



## **Polycyclic aromatic hydrocarbons and metals in ashes and burnt and unburnt forest soils in north-central Portugal**

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Wildfires constitute an important environmental problem associated with their various adverse impacts on air, soil, water and biota. A key aspect is related with the fire production of large amounts of deleterious pyrolytic substances, like polycyclic aromatic hydrocarbons (PAHs). Moreover, metals could be accumulated in ashes. Whilst PAHs are formed in the heating process, metals are released from burnt vegetation and deposited on the soil surface. The ashes and associated contaminants are subject to transport processes by wind but especially by overland flow or by water infiltration into the soil eventually ending up in aquifers. PAHs and metals are widely recognized for their environmental persistence, potential toxicity and tendency to bioaccumulation along the food chain, with pernicious consequences for the aquatic biota. Therefore, the objective of this study is to assess the presence of heavy metals and PAHs in the ashes and top soil of burnt and long unburnt forest plantations.

In the framework of FIRECNUTS project, a forest area situated in the municipality of Sever do Vouga, north-central Portugal, was selected as study area following a wildfire towards the end of July 2010. After that event, ashes and top soil (0-2 cm depth) were sampled at six recently burnt forest plantations (three eucalypt and three maritime pine). One neighbouring, long unburnt eucalypt area was considered as control for comparison purposes. Subsequent sampling is being carried out at 3-monthly intervals.

The ash and soil contents of various metals are being determined, after an acid digestion (United States Environmental Protection Agency, USEPA, method 3051). Vanadium, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd and Pb concentrations are being analysed by inductively coupled plasma-mass spectrometry (ICP-MS). Total mercury analyses in soils and ashes are being determined by pyrolysis atomic absorption spectrometry with gold amalgamation. This technique allows eliminating the digestion procedure prior to analysis and is free from matrix interferences.

The concentration of the sixteen priority PAHs are being quantified according to USEPA, after extraction and column clean up, with a gas chromatograph with a mass spectrometer (GC-MS).

The proposed presentation will analyse the results that are being obtained in soils and ashes by the above mentioned laboratory analyses. Expectedly, PAHs and metals concentrations at the burn sites are higher than at the unburnt site. Furthermore, PAHs and metals are expected to change with time after fire according to their known physico-chemical properties and, in particular, their hydrophobicity, lipophilicity and persistence in the environment.

**Keywords:** Polycyclic aromatic hydrocarbons (PAH); metals; soil; ash; wildfires