THEME 4:
THE EARTH'S SURFACE:
Pollution, climate, anthropogenic effects

Session 4.66:
Micropollutants and health

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This session aims to examine the role of geochemistry on influencing mechanisms, pathways and bioavailability of a variety of substances: inorganic, organic, radioactive, and biological that are detriment to health (primarily human but also to animals, plants and microorganisms). A non-exhaustive list of subtopics includes: nanomineralogy of particulate pollutants, reactive transport processes for micropollutants, airborne particles and human health, fate and exposure of pharmaceuticals in geosphere, endocrine disruptors in natural waters, pathogen fate and transport, TSE risk, sub-surface disposal of animal tissue and waste, geosphere modelling for human health risk assessment. We particularly encourage papers with a multidisciplinary approach or on novel topics.

4.66.11

Chemicals in the environment

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The impact of chemicals on the environment and human health is of increasing concern. Many studies are carried out but, in general, most problems are addressed by scientists with expert knowledge of particular groups of chemicals, such as metals or radioactive substances. In this paper we consider the availability of data and knowledge about all the principal groups of potentially harmful chemicals, including:

1. Potentially harmful inorganic elements such as As, Cd, Hg and Pb known to have adverse physiological or environmental effects at low levels, and elements and species such as Se, I and NOx that can be essential or harmful, depending on their concentration, speciation and bioaccessibility. Elements such as In, Rh and the PGEs used in the development of new materials, including nanotechnology applications, are also briefly discussed.
2. Radioactive substances, including naturally occuring radioisotopes, such as ^{238}U and its decay products, and processed materials, such as depleted uranium (DU), which affect the environment and human health because of their radiological and chemical toxicity. Data on isotopes such as ^{137}Cs and ^{240}Pu from the nuclear industry are also discussed, including accidental releases, e.g. from Chernobyl in 1986.
3. Persistent organic pollutants (POPs) including many synthetic chemicals such as DDT, PCBs PBFRs and their metabolites, which are characterised by their persistence, bioaccumulation (lipophylicity) and toxicity (PBT) properties.
4. Human and veterinary pharmaceuticals, of which there is increasing evidence of their presence in the environment. These substances are of particular concern because they are designed to target specific biological receptors and hence can have potentially deleterious effects at exceptionally low (nanomolar) concentrations.

All these groups of chemicals include endocrine disrupting chemicals (EDCs), capable of disrupting animal and human (including sex and thyroid) hormone systems.

Geochemical and airborne radiometric databases such as those prepared by the Forum of European Geological Surveys and the British Geological Survey provide systematic information on levels of inorganic chemicals and radioactive substances in the environment. These are used to demonstrate how such data can be of strategic importance in understanding the impact of chemicals on ecosystems and human health, from the national to global scale. It is argued that such systematic data for all chemicals is crucial for the sustainability of the environment into the 21st century.