The occurrence of organic pollutants in Alpine snow/ice has been reconstructed over the past three centuries using a new on-line extraction method for Polycyclic Aromatic Hydrocarbons (PAH) followed by liquid chromatographic determination.

The melt water flow from a continuous ice core melting system was split, with one aliquot directed to an Inductively Coupled Plasma Quadrupole Mass Spectrometer for continuous trace elements determinations and the second introduced into a solid phase C18 (SPE) cartridge for semi-continuous PAH extraction. The depth resolution for PAH extractions ranged from 40 to 70 cm, corresponding to 0.7 to 5 years.

The concentrations of 11 PAH were determined in dated snow/ice samples to reconstruct the occurrence of these compounds in the atmosphere of the last 300 years. The PAH pattern is normally dominated by Phenanthrene (Phe), Fluoranthene (Fla) and Pyrene (Pyr), which represent 60-80% of the total PAH mass. Before 1875 the sum of PAH concentration (ΣPAHs) was very low with total mean concentrations lower than 2 ng/kg and 0.08 ng/kg for the heavier compounds (ΣPAHs*, more than 4 aromatic rings).

During the first industrial revolution (1770-1830) the PAH deposition showed a weak increase which became much greater from the start of the second industrial revolution at the end of 19th century. In the 1920s, economic recession in Europe depressed industrial production, halving PAH emissions until the 1930’s when they increased again and reached a maximum concentration of 32 ng/kg from 1945 to 1955. From 1955 to 1975 the PAH concentrations decreased significantly reflecting improvements in emission controls especially from major point sources while from 1975 to 2003 rose again to values equivalent to those of 1910. The ratio Fla/(Fla+Pyr), often used for source assignment, indicates an increase in the relative contribution of gasoline and diesel combustion with respect to coal and wood burning from 1860 to the 1980s. This trend was reversed during the last two decades.