IN-PLOT REMOTE SENSING

TOWARDS A PRECISION IRRIGATION STRATEGY

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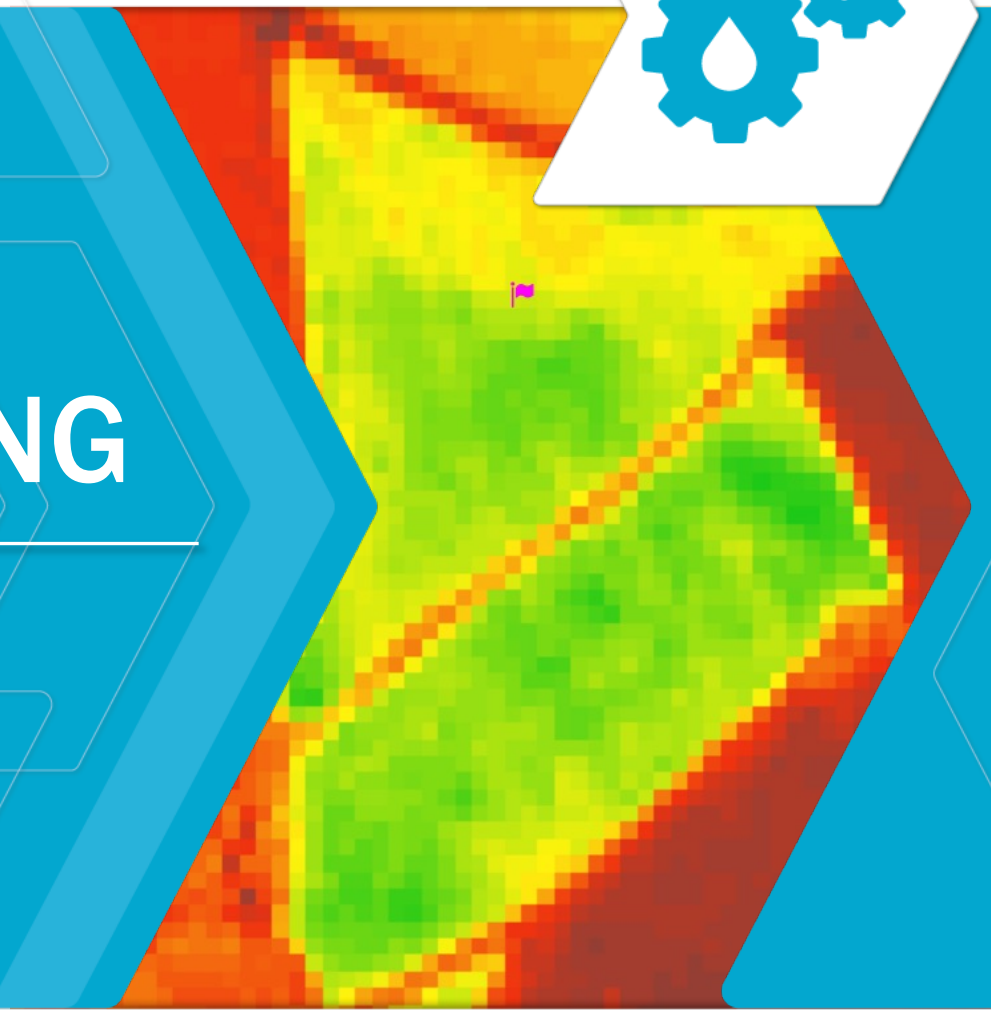
UNIVERSIDAD DE CASTILLA-LA MANCHA

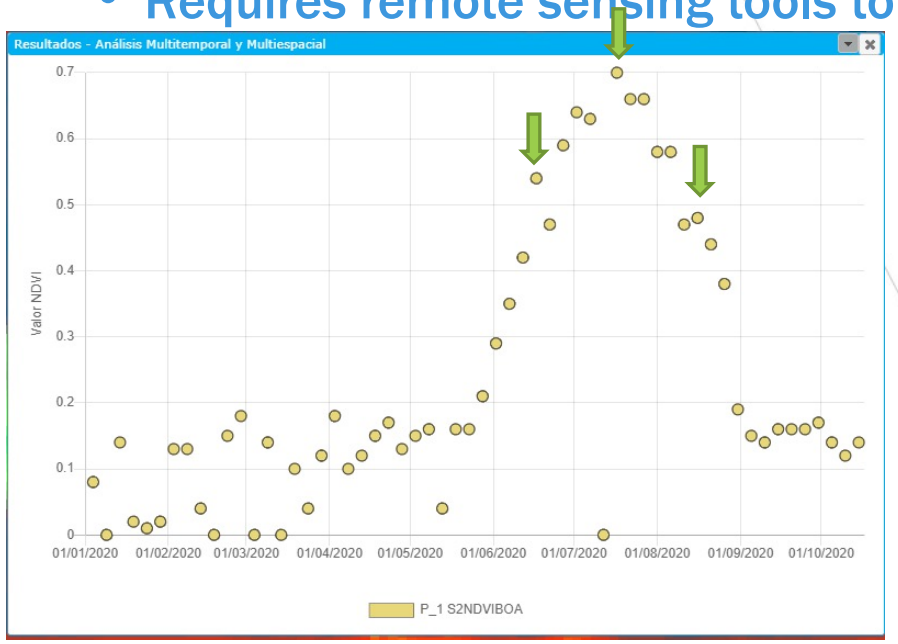
ONLINE ADMINISTERED COURSE – 14 DECEMBER 2020

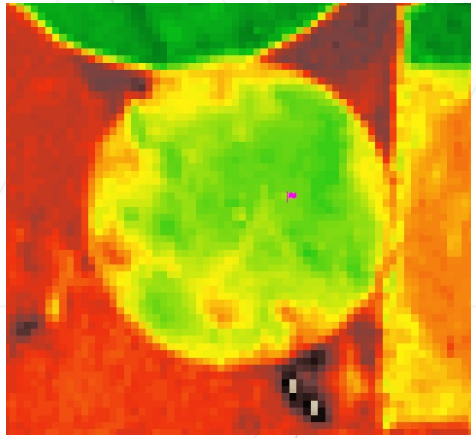


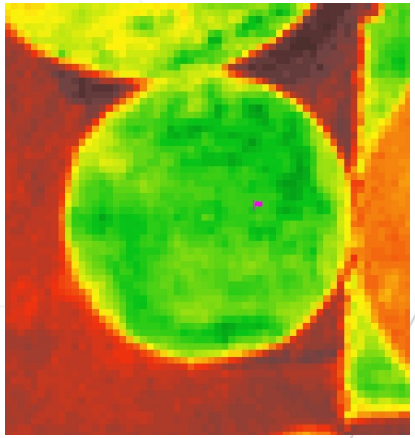
ITALIAN AGENCY FOR DEVELOPMENT COOPERATION

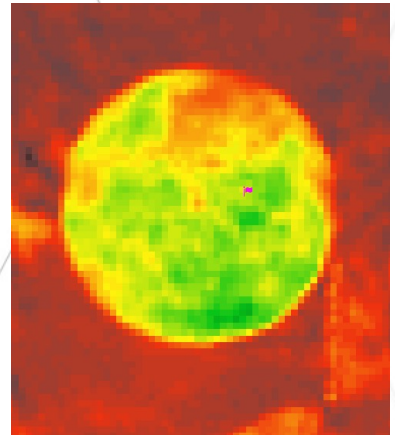
PRECISION AGRICLTURE AND REMOTE SENSING

- Precision agriculture
  - Detect in-plot variability and apply the right amount of inputs in the right place
  - Requires remote sensing tools to monitor crop variability









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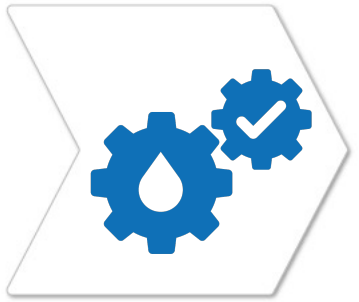

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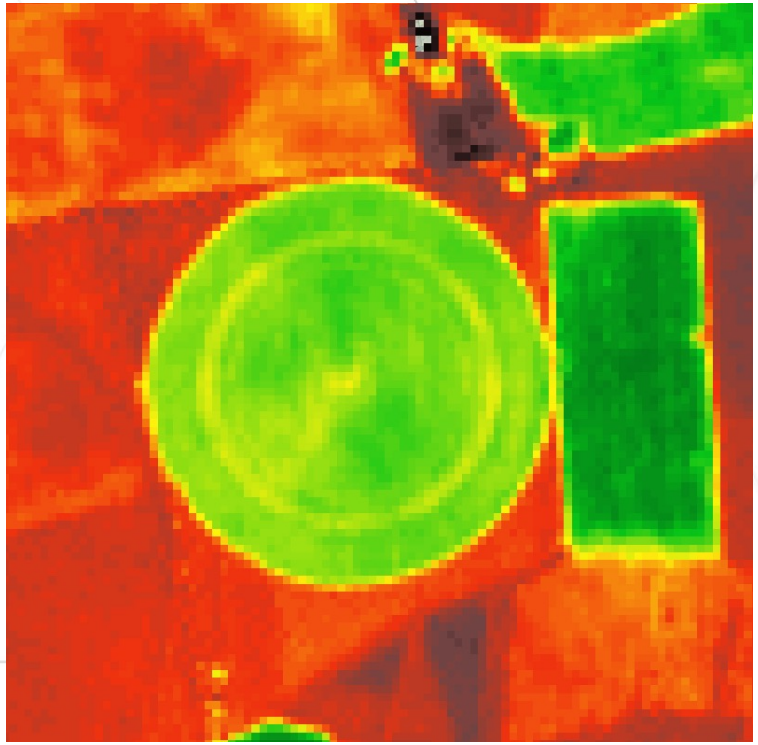

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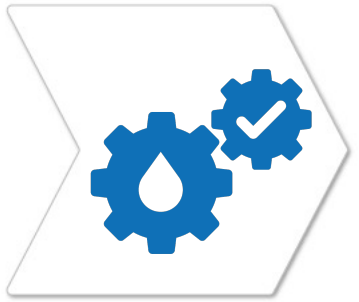

- Precision agriculture
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  - Permits detecting basic problems in irrigation systems
  - Permits introducing precision irrigation and fertilization techniques (soil variability)

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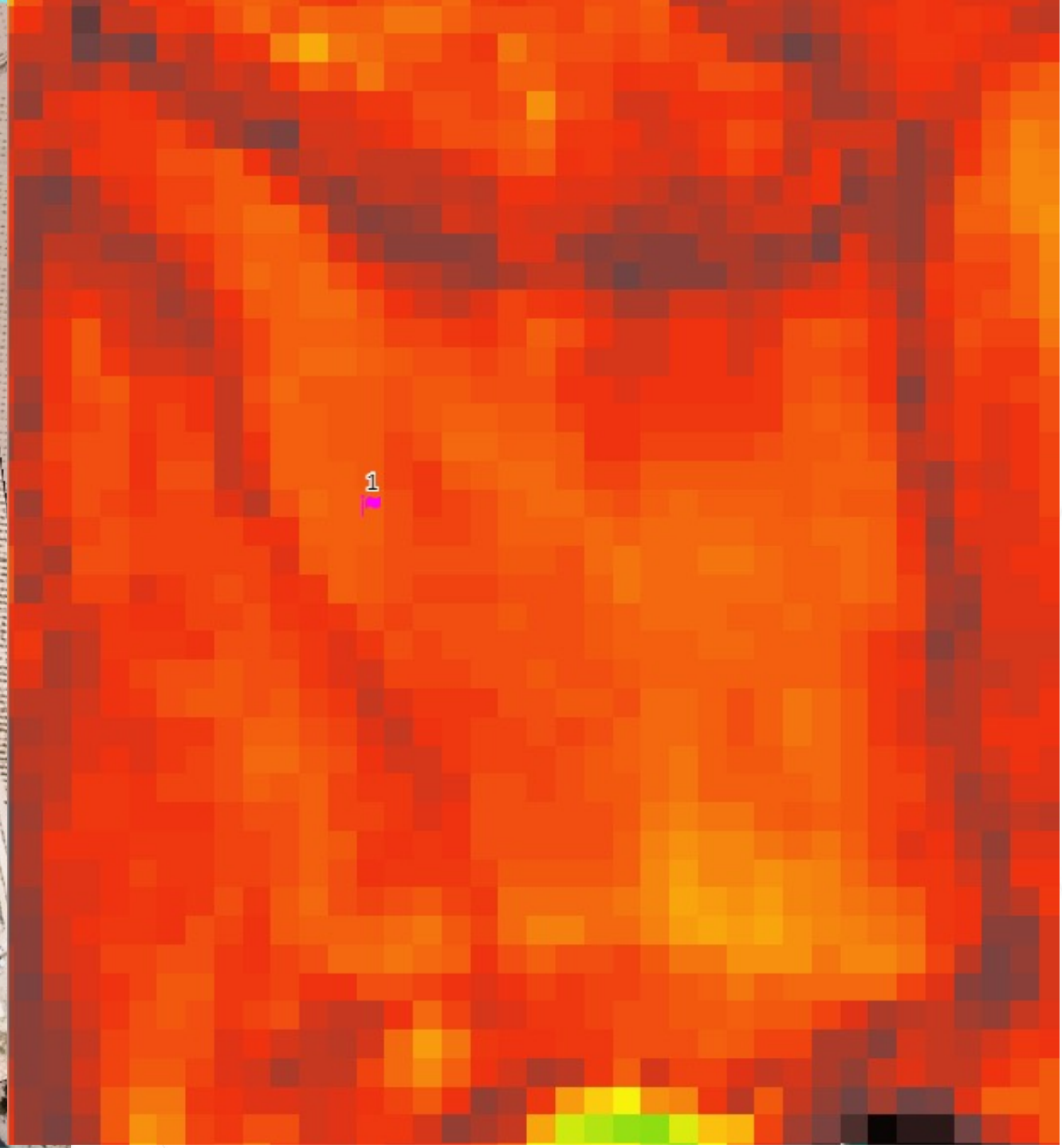
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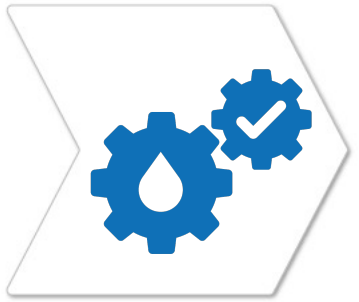

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  - Detect in-plot variability and apply the right amount of inputs in the right place
  - Requires remote sensing tools to monitor crop variability
  - Permits detecting basic problems in irrigation systems
  - Permits introducing precision irrigation and fertilization techniques
  - Estimating damage in agroinsurance
  - ...

PRECISION AGRICLTURE AND REMOTE SENSING

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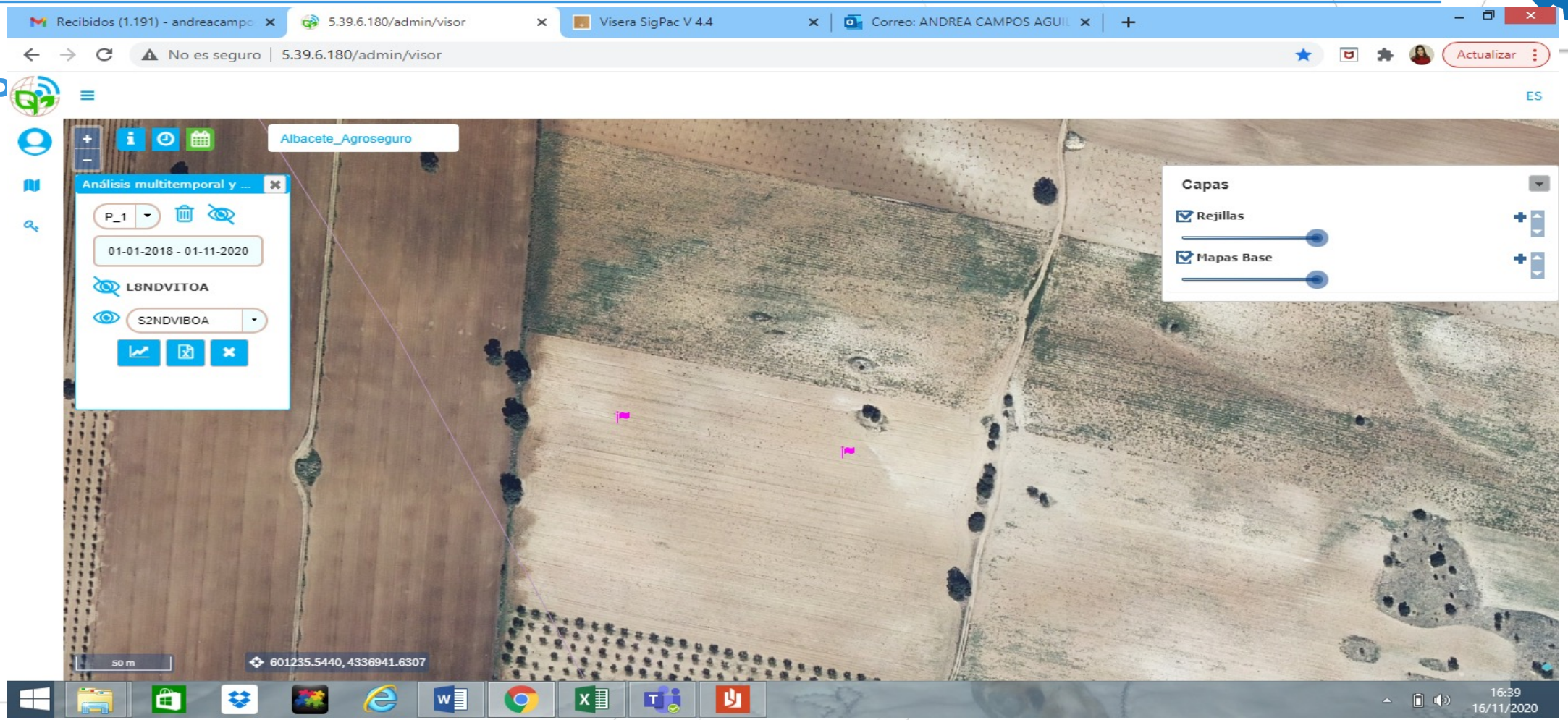

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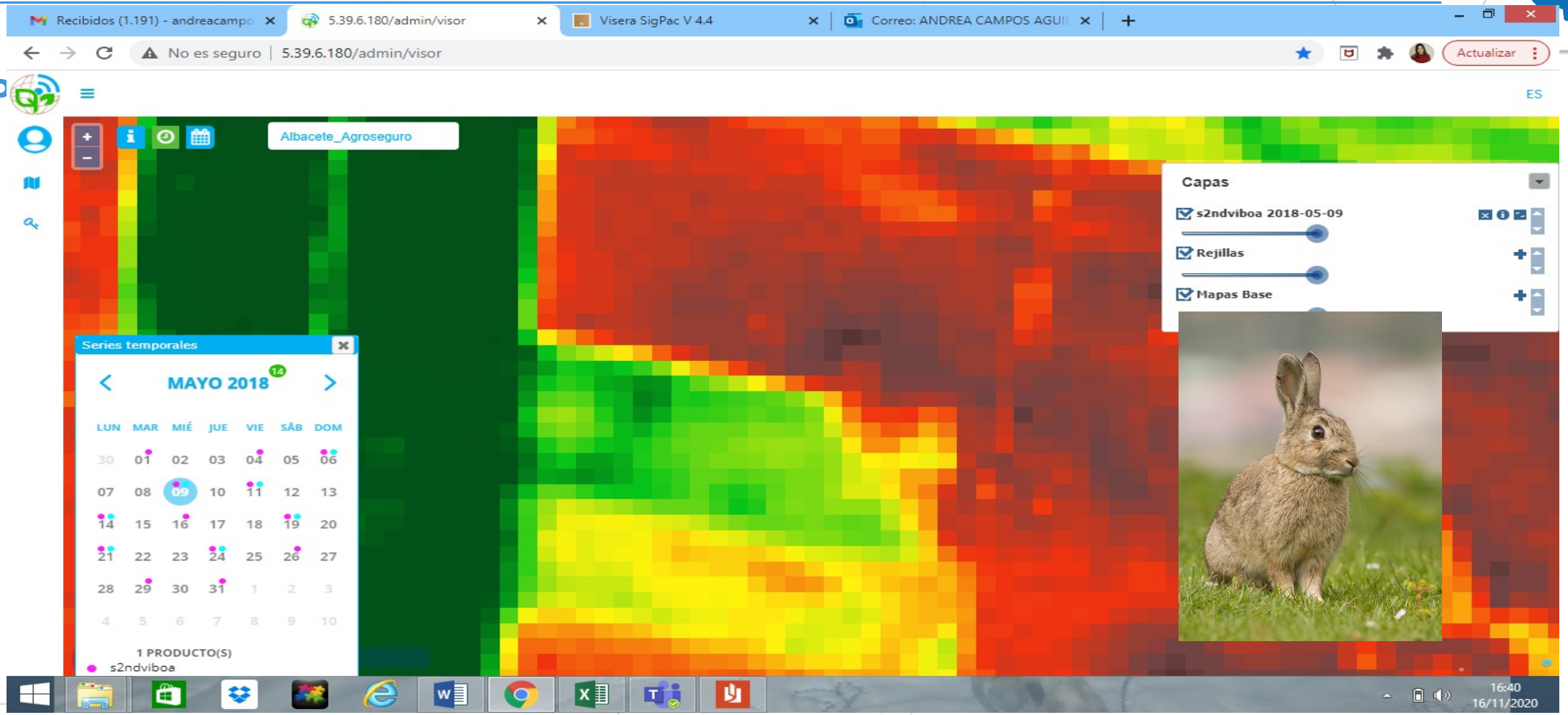

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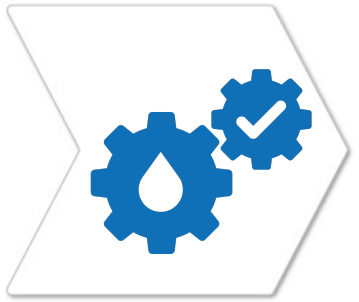

- Integration of remote sensing information with hydraulic models of the irrigation systems

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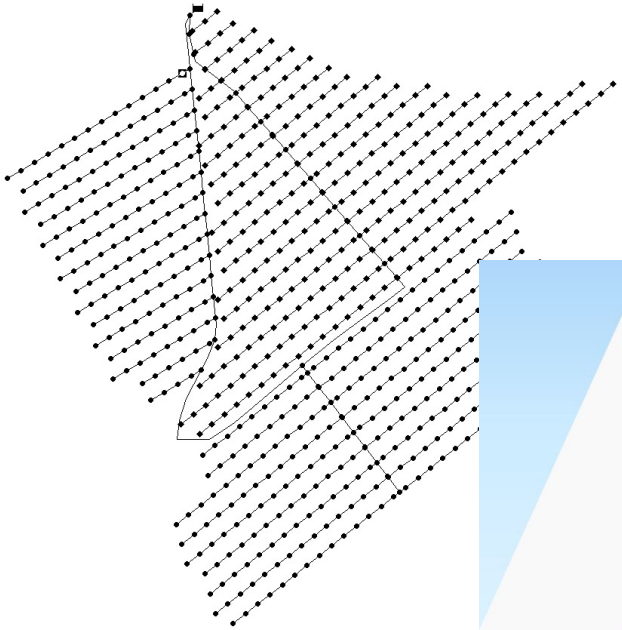

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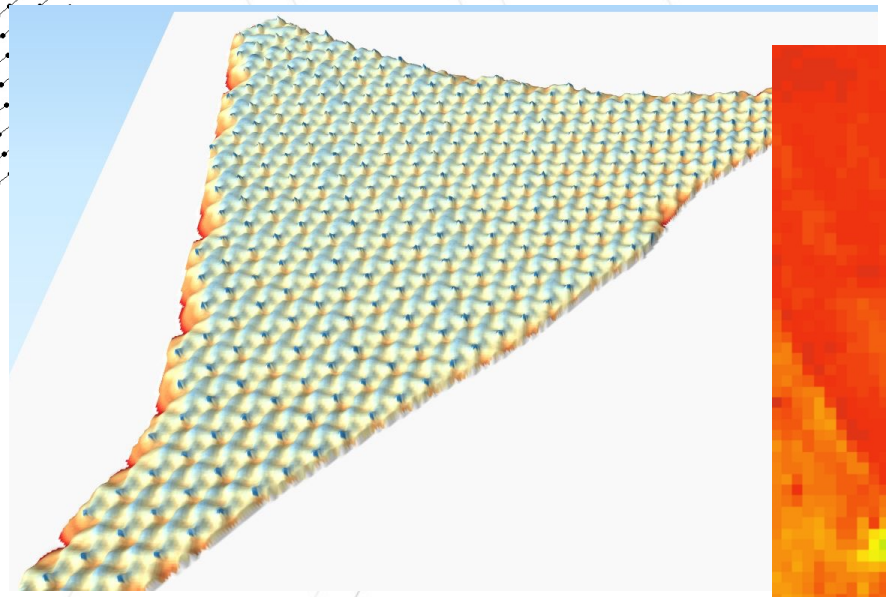
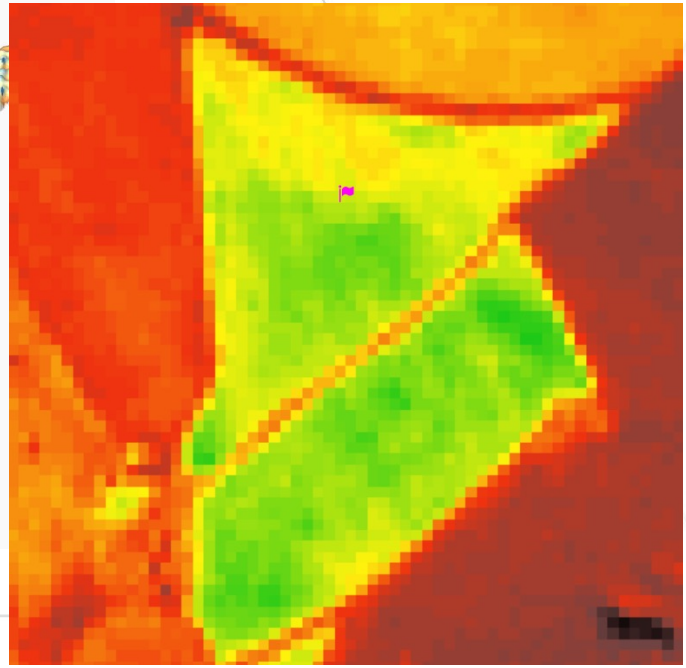
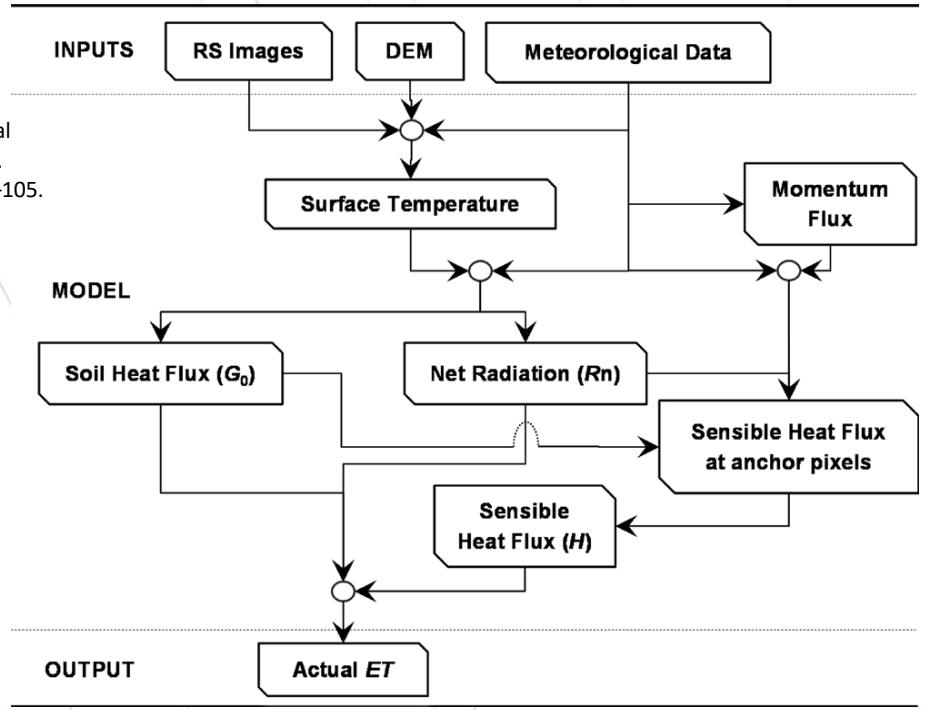




PRECISION AGRICLTURE AND REMOTE SENSING

- Estimating crop water requirements
  - Energy balance approach: requires thermal measurements



Awada, H., Ciraolo, G., Maltese, A., Provenzano, G., Moreno Hidalgo, M. A., & Còrcoles, J. I. (2019). Assessing the performance of a large-scale irrigation system by estimations of actual evapotranspiration obtained by Landsat satellite images resampled with cubic convolution. *International Journal of Applied Earth Observation and Geoinformation*, *75*(June 2018), 96–105. doi:10.1016/j.jag.2018.10.016

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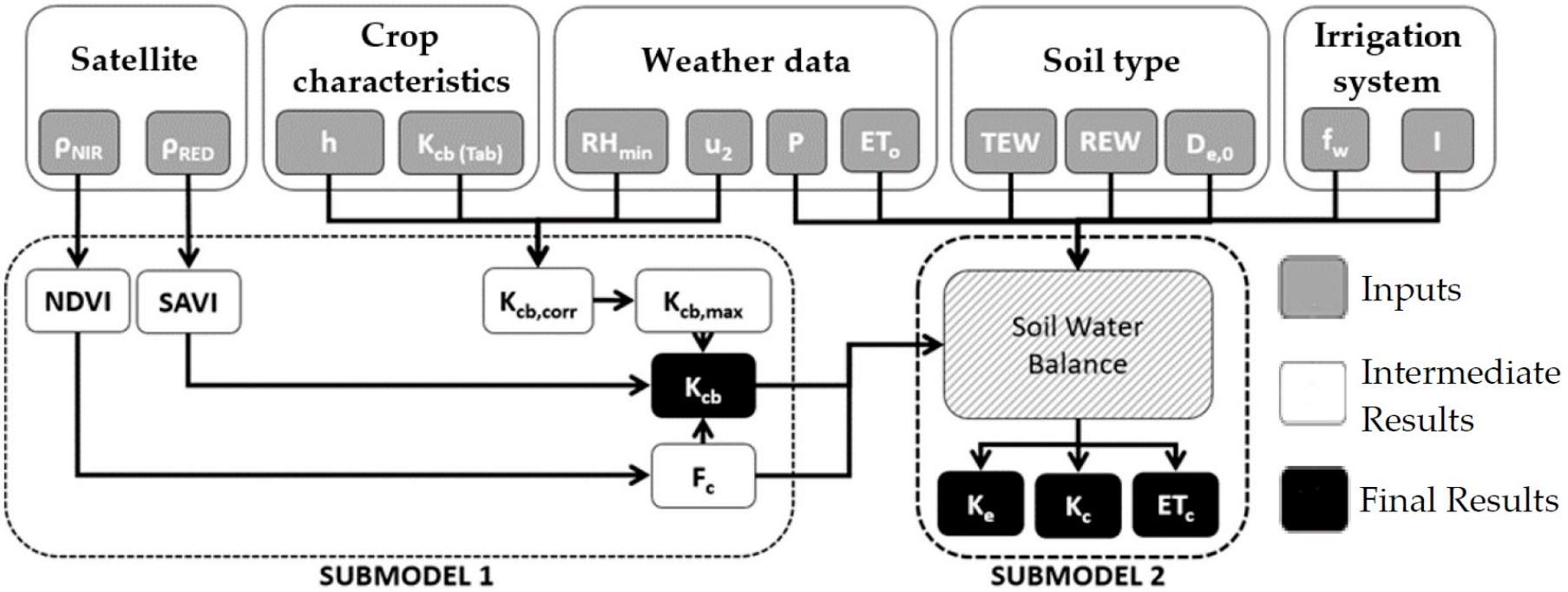
  - Water balance approach

Ramírez-Cuesta, J. M., Mirás-Avalos, J. M., Rubio-Asensio, J. S., & Intrigliolo, D. S. (2018). A novel ArcGIS toolbox for estimating crop water demands by integrating the dual crop coefficient approach with multi-satellite imagery. Water (Switzerland). doi:10.3390/w11010038

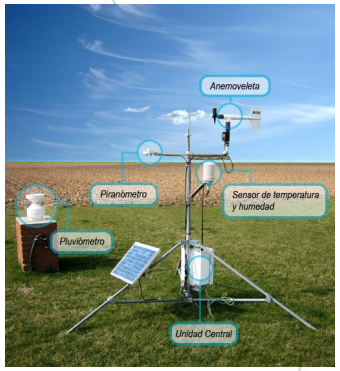


PRECISION AGRICLTURE AND REMOTE SENSING

- Estimating crop water requirements
  - Determination of transpiration

Crop evapoTRANSPIRATION

$$ETc = (ke + kcb) x ETo$$



Need to estimate with Fc

Kcb=1.5xNDVI-0,2 Campos et al. 2018

SUMMARY

- High spatial resolution allow us to see differences in the plot
- Only visual analysis and interpretation is helpful in some cases
- Mixing RS information with hydraulic or crop models gives much more information
- There are techniques to perform irrigation scheduling, but we have to be aware of their limitations