Fluid mixing at the depositional site of the Guelb Moghrein IOCG deposit, Mauritania

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The Guelb Moghrein IOCG deposit is located 250 km northeast of Nouakchott, Mauritania. The mineralization is hosted by < 30 m wide tabular tectonic breccias in a carbonate-facies iron formation. It comprises Oam, Mag, Po, Ccp, Fe-Co-Ni arsenides, Apy, cobaltite, uraninite, and Bi-Au-Ag-Te minerals in a proximal ore breccia grading into a distal ore breccia with Oam and Mag. Hydrothermal monazite and xenotime were dated at 2492 ± 9 Ma.

Fluid inclusions were studied in siderite (Sd) of the iron formation. Three generations are discriminated: Sd_1 is undeformed, locally idiomorphic and up to 5 cm in diameter. Sd_2 represents variably sized, angular fragments with numerous sulfide inclusions. Sd_3 is recrystallized carbonate. Two types of fluid inclusions are distinguished, which are interpreted to having formed contemporaneously: Type I are aqueous two-phase L-V inclusions, 6-10 µm in diameter that form trails in Sd_1 and Sd_2. They are spatially closely associated with the ore paragenesis. Type II inclusions are aqueous two- or three-phase (L-V, L-V-S) and form clusters and single inclusions in Sd_2 and Sd_3. They are up to 50 µm in diameter. Trapped sulfides are present if the cluster is intersected by a type I trail. The Te of both types show a wide scatter between -10°C and -80°C. The Te peaks are characteristic of $NaCl-H_2O$ and $NaCl-MgCl_2-H_2O$ mixtures, where type I inclusions are NaCl-dominated and type II inclusions are $MgCl_2$-dominated. The Cl^- content ranges between 0-4.5 mole/kg Cl^-. Th for types I and II inclusions have, both, a maximum at about 300°C.

Type I and II inclusions (1) occur on trails in brecciated Sd_2 and/or in recrystallized Sd_3, (2) they are spatially associated with sulfides, (3) sulfides are trapped in type II inclusions and (4) the uniform Th is consistent with trapping at 410 ± 30°C and 1-2 kbar, which are the P-T conditions of mineralization. The variable salinity and composition, the uniform Th, and the paragenesis of both fluid inclusion types with the ore minerals point to isothermal fluid mixing at the depositional site as a mechanism for ore formation. A $MgCl_2$-dominated fluid probably equilibrated with the Fe-Mg carbonate in the host rock and mixed with an externally derived NaCl-dominated fluid during progressive deformation.

The ore fluids at Guelb Moghrein have a relatively low salinity of < 20 wt.% $NaCl_{eq.}$ and lack a carbonic phase. This is unusual especially for magmatic IOCG deposits. The geological setting of Guelb Moghrein and the fluid composition suggests that this deposit formed in a metamorphic setting by fluid mixing during regional-scale thrusting.

Iron enrichments in salt marshes of NW Germany

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Salt marshes are a major, widely distributed, intertidal landscape. The salt marshes of the summer polder area of the East Frisian barrier island Langeoog (NW Germany) were protected by a summer dike until 2004. In 2004 this dike was removed and rebuilt toward centre of the island. Thus the Langeoog summer polder is afresh under tidal influence and the opportunity was given to inverstigate the effects of a simulated sea level rise on pore water geochemistry.

For in situ sampling four pore water samplers (Beck *et al.* 2007) were installed in the salt marsh sediments. These lances are aligned on a N-S transect including sites at high salt marsh, low salt marsh and transition zone low salt marsh/tidal flat. Pore water sampling started in June 2005 and samples were taken in monthly intervals.

Iron enrichments in pore water were observed at all different salt marsh sites. The transition zone low salt marsh/tidal flat is characterized by high iron concentrations up to 373 µM at 0.5 m depth. In contrast, at the low marsh site iron enrichments were observed in greater depths. We found iron concentrations of 588 µM at 1.25 m, 328 µM at 2.5 m and 633 µM at 5 m depth. Further, there is an increase of iron concentration with increasing depth at the high marsh site. In addition to this general trend, distinct iron enrichments of 285 µM at 2.5 m and 325 µM at 4 m depth were observed.

These high iron concentrations in salt marsh pore waters likely result from reduction of their corresponding oxides and partly coincide with sediment lithology. Portnoy & Giblin (1997) described implications of seawater flooding on salt marshes after decades of diking. Amongst others this could mobilize a large pulse of iron (II). The extreme iron enrichments at this marine-terrestrial transition could provide an indication of pyrite enrichments within Holocene coastal deposits.

References

Beck M., Dellwig O., Kolditz K., Freund H., Liebezeit G., Schnetger B., Brumsack H., (2007), *Limnology and Oceanography Methods*, in press

Portnoy J.W., Giblin A.E., (1997), *Biogeochemistry* **36**: 275-303.