**Title:** Global patterns of vertical distribution of soil microbial biomass carbon

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Small changes in soil organic carbon (SOC) may have great influences on the climate-carbon (C) cycling feedback. However, there are large uncertainties in predicting the dynamics of SOC in soil profiles at the global scale, especially the role of soil microbial biomass in regulating the vertical distribution of SOC. Here, we developed a database of soil microbial biomass carbon (SMBC), SOC, and soil microbial quotient (SMQ=SMBC/SOC) from 289 soil profiles globally, as well as climate, ecosystem types, and edaphic factors associated with these soil profiles. We assessed the vertical distribution patterns of SMBC and SMQ and the contributions of climate, ecosystem types, and edaphic conditions to their vertical patterns. Our results showed that SMBC and SMQ decreased exponentially with soil depth, especially within the 0-40 cm soil depth. SOC also decreased exponentially with depth but in different magnitudes compared to SMBC and SMQ. Edaphic factors (*e.g.*, soil clay content and C/N ratio) had the strongest control on the vertical distributions of SMBC and SMQ, probably by mediating substrate and nutrient supplies for microbial growth in soils. In contrast, the vertical distribution of SOC was significantly affected by climate and edaphic factors. Climate and ecosystem types likely simultaneously affected multiple factors that control SMBC, such as the allocation of soil clay and nutrients along soil profiles. Overall, our data synthesis provides quantitative information of how SMBC, SMQ, and SOC changed along soil profiles at large spatial scales and identifies important factors that influence their vertical distributions. The findings can help improve the prediction of C cycling in the terrestrial ecosystem by incorporating the contributions of soil microbes in Earth system models.