



Agricultural Crop Classification with Synthetic Aperture Radar and Optical Remote Sensing

October 5, 7, 12, 14, & 19, 2021

10:00-12:30 (English) or 13:00-15:30 (Spanish) EDT (UTC-4)

This five-part, intermediate webinar series will focus on the use of synthetic aperture radar (SAR) from Sentinel-1 and/or optical imagery from Sentinel-2 to map crop types and assess their biophysical characteristics. The webinar will cover a SAR and optical refresher along with pre-processing and analysis of Sentinel-1 and Sentinel-2 data using the Sentinel Application Platform (SNAP) and Python code written in JupyterLab, a web-based interactive development environment for scientific computing and machine learning. The webinar will also cover an operational roadmap for mapping crop type, including best practices for collecting field data to train and validate models for classifying crops on a national level. The final session of this series will cover crop biophysical variable retrievals using optical data.

Part 1: Synthetic Aperture Radar (SAR) Refresher

Instructors: Heather McNairn & Laura Dingle-Robertson (AAFC)

- SAR theory (phase, incidence angle, geometry, polarization, etc.)
- Optimal sensor parameters for agricultural applications
- Soil and crop characteristics on SAR response
- Q&A

Part 2: Optical Remote Sensing Refresher and Introduction to SNAP

Instructors: Magdalena Fitzryk & Fabrizio Ramoino (ESA)

- Basic physics, concepts and theory of optical remote sensing, and its applications for agriculture
- Optical imagery pre-processing using SNAP
- Q&A

Part 3: Operational Crop Classification Roadmap using Optical and SAR Imagery

Instructors: Heather McNairn & Laura Dingle-Robertson (AAFC)

- Roadmap for producing an Annual Crop Inventory
- Selection of radar + optical data for crop mapping
- Overview of how Agriculture and Agri-Food Canada (AAFC) collects training data
- SAR imagery pre-processing using SNAP
- Q&A



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Part 4: Operational Crop Classification Roadmap using Optical and SAR Imagery

Instructors: Georgia Karadimou & Tereza Roth (RUS)

- Explanation of Random Forest, Support Vector Machine, and Unsupervised algorithms as classifiers
- Explain Python libraries for running classifiers in JupyterLab
- Use of SNAP and Python for crop classification, including demonstration of different parameters (e.g., S1 vs. S2 alone) when classifying crop types in a given study area
- Q&A

Part 5: Biophysical Variable Retrieval using Optical Imagery to Support Agricultural Monitoring Practices

Instructors: Sophie Bontemps & Pierre Defourny (ESA)

- Biophysical Variables (LAI, FAPAR, FVC, Cab and CWC) derived from Sentinel-2
- Radiometric Indices: Quantitative measures of features that are obtained by combining several spectral bands
- Q&A



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