



Applications of Earth Observation products as a resource in agricultural management

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What's the type of agriculture in Europe?



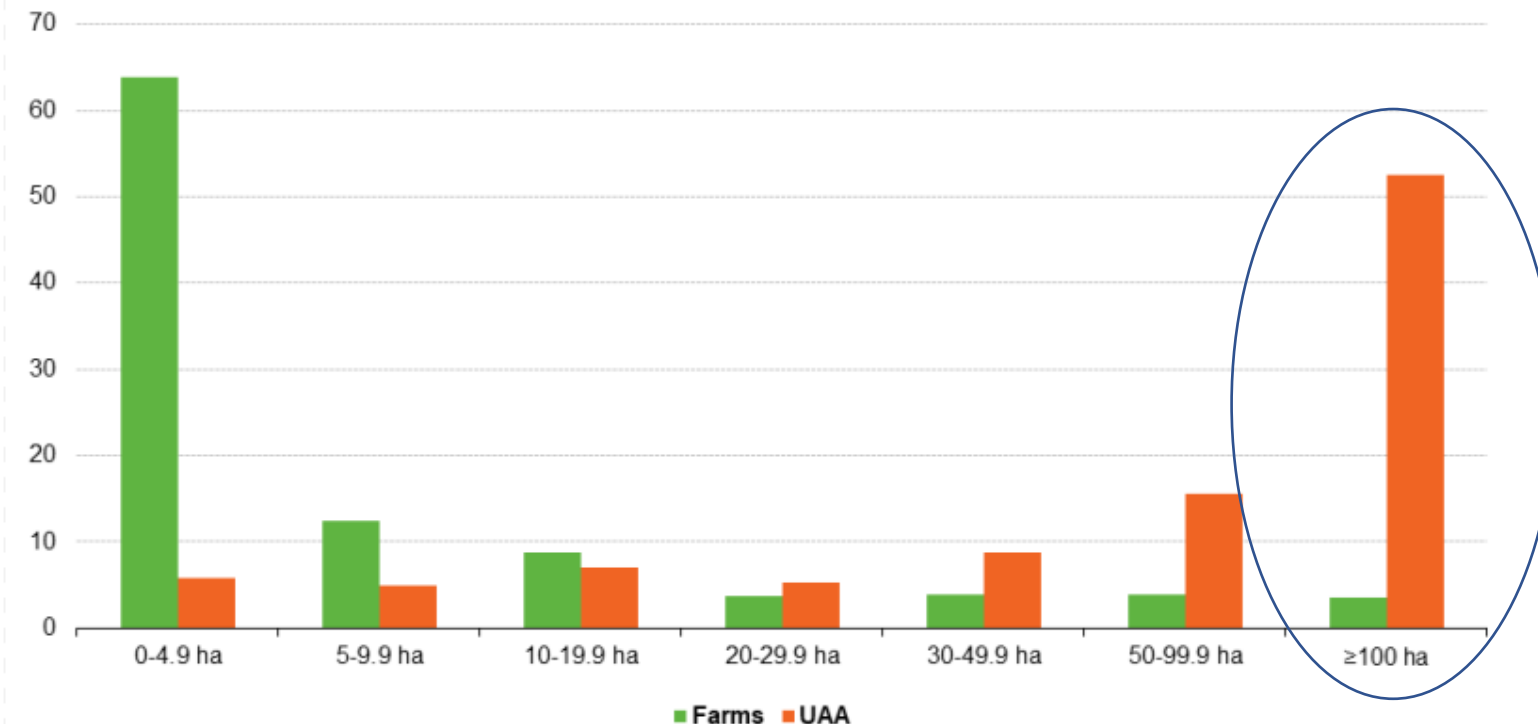
Mainly this



In numbers?

Distribution of EU farms and utilised agricultural area according to farm size

(%, 2020)

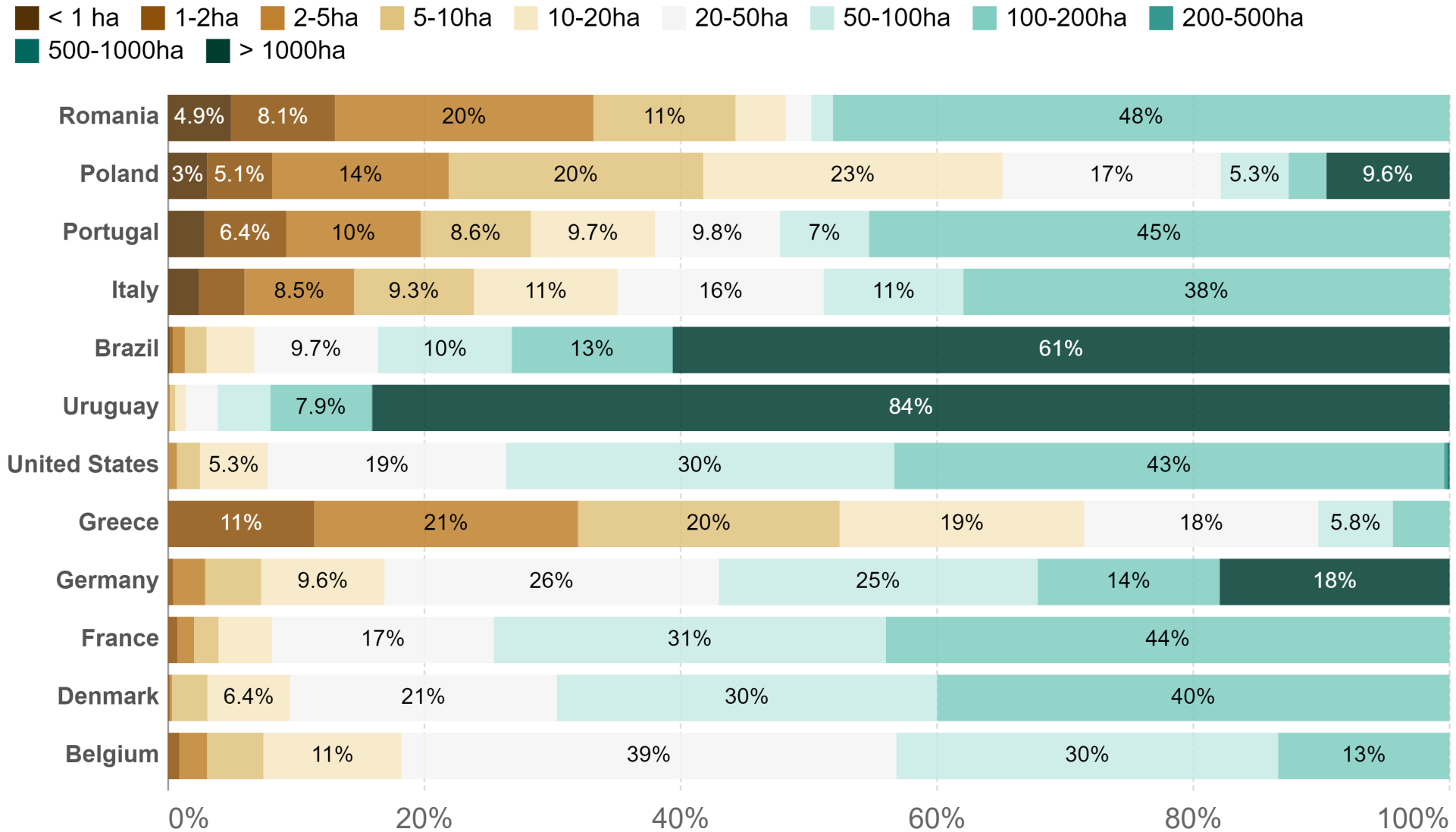


Note: There are some differences in the threshold applied by some Member States, often to exclude the very smallest agricultural holdings which together contribute 2% or less to the total UAA excluding common land, and 2% or less to the total number of farm livestock units.

Source: Eurostat (online data code: ef_m_farmleg)

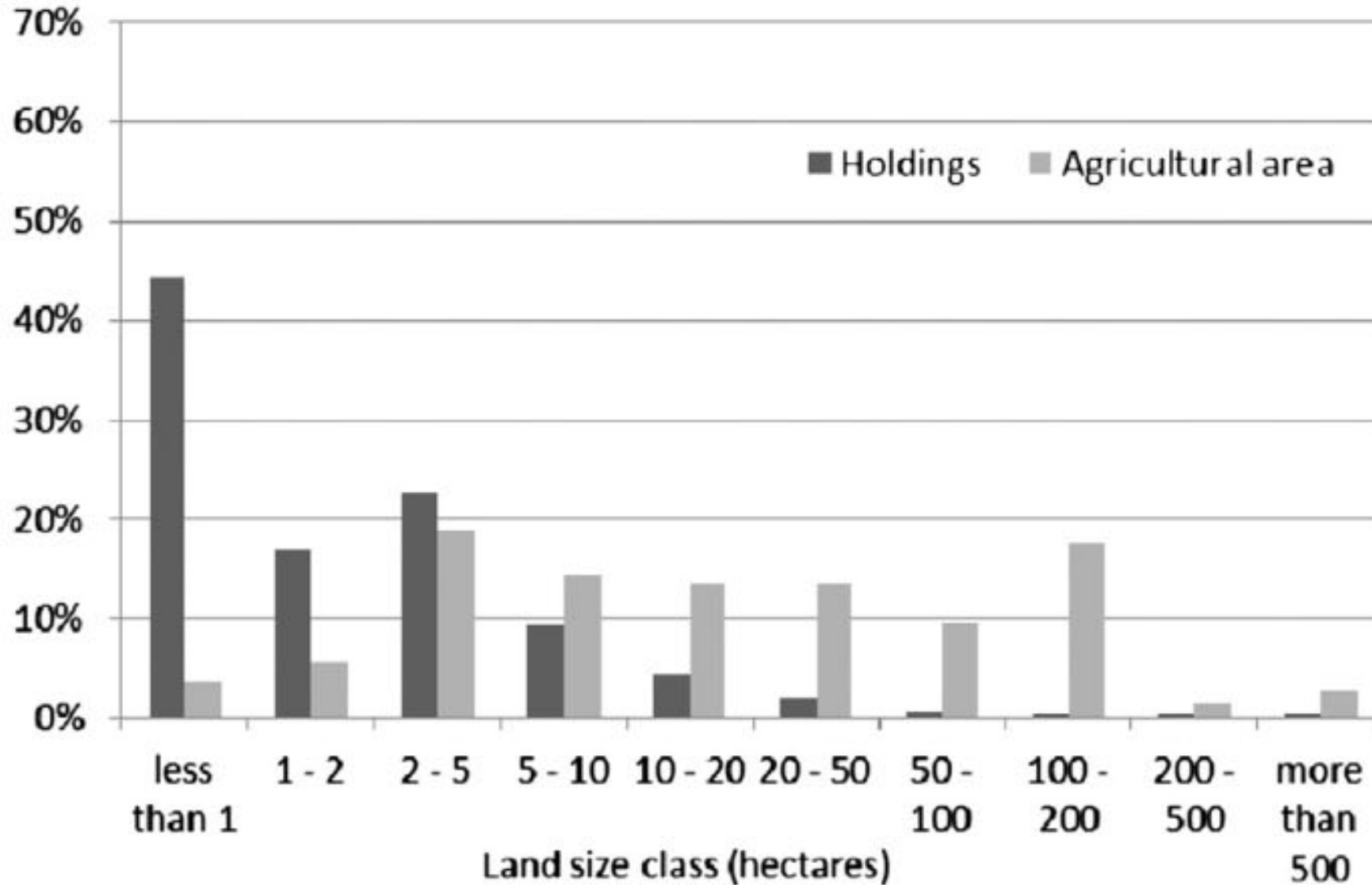
- In 2013, an average size of 16.1 ha per agricultural holding in the UE (EUROSTAT, 2019).
- For Spain, in 2021, the average was 44 ha (MAPA, 2021).

Agricultural land area by farm size, 2002



Source: Lowder et al. (2016). The number, size, and distribution of farms, smallholder farms, and family farms worldwide. World Development. OurWorldInData.org/farm-size • CC BY

Europe and Central Asia (9)

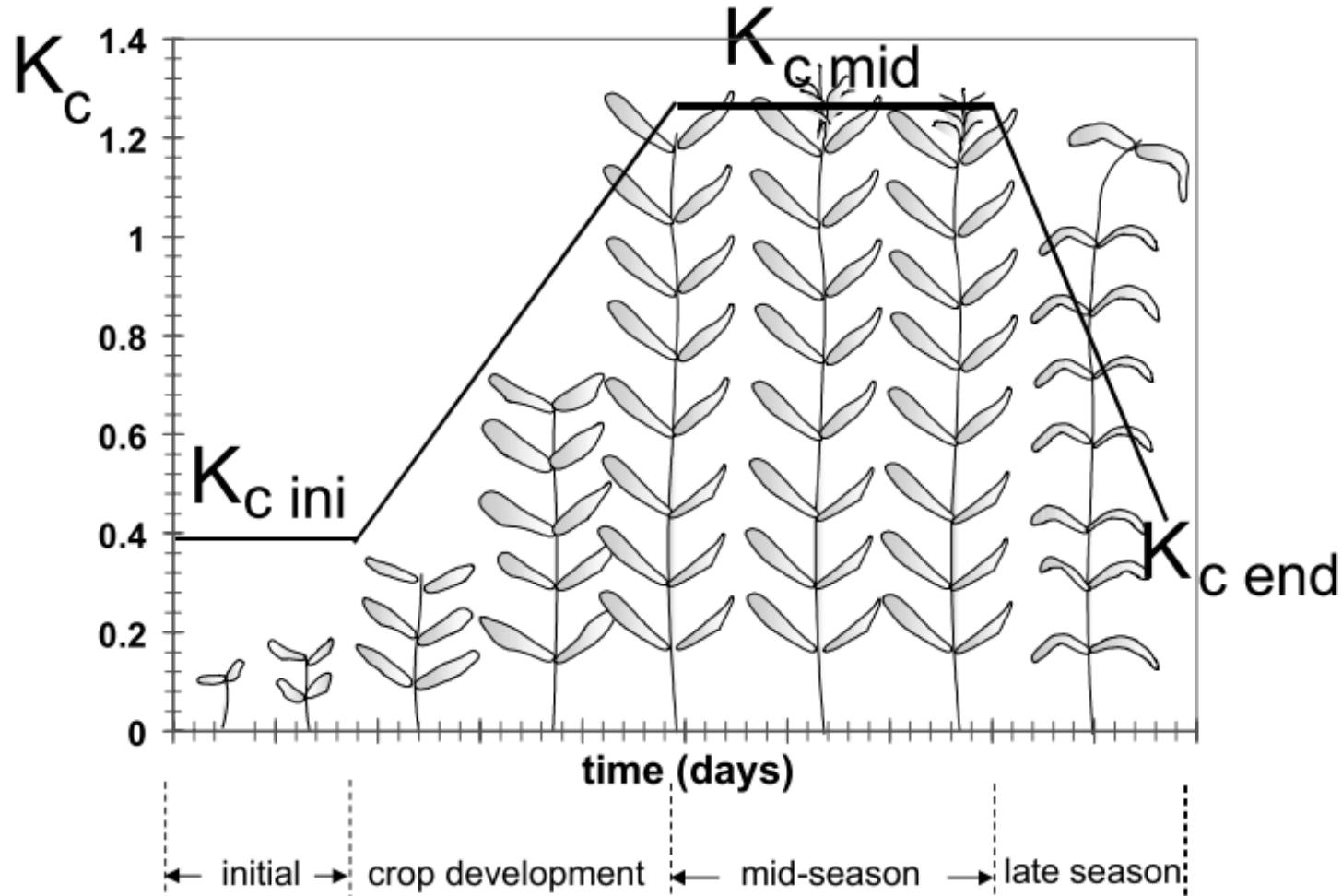


What do decision makers expect from Earth Observation or Remote Sensing data?

- Agriculture practice aims to have an economic benefit, any information that help farmers to increase profit margin is welcome, but 3 important points are mandatory:
 - Practical information
 - Easy to understand
 - Cheap (or free) for the final user
- Any product that fits with the **PEC** will have opportunities in the field of agronomy.
- Let's see an example

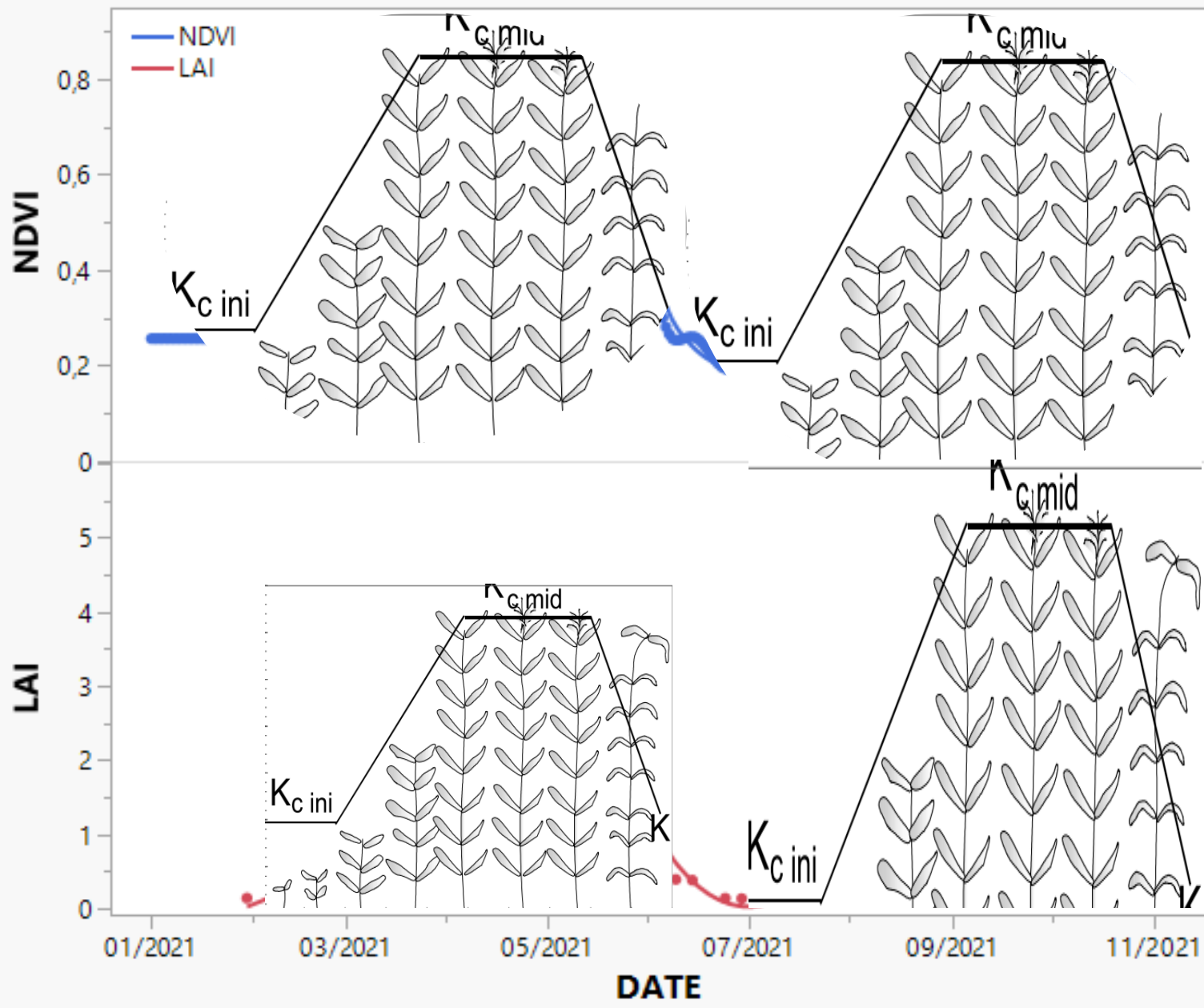
FIGURE 25
Generalized crop coefficient curve for the single crop coefficient approach

$$ET_c = ET_o \cdot k_c$$



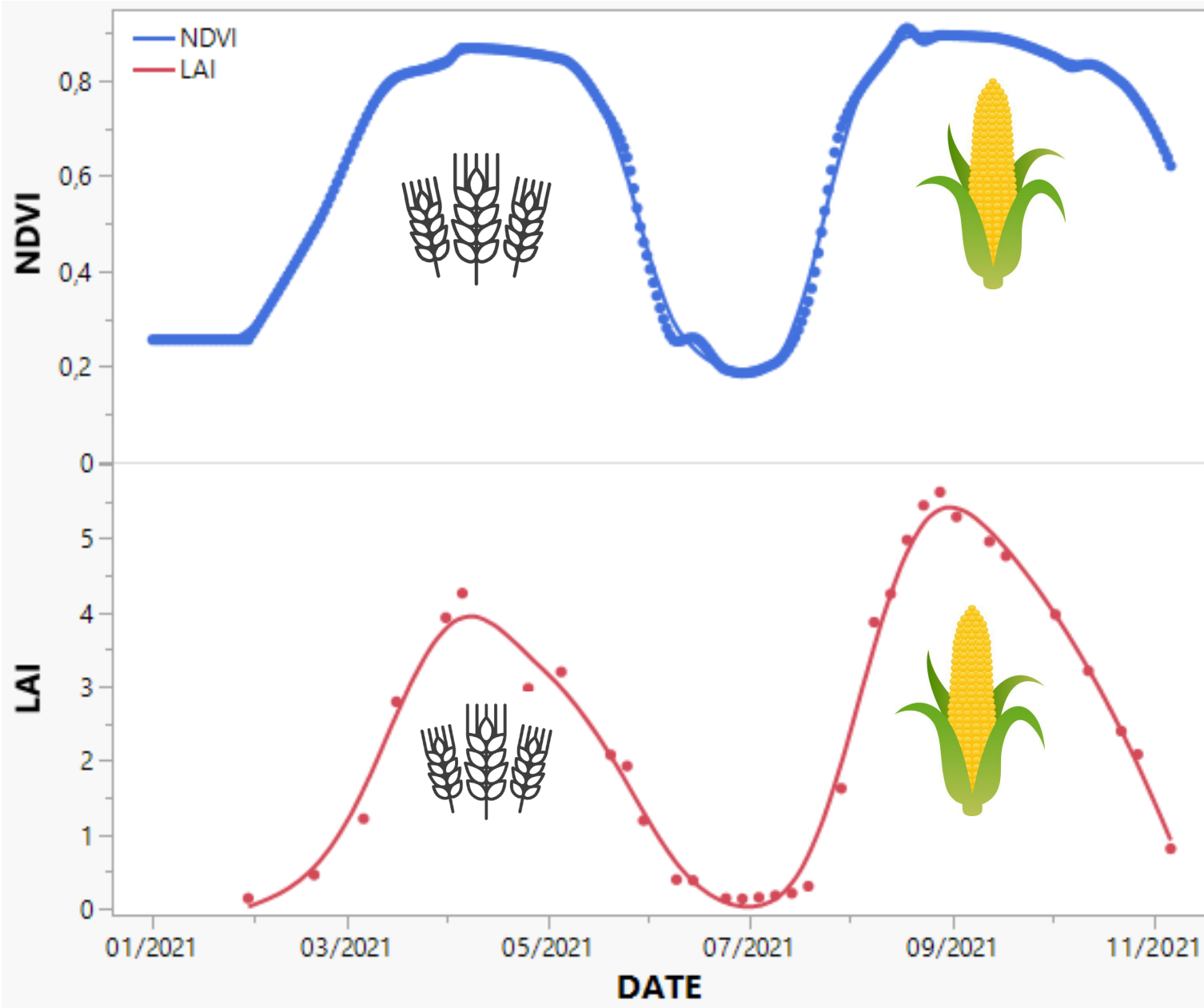
- Crop evapotranspiration (ET_c) depends on ET_o and k_c , which changes over time
- At higher K_c , higher water demands
- In this example, at least 3 irrigation doses are set
- Can we estimate the K_c with remote sensing?

From Allen, R.G., *et al.* (1998).



Daily NDVI & weekly LAI at 20x20 resolution from Sentinel-2 from a 20 ha field of spring barley followed by corn

Does it seem familiar?



Daily NDVI & weekly LAI at 20x20 resolution from Sentinel-2 from a 20 ha field of spring barley followed by corn

Does it seem familiar?

With this, we could, at least, set the change in the dose of irrigation:

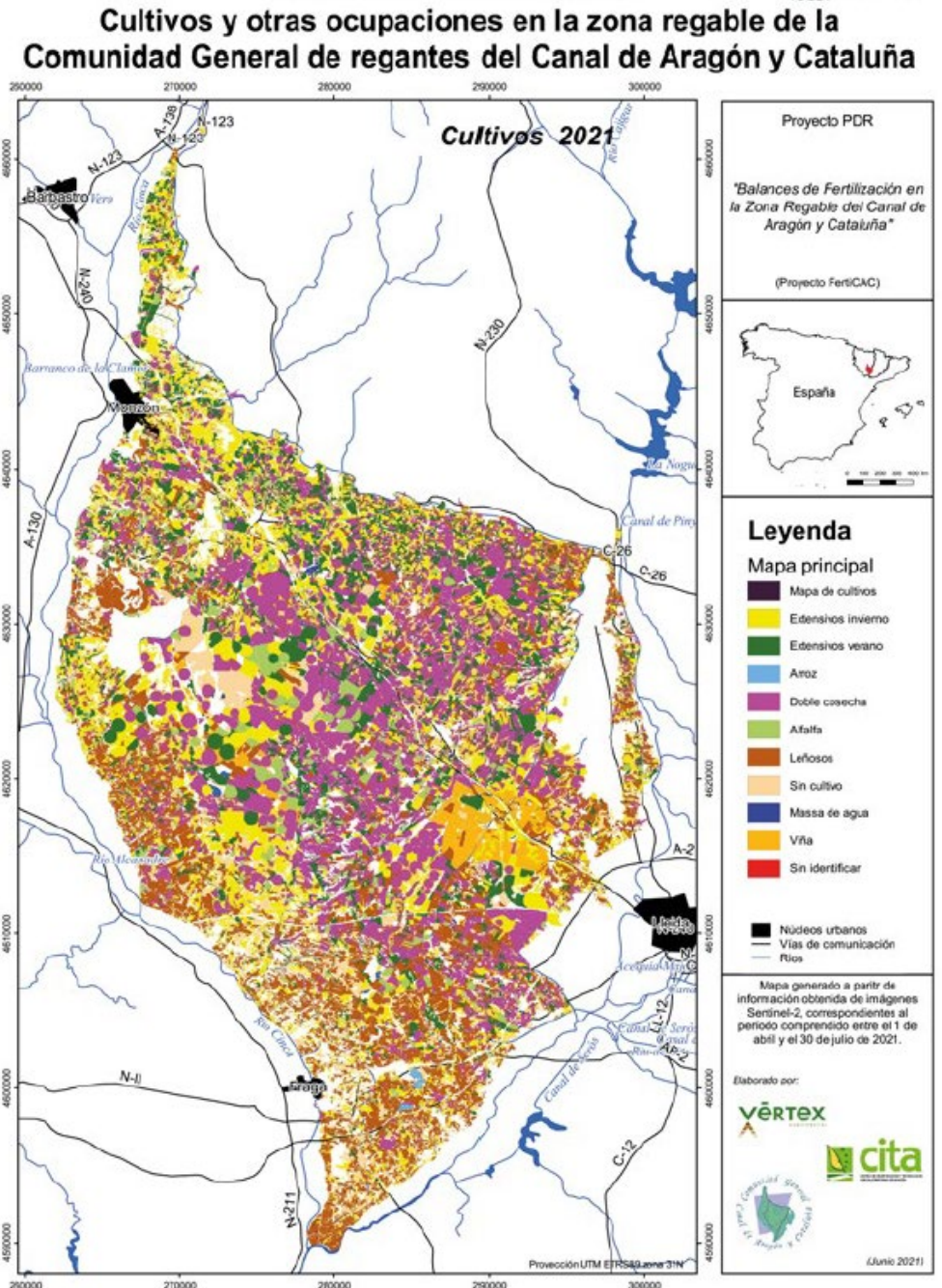
$kc_{ini} \rightarrow kc_{mid} \rightarrow kc_{end}$ at field scale

And at bigger scale?

Yes! An irrigation district could use it in order to know, at high resolution and for a certain moment, the type of crop they have, and the demand of water they will have for the next period.

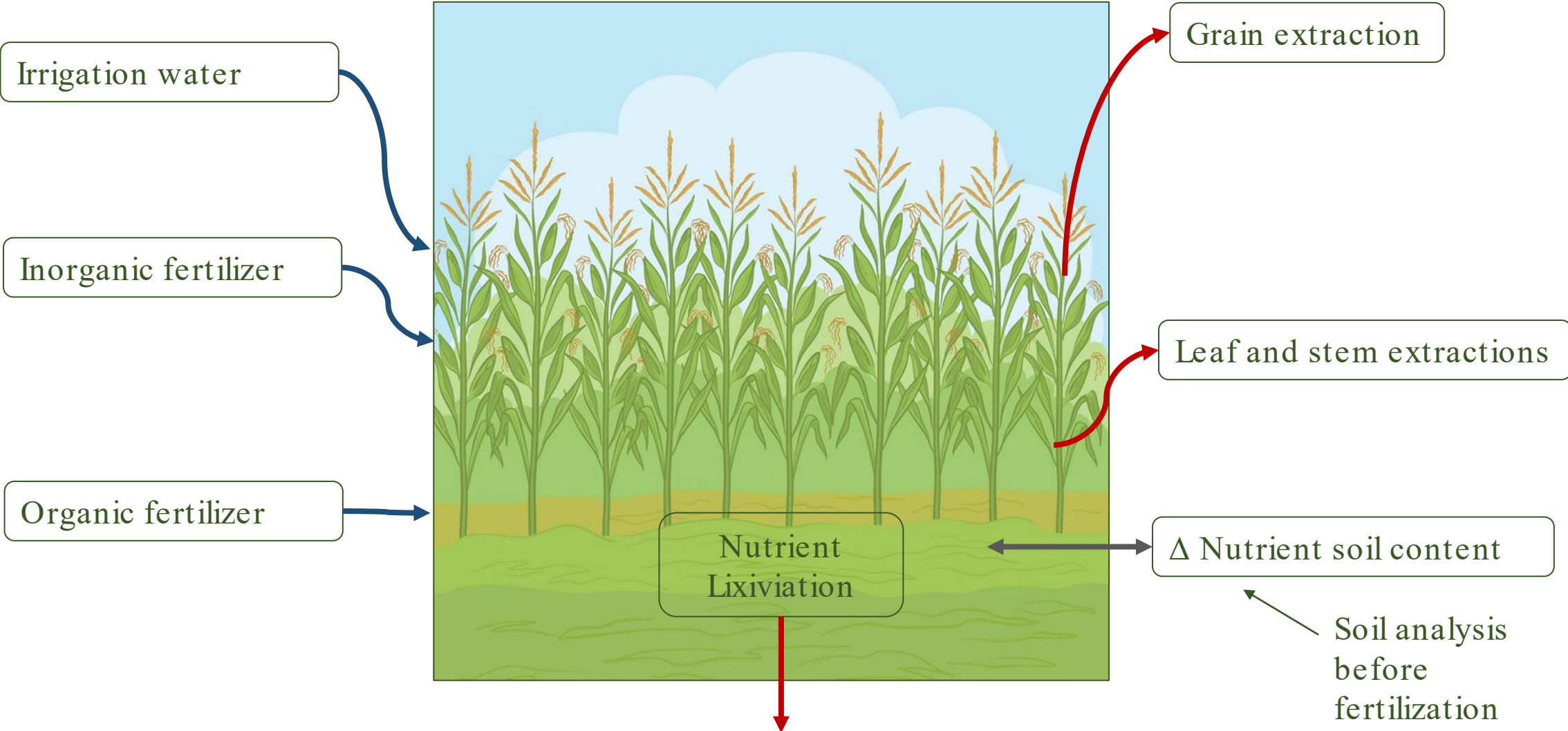
Here we have an example of a big irrigation district (110,000 ha) that uses this method monthly, in order to help them to take decision on water supply

Data provided by Comunidad General del Canal Aragón y Catalunya



What about nutritional parameters?

If all the input and output elements are monitored, or at least soil analysis are performed, the efficiency of the fertilization application is high and there is no need to have more data



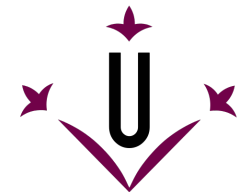
Conclusions

- We have to be realistic in the needs of the agricultural sector
- The margin of benefit is so short that any extra cost of money will be seen as a waste, if not well explained
- High resolution dataset can fit as PEC (Practical, Easy and Cheap) products
- NDVI and LAI products, among others, can be suitable for farmers and decision makers, as one more tool to take decisions
- Remote sensing and EO can't replace being in the field, but are a resource that will be essential in the incoming years

Thank you!

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