Mosses as biomonitors of atmospheric heavy metal and nitrogen pollution in Europe

The role of the ICP Vegetation

Thirty four countries in Europe plus the USA contribute experimental data and modelling expertise to the ICP Vegetation, an International Cooperative Programme reporting to the United Nations Convention on Long-range Transboundary Air Pollution (LRTAP Convention) on the effects of air pollution on natural vegetation and crops. Data and maps are used to inform international policy on the effectiveness of air pollution control and future requirements, leading ultimately to improvements in air quality across Europe.

Data collection and maps

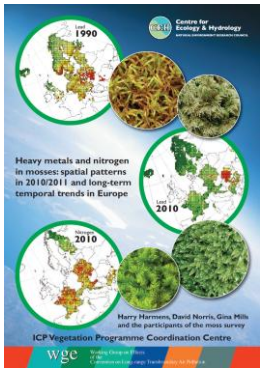
Since 1990, naturally growing mosses have been sampled every five years according to a standardised protocol. The most recent moss survey was conducted in 2010. **Heavy metal** and **nitrogen** concentrations in mosses have been determined since 1990 and 2005 respectively. In recent survey years the average concentrations were mapped on the EMEP 50 km x 50 km grid.

Persistent organic pollutants (POPs)

In 2010, six countries also determined the concentration of selected persistent organic pollutants (POPs), particularly polycyclic aromatic hydrocarbons (PAHs). The results confirmed that mosses can also be used as biomonitors of POPs deposition.

Further Information

For further information and a copy of the recent report, please visit our website (**icpvegetation.ceh.ac.uk**) or contact:



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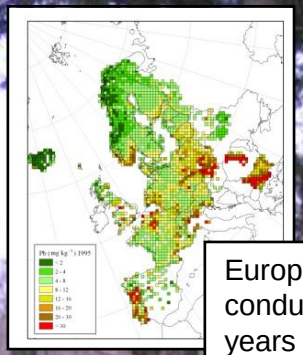
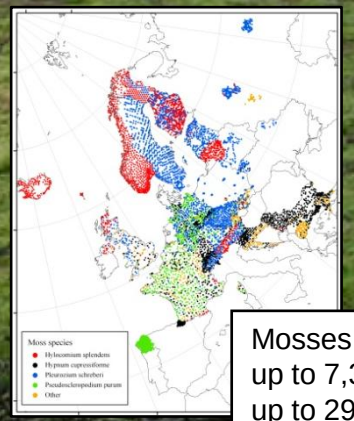


European surveys conducted every five years since 1990



Mosses sampled at up to 7,300 sites in up to 29 countries

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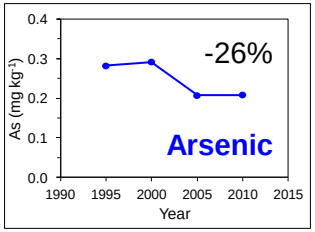

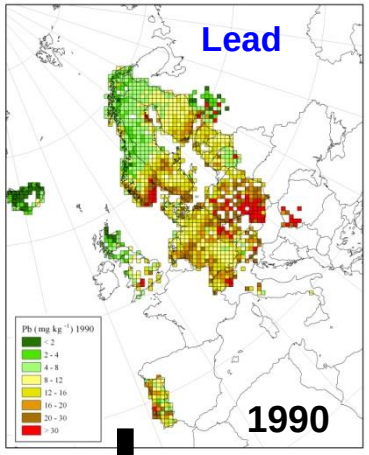

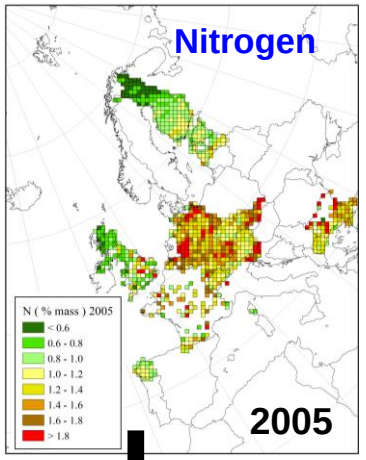

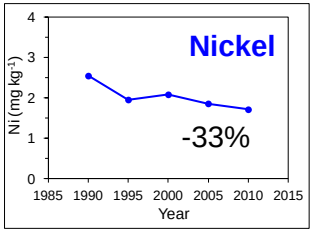

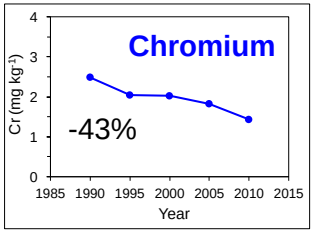

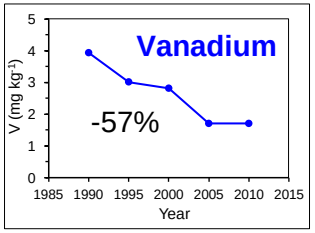

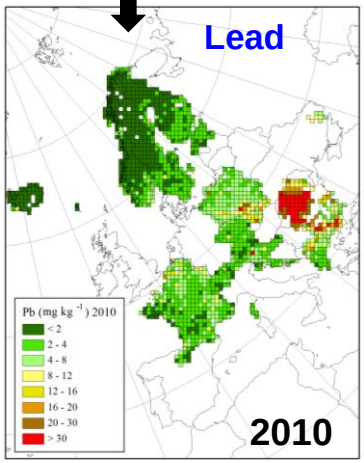

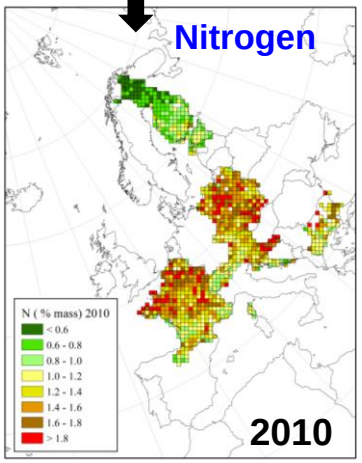

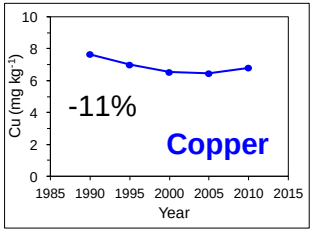

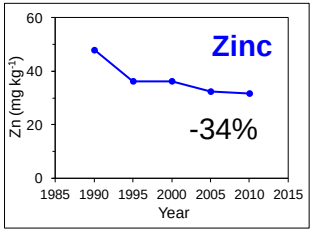

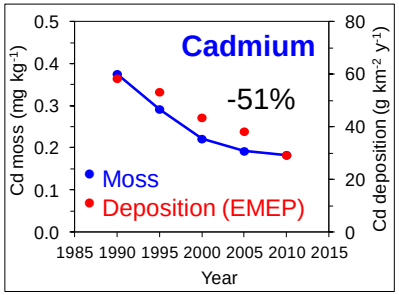

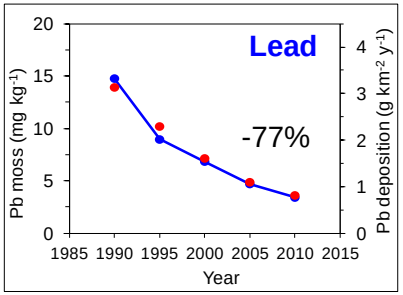

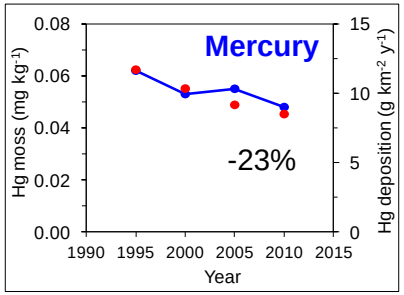

- Carpet forming mosses obtain trace elements and nutrients directly from the atmosphere.
- Mosses provide a complementary method to assess spatial patterns and temporal trends of atmospheric heavy metal deposition at a high spatial resolution.
- In recent years, generally the lowest concentrations of heavy metals in mosses were found in northern Europe and the highest concentrations in Belgium and (south-)eastern Europe.
- Mosses provide a good indication of areas at risk from high nitrogen deposition, with generally the highest concentrations reported for western and central Europe.
- Europe-wide the concentration of heavy metals in mosses has declined since 1990, ranging from 11% for copper to 77% for lead. Since 2005, the nitrogen concentration in mosses has declined by 5%.
- Temporal trends for cadmium, lead, mercury and nitrogen in mosses agree well with those for deposition modelled by the European Monitoring and Evaluation Programme (EMEP).
- Temporal trends were metal and country-specific.

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