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Fire legacy on dissolved organic matter (DOM) and soil properties along a fire severity gradient in two Eucalyptus ecosystems in South Western Australia

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Abstract

Fire is a major disturbance to forest soil carbon (C) and nutrient cycling due to both direct and indirect impacts on physical, chemical and biological processes. The soluble organic matter fraction - dissolved organic matter (DOM) - is likely to be a sensitive indicator of biogeochemical transformations in soils after fire. However, while DOM is generally considered the most active fraction of soil organic matter, its composition is highly variable and remains largely undescribed. In this study, we investigated changes in soil properties and differences in chemical properties of water extractable organic matter of soils from two fire prone ecosystems; Jarrah (Eucalyptus marginata) and Karri (Eucalyptus diversicolor) in a fire severity gradient, five years post fire in South Western Australia. We used fluorescence excitation-emission matrix and parallel factor analysis (EEM-PARAFAC) to characterise soil DOM (0-5 cm and 5-10 cm) from unburnt, low burnt and high severity burnt plots. Our results were distributed differently between forest types and fire severities. E2/E3 ratio and HIX values, which serve as indicators of molecular weight and humification of DOM, were higher in burnt samples of Karri forest, but not in Jarrah forest. Also, soil isotopes signatures 13C and 15N and total Carbon and Nitrogen soil content showed significant differences between fire severities.

Keywords: Dissolved organic matter (DOM), fire severity, Karri forest, Jarrah forest

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