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Chemical characterisation of PM10 emissions from combustion in a closed stove of common woods grown in Portugal

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A series of source tests were conducted to determine the wood elemental composition, combustion gases and the chemical constitution of PM10 emissions from the closed stove combustion of four species of woods grown in Portugal: Eucalyptus globulos, Pinus pinaster, Quercus suber and Acacia longifolia.
The burning tests were made in a closed stove with a dilution source sampler. To ascertain the combustion phase and conditions, continuous emission monitors measured O2, CO2, CO, NO, hydrocarbons, temperature and pressure, during each burning cycle.
Woodsmoke samples have been collected and analysed to estimate the contribution of plant debris and biomass smoke to atmospheric aerosols.
At this stage of work, cellulose, anhydrosugars and humic-like substances (HULIS) have been measured. Cellulose was determined photometrically after its conversion to D-Glucose. The determination of levoglucosan and other anhydrosugars, including mannosan and galactosan, was carried out by high performance liquid chromatography with electrochemical detection. HULIS determination was made with a total organic carbon analyser and an infrared non dispersive detector, after the isolation of substances.
Cellulose was present in PM10 at mass fractions (w/w) of 0.13%, 0.13%, 0.05% and 0.08% for Eucalyptus globulos, Pinus pinaster, Quercus suber and Acacia longifolia, respectively. Levoglucosan was the major anhydrosugar present in the samples, representing mass fractions of 14.71%, 3.80%, 6.78% and 1.91%, concerning the above mentioned wood species, respectively. The levoglucosan-to-mannosan ratio, usually used to evaluate the proportion of hardwood or softwood smoke in PM10, gave average values of 34.9 (Eucalyptus globulos), 3.40 (Pinus pinaster), 24.8 (Quercus suber) and 10.4 (Acacia longifolia). HULIS were present at mass fractions of 2.35%, 2.99%, 1.52% and 1.72% for the four wood species listed in the same order as before.