Worldwide Distribution of Persistent Organic Pollutants

A new study carried out by a team of scientists from North America and Europe presents the most comprehensive analysis yet of global concentrations of persistent organic pollutants in the air. The most unexpected results are the high concentrations observed for pesticides banned several decades ago. The results also suggest that, in some cases, the emissions into the air of these compounds were due to possible new uses of the banned pesticides, but also highlight the continuing importance of old sources.

Persistent organic pollutants (POPs) are chemicals that remain intact in the environment and bioaccumulate in the food chain. Moreover, they exhibit numerous toxic properties that pose a health risk to humans and wildlife. To date, two international legally binding instruments have been negotiated and concluded in order to address and reduce the presence of POPs in the environment: The Protocol for the regional UNECE Convention on Long-Range Transboundary Air Pollution on POPs and the Stockholm Convention on POPs. The Stockholm Convention stipulates that the Conference parties shall establish a monitoring network for investigating spatial and temporal trends for POPs globally in order to evaluate the effectiveness of the Convention. To date, such a network does not exist.

A recently published study presents new data on global concentrations of POPs in the air. Simple, passive air sampling devices were used to collect the data at 42 sites on 7 continents. In addition to the 12 POP compounds targeted by the Stockholm Convention, the researchers also provided data about contaminants currently under consideration for inclusion in this treaty.

As expected, polychlorinated biphenyls (PCBs) were the POPs found at some of the greatest concentrations, especially at urban sites. For Octa-BDE and Penta-BDE, two polybrominated diphenyl ethers (PBDEs) currently considered candidates POPs by the Stockholm treaty, the researchers found that the levels are generally higher near urban sites as well. These results are consistent with their historical use pattern.

But the study also reports unexpected high concentrations for pesticides banned by the POPs treaty, such as hexachlorocyclohexanes (HCHs), Chlordane and dieldrin, at urban as well as agricultural sites.

In the case of organochlorine pesticides (OCPs), the results suggest that the emissions were due to new uses of the banned POPs, but the new data also highlights the importance of old sources. For example, in the case of the famous pesticide DDT, the highest levels of the dominant component were found in a site where DDT was banned several decades ago.

In general, the results of this study demonstrate that this type of monitoring with passive air sampling devices is feasible for assessing POP concentrations in the air on a global scale.

The next step will be to assess the seasonal behaviour of the POPs. In the long term, the sampling network will be extended and it will become possible to model global transport patterns and to assess the results of the efforts to reduce their level in the environment more accurately.

Clarification introduced on December 2006: Octa-BDE and Penta-BDE are the only PBDEs currently considered candidates under the Stockholm Convention on POPs. These two products were banned by the European Union in 2004.

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