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Morphology and classification of urban soils in Santiago de Compostela (Spain)

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Abstract

Many different soils can exist in urban areas, with a range of properties that determine their functionality and best potential use, just the same as in non-urban land. With the objective of increasing available knowledge on urban soil types, we have studied here the morphology of soils in the city of Santiago de Compostela (northwestern Spain). Thirteen profiles have been described, analyzed and classified following the World Reference Base for Soil Resources, corresponding to soils developed on different parent materials and affected by different degrees of artificialization. These include former natural and agricultural soils that have been encircled within the city during urban growth, soils constructed with human-altered and transported materials (HATM), and soils that have been sealed by pavement or concrete. In general, the soils are acid, rich in organic matter, with medium to coarse textures dominated by sandy loams, with presence of poorly-crystalline Fe and Al compounds, and variable amounts of artefacts (mainly coal, bricks and glass, as well as layers of construction sand). The soils developed on naturally-deposited materials are currently occupied by public parks and urban gardens, and can be classed in two groups: first, former or current forest soils, shallow, very acid and very rich in OM, classified as Umbric Leptosols and Haplic or Leptic Umbrisols; and a second group that corresponds to former agricultural terraced soils, deeper and less acid, classified as Haplic and Endocambic Umbrisols and Eutric Regosols. Regarding soils developed on HATM, two groups can also be established: first, soils formed on important amounts of human-transported materials, but not sealed, which are the typical soils of recently urbanized green areas, where the original soil has been removed and/or buried by excavated materials. These would be classified as Skeletic Regosols and Urbic Technosols. The second group would include all soils that have been sealed for the construction of urban infrastructures, classified as Ekranic Technosols. Overall, the morphological diversity of the profiles studied here is illustrative of the high spatial heterogeneity that is typical of urban soils even in small areas.