



Soil POP concentrations in decline

Overall concentrations of some persistent organic pollutants (POPs) in soil have declined, according to research conducted in Norway and the UK. The researchers suggest that there has been a reduced influence of primary sources of some POPs on soils for these two countries in recent years.

POPs are a group of chemical substances, which include some pesticides and industrial chemicals, known to pose human health and ecological risks. Their use is heavily restricted under the Stockholm Convention¹ and the UN's LRTAP Convention². The EU ratified both treaties in 2004 and, under the Stockholm Convention, Member States must identify and conduct inventories of POP sources.

This study investigated concentrations of some POPs in European soils. Soil plays an important role in the fate and distribution of POPs and can act as a sink or a source. POPs can be transported around the world in the atmosphere, and deposited in soil at significant distances from their original source and, in turn, soil can re-emit POPs to the atmosphere and be moved on again. However, there remain uncertainties surrounding POP distribution, degradation and circulation between air and soil.

To help address these uncertainties, the researchers analysed POP concentrations in soil samples taken from 70 rural locations in Norway and the UK in 1998 and again in 2008. They compared concentrations of polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), and organochlorine pesticides between the two years.

There was little change in organochlorine pesticides concentrations or distribution over the ten years. However, overall concentrations of PBDEs and PCBs had both fallen, with PBDEs showing the strongest decline. By 2008, concentrations were significantly lower at 79% of all test sites, at around 23% of the 1998 concentrations. For both years, significantly higher levels were found in the UK than in Norway.

PCB concentrations were only significantly lower at around half of the sites monitored in 2008, where concentrations had fallen to 42% of 1998 levels. Historically, the UK has used and emitted much higher levels of PCBs than Norway, and concentrations for both countries were similar in 1998. However, by 2008, concentration levels in Norway had become higher than in the UK.

The researchers conclude that primary sources (industry and substances including paint and adhesives) reduced their influence on POP concentrations in soil between 1998 and 2008. Possible reasons for PBDEs' sharp decline, as compared to PCBs, may include that they degrade more readily in soil or sink into inaccessible soil layers and that emissions have fallen much more quickly than emissions of PCBs. Changes between the two countries may be explained by 'hopping' – the repeated exchange of POPs between air and soil involved in their transport around the globe.

Although POPs are persistent, further chemical analysis provided evidence that PCBs were biodegrading very slowly in soil. The researchers suggest that, although in decline, primary emissions for PCBs are still too strong and there were indications from their measurements that an air-surface soil equilibrium is approaching.

1. See: <http://chm.pops.int>
2. See: <http://unece.org/env/lrtap/>

Source: Schuster, J.K., Gioia, R., Moeckel, C. et al. (2011) Has the Burden and Distribution of PCBs and PBDEs Changed in European Background Soils between 1998 and 2008? Implications for Sources and Processes. *Environmental Science and Technology*. DOI: 10.1021/es200961p.

Contact: j.schuster1@lancaster.ac.uk

Theme(s): Air pollution, Soil