

# Unsupervised classification of flowing condition in non-perennial rivers

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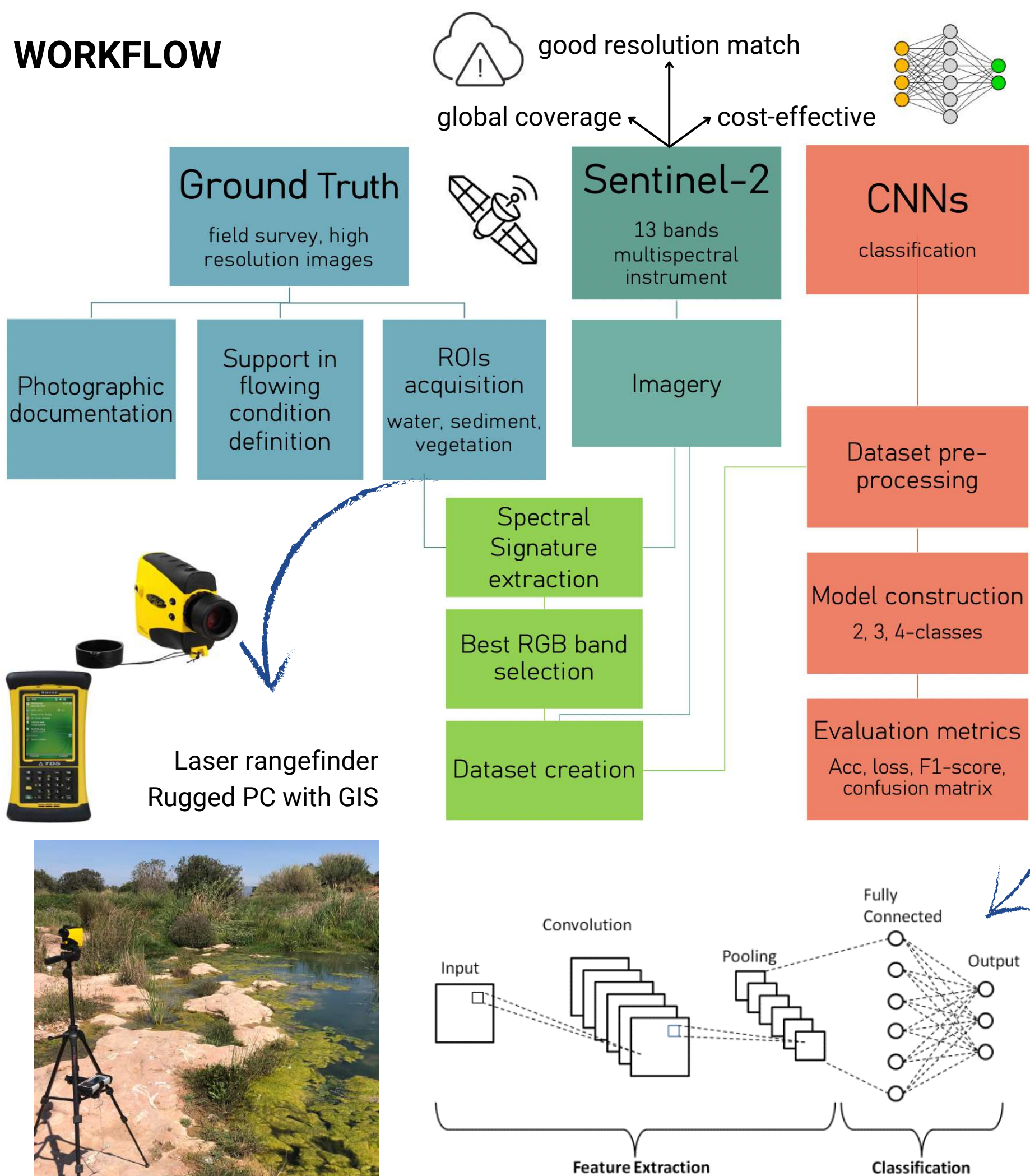
## INTRODUCTION



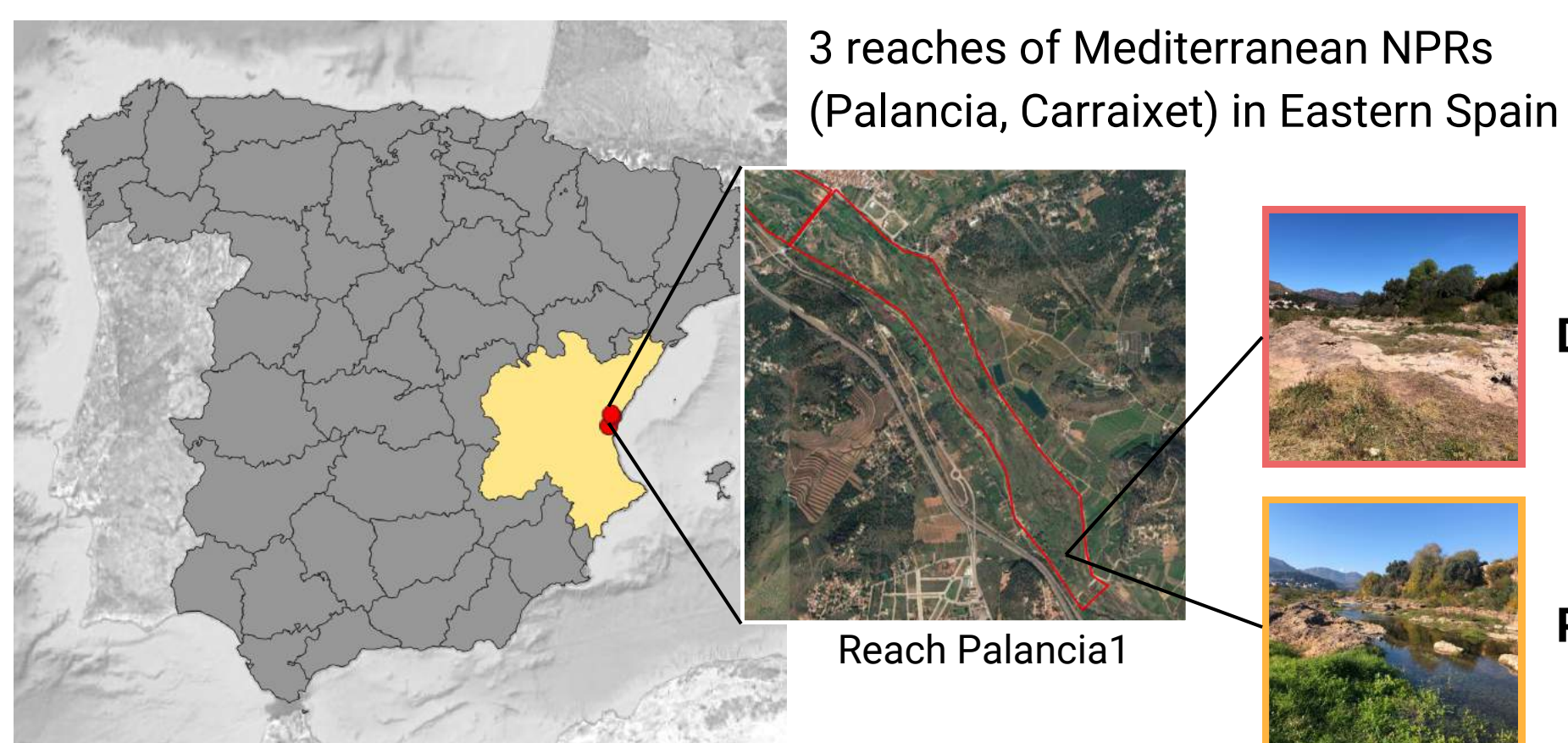
Watercourses characterized by the occurrence of **non-flowing periods**.

- Common and ubiquitous (~50% of world river network)<sup>2</sup>
- Rivers' intermittencies amplified by anthropogenic pressures and climate change
- **Flowing, ponding, dry condition (F/P/D)**
- **4 management categories for NPRs:** Quasi-perennial, Intermittent-fluent, Intermittent-stagnant, Ephemeral<sup>3</sup>
- Rich in biodiversity
- **Limited knowledge + inadequate monitoring instruments**<sup>4</sup>

## MATERIAL & METHODS



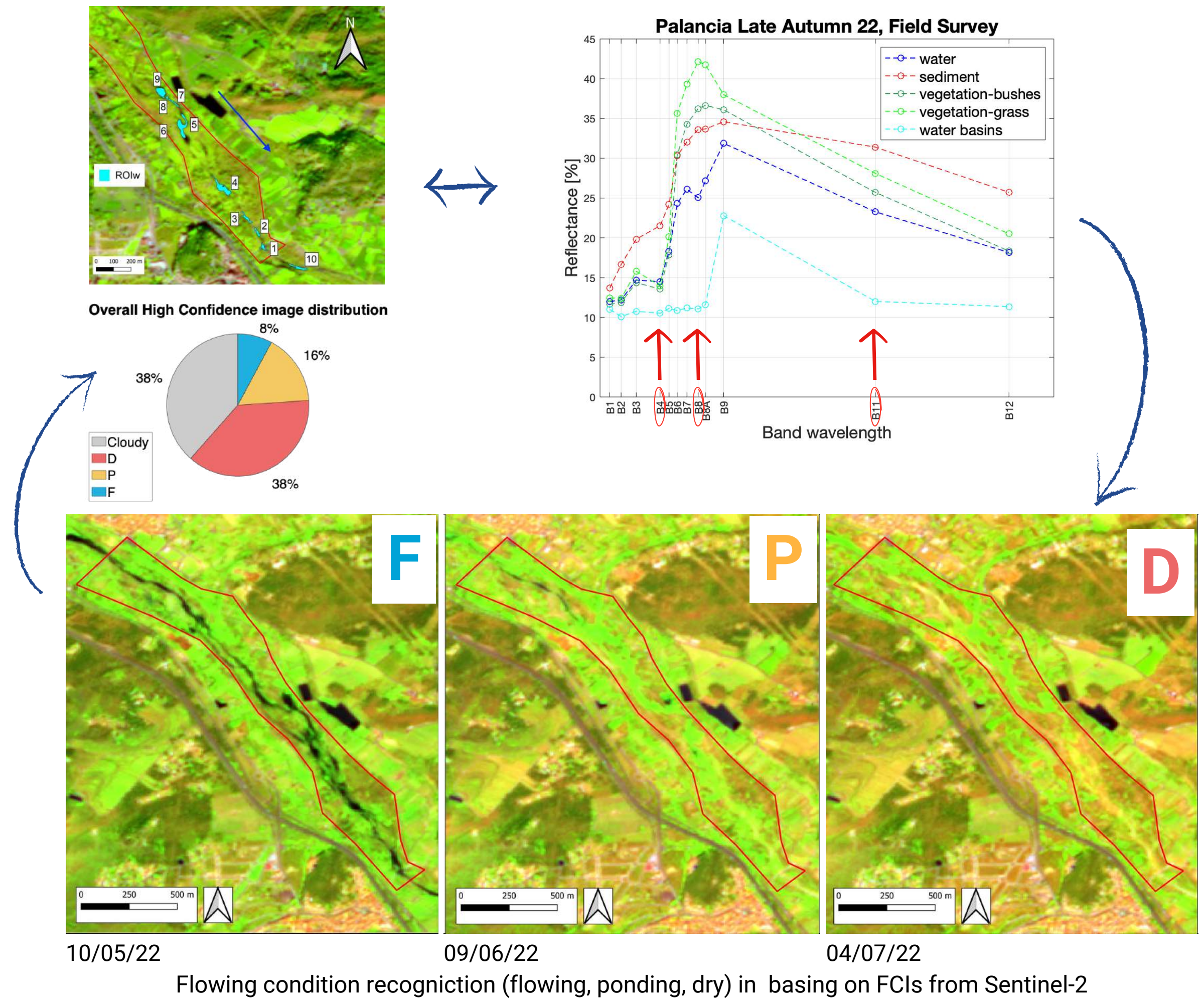
## CASE STUDIES



CHJ: Conferderacion Hidrografica del Jucar

## RESULTS

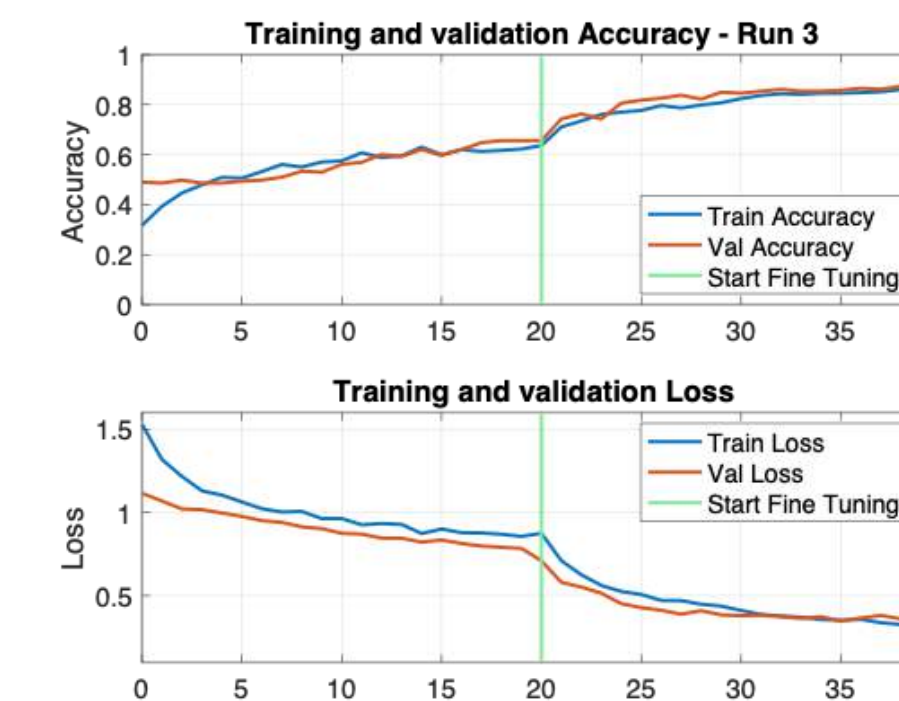
**Spectral signature** obtained by overlapping acquired ROIs and Sentinel-2 image  
**Selected bands B11-B8-B4 for False Color Images (FCIs) visualization**



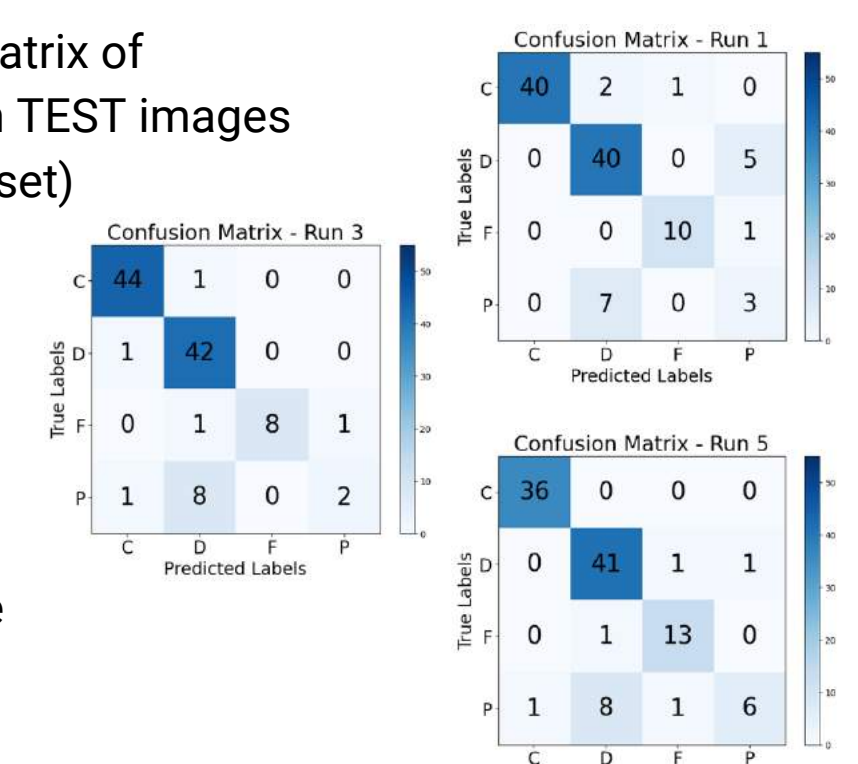
## CNNs PERFORMANCE

- Model accuracy
- 2-classes 0.70 - 0.78
  - 3-classes 0.72 - 0.85
  - 4-classes 0.79 - 0.88

Run n.	Test Loss	Accuracy	F1-score C	F1-score D	F1-score F	F1-score P
1	0.34	0.85	0.96	0.85	0.91	0.32
2	0.36	0.84	0.97	0.84	0.87	0.38
3	0.33	0.88	0.97	0.88	0.89	0.29
4	0.42	0.79	0.92	0.80	0.88	0.17
5	0.37	0.88	0.99	0.88	0.90	0.52
AVG	0.36	0.85	0.96	0.85	0.89	0.33

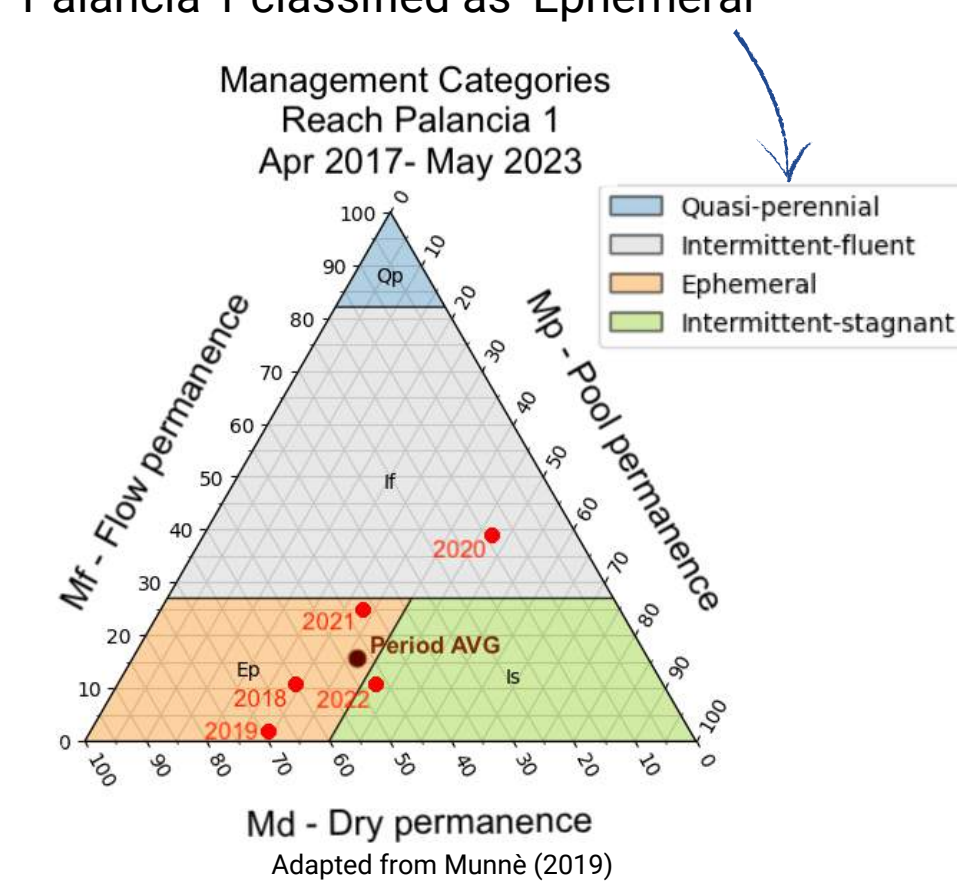


Confusion matrix of prediction on TEST images (10% of dataset)



Learning curve

Basing on satellite dataset, reach Palancia 1 classified as 'Ephemeral'



## CONCLUSION

- ! Dataset more populated
- ! Necessary to improve ponding inputs
- ! Search methods for discriminating P from D

- Cloudy images best identified, since they have clear features, followed by flowing ones
- Ponding class lowered the performance, being confused with dry features (similar from FCIs)
- Not optimal learning for data quantity and quality

## REFERENCES

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- Munné, A. et al. (2021). A proposal to classify and assess ecological status in Mediterranean temporary rivers: Research insights to solve management needs. Water, 13(6), 767
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