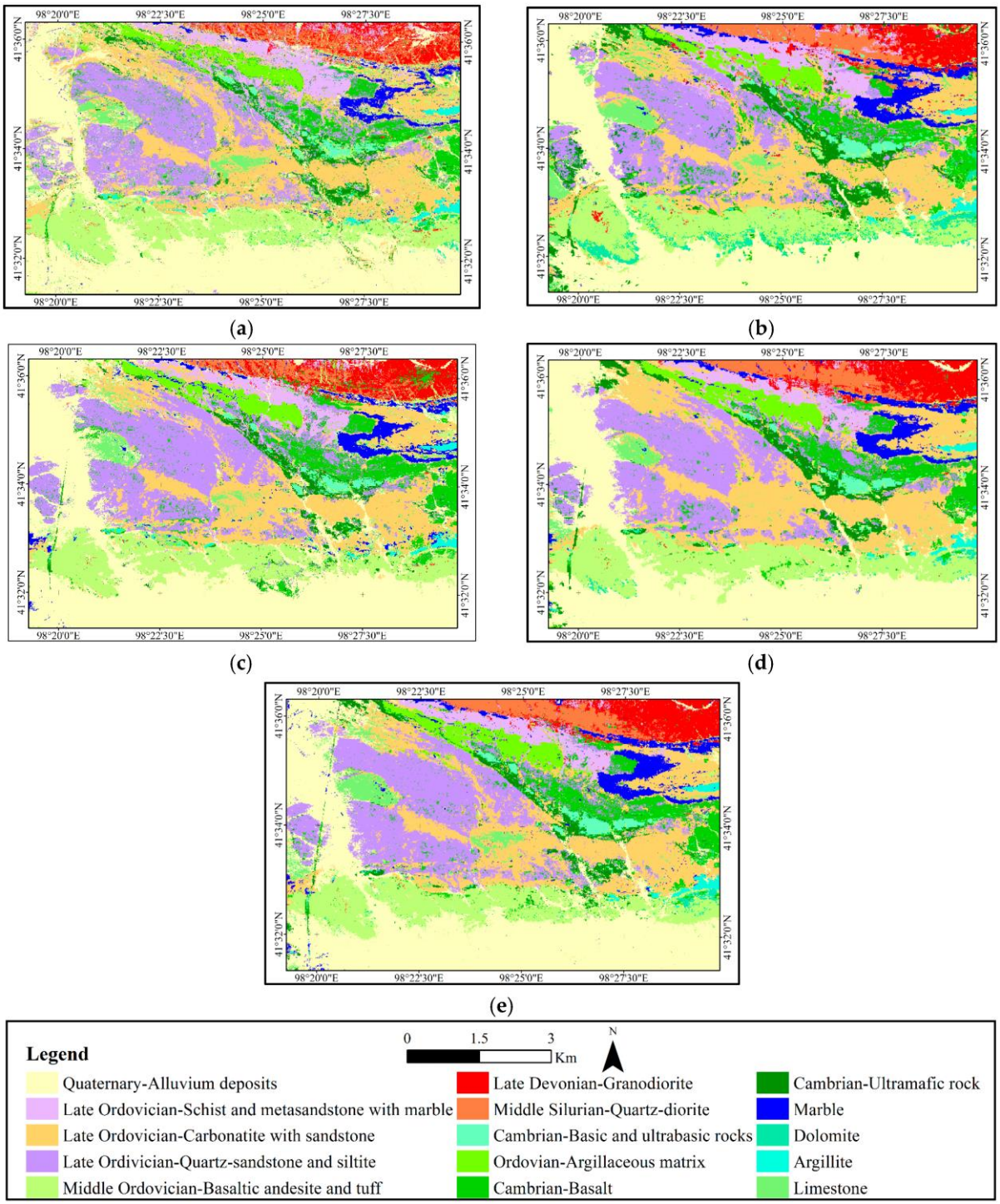

Lithological classification in the Shibanjing Ophiolite Complex in Inner Mongolia, China using Sentinel-2 and DEM using machine learning methods. (a) k-nearest neighbour (k-NN); (b) random forest classifier (RFC); (c) artificial neural network (ANN); (d) support vector machine (SVM); (e) maximum likelihood classification (MLC) (Source: Ge, W., Cheng, Q., Tang, Y., Jing, L. and Gao, C., 2018. Lithological classification using Sentinel-2A data in the Shibanjing ophiolite complex in Inner Mongolia, China. Remote Sensing, 10(4), p.638.).

EO-FIN

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

UN9: Understanding stock levels and monitoring supply chains.

Description

This product provides a spatial characterization of surface rock and soil types based on satellite imagery. These maps can be used by mining exploration companies to know the mineral composition of the area they are exploring. Litho-types can be distinguished based on their spectral signatures, as well as their associations with topographical and geomorphological features, in particular surface texture (roughness) and patterns (including drainage patterns).

Spatial coverage target

Mining area

Data throughput

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

Product specifications	
Main processing steps	Lithology and surficial geology maps are produced based on supervised classification techniques. These maps are produced by applying supervised classification algorithms (e.g., machine learning based algorithms) using data from multispectral imagery like Sentinel-2 and other ancillary EO data like DEM. These models should be trained by using reference maps which were generated by in-field surveys.
Input data sources	Optical: Sentinel-2 Radar: N.A Supporting data: DEM
Accessibility	Sentinel-2: is freely and publicly available through ESA.
Spatial resolution	Sentinel-2: 10 m
Frequency (Temporal resolution)	Sentinel-2: ~ 6 days
Latency	Sentinel-2: ≤ 1 day
Geographical scale coverage	Globally
Delivery/ output format	Data type: Raster File format: GeoTiff
Accuracies	Thematic accuracy: 75-85% Spatial accuracy: 1.5-2 pixels of input data
Constraints and limitations	■ Mapping lithology is most effective in arid and semi-arid regions. ■ It becomes more difficult and less accurate in temperate and tropical areas where weathering is extensive, and dense vegetation cover is prevalent. ■ Cloud presence. ■ Rely on reference data.
Level of skills required by users to use the EO service	Skills: Essential Knowledge: Essential