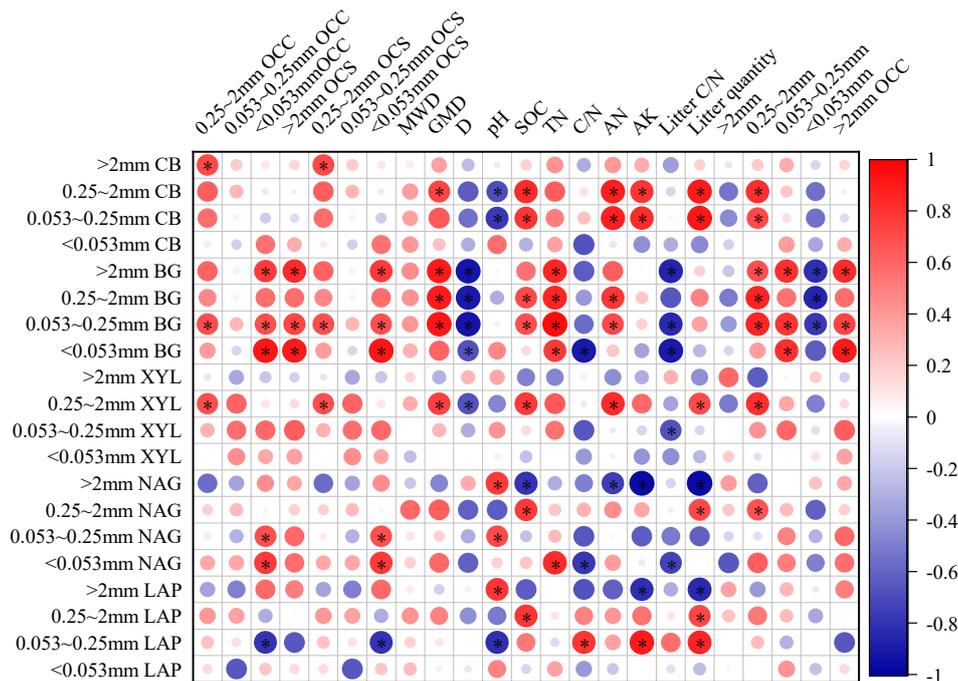


**Figure S1.** Correlation between soil aggregates, aggregate-associated SOC concentration, aggregate-associated SOC storage and physico-chemistry in three forest types. >2mm OCC: coarse macro-aggregates organic C content, 0.25–2 mm OCC: fine macro-aggregates organic C content, 0.053–0.25 mm OCC: micro-aggregates organic C content, <0.053 mm OCC: silt and clay fractions organic C content, >2mm OCS: coarse macro-aggregates organic C storage, 0.25–2 mm OCS: fine macro-aggregates organic C storage, 0.053–0.25 mm OCS: micro-aggregates organic C storage, <0.053 mm OCS: silt and clay fractions organic C storage, SOC: soil organic content, TN: total nitrogen, C/N: carbon and nitrogen ratio, AN: alkaline nitrogen; AK: available potassium, Litter C/N: carbon and nitrogen ratio of litter, MWD: mean weight diameter, GMD: geometric mean diameter, D: fractal dimension, \*:  $p < 0.05$ . The same below.



**Figure S2.** Correlation between enzyme activity, physics–chemistry and other properties in three forest types and aggregate fractions. CB: Cellobiohydrolase, BG:  $\beta$ -glucosidase, XYL:  $\beta$ -xylosidasen, NAG: N-acetylglucosaminidase, LAP: Leucine aminopeptidase. >2mm CB: Cellobiohydrolase enzyme activity of coarse macro-aggregates, 0.25–2 mm CB: Cellobiohydrolase enzyme activity of fine macro-aggregates, 0.053–0.25 mm CB: Cellobiohydrolase enzyme activity of micro-aggregates, <0.053 mm CB: Cellobiohydrolase enzyme activity of silt and clay fractions, >2mm BG:  $\beta$ -glucosidase enzyme activity of coarse macro-aggregates, 0.25–2 mm BG:  $\beta$ -glucosidase enzyme activity of fine macro-aggregates, 0.053–0.25 mm BG:  $\beta$ -glucosidase enzyme activity of micro-aggregates, <0.053 mm BG:  $\beta$ -glucosidase enzyme activity of silt and clay fractions, >2mm XYL:  $\beta$ -xylosidasen enzyme activity of coarse macro-aggregates, 0.25–2 mm XYL:  $\beta$ -xylosidasen enzyme activity of fine macro-aggregates, 0.053–0.25 mm XYL:  $\beta$ -xylosidasen enzyme activity of micro-aggregates, <0.053 mm XYL:  $\beta$ -xylosidasen enzyme activity of silt and clay fractions, >2mm NAG: N-acetylglucosaminidase enzyme activity of coarse macro-aggregates, 0.25–2 mm NAG: N-acetylglucosaminidase enzyme activity of fine macro-aggregates, 0.053–0.25 mm NAG: N-acetylglucosaminidase enzyme activity of micro-aggregates, <0.053 mm NAG: N-acetylglucosaminidase enzyme activity of silt and clay fractions, >2mm LAP: Leucine aminopeptidase enzyme activity of coarse macro-aggregates, 0.25–2 mm LAP: Leucine aminopeptidase enzyme activity of fine macro-aggregates, 0.053–0.25 mm LAP: Leucine aminopeptidase enzyme activity of micro-aggregates, <0.053 mm LAP: Leucine aminopeptidase enzyme activity of silt and clay fractions.