

## Spatial evaluation of the stable iodine background contribution to the risk of thyroid cancer in areas subjected to radioiodine contamination

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Iodine deficit in the environment is known to provoke the thyroid gland diseases and to contribute to the thyroid cancer cases in the areas subjected to radioiodine isotopes contamination. Relation between the iodine background concentration in soils and its transfer to plants and food chains allows to evaluate the spatial differentiation of the stable iodine background on the basis of the soil maps depicting the soil features responsible for iodine accumulation. The soil map used with the reference data on iodine content allows to compare the iodine geochemical background with the medical data.

The possibility to evaluate significance of the geochemical background for the thyroid cancer occurrence over large areas based on the soil maps was shown in the framework of the international project [1].

The proposed approach is now tested on example of the Bryansk region using the soil maps, experimental data and the medical data on the thyroid gland cancer. It is extended to derive the risk map of thyroid cancer due to a combination of the iodine radioisotopes' fallout and the iodine deficit related to the stable iodine background in soils. This work is supported by RFBR.

[1] Cardis *et al.* (2005). *Journal of the National Cancer Institute* **97**, 724-732.

## Characterisation of claystone alteration surrounding a long-term perturbed *in situ* diffusion experiment

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For better constriction of the chemical and physical parameters of pore water in Opalinus Clay a five-year *in situ* diffusion experiment was carried out at the Mont Terri underground rock laboratory in the Jura Mountains, Switzerland [1]. It initially consisted of a circulating system containing traced artificial pore water. Microbial activity eventually induced some chemical perturbances. Regular sampling documented the chemical evolution of the circulation artificial pore water. After about five years, the cylindrical packer system set up was overcored, segmented and the surrounding claystone analyzed by the University of Bern and at BRGM in Orléans (F).

Radial analyses of the overcored segments included mineralogy (XRD, SEM-EDX), bulk parameters (water content, density, C, S), water stable isotopes, cation exchange capacity and occupancy, aqueous leachates for Cl, Br, SO<sub>4</sub> and water stable isotopes.

Results show that the distribution of anionic species (Br<sup>-</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>2-</sup>) and water tracer follows the expected out/in-diffusion profile compatible with the time-dependent boundary conditions in the borehole. Otherwise, the Opalinus clay mineralogy and ionic exchange complex effectively buffered major disturbances induced by microbial sulfate reduction and oxidation of an organic carbon source. This is also in agreement with reactive transport modelling of the experiment. These findings support the postulated long-term buffering capacity and effectivity of claystones vs. induced (bio-) geochemical disturbances.

[1] Wersin *et al.* (2004) In: R.B. Wanty & R.R. Seal II (eds) 523-526.