



Rock fragments and soil physical properties in the fire-prone Portuguese schist region

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Fires often occur on shallow or stony soils. In Portugal for instance, one of the most fire-prone countries in Europe, 51% of the fires between 1990 and 2008 occurred on shallow soils (<40 cm deep, and 37% occurred on soils with $\geq 0.15 \text{ m}^3 \text{ m}^{-3}$ rock fragments. Fire damage to soils can considerably affect hydrology and erosion processes, and even though rock fragments can significantly impact fire-induced soil temperatures and soil physical properties, their role in fire-prone environments is little studied. I will present an analysis of relationships between topsoil rock fragment content and soil physical properties based on > 2300 topsoil samples collected at 13 sites in the Portuguese schist region in north-central Portugal. Soil physical properties assessed include soil water retention, saturated hydraulic conductivity, soil water repellency, bulk density and soil organic matter content. I will additionally show how surface rock fragments, and rock fragments incorporated into the soil, affect soil temperatures during fire. The particle density of these rock fragments was determined at 2.36 g cm^{-3} (for particles 2–20 mm), indicating that use of the common value of 2.65 g cm^{-3} to calculate rock fragment volume from their weight may lead to underestimation of the volume of rock fragments in the soil, and an associated underestimation of the bulk density of the fine earth fraction. The differences and commonalities between sites will be highlighted, and the impacts of rock fragments on fire impact and soil hydrology in fire-prone environments discussed.