

THE CANAL OF ARAGÓN AND CATALUÑA EXPERIENCE IN REMOTE SENSING INTEGRATION TO SUPPORT WATER MANAGEMENT DECISIONS



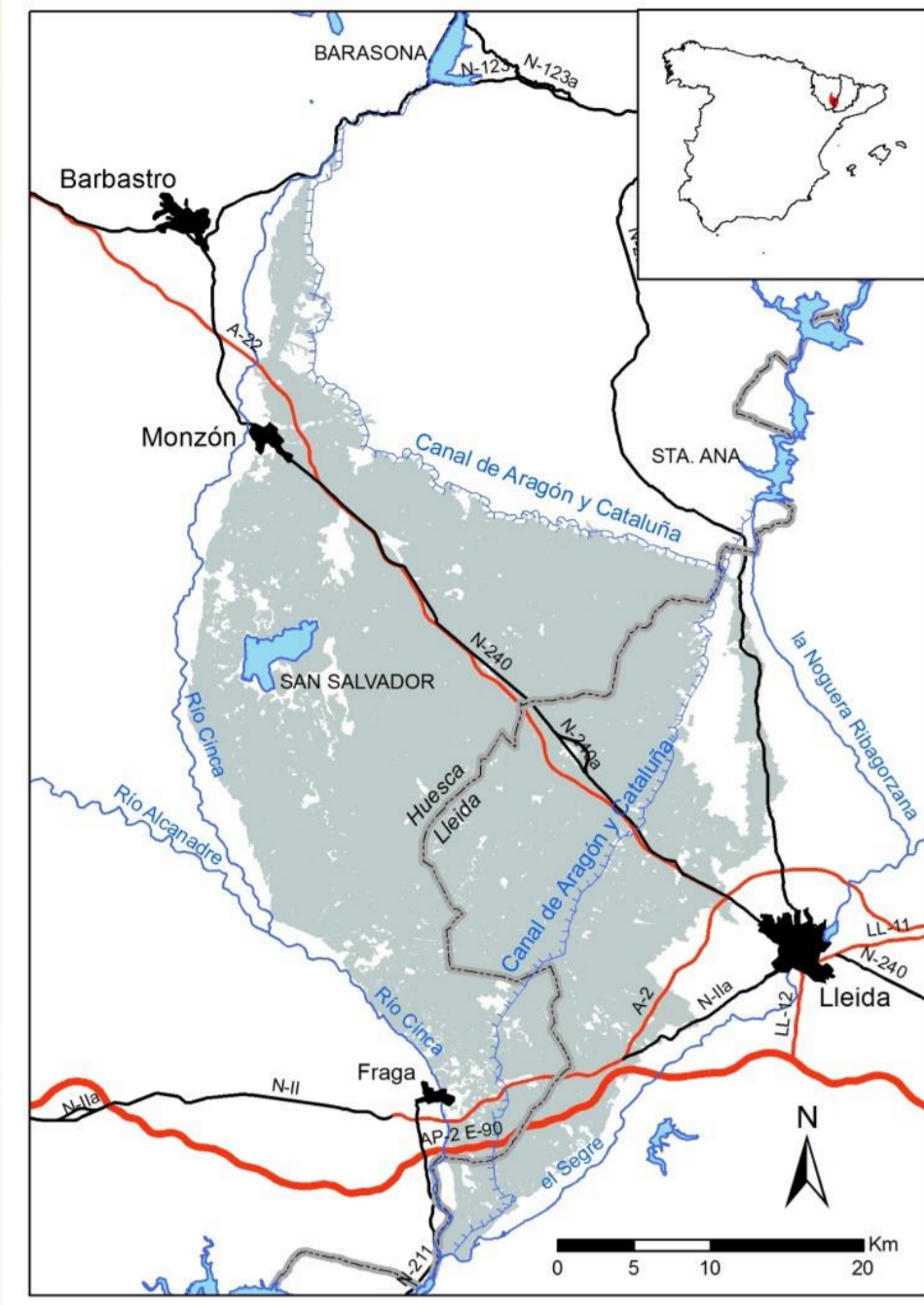
¹ Avda. Montañana 930, 50059 Zaragoza, Spain
acasterad@aragon.es
http://www.cita-aragon.es http://grupo-rama.es

M. A. Casterad¹, M. Balcells¹, I. Clavería¹, R. Quintilla²



² C/ Lérida 18, 225000 Binefar (Huesca), Spain
roberto@cayc.es
http://www.cayc.es

CANAL OF ARAGÓN AND CATALUÑA



Study area

- Location: Spain, Huesca and Lleida provinces
41° 40' N 0° 20' E
- Irrigated area: 1,080 Km²
- Irrigation districts: 131
- Irrigation system: 50% sprinkler, 27% surface, 23% drip
- Dominant Crops: fruit trees, alfalfa, barley, wheat, corn, double-crop
- Rainfall exhibits strong seasonality
- April to September: $ET > P \rightarrow$ Irrigation is needed

High temporal variability of water availability

Adopt limitations on water consumption is need

Decisions about water resources

Irrigation season:
Ensure water availability

Decisions about amount

How much water do you have?
How much water will you need?

Optimize water use and productivity
Minimize environmental impacts

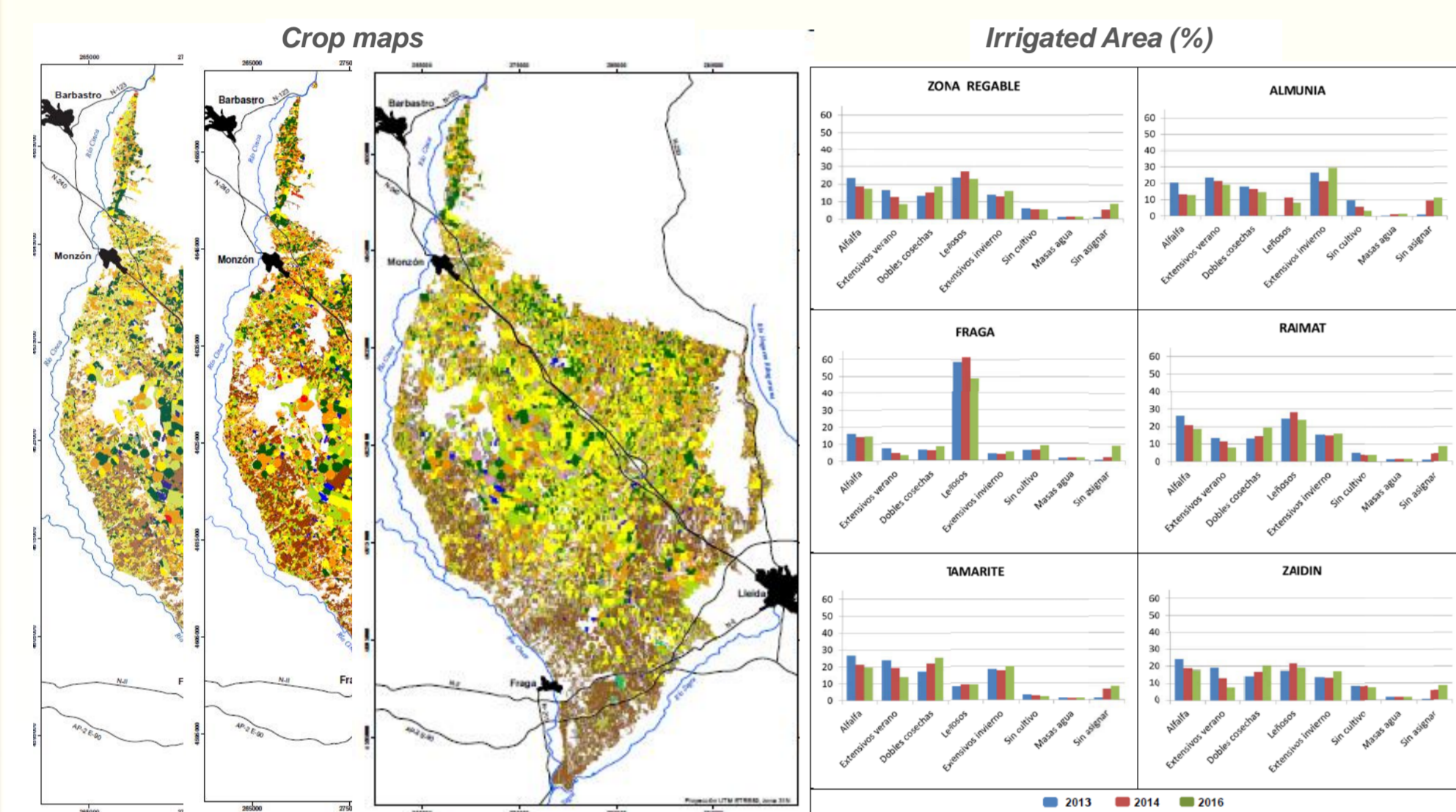
Measures to be taken

How is water used?
What is its productivity?
And its quality?

Make better use of irrigation water
Improve management

Adopt tools to support decision-making, planning and management
Betting on geography information technologies: remote sensing and GIS

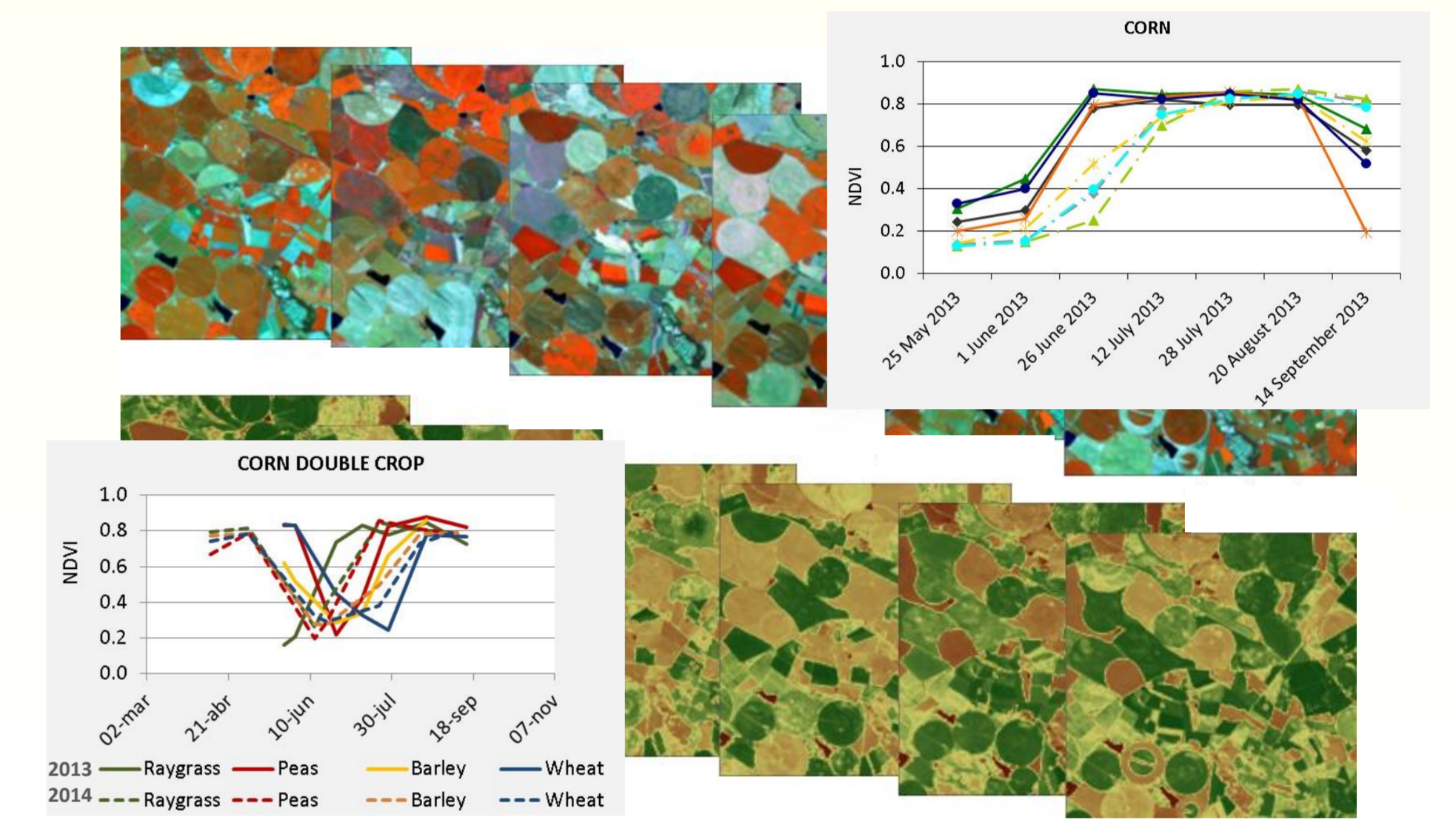
SATELLITE IMAGES SUPPORT



Landsat 8 and Sentinel 2

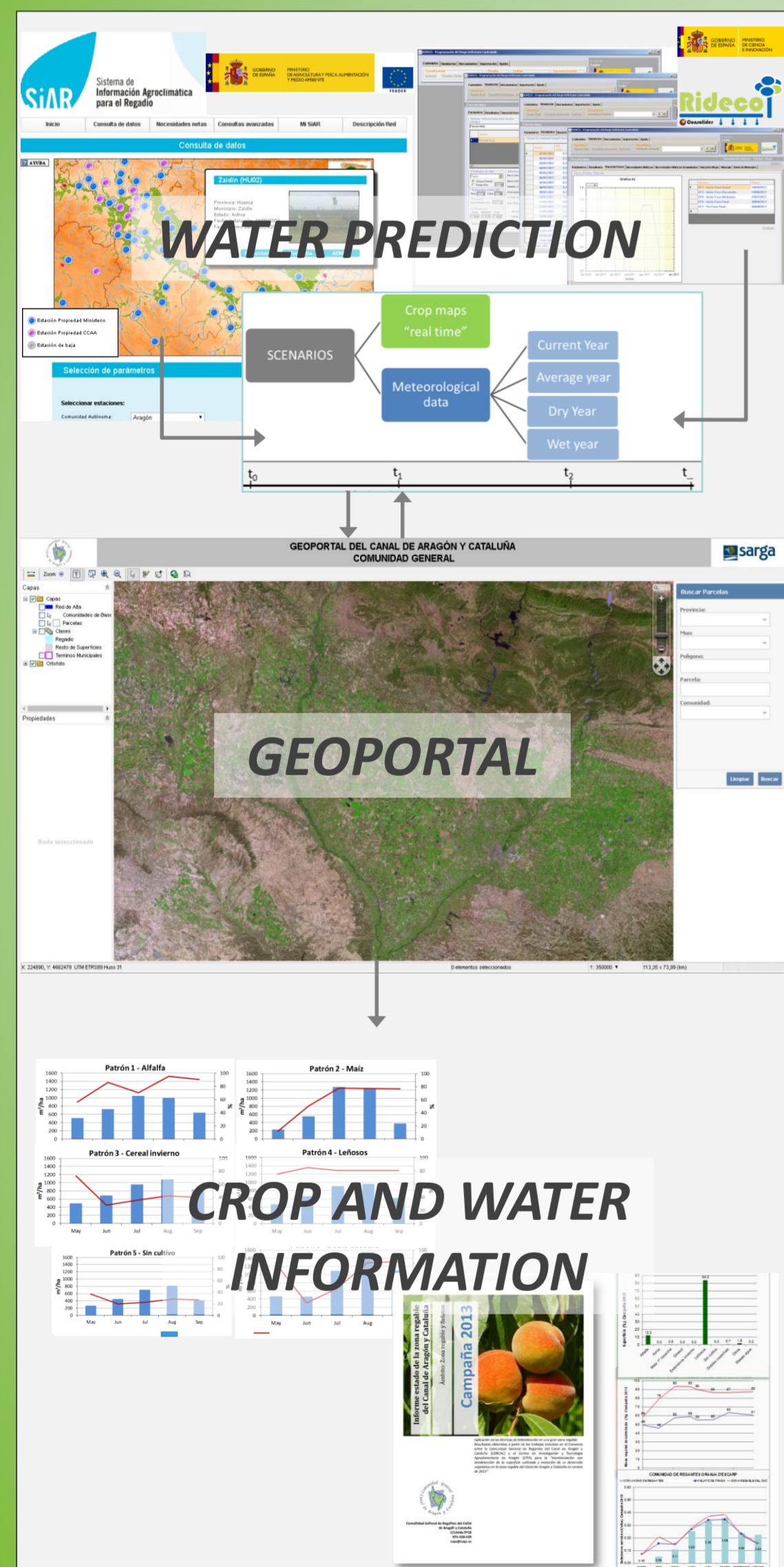
Real time crop monitoring:
identification and development

- Crop maps
- Vegetation indices time series (i.e. NDVI)
- Double-crop identification
- Phenology information (phases, Kc...)



Irrigation Water Management Support-Tool

CITA-CGRCAYC collaboration agreements (2013, 2014 and 2016)
PDR-Aragón Cooperation Group Project (2017-2018)



- Development and implementation of tools to support water decision-making, planning and management.
- Creation of a remote sensing-based crop monitoring model for water demand management (Model IC+CA).

- Providing real time crop and water availability information.
- Developing a software for water demand prediction several weeks ahead (In progress).
- Building a Web-Geoportals to make available the information.

Updated availability and water demand information is the key

- Stored volumes
- Current flows
- Historical series
- Snow reserves
- Crop areas (crop patterns)
- Crop development (vegetative activity)

Determining geospatial seasonal crop information is essential

Limitation: Real time

SATELLITE INFORMATION

Environmental Monitoring Program

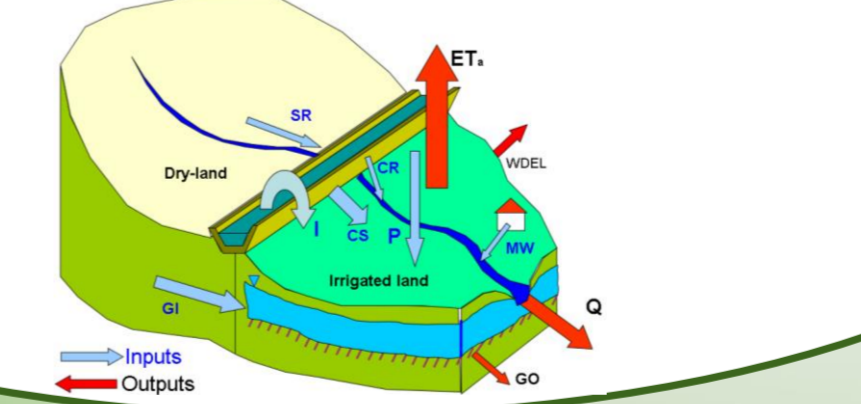
CITA-CHE collaborations agreements (2009 to 2017)
Research project AGL2013-48728-C2-2-R

- Environmental impact of agricultural activities of irrigated systems in the Ebro Basin.
- Determination of the influence of crop patterns, irrigation and fertilization management on surface water quality.

- Determining the temporal variability of salinity and nitrogen at basin output.
- Establishing salt and nitrogen irrigation inputs.
- Establishing the water, salt and N balances.

Water balance is the key

$$I+P+GI+SR+CR+MW+CS-(ETa+Q+GO+WDEL) = \Delta W$$

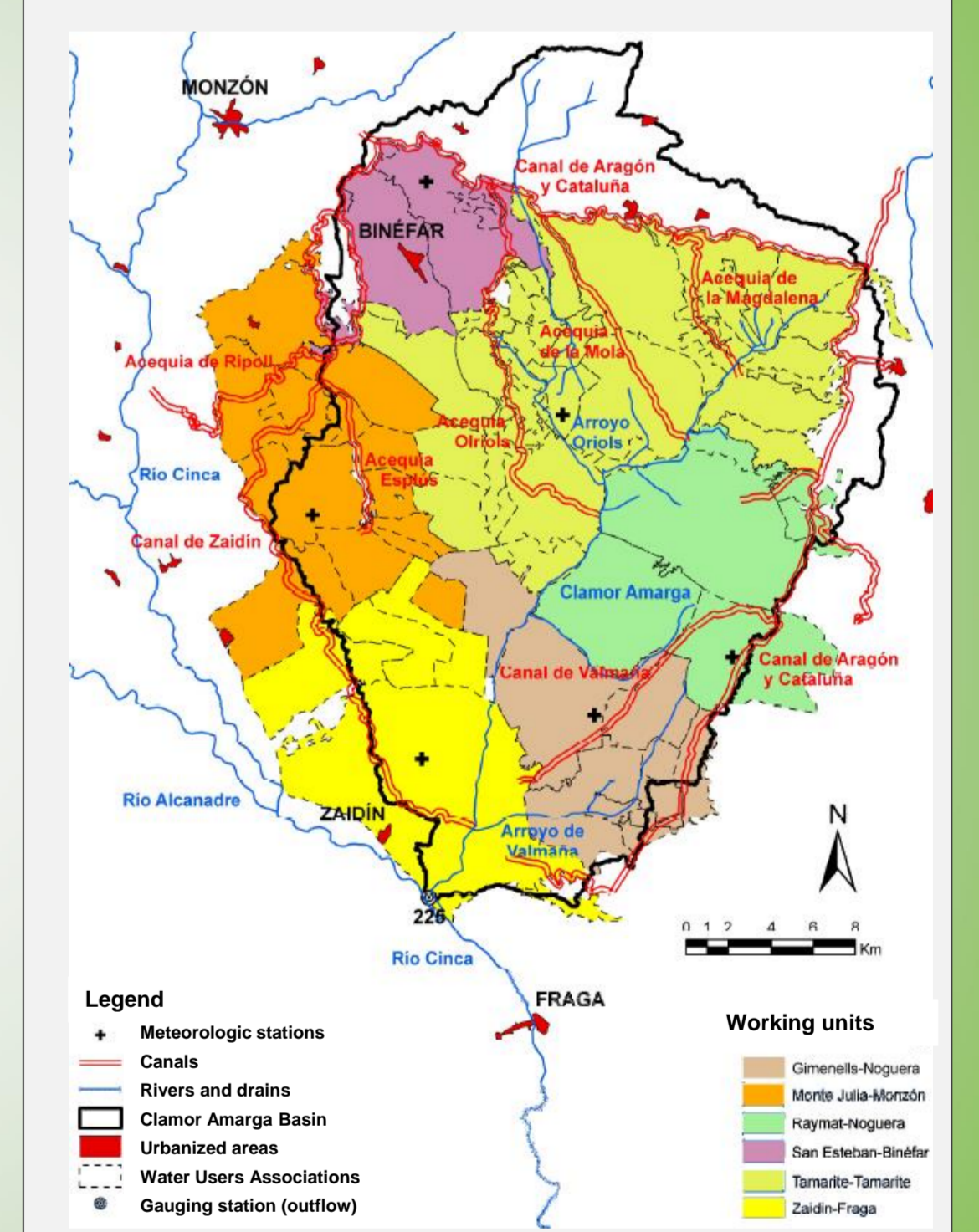


Determining ETa is essential for the water balance

Limitation: Information on Double-Crop

SATELLITE INFORMATION

CLAMOR AMARGA BASIN



- High animal farming (swine and cattle) and agri-food industry
- High double crop area

EXPECTED ACHIEVEMENTS

- ❑ Real time mapping of crops and their vegetative activity \Rightarrow An operational tool for water demand estimation two months in advance \Rightarrow Adjusting water supplies to provisions of water resources availability
- ❑ A more accurate water balance \Rightarrow Improved estimation of diffuse pollution and environmental impact
- ❑ A web interface available to all users (water managers, technicians and farmers) for data consultation \Rightarrow Up-to-date information and support for water decision-making, planning and management

REFERENCES

Water prediction: SIAR- Irrigation Agroclimatic Information System <http://eportal.mapama.gob.es/websiar/Inicio.aspx>
Rideco software- Software for on-farm irrigation scheduling of stone fruit orchards under water limitations (Zapata et al. 2012) <http://digital.csic.es/handle/10261/45608>
Geoportals: Geoportals del Canal de Aragón y Cataluña <http://www.cayc.es/index.php/servicios-web/geoportals>
Crop and Water Reports: Comunidad General de Regantes del Canal de Aragón y Cataluña (CGRCAYC) <http://www.cayc.es/>
Casterad et al. (2013, 2014 and 2016) <http://citarea.cita-aragon.es/citarea/>
Water balance: Confederación Hidrográfica del Ebro (CHE) <http://www.chebro.es/contenido.visualizar.do?idContenido=14417&idMenu=3087>

ACKNOWLEDGEMENTS

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