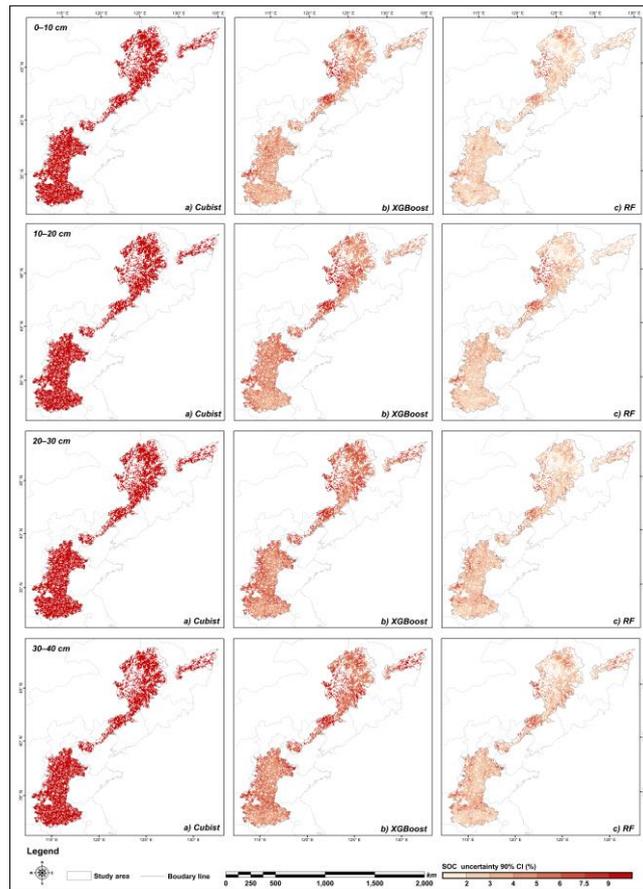


**Figure S1.** Spatial and vertical distribution pattern of SOC concentration with Cubist, XGBoost and RF.



**Figure S2.** Spatial and vertical distribution pattern of uncertainty with Cubist, XGBoost and RF.

**Table S1.** List of all environmental covariates

<b>Factor</b>	<b>Number</b>	<b>Content</b>
Soil and Parent material	29	Soil Moisture, Sand Content, Silt Content, Clay Content, Brightness Index, Clay Index, Hue Index, Saturation Index, Bare Soil Index, Salinity Ratio Index, Soil Organic Carbon Index, Canopy Response Salinity Index, Grain Size Index, Reflectance Absorption Index, Ratio-Based, Stress Related, Redness Index, Soil Deposit Thicknesses, Soil Temperature, Soil Type, Soil Erosion, Carbonate Index, Coloration Index, Ferrous Minerals, Gypsum Index, Iron Oxide, Sedimentary Rock Type Index, Lithology
Climate	41	Land Surface Day Temperature, Land Surface Night Temperature, Evapotranspiration, Potential Evapotranspiration, Latent Heat Flux, Potential Latent Heat Flux, Burn Date, Palmer Drought Severity Index, Snow Cover Fraction, Precipitation, Minimum Temperature, Maximum Temperature, Mean Temperature, Vapour Pressure, Wind Speed, Solar Radiation, Relative Humidity, Sunshine Duration, Annual Mean Temperature, Mean Diurnal Range, Isothermality, Temperature Seasonality, Max Temperature of Warmest Month, Min Temperature of Coldest Month, Temperature Annual Range, Mean Temperature of Wettest Quarter, Mean Temperature of Driest Quarter, Mean Temperature of Warmest Quarter, Mean Temperature of Coldest Quarter, Annual Precipitation, Precipitation of Wettest Month, Precipitation of Driest Month, Precipitation Seasonality, Precipitation of Wettest Quarter, Precipitation of Driest Quarter, Precipitation of Warmest Quarter, Precipitation of Coldest Quarter, Moisture Stress Index, Normalized Difference Snow Index, Normalized Difference Water Index, Pedoclimatic Zone
Organism	51	Atmospherically Resistant Vegetation Index, Blue-Wide Dynamic Range Vegetation Index, Chlorophyll Vegetation Index, Differenced Vegetation Index, Enhanced Vegetation Index, Green Atmospherically Resistant Vegetation Index, Green Leaf Index, Green Normalized Difference Vegetation Index, Green-Blue Normalized Difference Vegetation Index, Infrared Percentage Vegetation Index, Modified Soil Adjusted Vegetation Index, Norm NIR, Normalized Difference Tillage Index, Normalized Difference Vegetation Index, Ratio Vegetation Index, Normalized Difference Red/Green Redness Index, Renormalized difference Vegetation Index, Soil-Adjusted Vegetation Index, Soil Adjusted Total

Vegetation Index, Optimized Soil-Adjusted  
 Vegetation Index, Green-Red Normalized Difference  
 Vegetation Index, Blue Normalized Difference  
 Vegetation Index, Modified Normalized Difference  
 Vegetation Index, Normalized Burnt Ratio,  
 Generalized Difference Vegetation Index, Two-Band  
 Enhanced Vegetation Index, Extended Normalized  
 Difference Vegetation Index, Extended Enhanced  
 Vegetation Index, Global Vegetation Moisture Index,  
 Transformed Vegetation Index, Green-Red  
 Difference Index, Green Ratio Vegetation Index,  
 Green Difference Index, Normalized Difference  
 Drought Index, Canopy Index, Normalized Canopy  
 Index, Modified Normalized Difference, Green  
 Vegetation Index, Norm GREEN, Norm RED,  
 Combined Spectral Response Index, Global  
 Environment Monitoring Index, Gross Primary  
 Production, Net Primary Productivity, Leaf Area  
 Index, Fraction of Absorbed Photosynthetic Active  
 Radiation, Bare Surface Frequency, Fractional Tree  
 Cover, Aboveground Biomass, Belowground  
 Biomass, Vegetation Type  
 Digital Elevation Model, Analytical Hillshading,  
 Slope, Aspect, Plan Curvature, Profile Curvature,  
 Convergence Index, Closed Depressions, Total  
 Catchment Area, Topographic Wetness Index, Slope-  
 Length Factor, Channel Network Base Level,  
 Channel Network Distance, Valley Depth, Relative  
 Slope Position, Curvature Classification, Landform,  
 Maximum Membership, Entropy, Confusion Index,  
 Geomorphons, Morphometric Features, Generalized  
 Surface, Longitudinal Curvature, Cross-Sectional  
 Curvature, Surface Special Point Result, TPI Based  
 on Landform Classification Landforms, Clusters,  
 Hill Height, Valley Index, Hill Index, Hillslope  
 Index, Fill DEM, DEM No Flats, DEM Flats, Sink  
 Route, Sink Removal, Gradient, Gradient Difference,  
 Protection Index, Multi-Scale Topographic Position  
 Index, Multiresolution Index of Valley Bottom  
 Flatness, Multiresolution Index of Ridge Top  
 Flatness, Surface Area, Slope Height, Normalized  
 Height, Standardized Height, Mid-Slope Position,  
 General Curvature, Tangential Curvature, Minimal  
 Curvature, Maximal Curvature, Total Curvature,  
 Flow Line Curvature, Terrain Ruggedness Index,  
 Convexity, Texture, Topographic Position Index,  
 Local Curvature, Upslope Curvature, Local Upslope  
 Curvature, Downslope Curvature, Local Downslope  
 Curvature, Vector Terrain Ruggedness, Visible Sky,  
 Sky View Factor, Terrain View Factor, Average View  
 Distance, Positive Openness, Negative Openness,

Relief

111

		Direct Insolation, Diffuse Insolation, Total Insolation, Direct to Diffuse Ratio, Compare to Flat Terrain, Duration of Insolation, Sunrise, Sunset, Sediment Top Elevation, Coastline, Normals, Diurnal Anisotropic Heating, Wind Exposition, Wind Shelter Index, Flow Direction, Flow Connectivity, Strahler Order, Drainage Basins, Ridge Level, Cell Balance, Slope Length, Upslope Length Factor, Effective Flow Length, Upslope Slope, Sediment Balance, Catchment Area, Maximum Height, Melton Ruggedness Number, Catchment Slope, Modified Catchment Area, SAGA Wetness Index, Stream Power Index, Flow Accumulation, Edge Contamination, Flow Path Length, Flow Width, Maximum Flow Path Length, Upslope Area Height, Upslope Area Slope, Upslope Area Aspect, Geomorphology
Position	2	X coordinates, Y coordinates
Remote sensing	15	Blue Band, Green Band, Red Band, Near Infrared Band, Shortwave Infrared 1 Band, Shortwave Infrared 2 Band, Principal Component 1, Principal Component 2, Principal Component 3, Tasseled Cap 1, Tasseled Cap 2, Tasseled Cap 3, Wetness Brightness Difference Index, Downward Shortwave Radiation, Downward Longwave Radiation

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