



Record high peaks in PCB concentrations in the Arctic atmosphere due to long-range transport of biomass burning emission

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Soils and forests in the boreal region of the northern hemisphere are recognised as having a large capacity for storing atmospherically derived Persistent Organic Pollutants (POPs), such as the polychlorinated biphenyls (PCBs). Following reductions of primary emissions of various POPs, there is an increasing interest and debate about the relative importance of secondary re-emissions on the atmospheric levels of POPs. In spring of 2006, approximately two million hectares of agricultural land were burned in Eastern Europe. Biomass burning emissions were transported to the Zeppelin station on Svalbard, where record-high levels of many air pollutants were recorded. Here we report on the extremely high concentrations of PCBs that were also measured during this period. 21 out of 32 PCB congeners were enhanced by more than two standard deviations above the long-term mean concentrations. In July 2004, about 5.8 million hectare of boreal forest burned in North America, emitting a pollution plume which reached the Zeppelin station after a travel time of 3-4 weeks. Again, 12 PCB congeners were elevated above the long-term mean by more than two standard deviations, with the less chlorinated congeners being most strongly affected. We propose that these abnormally high concentrations were caused by biomass burning emissions. Based on enhancement ratios with carbon monoxide and known emissions factors for this species, we estimate that 150 and 70 micro g PCBs were released per kilogram dry matter burned. To our knowledge, this is the first study relating atmospheric PCB enhancements with biomass burning. The strong effects on observed concentrations far away from the sources, suggest that biomass burning is an important source of PCBs for the atmosphere