Problems with high concentrations of Mn and Fe at the pumping site Petruševec – Zagreb (Croatia)

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The aquifer of the Zagreb area is the most important source of water supply for the city of Zagreb. Daily, from the Zagreb aquifer is pumped about 5.5 m^3/s. Because of its great importance it has been intensively explored.

The Zagreb aquifer is made of Quaternary sediments, which are distinguished by horizontal and vertical exchange of various litholoical units [1]. Mainly aquifer consists of gravel-sand sediments where the pebbles and grains of limestone and dolomite are prevailing. Also, the aquifer is interbeded with silt, fine sand and clay sediments which can contain the organic matter and metals. In the Zagreb area there are several pumping sites. Petruševec is one of the Zagreb's pumping site. On this pumping site on some wells it was observed the high concentrations of Mn and Fe. The concentrations sometimes exceed the Croatian drinking limits which for Mn is 50 ppb and for Fe 200 ppb. Both Fe/Mn are essential nutrients for all life. High levels of Mn in drinking water may affect neurological and muscle function in humans.

The manganese concentrations vary from 2.2 ppb to 420 ppb and the iron concentrations varies from 8.1 ppb to 350 ppb. The amount of Mn and Fe in the water depend on where the well situated is and how deep it is. The Mn and Fe are geogenic and it is not anthropogenic. The specie of Mn and Fe on Petruševec pumping site is given in Fig. 1.

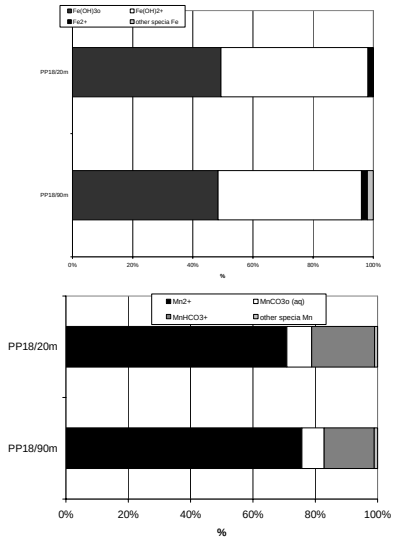

Figure 1: The Fe and Mn specie

Also, certain bacteria thrive in the presence of Fe/Mn, clog strainers, pumps, and valves. Because of all these problems Mn is removed from the water.

[1] Velić *et al*. (1999) *Geo.l Croatica* **52** (2), 119-130.

A modified Rayleigh model to study the evolution of $\delta^{13}C$ in a soil profile

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Carbon isotopic systematics has widely been used to study the soil carbon dynamics. Here we present $\delta^{13}C$ data for a soil inventory from a reserve forest of Chhattisgarh state, Central India. The observed values have been fitted with a modified Rayleigh fractionation model [1] and least square minimization has been used to get the best value of fractionation factor (α).

Discussion of Results

An increase in $\delta^{13}C$ with depth has been observed in Chhattisgarg soil profile which can be due to the discrimination against ^{13}C during microbial decomposition. The estimated value of α obtained from model fit (Figure 1) is 0.9985. Results suggest that the Rayleigh fractionation model needs modification for open systems like soil.

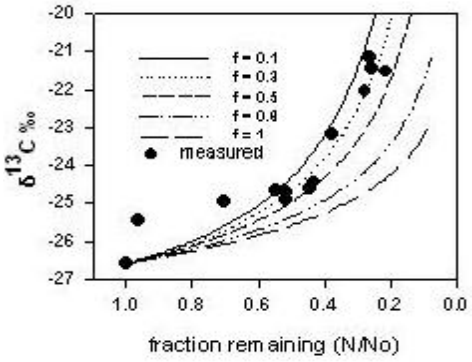

Figure 1: Variation of $\delta^{13}C$ with fraction of remaining biomass at different depths (filled circles for measured and lines for model values). f is the fraction of the outgoing organic carbon from the total input , f=1 corresponds to Rayleigh model without modification.

[1] Mook (2006) *Introduction to isotope hydrology*, **25**. Stable and Radioactive Isotopes of Hydrogen, Oxygen and Carbon, Taylor and Francis, London, UK, pp.19-28.