# Bioavailability of metals in soils: integrating knowledge into risk assessment

**S. Lofts[1], D. Spurgeon[2], C. Svendsen[2], E. Tipping[1]**

**[1]NERC Centre for Ecology and Hydrology, Lancaster Environment Centre, Lancaster LA1 4AP**

**[2]NERC Centre for Ecology and Hydrology, Maclean Building, Crowmarsh Gifford, Wallingford, Oxfordshire OX10 8BB**

In recent years there have been considerable advances in integrating bioavailability into risk assessment for metals such as nickel, copper, zinc, cadmium, lead and mercury. This presentation will focus on two aspects of metal bioavailability in soils: firstly, the influence of soil chemistry on metal speciation and uptake, and secondly the influence of long-term 'aging' reactions of metals in soils on their bioavailability and toxicity. The 'free ion approach' may be used to derive critical limit concentrations of metals that take the influence of soil chemistry into account. It will be shown how such critical limit concentrations have been applied to assess the risks due to the atmospheric deposition of metals to UK soils, and how the use of critical limit concentrations that account for bioavailability influences the risk estimation. It will also be shown how the methodology can be extended to allow for the calculation of Potentially Affected Fractions (PAFs), and for probabilistic risk assessment of metals in soils. Aging of metals in soils is an important speciation process, since it controls the size of the 'geochemically active' or labile pool, which in turn controls the free ion concentration. Using models derived from laboratory data on aging, it will be shown how aging processes should act to attenuate the risks due to repeated additions of metals to soils such as might occur due to agricultural practices. Finally, potential approaches to account for bioavailability in the context of metal mixtures will be presented.