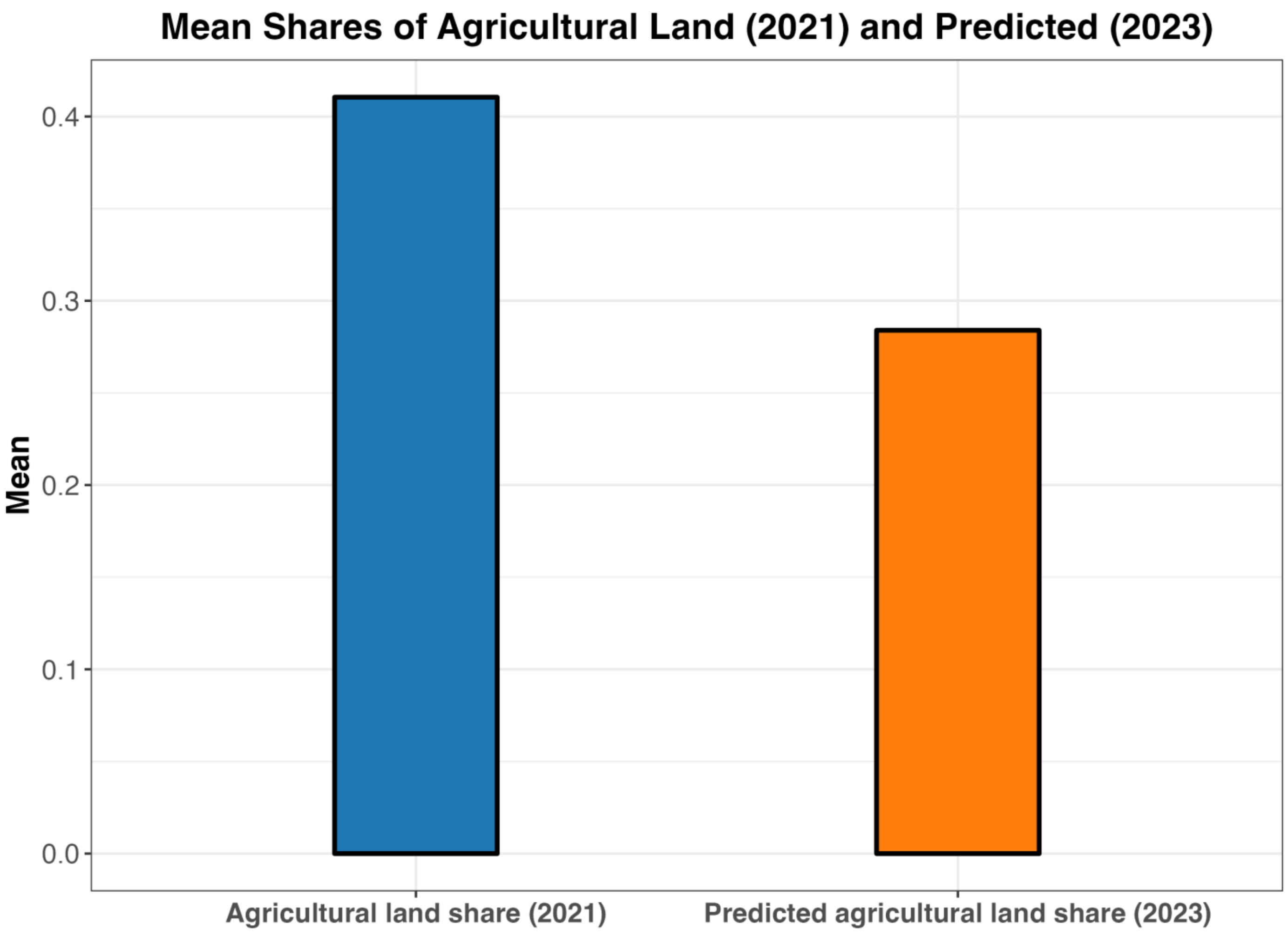
Autoregressive paramater

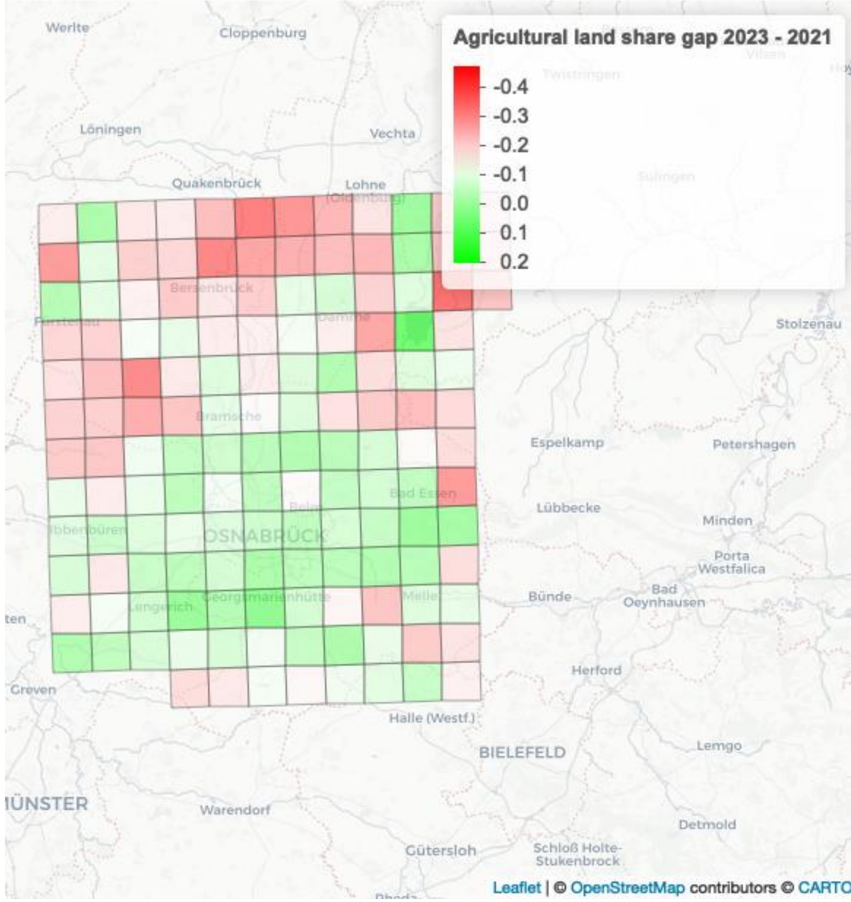
Spatial weights matrix

$$Y = \rho W Y + X\beta + \varepsilon$$

Agricultural land share

Total population + Temperature + Normalized Difference Vegetation Index + Moisture Index





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Differences in Agricultural Land Share: 2021 vs Predicted 2023

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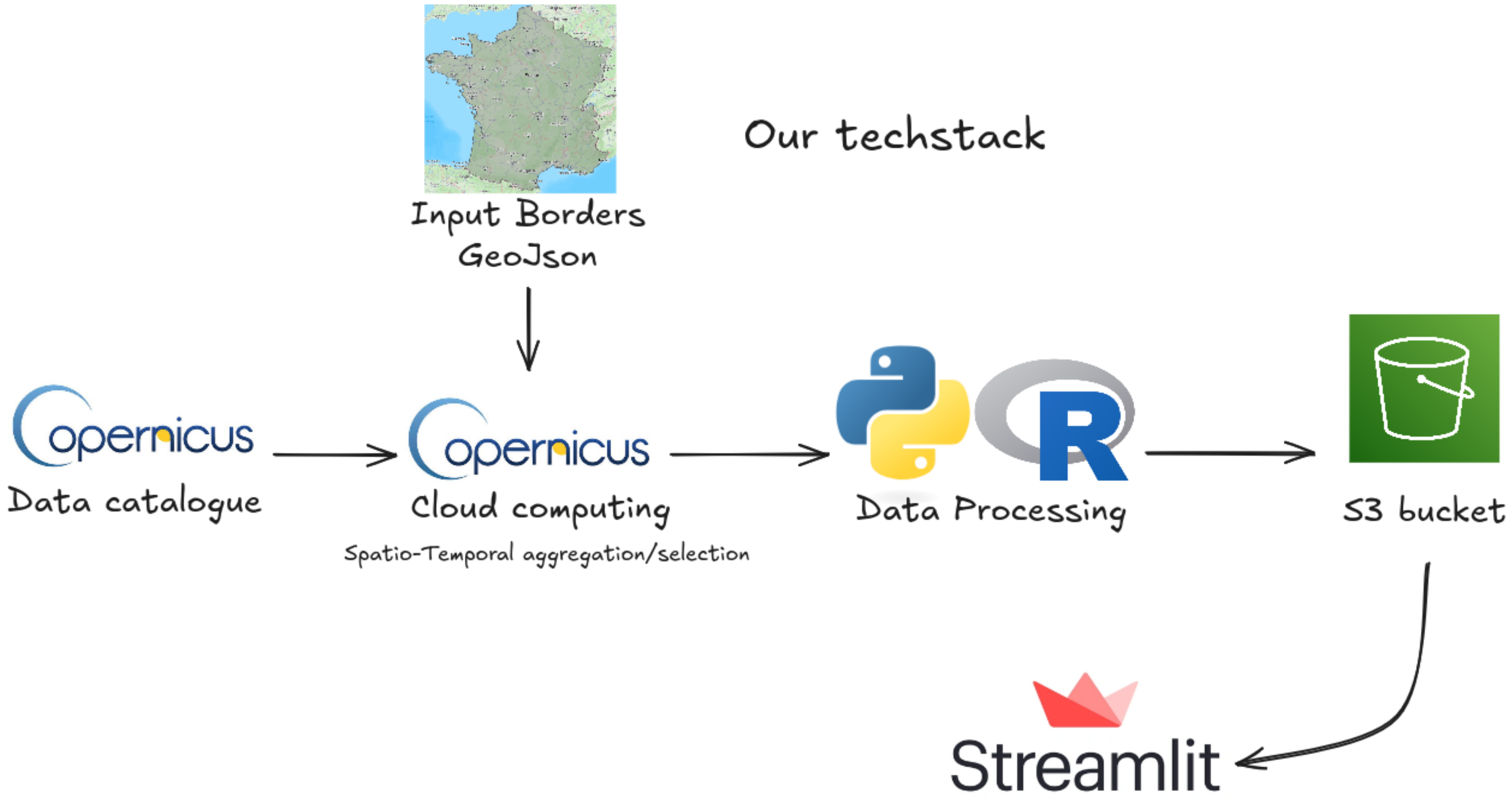

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Thank you

-Team EMOS ENSAI / FRANCE-