Experimental determination of restite/melt partitioning in anatexis: The role of apatite

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Diamond-trap melting experiments were conducted on a mica-rich orthogneiss of the Cambro-Ordovician ferrosilicic volcanic succession from Iberia. Conditions covered the range from 750-900°C and 1.0 GPa at water saturated conditions. The melts extracted to the diamond trap were analyzed for trace elements by LA-ICP-MS. A report on the REE abundances and restite/melt partitioning is shown here. With the exception of the run at the lowest T (750°C), the others show chondrite-normalized patterns very close to those of the protolith (see attached figure). At 750°C the REE pattern is depleted in all REE and shows a marked Eu positive anomaly. This is related to the preferential incorporation of plagioclase and not the mica at these conditions. At higher T, the amount of melt is quite high and the patterns approach to the source pattern. Calculations indicate that the slight differences between melts and restite are controlled by apatite. If 15% biotite and 3% quartz are present in the restite, a little amount of 1% apatite and ~0,02% monazite are needed to explain the REE content of melt at 750°C.

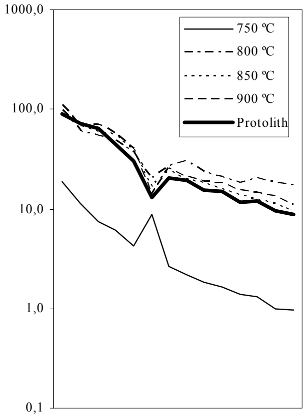

Figure 1: REE data from experimental melts and protolith.

These results may be used to model the trace element behaviour in water-added anatexis of mica-rich protoliths. It is emphasized the role played by accesory minerals (i.e. apatite) in controlling REE variations in anatectic granites, S-type granites.

Decomposition of macroalgae affects N-cycling in intertidal sediments

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The decomposition of macroalgal detritus increased the concentration of inorganic nitrogen within the sediment and therefore likely stimulates several microbial process that use these compounds as substrates [1, 2]. To test this hypothesis, a microcosm experiment was carried out where the decomposition of *Ulva* sp. detritus was studied in the dark. Changes in O_2, NO_X^- and NO_2^- distribution inside the sediment were measured using O_2, NO_X^- and NO_2^- microsensors [3]. Macroalgal detritus increased aerobic respiration in the upper layer of the sediment and decreased the O_2 penetration depth (Fig. 1). The concentration of NO_3^- (NO_x^-- NO_2^-) and NO_2^- within the sediment increased showing a maximum at about 1mm depth. The numerical modeling of these profiles allowed estimating several key processes of N cycle within the sediment [3, 4]. Macroalgal detritus increased nitrification rate in the upper oxic layer of the sediment, and the consumption of NO_3- and NO_2^- in the anoxic layer, likely due to an increase in the denitrification and/or anammox rates (Table 1).

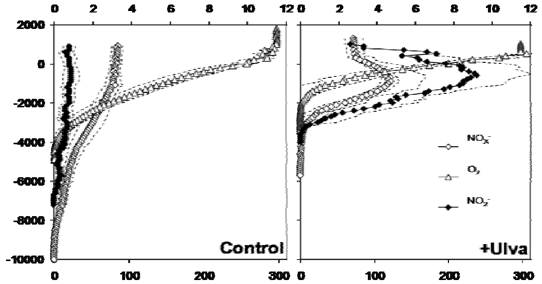

Figure 1: Means O_2, NO_x^- and NO_2^- profiles in the control (n=3) and +Ulva detritus (n=3) microcosms after 3 weeks. Dotted lines represent the standard error.

	Control	+Ulva
Nitrification	211,0 ± 32,6	458,1 ± 60,5
Anoxic NO_X^- consumption	-172,3 ± 22,4	-372,2 ± 37,5

Table 1: Mean ± SD rates obtained after modeling of all NO_x^- and NO_2^- profiles obtained during experiment (n=12).

[1] Garcia-Robledo *et al*. (2008) *Mar. Ecol. Progr. Ser.* **356**, 139-15. [2] Corzo *et al*. (2009) *Mar. Ecol. Progr. Ser.* (in press). [3] Meyer *et al*. (2005) *Appl. Envirom. Microbiol.* **71**, 6141-6149. [4] Berg *et al*. 1998. *Limnol. Oceanogr.* **43**, 1500-1510.