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SPATIAL AND TEMPORAL TRENDS IN HEAVY METAL ACCUMULATION
IN MOSSES IN EUROPE (1990-2005)

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The first European moss survey was conducted in 1990/1 and has since then been repeated at five-yearly intervals. The most recent survey was conducted in 2005/6, with mosses collected from over 6,000 sites in 28 countries. Samples were collected according to a standardised protocol and concentrations for 10 – 12 heavy metals were determined in the last three years' growth segments. In 2005/6, the lowest concentrations of heavy metals in mosses were generally found in (north) Scandinavia, the Baltic States and northern parts of the United Kingdom. Relatively low concentrations of iron, mercury, nickel and vanadium were also observed in central Europe. Depending on metal, the highest concentrations were often found in Belgium and eastern European countries. Antimony concentrations were generally high in densely populated areas and in eastern European countries with high metal pollution levels. The decline in emission and subsequent deposition of heavy metals across Europe has resulted in a decrease in the heavy metal concentration in mosses since 1990 for the majority of metals. Between 1990 and 2005, the concentration in mosses has declined the most for lead (72%), arsenic (72%, based on five countries), vanadium (60%), cadmium (52%) and iron (45%). An intermediate decline was found for zinc (29%), copper (20%) and nickel (20%) and no significant reduction for chromium (2%). Since 1995, the arsenic concentration in mosses has declined by 21% (based on 14 countries), whereas mercury showed no significant decline (12%). However, on a national/regional scale large deviations from the general European trend were found. At the European scale, spatial and temporal trends in heavy metal concentrations in mosses were generally in agreement with trends in heavy metal deposition modelled by EMEP (Cooperative Programme for Monitoring and Evaluation of Long-range Transmission of Air Pollutants in Europe) for the metals cadmium, lead and mercury.