



Distribution of polycyclic aromatic hydrocarbons (PAHs) in sewage effluent, continental and coastal waters from the Northwestern Mediterranean Sea: Comparison between two contrasted catchment areas (Marseilles Bay and Vermeille coast)

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Polycyclic aromatic hydrocarbons (PAHs) were analysed from sewage treatment plant waters and surface waters collected in continental (rivers), harbour and off-shore marine sites from Marseilles Bay and Vermeille coastal areas between 2009 and 2013 (Northwestern Mediterranean Sea, France). After collection, water samples were first filtered on glass fiber filters, then PAHs from the dissolved phase were extracted using liquid-liquid or solid phase extraction (SPE) methods, while those from particles were treated according to Bligh and Dyer method. After a possible purification step, extracts were analysed by gas chromatography coupled to mass spectrometry (GC-MS).

Regardless of the study area, dissolved and particulate PAH (18 parents + alkylated homologues) concentration averages were 150.2 ± 140.5 ng l⁻¹ and 39.4 ± 71.2 ng l⁻¹, respectively.

Interestingly, the concentration in dissolved PAHs was on average 3.8 higher than the concentration in particulate PAHs.

In addition, a gradient of PAH concentrations was observed from coastal waters with the highest values in harbours and outlet sewage effluents and the lowest values in off-shore marine waters. Intermediate concentrations were recorded in continental waters.

In the Marseilles Bay, dissolved PAH concentrations were significantly higher and associated to increased signatures of unburned and combusted fossil fuels, mainly from heating, during the cold period (November-April). In contrast, unburned petroleum signature dominated in the warm period (May-October), emphasizing the intense shipping traffic and urban/industrial activities occurring in one of the largest Mediterranean harbour and city. Conversely, in the Vermeille coastal waters, dissolved PAH concentrations were higher during the warm period when particulate PAHs displayed the lowest concentrations, suggesting a seasonal related partition between dissolved and particulate PAHs. In addition, in the Vermeille coastal waters, PAHs were dominated by combusted fossil fuels, whatever the season, revealing a very distinct pattern from the Marseilles area.

These results show the importance of the dissolved compartment dynamics, especially spatio-temporal variability at catchment scale, when assessing the budget of organic pollutants in coastal environments.