Tracing the fate of endogenous CH_4 in water-logged soil and peat

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Anaerobic conditions in soils experiencing water saturation favour the production of methane (CH_4) [1], which may undergo subsequent oxidation by methanotrophs [2]. Here, we combine stable isotope probing and flux methods to trace the fate of ^{13}C-labelled methanogen substrates introduced to a peat and organic-rich water-saturated soil, in order to constrain production by methanogenic *Euryarchaeota* and its subsequent utilisation by CH_4-oxidisers. We monitor carbon flow by ^{13}C-analysis of *Archaea*-derived intact polar lipids, proposed to serve as a biomarker for extant methanogen biomass in this setting [3], and phospholipid fatty acids (PLFAs), in addition to the isotopic composition and flux of CH_4 and CO_2.

Enrichment in the $\delta^{13}C$ values of CH_4, and concurrently phospholipid-bound archaeol, confirm the *in situ* production of CH_4 and incorporation of ^{13}C into archaeal biomass by predominantly acetoclastic and, to a lesser extent, hydrogenotrophic methanogens. Utilisation of endogenous CH_4 by methanotrophs was traced by incorporation of ^{13}C-label in the isotopic values of CO_2. Enrichment of some PLFA lipids was also observed. At present, we are unaware of any other studies which have successfully involved the ^{13}C-labelling of intact archaeal lipids in the terrestrial realm.

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Indium from the Lagoa Salgada Orebody, Portugal

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The Iberian Pyrite Belt is one of the most outstanding European ore province, hosting one of the largest concentrations of massive sulphides in the Earth's Crust. Lagoa Salgada orebody, the most northerly of the Iberian Pyrite Belt known so far, is a small massive sulphide deposit with an inferred mineral resource of 3.7 Mt. The orebody has been described as composed of a central stockwork zone – a thick Volcano Sedimentary Complex with more than 700m – and a massive sulphide lens in the northwest. It is covered by more than one hundred meters beneath sediments of the Sado Tertiary basin.

A Junior Exploration Company has implemented an exploration program with recent drilling holes in new areas of the northwest lens of the deposit. Different types of ores have been identified on preliminary metallographic study that have established five basic textural domains: (i) Massif pyrite; (ii) Banded texture with layers of sphalerite and, rarely, of sphalerite and galena; (iii) Secondary transformation of massif pyrite; (iv) Infilling veins texture; (v) Supergenic banded texture.

The ore mineralization assemblage is mainly composed of pyrite with minor sphalerite, tetrahedrite-tennantite, arsenopyrite, chalcopyrite, galena, stannite, cassiterite, and supergene minerals which are in different amounts represented throughout the basic textural domains.

Polished sections of massive sulphide ore samples were studied by Electron-probe microanalyses (EMPA). Most of the minerals phase are behind the detection limit of Indium values, however, related with banded basic textural domain (ii) it was identified one generation of sphalerite, with mean granular dimension of 20 micra included on recrystallized arsenopyrite, that have 23000 ppm of Indium. This value is four times more Indium content than the best average values of other studied sphalerite examples on the same orebody deposit, in recent published results. This discovery proves again the complexity of this deposit and highlights the needed of prospecting new areas inside the ore body with predominance of this generation of sphalerite.

Ongoing works will demonstrate the Lagoa Salgada orebody potential for this rare trace metal, that is used in high-tech applications and is critical for European Industry.

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