Geophysical Research Abstracts
Vol. 16, EGU2014-13854, 2014
EGU General Assembly 2014


# Stable isotope signatures in bulk samples from two soils with contrasting characteristics. What do they tell about ongoing pedogenic processes?

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**Isotopic ratio mass spectrometry (IRMS) has been proven as a promising tool for the monitoring of biogeochemical processes in soil. In this work, stable isotope signatures of light elements $\delta$15N, $\delta$13C, $\delta$18O and $\delta$D were determined for two soils with contrasting characteristics in terms of climate, vegetation, land use and management.**

**The studied soils were a Cambisol from a subtropical area (Paraná region, South Brazil) and an Arenosol from a Mediterranean climate (Andalusia, South Spain). A Flash 2000 HT (N, C, S, H and O) elemental analyzer (Thermo Scientific) coupled to a Delta V Advantage IRMS (Thermo Scientific) was used. Isotopic ratios are reported as parts per thousand (‰) deviations from appropriate standards recognized by the international atomic energy agency (IAEA).**

**In a first approach we took advantage of the well-known different $\delta$13C signature between plants using either the C4 or C3 carbon fixation pathway (O´Leary, 1981). The Arenosol (Spain) revealed a $\delta$13C signature which is clearly in the range of C3 plants (-26 to -30 ‰). Different plant canopies (tree, shrubs or ferns) caused only slight variations $\delta$13C (STD= 0.98). In contrast, the Cambisol (Brazil) showed less depletion of the heavier carbon isotope corresponding to C4 predominant vegetation. In addition an increase from -19 ‰ in the soil surface (0 – 5 cm) to -16 ‰ in the subsoil (20 – 30 cm) was observed in line with a recent (2 years old) shift of the land use from the predominant C4 grassland to eucalypt (C3) cultivation. Crossplots of $\delta$15N vs. $\delta$18O may provide information about nitrate ($NO_3$-) sources and N cycling (Kendall, 1998). In the Mediterranean Arenosol this signal ($\delta$18O = 30‰ $\delta$15N = 2‰) was found compatible with a predominant nitrate atmospheric deposition, whereas the signal in the Brazilian Cambisol pointed to the use of a mineral N fertilization with signs of denitrification processes ($\delta$18O = 13‰ $\delta$15N = 9‰).**

**No conclusive results could be obtained from the $\delta$D isotopic signature probably due to overlapping of the $\delta$D signals from the organic and the mineral fractions. For a more detailed analysis steps allowing their separation are necessary (Ruppenthal et al. (2013) and references therein).**

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