

# Dioxins/Furans contamination at regional scale: comparing soil fingerprints with those of fluvial, estuarine and coastal sediments

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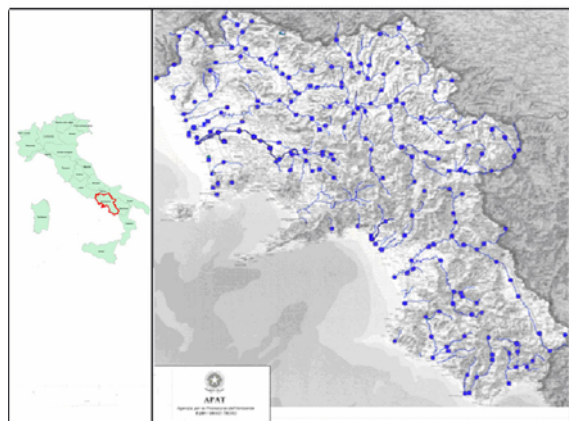
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**Introduction:** Relationships between PCDD/Fs contamination of soils and fluvial, estuarine and coastal sediments were investigated. The data were derived from a region-wide monitoring campaign conducted by the Italian Environment Agency (APAT) in 2004-2005, after the discovery of elevated dioxin/furan concentrations in milk and cheese in Campania Region, Italy (Di Guardo et al., 2006).

**Methods:** Given the extent of the contamination, the initial monitoring efforts were devoted to characterise concentration levels in the main environmental media: soil, air, streamwater, as well as fluvial, estuarine and coastal sediments. This was done to pinpoint the possible causes (spatially and temporally) and plan future monitoring and remediation efforts. Sediments were sampled at different points in the main rivers and their estuaries. Soil samples were obtained for the entire region. Fingerprinting techniques (comparing sample congener profiles for dioxins and furans to a number of emission signatures) were first applied to soils.



**Fig. 1:** Sediment sampling in Campania Region

**Results:** The octa-chlorinated dioxins (D8) were the most prevalent group in respect to other congener groups such as chlorinated furans (F6, F7, F8). The spectrum of furans presented a certain degree of similarity with traffic emissions and combustion sources (heavy-duty diesel, tire and industrial wood combustion). Four samples collected in less contaminated areas (out of a total of 190) were characterised by concentrations of F8 congeners which were higher than those of D8. Fingerprinting analysis applied to coastal sediments showed a close resemblance to soil fingerprints characterised by a relatively high proportion of D8 (58 samples out of 68), with the exception of 10 samples in which F8 levels prevailed. Fluvial sediment analysis showed a somehow more complex picture: cluster analysis techniques (hierarchical, based on Euclidean distances) showed two groups of samples. The first group, comprising two thirds of the samples, presented fingerprints resembling those of soils (therefore probably related to the erosion of soil particles); the remaining one third showed F7 congeners prevailing over F8 and D8.

**Discussion:** This last type of fingerprint is rather different from any of the standard signatures available for the available emission sources. This type of fingerprint is indicative of a contamination due to direct discharges of PCDD/Fs into surface waters rather than to soil erosion.

**References:** [1] Di Guardo A., Raspa G. and Mussapi R. (2006) Dioxin/furans (PCDD/Fs) and dioxin like PCBs (PCBdl) contamination in Campania Region (Italy): an integrated monitoring/modelling approach to source apportionment. Poster contribution presented at the *SETAC Europe XVI Annual Meeting* in The Hague (The Netherlands), 7-11 May 2006.