

SUPPLEMENTARY MATERIAL

Table S1. Validation results of the PCR models for estimating SOC using the 350-2500 nm spectrum.

PCR	Untransformed Full Spectrum	First Derivative Full Spectrum	Smoothed Full Spectrum
A1	<p>A1 - Untransformed spectrum (11 factors)</p> <p> $R^2 = 0.86$ $R^2 \text{ adj.} = 0.84$ RMSE = 15.2% RPD = 2.03 </p>	<p>A1 - 1st derivative (17 factors)</p> <p> $R^2 = 0.91$ $R^2 \text{ adj.} = 0.90$ RMSE = 17.6% RPD = 1.76 </p>	<p>A1 - Smoothed reflectance (11 factors)</p> <p> $R^2 = 0.86$ $R^2 \text{ adj.} = 0.84$ RMSE = 15.0% RPD = 2.06 </p>
A2	<p>A2 - Untransformed spectrum (19 factors)</p> <p> $R^2 = 0.40$ $R^2 \text{ adj.} = 0.34$ RMSE = 21.7% RPD = 1.30 </p>	<p>A2 - 1st derivative (5 factors)</p> <p> $R^2 = 0.13$ $R^2 \text{ adj.} = 0.03$ RMSE = 25.7% RPD = 1.10 </p>	<p>A2 - Smoothed reflectance (20 factors)</p> <p> $R^2 = 0.39$ $R^2 \text{ adj.} = 0.32$ RMSE = 22.1% RPD = 1.28 </p>
A1&A2	<p>A1 & A2 - Untransformed spectrum (26 factors)</p> <p> $R^2 = 0.77$ $R^2 \text{ adj.} = 0.76$ RMSE = 10.6% RPD = 2.11 </p>	<p>A1 & A2 - 1st derivative (1 factor)</p> <p> $R^2 = 0.17$ $R^2 \text{ adj.} = 0.13$ RMSE = 29.2% RPD = 0.77 </p>	<p>A1 & A2 - Smoothed reflectance (20 factors)</p> <p> $R^2 = 0.73$ $R^2 \text{ adj.} = 0.72$ RMSE = 11.6% RPD = 1.93 </p>

Table S2. Validation results of the PLSR models for estimating SOC using the 350-2500 nm spectrum

PLSR	Untransformed Full Spectrum	First Derivative Full Spectrum	Smoothed Full Spectrum
A1	<p>A1 - Untransformed spectrum (8 factors)</p> <p> $R^2 = 0.81$ $R^2 \text{ adj.} = 0.78$ RMSE = 15.0% RPD = 2.07 </p>	<p>A1 - 1st derivative (6 factors)</p> <p> $R^2 = 0.88$ $R^2 \text{ adj.} = 0.86$ RMSE = 16.0% RPD = 1.93 </p>	<p>A1 - Smoothed reflectance (7 factors)</p> <p> $R^2 = 0.84$ $R^2 \text{ adj.} = 0.81$ RMSE = 15.1% RPD = 2.04 </p>
A2	<p>A2 - Untransformed spectrum (11 factors)</p> <p> $R^2 = 0.44$ $R^2 \text{ adj.} = 0.38$ RMSE = 22.3% RPD = 1.27 </p>	<p>A2 - 1st derivative (1 factor)</p> <p> $R^2 = 0.07$ $R^2 \text{ adj.} = 0.02$ RMSE = 29.2% RPD = 0.97 </p>	<p>A2 - Smoothed reflectance (11 factors)</p> <p> $R^2 = 0.47$ $R^2 \text{ adj.} = 0.41$ RMSE = 21.8% RPD = 1.29 </p>
A1&A2	<p>A1 & A2 - Untransformed spectrum (12 factors)</p> <p> $R^2 = 0.73$ $R^2 \text{ adj.} = 0.71$ RMSE = 11.9% RPD = 1.88 </p>	<p>A1 & A2 - 1st derivative (1 factor)</p> <p> $R^2 = 0.19$ $R^2 \text{ adj.} = 0.14$ RMSE = 30.2% RPD = 0.74 </p>	<p>A1 & A2 - Smoothed reflectance (20 factors)</p> <p> $R^2 = 0.76$ $R^2 \text{ adj.} = 0.75$ RMSE = 11.2% RPD = 1.99 </p>

Table S3. Validation results of the PCR models for SOC prediction after selecting the spectral bands.

PCR	Untransformed Selected Bands	First Derivative Selected Bands	Smoothed Selected Bands
A1	<p>A1 - Untransformed spectrum (10 factors)</p> <p> $R^2 = 0.96$ $R^2 \text{ adj.} = 0.90$ RMSE = 11.7% RPD = 2.65 </p>	<p>A1 - 1st derivative (10 factors)</p> <p> $R^2 = 0.90$ $R^2 \text{ adj.} = 0.89$ RMSE = 10.8% RPD = 2.85 </p>	<p>A1 - Smoothed reflectance (9 factors)</p> <p> $R^2 = 0.91$ $R^2 \text{ adj.} = 0.90$ RMSE = 9.2% RPD = 3.38 </p>
A2	<p>A2 - Untransformed spectrum (5 factors)</p> <p> $R^2 = 0.61$ $R^2 \text{ adj.} = 0.57$ RMSE = 18.1% RPD = 1.36 </p>	<p>A2 - 1st derivative (10 factors)</p> <p> $R^2 = 0.75$ $R^2 \text{ adj.} = 0.72$ RMSE = 15.9% RPD = 1.77 </p>	<p>A2 - Smoothed reflectance (4 factors)</p> <p> $R = 0.61$ $R^2 \text{ adj.} = 0.56$ RMSE = 20.2% RPD = 1.40 </p>
A1&A2	<p>A1&A2 - Untransformed spectrum (6 factors)</p> <p> $R^2 = 0.71$ $R^2 \text{ adj.} = 0.70$ RMSE = 11.8% RPD = 1.90 </p>	<p>A1&A2 - 1st derivative (11 factors)</p> <p> $R^2 = 0.82$ $R^2 \text{ adj.} = 0.81$ RMSE = 10.2% RPD = 2.19 </p>	<p>A1&A2 - Smoothed reflectance (13 factors)</p> <p> $R^2 = 0.88$ $R^2 \text{ adj.} = 0.87$ RMSE = 7.7% RPD = 2.90 </p>

Table S4. Validation results of the PLSR models for SOC prediction after selecting the spectral bands.

PLSR	Untransformed Selected Bands	First Derivative Selected Bands	Smoothed Selected Bands
A1	<p>A1 - Untransformed spectrum (9 factors)</p> <p> $R^2 = 0.95$ $R^2 \text{ adj.} = 0.95$ RMSE = 14.1% RPD = 2.19 </p>	<p>A1 - 1st derivative (9 factors)</p> <p> $R^2 = 0.90$ $R^2 \text{ adj.} = 0.89$ RMSE = 10.9% RPD = 2.85 </p>	<p>A1 - Smoothed reflectance (8 factors)</p> <p> $R^2 = 0.92$ $R^2 \text{ adj.} = 0.91$ RMSE = 8.7% RPD = 3.56 </p>
A2	<p>A2 - Untransformed spectrum (5 factors)</p> <p> $R^2 = 0.61$ $R^2 \text{ adj.} = 0.57$ RMSE = 18.2% RPD = 1.56 </p>	<p>A2 - 1st derivative (7 factors)</p> <p> $R^2 = 0.74$ $R^2 \text{ adj.} = 0.71$ RMSE = 15.9% RPD = 1.78 </p>	<p>A2 - Smoothed reflectance (4 factors)</p> <p> $R^2 = 0.61$ $R^2 \text{ adj.} = 0.56$ RMSE = 20.2% RPD = 1.40 </p>
A1&A2	<p>A1&A2 - Untransformed spectrum (6 factors)</p> <p> $R^2 = 0.71$ $R^2 \text{ adj.} = 0.70$ RMSE = 11.8% RPD = 1.90 </p>	<p>A1&A2 - 1st derivative (7 factors)</p> <p> $R^2 = 0.86$ $R^2 \text{ adj.} = 0.85$ RMSE = 9.7% RPD = 2.30 </p>	<p>A1&A2 - Smoothed reflectance (9 factors)</p> <p> $R^2 = 0.88$ $R^2 \text{ adj.} = 0.87$ RMSE = 7.9% RPD = 2.85 </p>