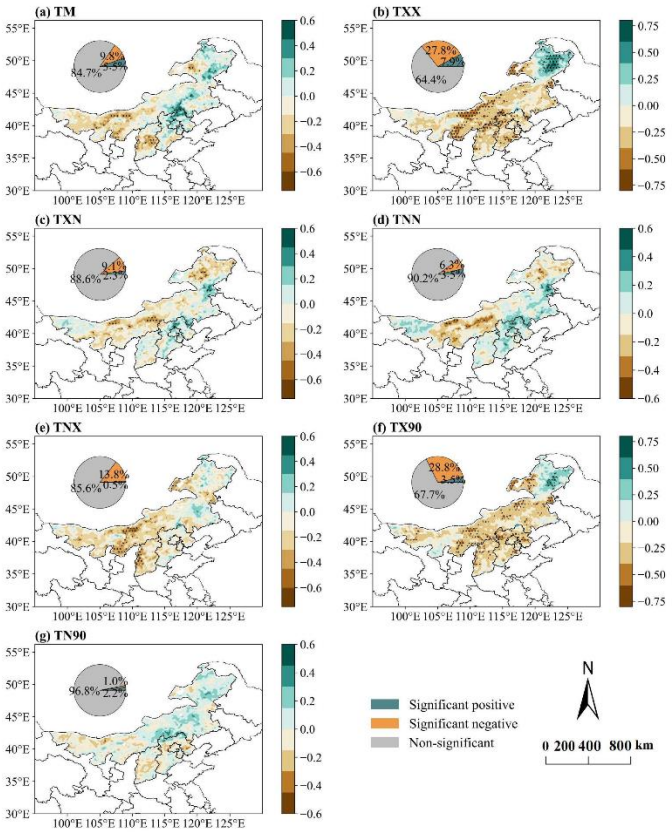
EO-FIN

Impact of Increased Temperatures on Soil Moisture and Vegetation Condition



Spatial patterns of the correlations between the NDVI and the extreme-high-temperature indices in North China from 1982 to 2015 (Source: Yang, Q., Jiang, C. and Ding, T., 2023. Impacts of Extreme-High-Temperature Events on Vegetation in North China. Remote Sensing, 15(18), p.4542.).

Product Category

☐ Land Use ☐ Natural Disaster ☐ Coast Management ☐ Earth's Surface Motion
☐ Land Cover ■ Climate Change ☐ Marine

Financial Domain(s)

☐ **Investment management** ■ **Risk analysis** ☐ **Insurance management** ☐ **Green finance**

User requirements

UN41: Need to monitor the impact of increased temperatures on assets.

Description

This product offers a comprehensive understanding of how temperature changes affect soil moisture levels and the overall health of vegetation. Such information is invaluable for financial institutions, investors, and insurers as it enables them to evaluate climate-related risks associated with agricultural investments, land portfolios, and insurance underwriting. This product is generated by analysing the correlation between temperature maps, soil moisture data and vegetation indices that have been generated through the EO dataset.

Spatial coverage target

Asset level

Data throughput

Rapid tasking ☐ High ■ Low
Data availability ☐ High ■ Low

Product specifications	
Main processing steps	The first stage is to generate time series maps of the temperature, soil moisture, and vegetation indices over the asset. These data can be downloaded directly from open access sources such as those provided by Copernicus,

Product specifications	
	MODIS, or EUMETSAT. Subsequently, time series analysis would be applied to gain insight into the correlation between the variables.
Input data sources	Optical: Sentinel-2&3 to calculate vegetation indices. Radar: N.A Satellite-based products: for soil moisture: ESA C3S SSM, SMOS L2 SSM, H SAF ASCAT SSM, SMAP L4 RZSM, VanderSat, and Soil Water Index (SWI) from Copernicus Land Services. Reanalysis products: Temperature data from ERA5 land Supporting data: N.A
Accessibility	Sentinel-2&3, ESA C3S SSM, SMOS L2 SSM, SWI, and ERA5 land are freely and publicly available through ESA. H SAF ASCAT SSM: is publicly and freely available from EUMETSAT. SMAP L4 RZSM: is publicly and freely available from NASA. VanderSat is commercially available through VanderSat.
Spatial resolution	Sentinel-2: 10 m Sentinel-3: 300 m ESA C3S SSM: 0.25° SMOS L2 SSM: 36 km SWI: 0.1° globally and 1 km over Europe H SAF ASCAT SSM: 6.25 km & 12.5 km SMAP L4 RZSM: 9 km VanderSat: 100m ERA5 land: 0.1°
Frequency (Temporal resolution)	Sentinel-2: ~ 6 days Sentinel-3: 1-2 days ESA C3S SSM: Daily SMOS L2 SSM: 1-2 days SWI: daily H SAF ASCAT SSM: 1-2 days SMAP L4 RZSM: Daily VanderSat: Daily ERA5 land: Hourly
Latency	Sentinel-2: ≤ 1 day Sentinel-3: ≤ 1 day ESA C3S SSM: ~ 10 days SMOS L2 SSM: 1 day SWI: 1-2 days H SAF ASCAT SSM: 1 day SMAP L4 RZSM: 7 days VanderSat: N.A ERA5: ≤ 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	■ Low spatial resolution of products for temperature and soil moisture ■ Cloud presence ■ Ground truth data is important for validation purposes
Level of skills required by users to use the EO service	Skills: Essential Knowledge: Essential