Sentinels synergy for seasonal agricultural crop mapping

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Sentinels Synergy for Agriculture

- Horizon 2020 project
  `http://ipl.uv.es/sensagri/index.php`
- UPS-CESBIO, UVEG, CNR-ISSIA, CREA, ITACyL, IPP

- To develop an innovative prototypes agricultural monitoring services by exploiting Sentinels synergy
- Three prototype Copernicus services: (1) Surface Soil Moisture, (2) green and brown Leaf Area Index and seasonal **(3) Crop Mapping.**
- More robust, accurate, frequently updated seasonal crop type maps
- *Four european test sites* : Spain, France, Italy, Poland

  Area : $40000km^2$, $2500km^2$, $4000km^2$, $30000km^2$

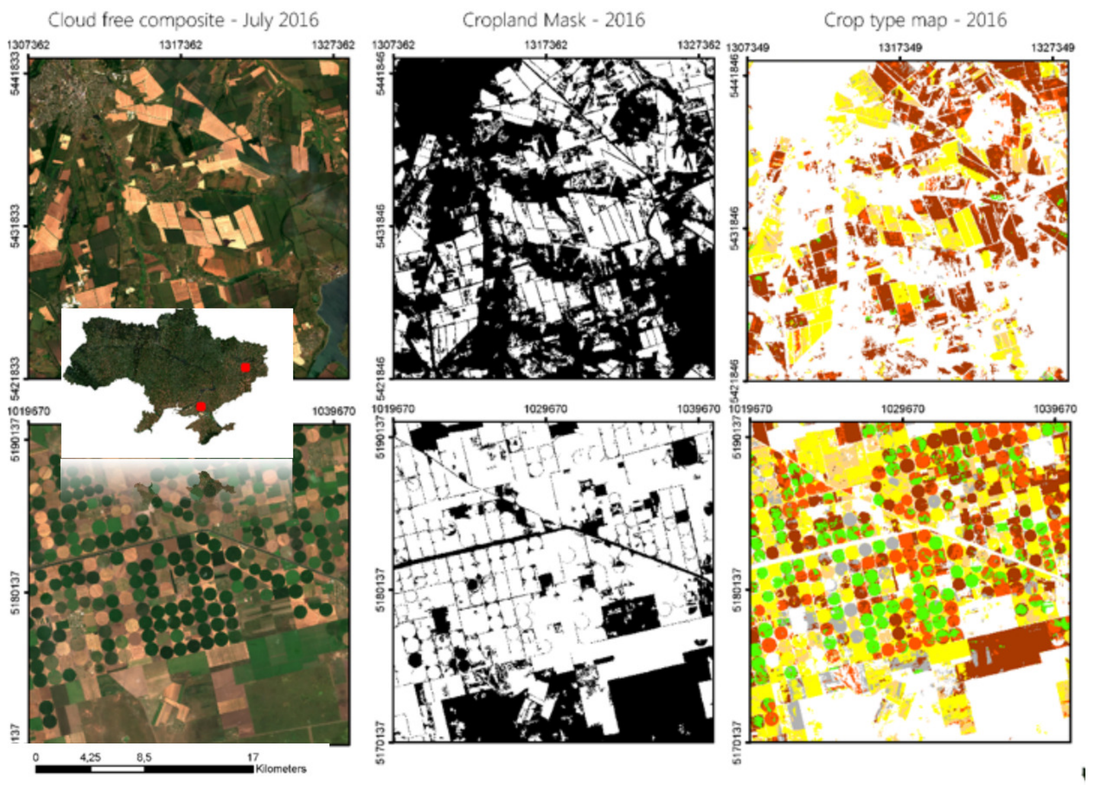
  Crops : Wheat, barley, sunflower, rapeseed, oats, maize, legumes

Crop mapping goals

- New classification strategies by **exploiting S1 and S2** times series
- **Seasonal** binary **crop mask** and **crop type map**
- **Early crop mapping** by using information from previous years
- To minimize the use of reference data

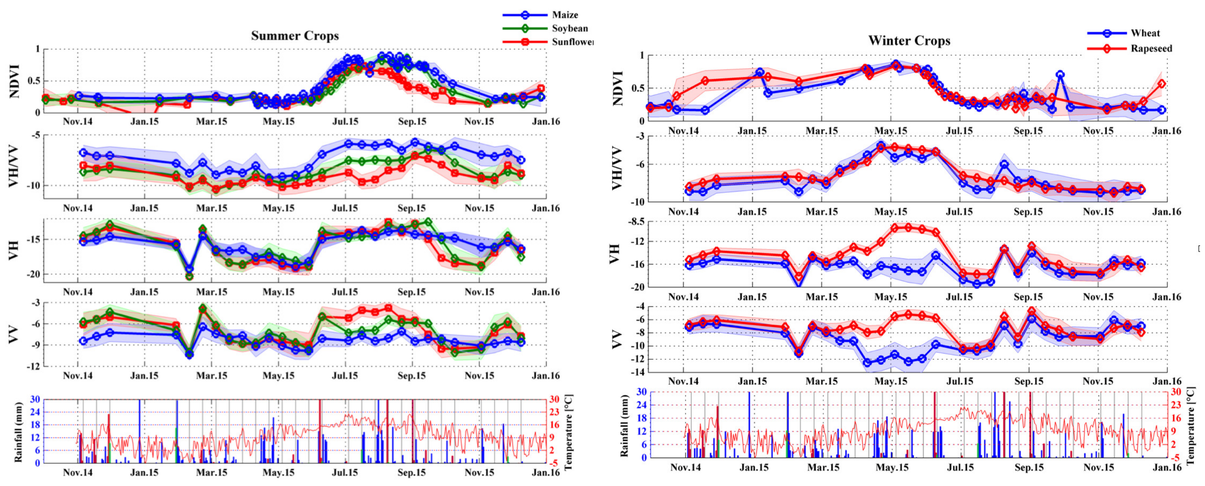
Existing crop mapping systems

- Sen2-Agri project, funded by ESA
- Earth observation products dedicated to agriculture monitoring
- 12 different international test sites covering different landscapes
- CESBIO => algorithm selection, system design and benchmarking



Understanding crops using S1

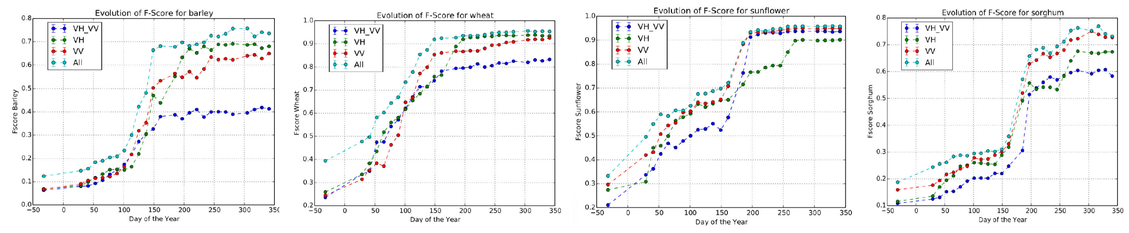
- VH/VV could be used to discriminate summer crops during the heading/flowering phase allowing early crop type identification
- VH and/or VV can be used to identify winter crops between the tillering and senescence stages
- The sensitivity of SAR data to soil moisture may be useful for detecting irrigated crops



Preliminary results on Sentinels

Sentinel - 1

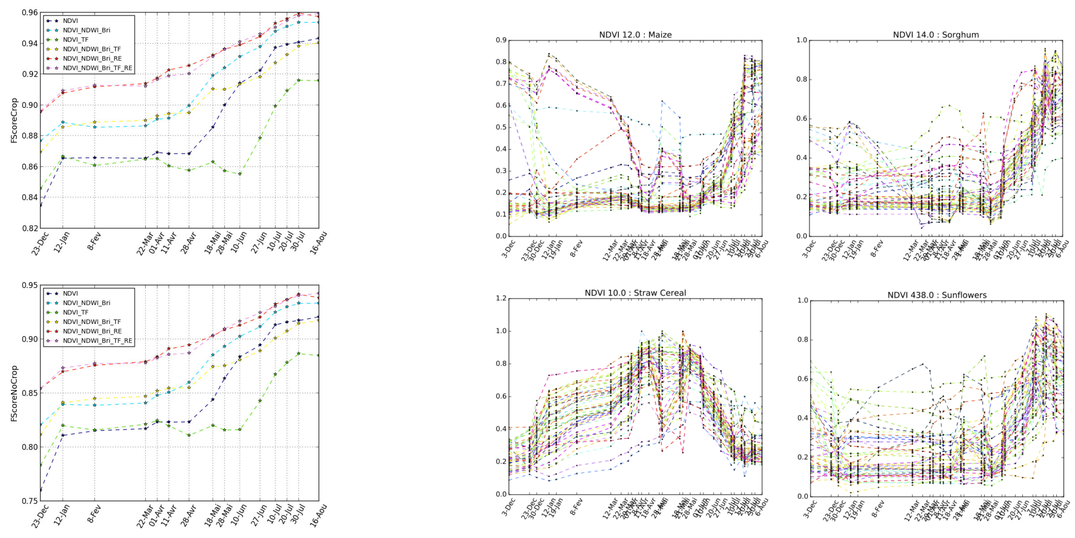
- The use of all polarimetric information for crop identification



From left right: F-Score obtained by (a) Barley (b) Wheat (c) Sunflowers and (d) Sorghum

Sentinel - 2

- 31 gapfilled images
- 5 Crop and 5 No Crop classes
- Random Forest classifier trained by 500 samples/class



Conclusions

- To benefit from the complementarity between S1 and S2 imagery
- How to handle large data volume ?
- The exploitation of red-edge and temporal features
- Dealing with seasonal constraints

References

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