

## Health risk linked to arsenic-rich waters and soils from Saru Dornei, Eastern Carpathians, Romania

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In the area of Saru Dornei in north-eastern Romania several CO<sub>2</sub>-rich cold mineral springs occur, the arsenic contents of which belong to highest ones known in Romania. The area is characterized by micaschists belonging to the Bretila basement series of the upper Precambrian, Mesozoic sedimentary rocks, and overlying volcanic andesitic rocks of Late Tertiary and Quaternary age. In the basement rocks, hydrothermal veins of arsenic sulfides such as realgar (As<sub>4</sub>S<sub>4</sub>) and orpiment (As<sub>2</sub>S<sub>3</sub>) occur. At the outlet of the springs, As-rich amorphous Fe-oxides deposits are common and accompanied by more or less large areas of contaminated soils or marsh areas. In this paper we present first results concerning the origin of the contamination and the health risk for men and cattle. Our field investigation methods include local geological mapping, sampling of water, soil and rocks, in-situ measurement of physical - chemical parameters (e.g. temperature pH, conductivity), and isotopic-meteoric water samples to constrain the altitude of water infiltration. They were followed by laboratory analysis, such as major and trace element analysis of the sampled materials by ionic conductivity, ICP-MS, total inorganic and organic dissolved carbon (waters), X-ray fluorescence and X-ray diffraction (rocks and soils) as well as mass spectrometry for O-and H-isotopes (water). In the 40 km<sup>2</sup> area monitored so far, of the 74 surface and ground waters collected, four are high As-springs with waters of Ca-SO<sub>4</sub>-type and As-concentrations varying between 200 microg/l and 44 mg/l, twenty-two are samples of rivers as well of springs with arsenic concentrations reaching 20 ppb, mainly of Ca – HCO<sub>3</sub> type. The remaining are poorly mineralized waters with electric conductivities varying between 32 and 320 microS/cm and pH values ranging from 4.5 to 8.1. Naturally contaminated sediments and soils contain between 4 ppm and 14 wt% As. Strongly contaminated areas are normally limited to a few hundreds of meters around the spring. One of the springs has been bottled as mineral water until 1960, but has ever since been forbidden, as tests revealed that it was unfit to consumption. Individual contaminated wells have thus been banished and another water network has been installed for the local population. Warnings are however still badly carried out and a part of the population still drinks As-rich waters because they are fresh and sparkling. In one place, even a fish farm has been built. The origins of the arsenic conceivably are CO<sub>2</sub>-and As-rich volcanic gases, which mixed with local ground waters during the hydrothermal phase which followed the Eastern Carpathian volcanic activity. Stable isotope investigations on O, H and C are currently in progress to answer this question.