SEASONS IN THE ALGORITHM: ERROR-DRIVEN INSIGHTS INTO WINTER AND SPRING CROPS CLASSIFICATION

An Exploratory Study by Statistics Portugal

AUTHORS: CRISTINA GABRIEL | ISABEL GONÇALVES

DMSI / GEO

JOCLAD 2026

Portalegre 10/04/2026

INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL

Table of Contents

1. Context & Objectives

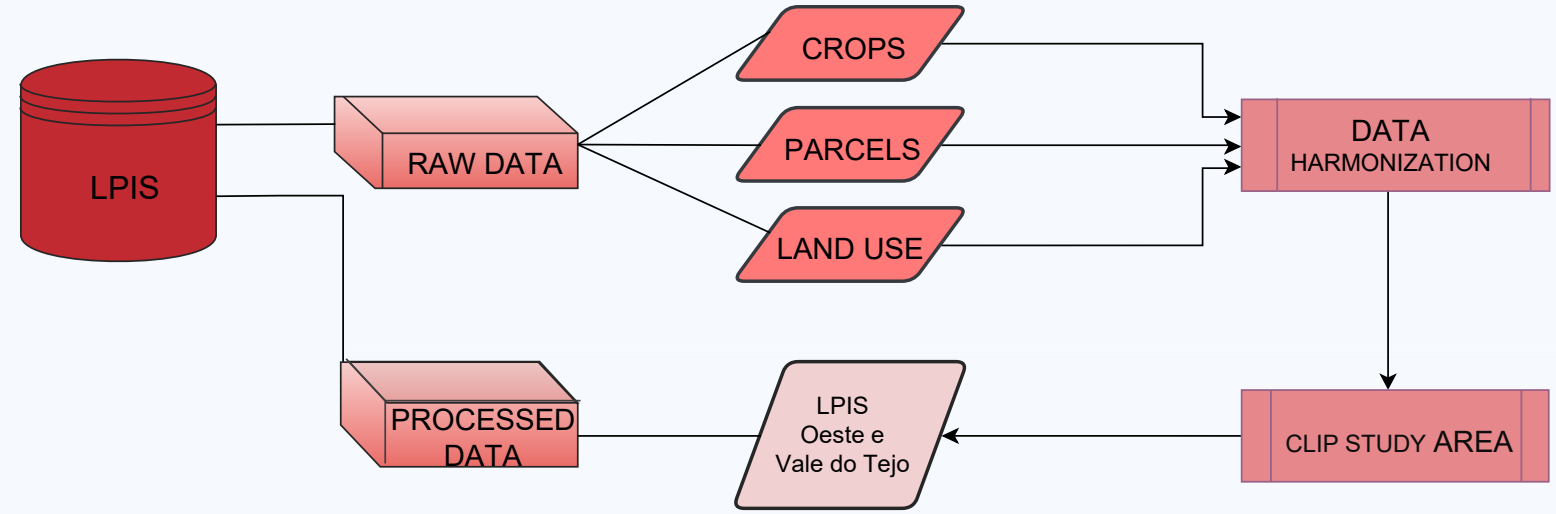
Artificial Intelligence / Machine Learning For Official Statistics

Grant Agreement Number: 101146355 (AIML4OS)
WP7 kick-off, May 15th, 2024

OBJECTIVES

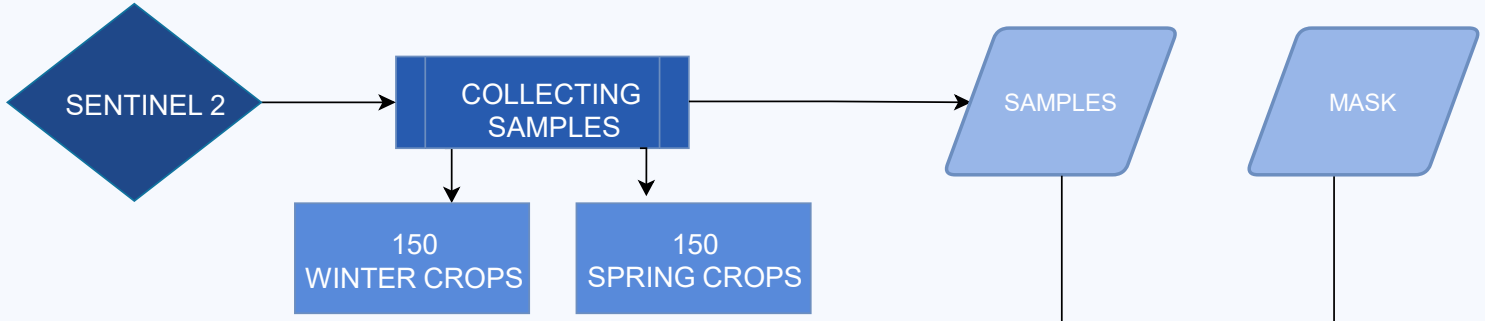
- Strengthen the use of AI within National Statistical Institutes' Spatial Data Infrastructures, collaborating at EU/international level.
- Ensure Earth-Observation-based AI solutions are comparable, robust, and reusable across countries and timeframes.
- Develop common methodological and implementation guidelines for AI/ML in official statistics.

2. Work IN Progress



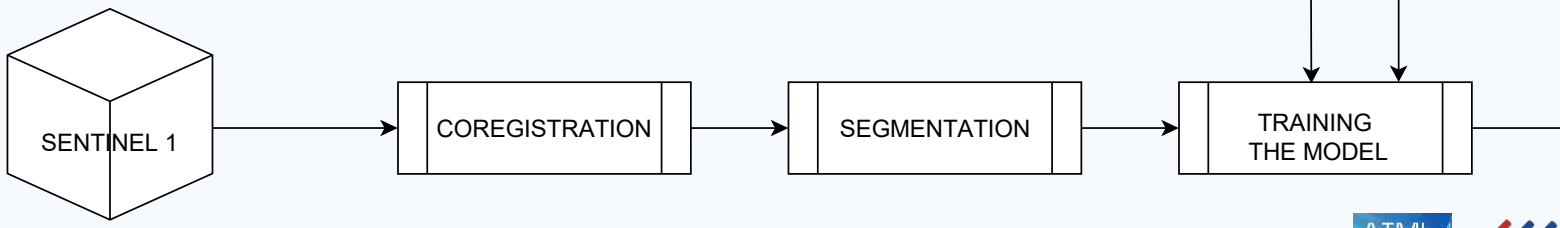
TEAM INE

INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL



GUS

TEAM GUS



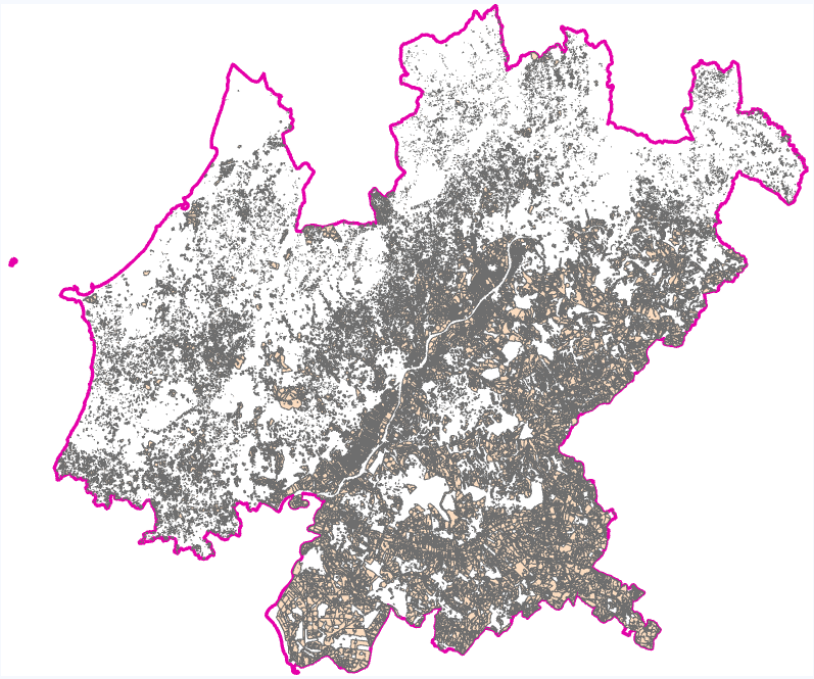
AIML 4OS

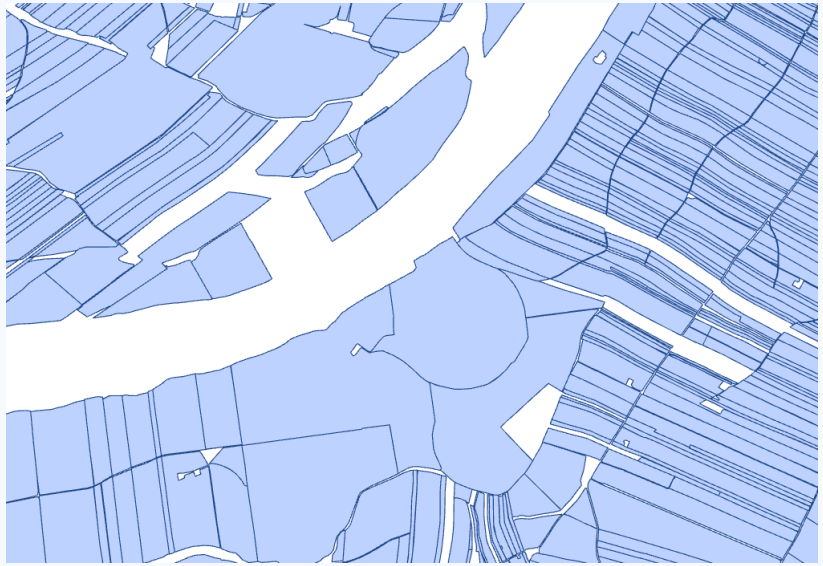
INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL

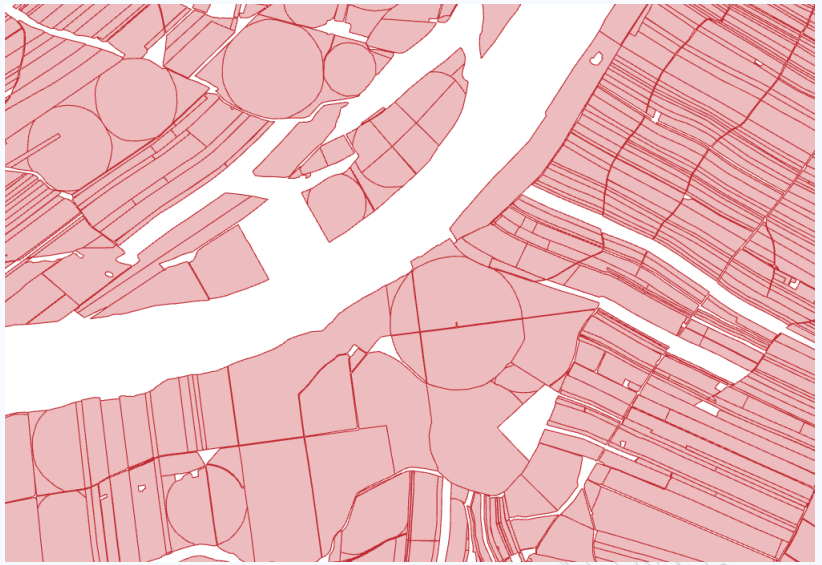
3. LPIS Data (1/3)

PARCELS, LAND USE and CROPS (LPIS 2025): Link these information layers

Source: IFAP Open Web Services (OWS) https://www.ifap.pt/isip/ows/







STUDY AREA: PT11D: **OESTE E VALE DO TEJO**

Selected for its watercourse and diverse, representative crops.

AIML 4OS

INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL

3. LPIS Data (2/3)

PARCELS, LAND USE and CROPS (LPIS 2025)

Source: IFAP Open Web Services (OWS) https://www.ifap.pt/isip/ows/

	hectares	
Temporary Crops	79,563	28 %
Permanent Crops	59,889	21 %
Grassland	65,823	23 %
Wooded Pasture	65,503	23 %
Forest	12,833	5 %
TOTAL	283,611	

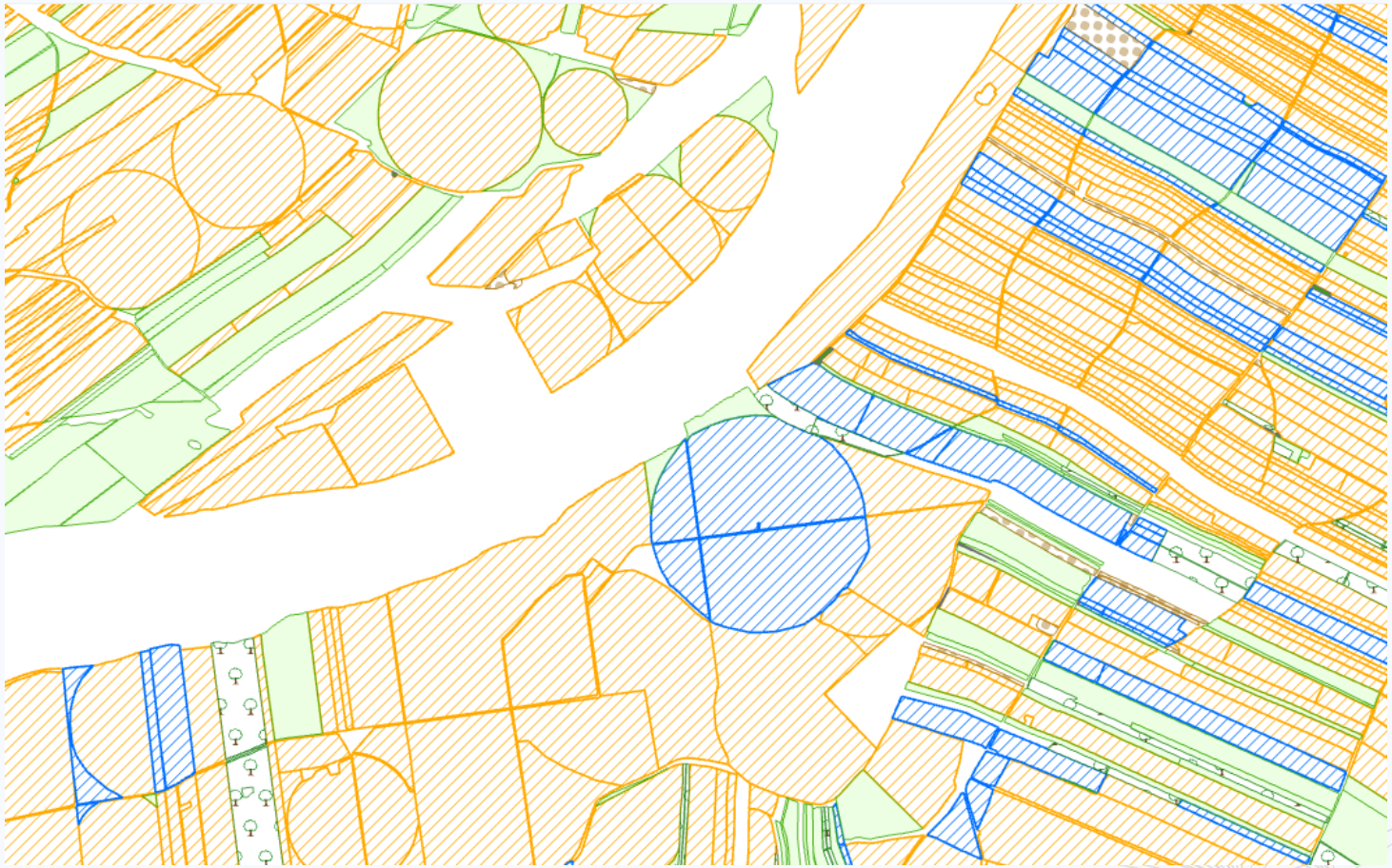
3. LPIS Data (3/3)

PARCELS, LAND USE and CROPS (LPIS 2025)

Source: IFAP Open Web Services (OWS) https://www.ifap.pt/isip/ows/

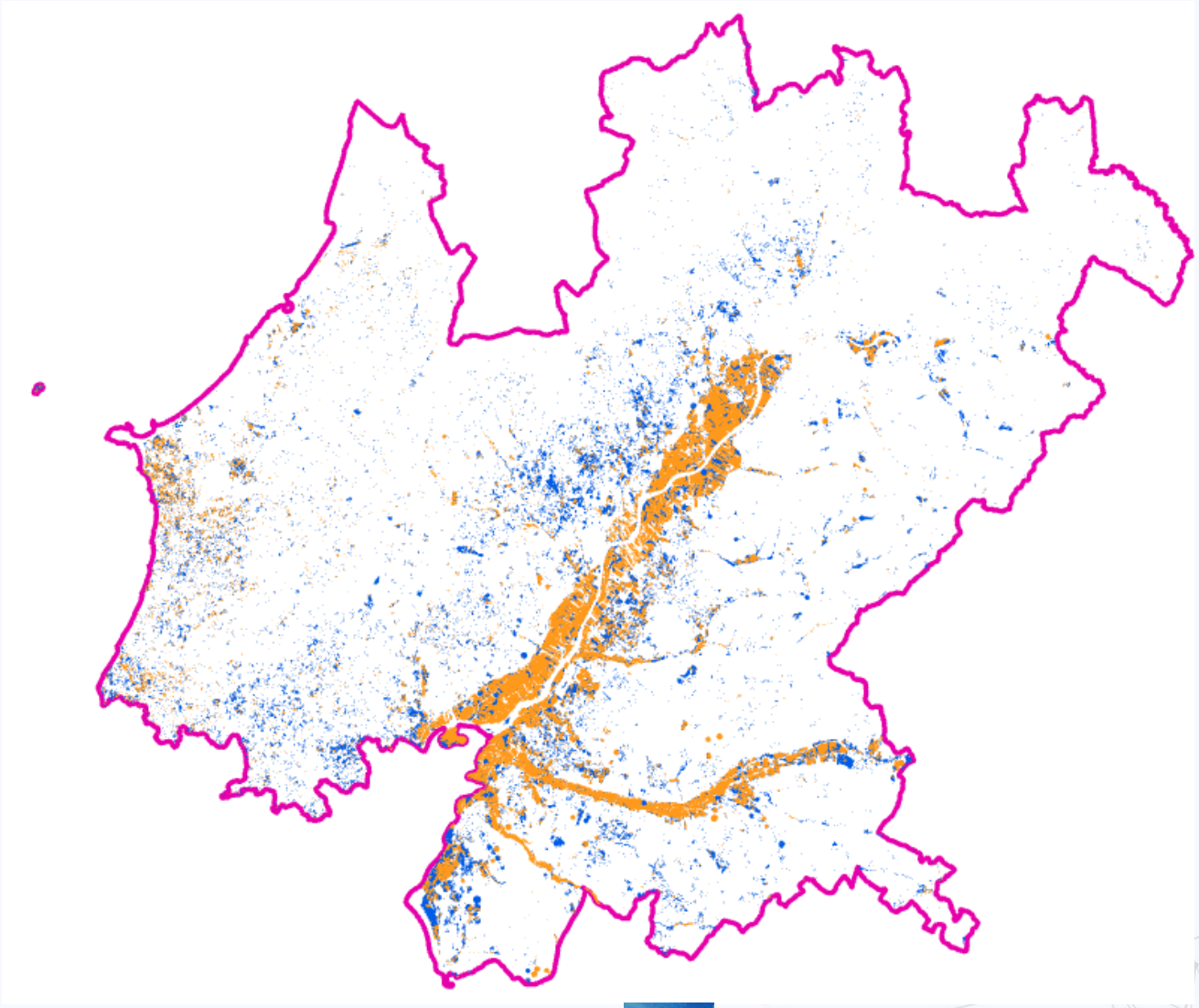
	AREA (ha)	
SPRING Crops	39,101	49 %
WINTER Crops	5,271	7 %
Other Temp. Crops	35,191	44 %

44,372 ha

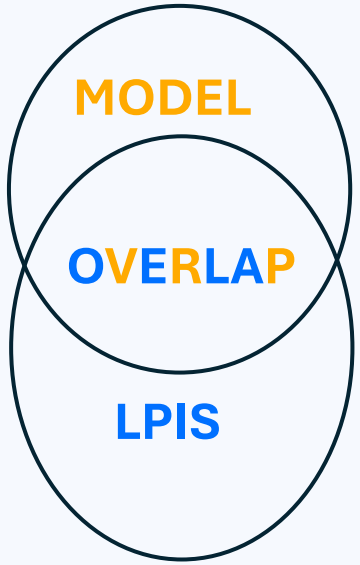


4. MODEL Classification: Identify SPRING & WINTER crops

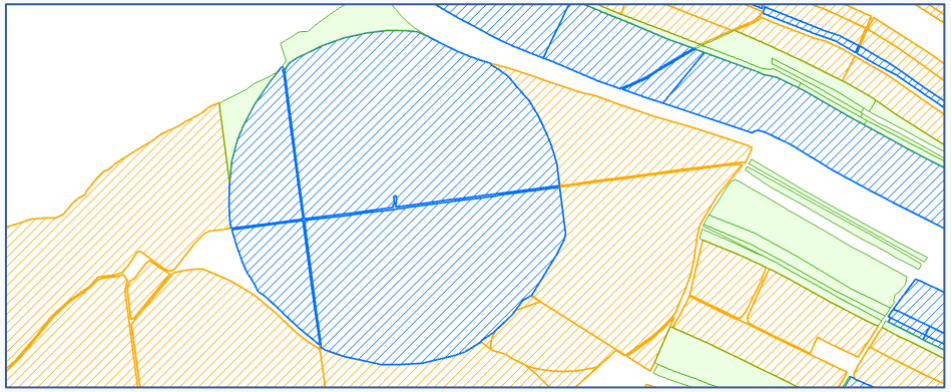
	AREA (ha)	
WINTER Crops	35,692	39 %
SPRING Crops	55,798	61 %
Total	**91,490**	



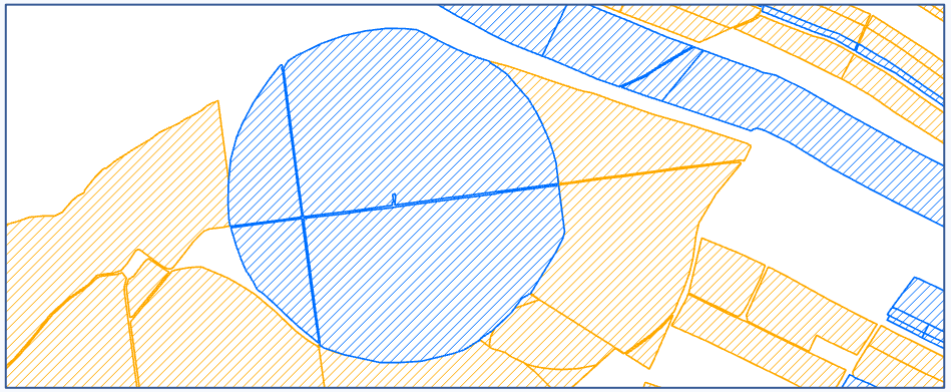
5. RESULTS ANALYSIS: MODEL Classification *vs* LPIS (1/6)



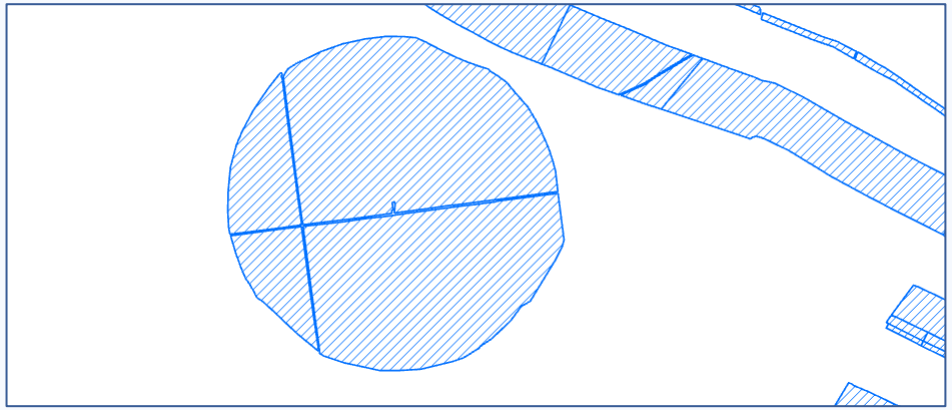
74% TEMPORARY CROPS



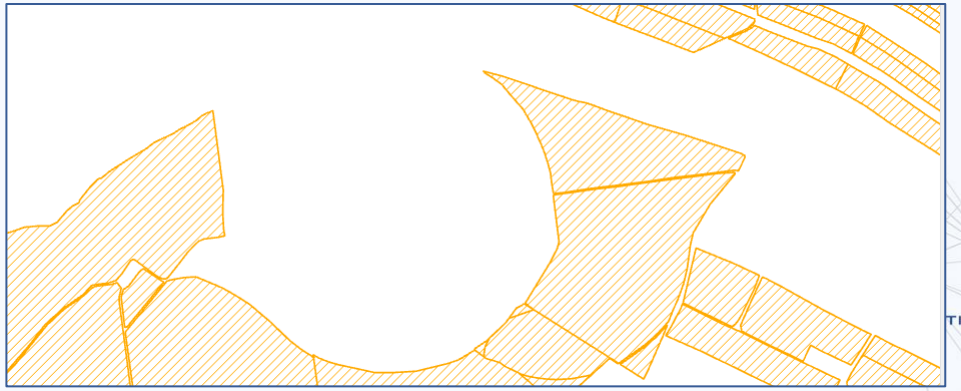
93% WINTER & SPRING CROPS



68% WINTER CROPS (5271 ha)

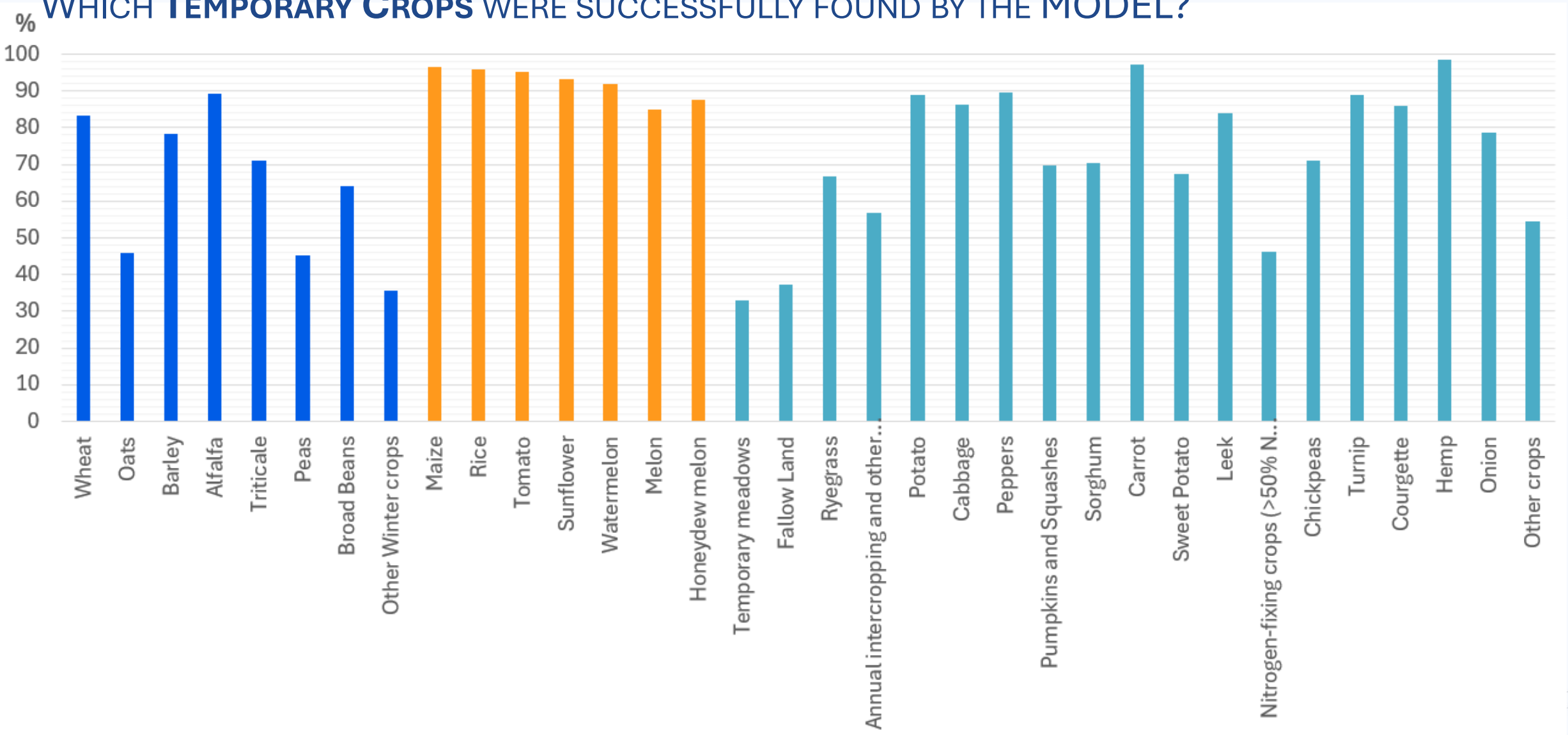


96% SPRING CROPS (39101 ha)



5. RESULTS ANALYSIS: MODEL Classification *vs* LPIS (2/6)

WHICH **TEMPORARY CROPS** WERE SUCCESSFULLY FOUND BY THE MODEL?



WINTER Temporary crops
68%

SPRING Temporary Crops
96%

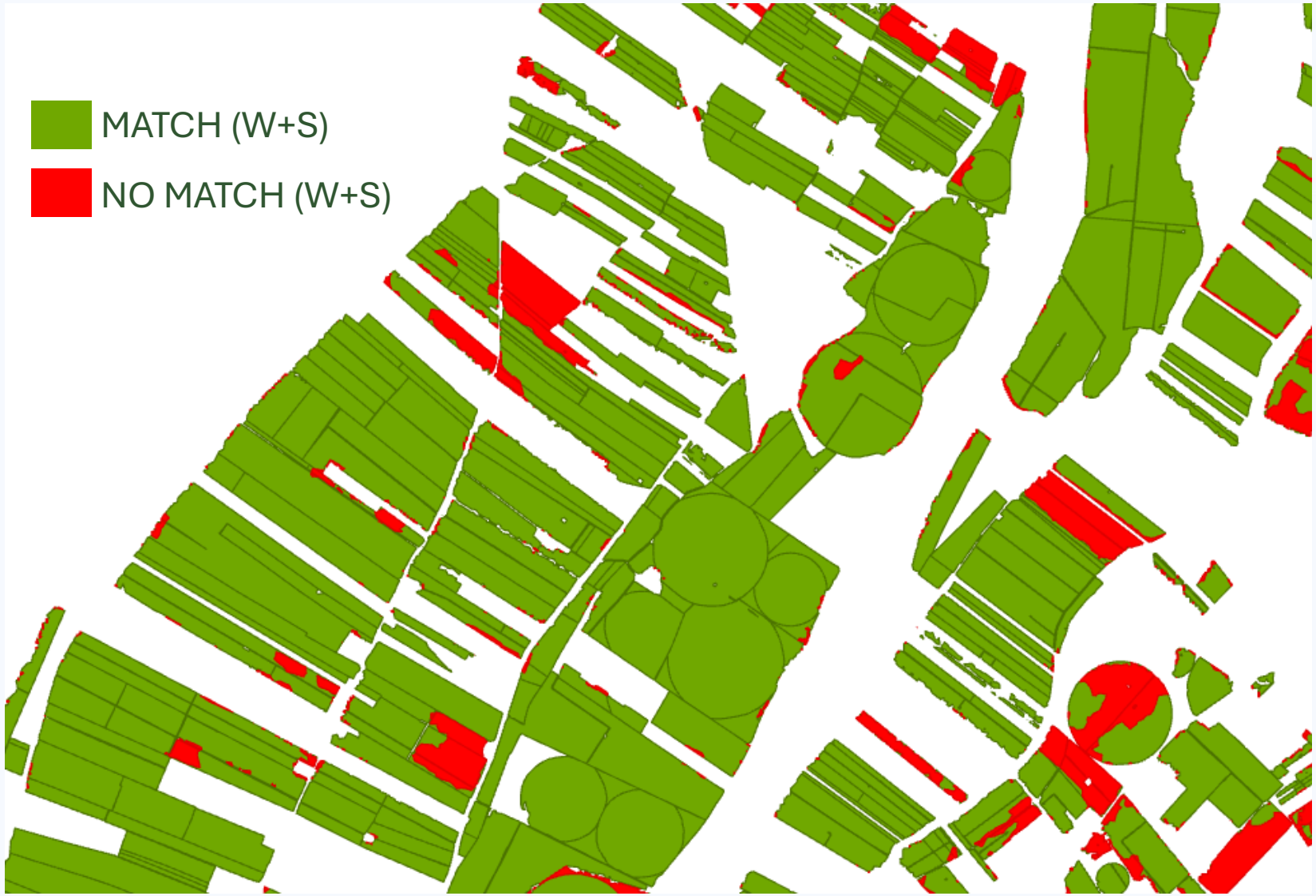
Other Temporary Crops
50%

AIML 4OS

INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL

5. RESULTS ANALYSIS: MODEL Classification *vs* LPIS (3/6)

WHERE DOES THE **MODEL MATCH CORRECTLY** WINTER (W) AND SPRING (S) CROPS?



Algorithm Classification		LPIS	
		WINTER Crops	SPRING Crops
	WINTER	84%	11%
	SPRING	16%	89%

OVERALL ACCURACY

89%

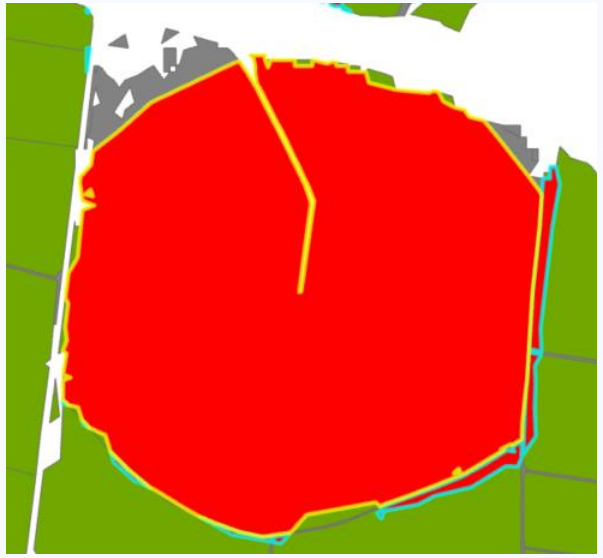
Considering the overlapping area of WINTER and SPRING Crops

AIML 4OS

INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL

5. RESULTS ANALYSIS: MODEL Classification *vs* LPIS (4/6)

WHERE DOES THE **MODEL FAIL**?

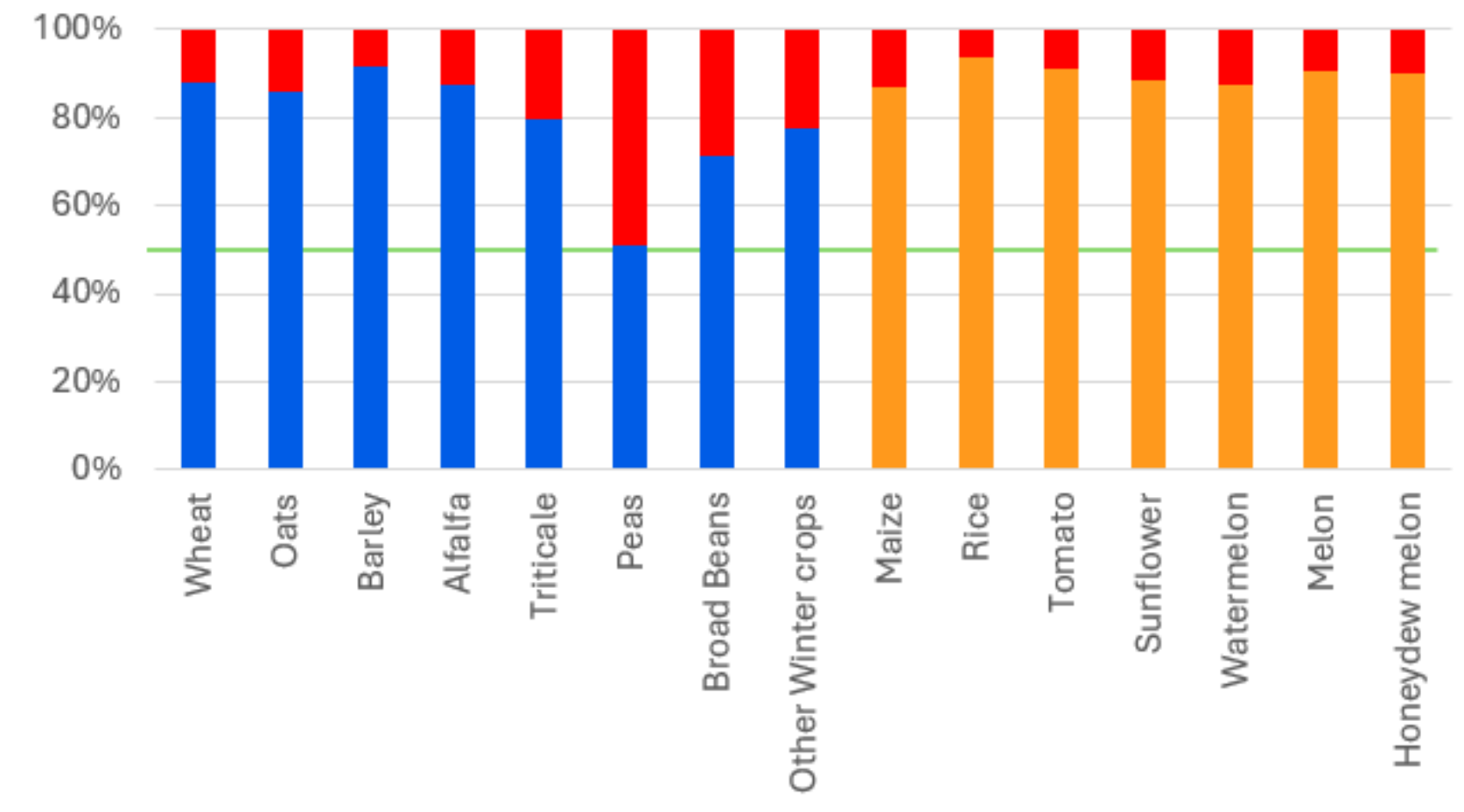


MISCLASSIFICATION

SEGMENTATION ERROR RESULTING IN MISCLASSIFICATION

5. RESULTS ANALYSIS: MODEL Classification *vs* LPIS (5/6)

MODEL'S ABILITY TO DISTINGUISH BETWEEN WINTER AND SPRING CROPS



5. RESULTS ANALYSIS: MODEL Classification *vs* LPIS (6/6)

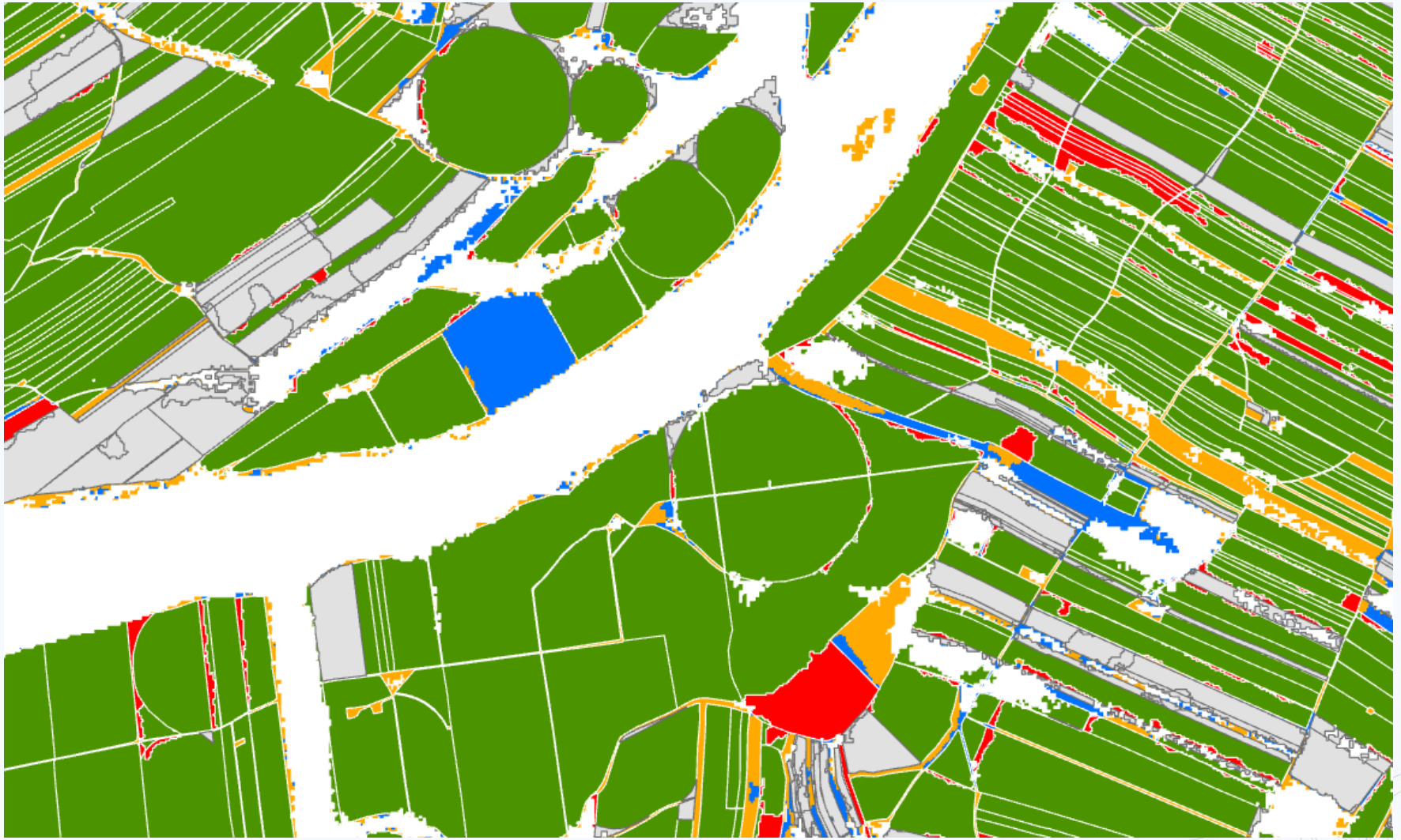
THE MODEL CLASSIFIES AREAS NOT COVERED BY LPIS 2025

MODEL NON-OVERLAP LPIS DATA 2025 (~27,000 ha)

- WINTER (W)
- SPRING (S)

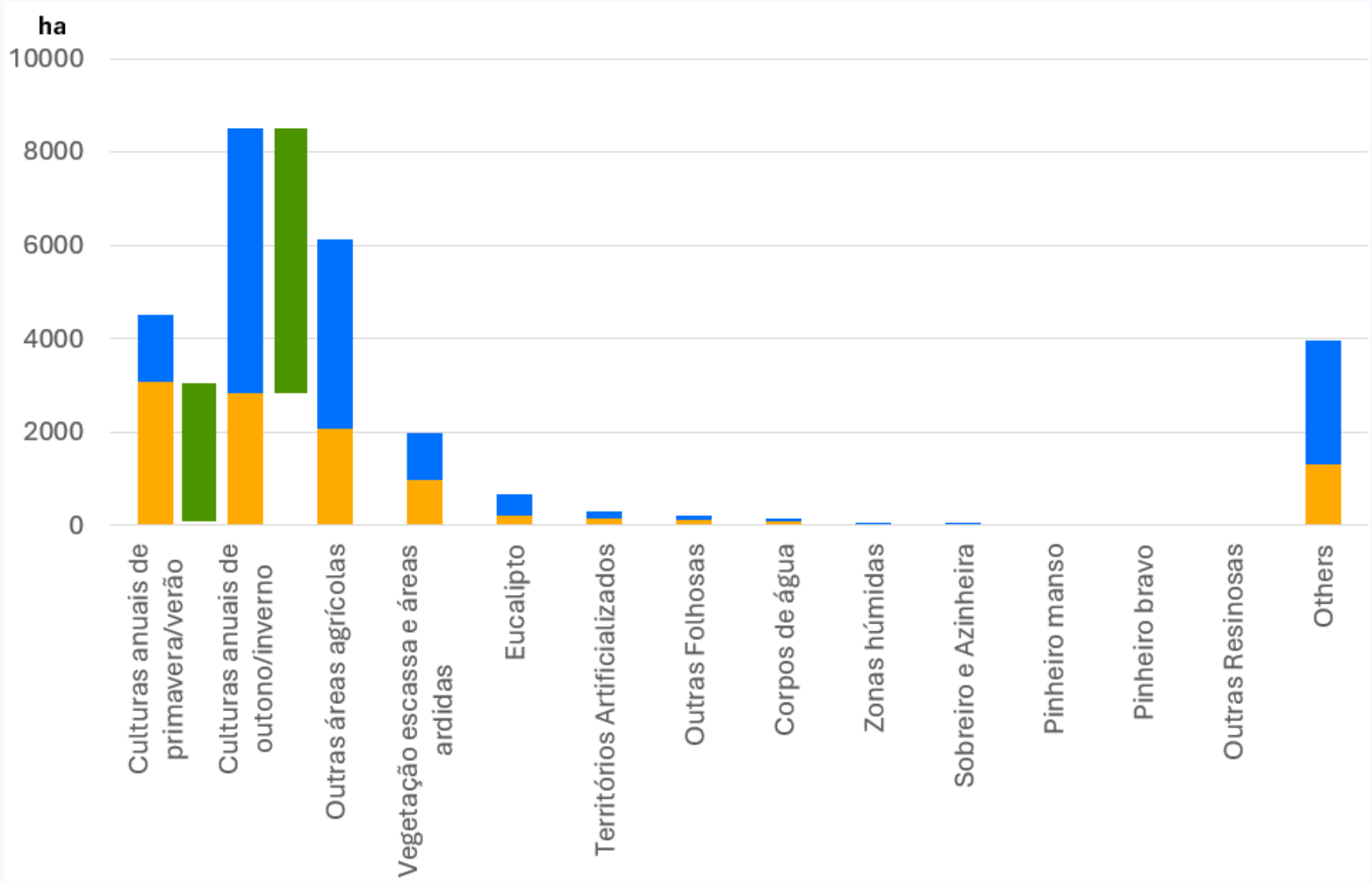
MODEL OVERLAP LPIS DATA 2025

- Match (W+S)
- NO Match (W+S)
- Other Temporary Crops



6. Exploratory Analysis: MODEL Classification *vs* LPIS vs COSc

MODEL NON-OVERLAP LPIS DATA 2025, WHAT COSc IDENTIFIES IN THIS AREA.



49%
LPIS NON-OVERLAP AREA
MATCHS COSc classes
of WINTER & SPRING CROPS

SPRING
WINTER
MATCH

Co-funded by the European Union

Project 101146355 – AIML4OS

One-Stop-Shop Artificial Intelligence and Machine Learning for Official Statistics

OBRIGADA

CRISTINA GABRIEL cristina.gabriel@ine.pt
ISABEL GONÇALVES isabel.goncalves@ine.pt

AIML 4OS
INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL