S2-A/B & Chinese Data Agriculture monitoring & retrievals

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中欧科技合作“龙计划”第四期 **2019**年陆地遥感高级培训班

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培训时间:2019 年11月18日-23日 主办方:重庆大学

Training Content

Part 1: Generate crop related parameters using SNAP

1.1 Generate crop related vegetation indices from a subset of a Sentinel-2A/B L2A product and GF-1; using SNAP

1.2 Estimation of the LAI biophysical variable using SNAP tool and VIs

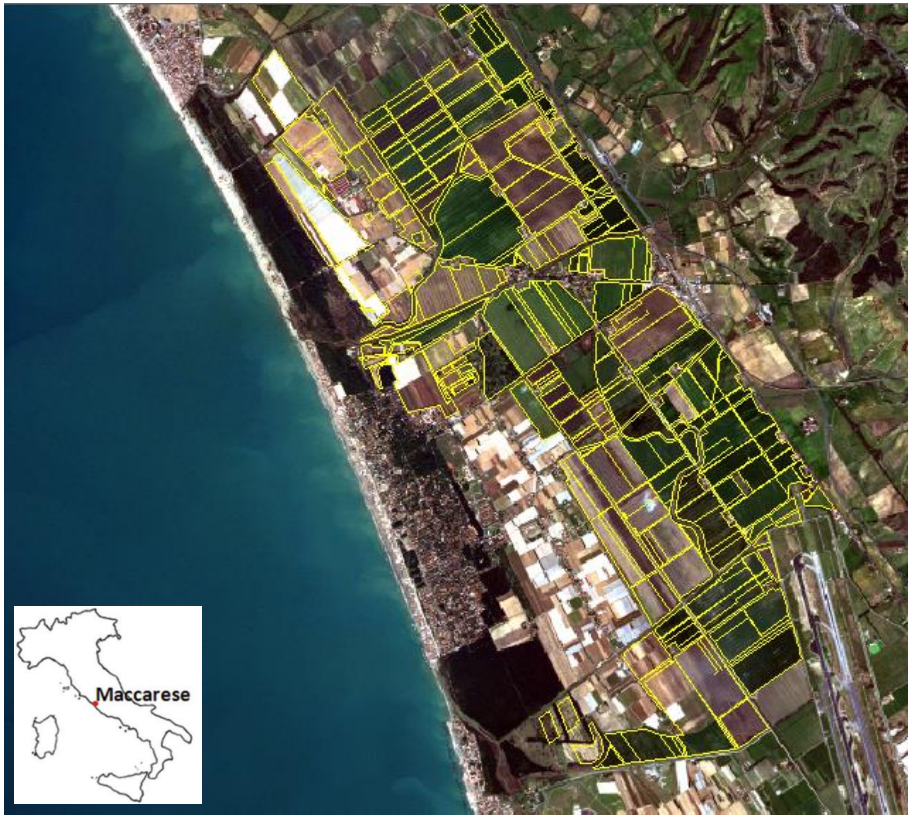
1.3 Extract the soil line to generate VIs less affected by soil contribution; using SNAP

Part 2: Generate biophysical variables from RTM, using SNAP

2.1 Generate crop biophysical variables (LAI, LAI_Cab, LAI_cw, FAPAR, FCOVER) from a subset of a Sentinel-2 L2A product and GF-1; using SNAP

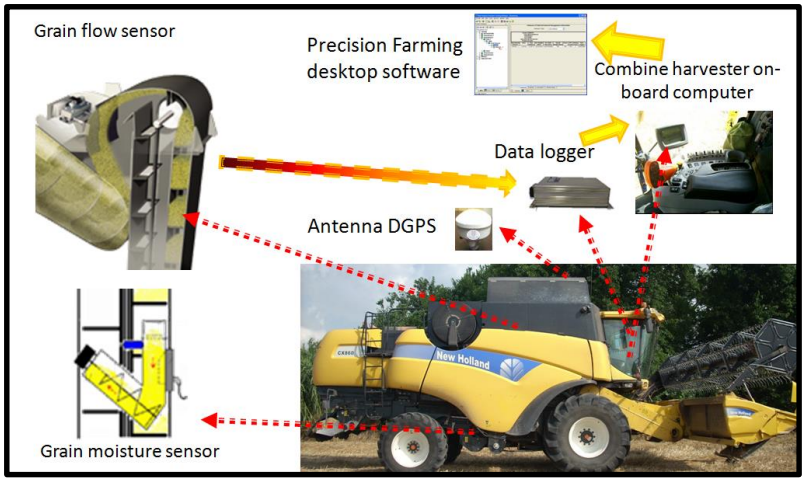
Part 3: Validation using ground measurements

Study area 1: Maccarese test site , Italy

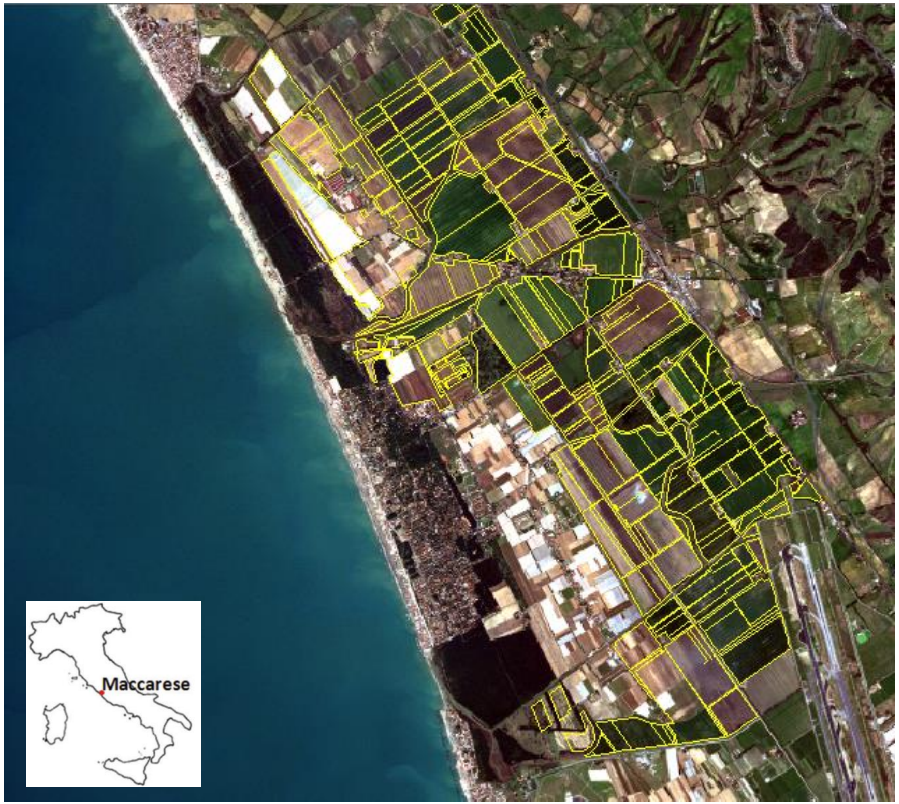


Large private farm 3,200 *ha* flat coastal area close to Rome

- 41° 52‘ N , 12° 12‘ E
- large fields (15 – 100 ha plots)
- precision farming equipment
- http://www.maccaresespa.com/azienda.htm

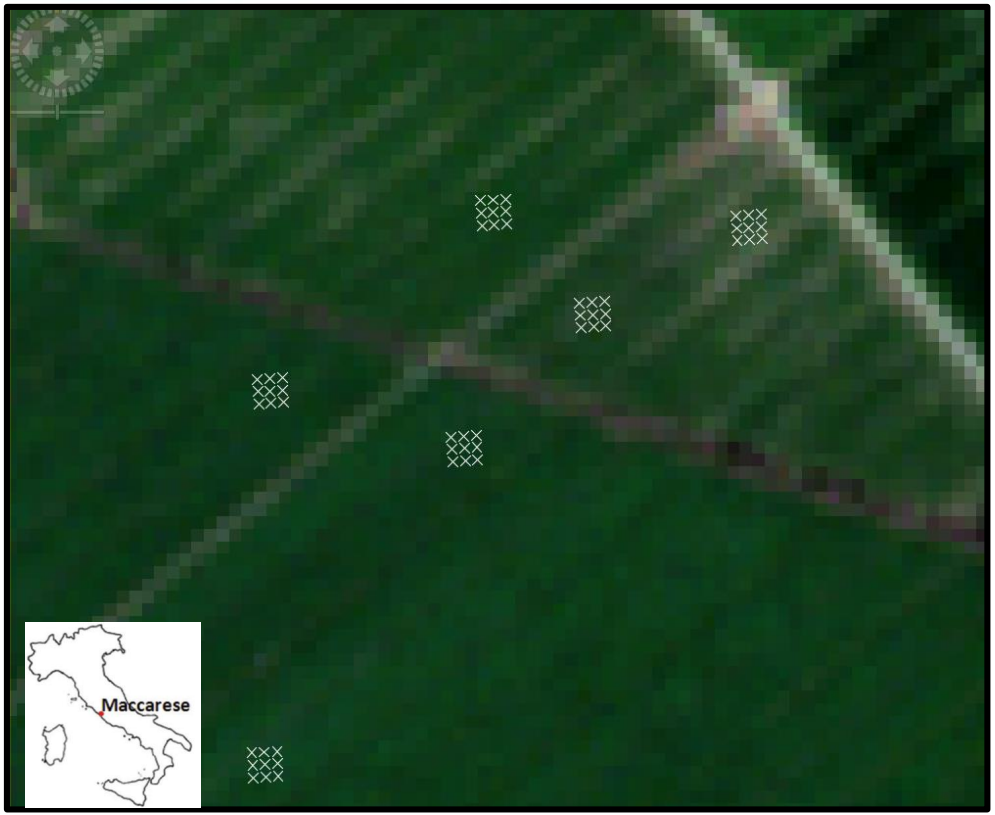


Maccarese Image Data



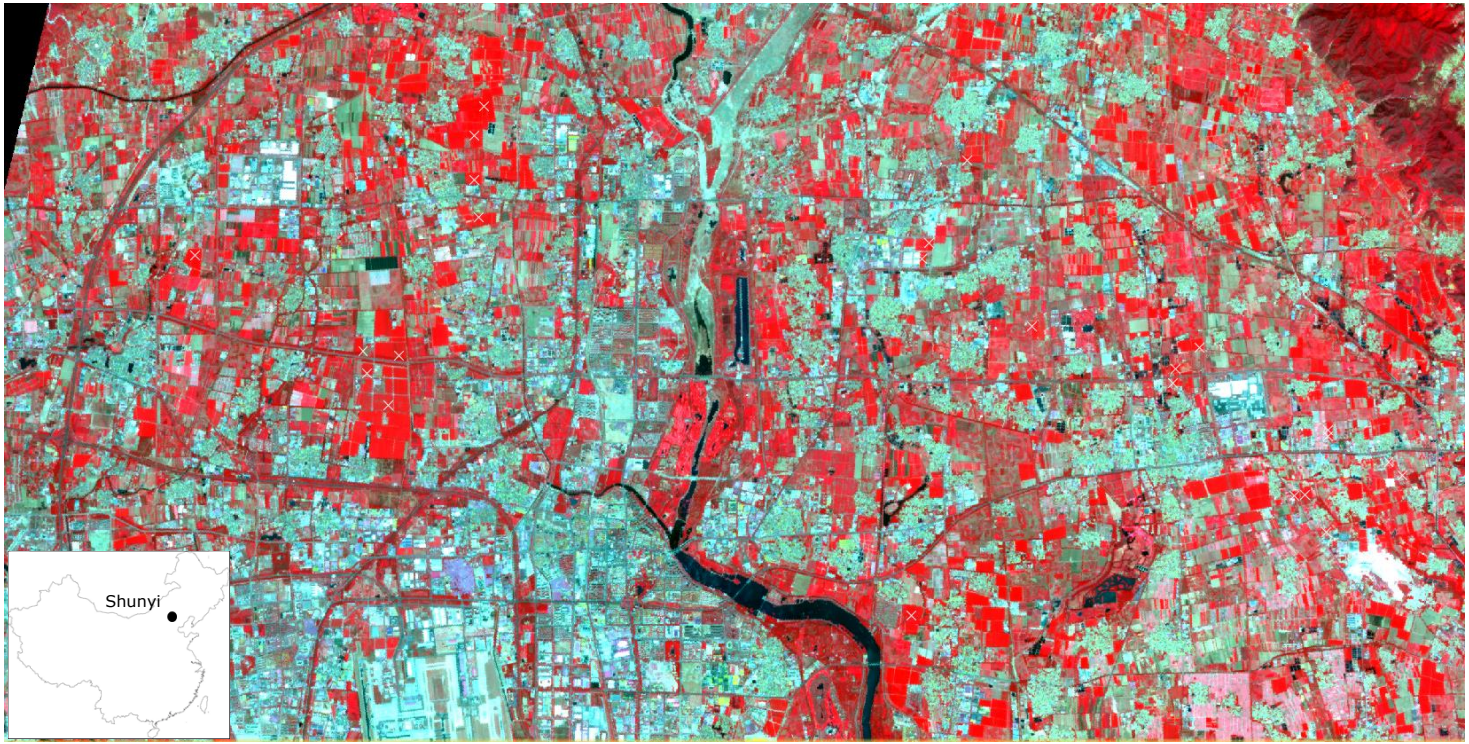
- Sentinel-2A and 2B
- Time series from January to June 2018
- 12 spectral bands at 10 m spatial resolution
- Level 2A after Sen2Cor preprocessing

Maccarese Ground Measurements



- The crop biophysical variables were sampled according to elementary sampling unit (ESU) scheme (quadrat of 20 m by 20m);
- 15 ESUs, placed at different locations were employed at different sampling dates;
- Each ESU contains 9 points, where LAI (LAI 2000/2200C) and Chlorophyll (Force-A Dualex leaf clip) measurements were collected on winter wheat.

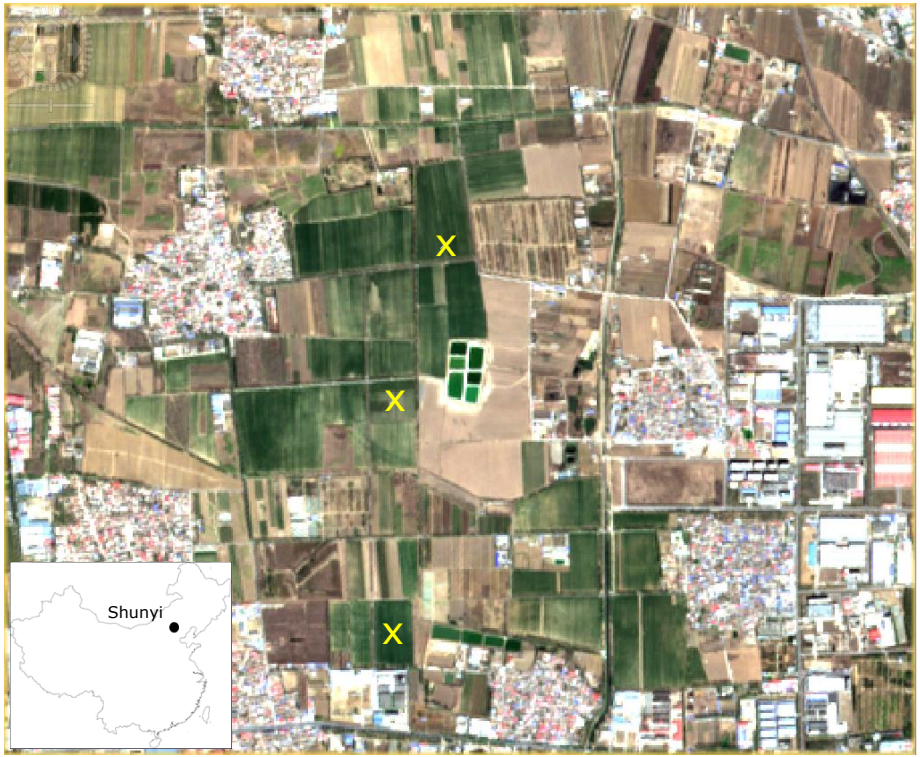
Study area 2: Shunyi test site, China



Sparse experimental fields in an agricultural district near Beijing

Ground campaigns carried out between April 2016 and May 2016 on the winter wheat (*Triticum aestivum L.*) crop

Shunyi Reference Data

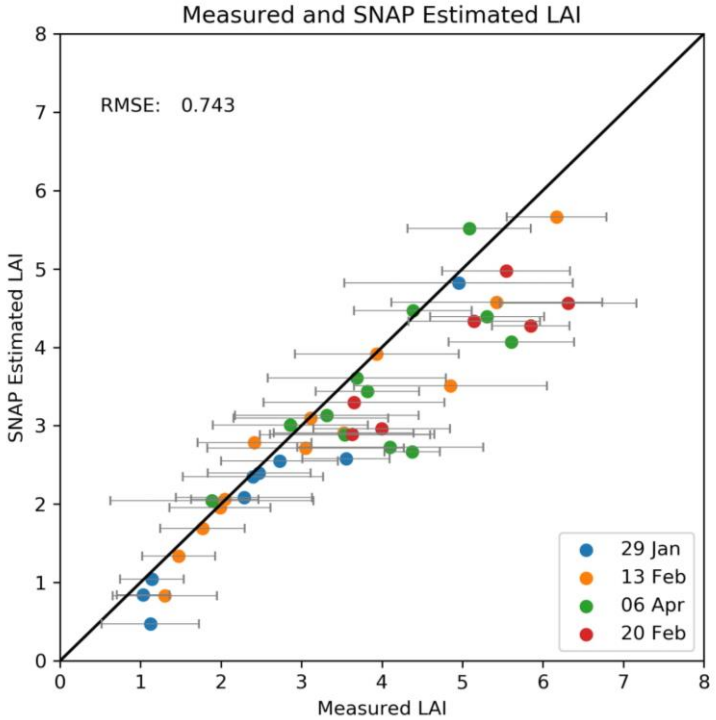


- The crop biophysical variables were sampled along the growing season;
- 24 points placed at different locations were employed at different sampling dates;
- For each point LAI (LAI 2000/2200C) and Chlorophyll (Force-A Dualex leaf clip) measurements were collected.

Methodology

- Retrieval of crop related biophysical variables using RTM and VIs as implemented in SNAP
- VI optimization according to site-specific characteristics
- Accuracy assessed using ground measurements (LAI, FVC and Chlorophyll) for quantitative evaluation: like root mean squared error (RMSE), R^2, etc.

Upreti, D., et al. (2019). *Remote Sensing*, *11*(5), 481.



Software & Data

- SNAP 7.0 free open source software
- SNAP Sentinel-2 tools
- S-2 A/B time series
- GF-1 time series
- Maccarese Ground data, collected in collaboration with University of TUSCIA (VT), Italy
- Shunyi ground data provided by RADI CAS, Beijing (China)