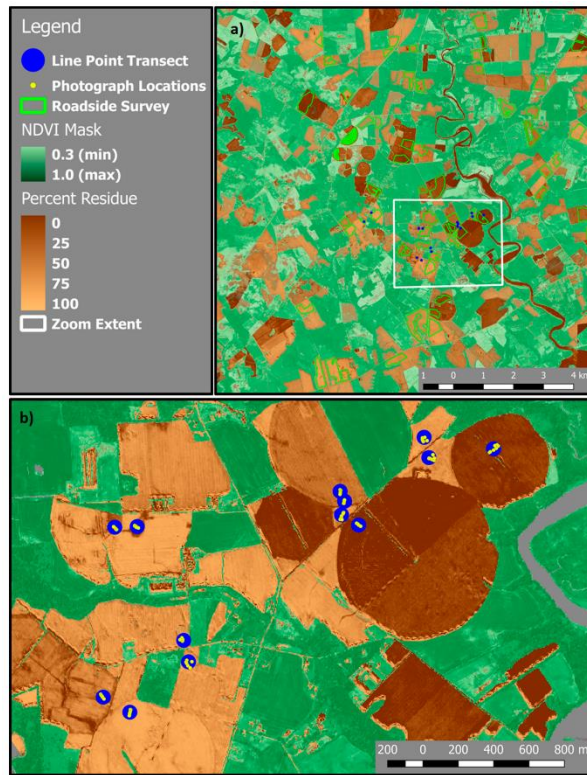


Tillage and Crop Residue Cover Practices



Map of calculated percent residue cover on non-vegetated fields within (a) the WorldView-3 (WV3) shortwave infrared (SWIR) imagery extent and (b) the extent of on-farm sampling. Green shading represents levels of vegetation measured by the Normalized Difference Vegetation Index (NDVI), and tan shading represents mapped levels of crop residue on non-vegetated fields. Legend identifies line-point transect locations (blue dots), photo sampling locations (yellow points), and roadside survey boundaries (green polygons). (Source: Hively, W.D., Lamb, B.T., Daughtry, C.S., Shermeyer, J., McCarty, G.W. and Quemada, M., 2018. Mapping crop residue and tillage intensity using WorldView-3 satellite shortwave infrared residue indices. *Remote Sensing*, 10(10), p.1657.)

Product Category

- | | | | |
|----------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------------|
| <input checked="" type="checkbox"/> Land Use | <input type="checkbox"/> Natural Disaster | <input type="checkbox"/> Coast Management | <input type="checkbox"/> Earth's Surface Motion |
| <input type="checkbox"/> Land Cover | <input type="checkbox"/> Climate Change | <input type="checkbox"/> Marine | |

Financial Domain(s)

- Investment management Risk analysis Insurance management Green finance

User requirements

UN18: Need to monitor crop productivity.

Description

An EO product designed for monitoring tillage and crop residue cover practices involves the use of remote sensing technology to assess the extent and intensity of tillage operations, as well as the amount of crop residue left on agricultural fields. This product provides valuable insights into sustainable farming practices and their relation to crop productivity. Tracking tillage and residue cover, enables farmers and agricultural policymakers to optimize land management strategies, reducing soil erosion and conserving moisture. The maintenance of crop residues on fields can improve soil health, reduce weed growth, and enhance nutrient retention, ultimately promoting higher crop yields and increased agricultural sustainability.

Spatial Coverage Target

Individual farm level

Data Throughput

- | | | |
|-------------------|-------------------------------|-----------------------------------------|
| Rapid tasking | <input type="checkbox"/> High | <input checked="" type="checkbox"/> Low |
| Data availability | <input type="checkbox"/> High | <input checked="" type="checkbox"/> Low |

Product specifications



EO-FIN

Product specifications	
Main processing steps	Based on calculating phenology metrics, monitoring activities following the conclusion of the first growing season, such as ploughing and residue management, can be accomplished by utilizing soil, senescence, and tillage indices. Soil indices can help determine if the soil remains fallow or is being actively managed. Additionally, the use of senescence and tillage indices allows for distinguishing between different levels of intensity in ploughing and residue management scenarios. To achieve this, it is essential to have sampling points with known tillage practices and residue management to train and validate the modelling process.
Input data sources	Optical: Sentinel-2, VHR based on the availability like Pleiades 1A/1B & NEO, WorldView2&3, and SPOT6/7 Radar: Sentinel-1 Supporting data: Crop phenology observations, ground truth tillage and crop residue practices
Accessibility	Sentinel-1&2: freely and publicly available from ESA. Optical VHR imagery: commercially available on demand from EO service providers.
Spatial resolution	Sentinel-2: 10 m Optical VHR: ≤ 1 m Sentinel-1: 20 m
Frequency (Temporal resolution)	Sentinel-2: 6 days Optical VHR: Sub-daily to Daily Sentinel-1: 6 days
Latency	< 1 Day
Geographical scale coverage	Globally
Delivery/ output format	Data type: Raster File format: GeoTIFF
Accuracies	Thematic accuracy: 80-90% Spatial accuracy: 1.5-2 pixels of input data
Constraints and limitations	<ul style="list-style-type: none"> ■ The lack of local in-situ data ■ Cloud presence ■ The effectiveness of the product can be affected by environmental conditions such as heavy rain, snow cover, or flooding, which can obscure the view of the land surface or modify tillage and residue patterns. ■ Different crops and crop varieties may have varying residue cover practices, making it challenging to establish a one-size-fits-all monitoring system.
User's level of knowledge and skills to extract information and perform further analysis on the EO products.	Skills: Essential Knowledge: Essential