Geophysical Research Abstracts
Vol. 14, EGU2012-1058-1, 2012
EGU General Assembly 2012

REE incorporation and behaviour in aquatic turtles as a consequence of environmental exposure and biological processes

P. Censi (1), L.A. Randazzo (1), S. D'Angelo (2), A. Cuttitta (3), and F. Saiano (4)

(1) DISTEM department, Università di Palermo, PALERMO, Italy (paolo.censi@unipa.it), (2) Italian Section of World Wide Fund for Nature, Mazara del Vallo, Italy (s.dangelo@wwf.it), (3) IAMC-CNR, UOS di Capo Granitola, Campobello di Mazara (TP), Italy (angela.cuttitta@iamc.cnr.it), (4) SAGA department, Università di Palermo, PALERMO, Italy (filippo.saiano@unipa.it)

Rare Earth Elements (REE) contents in Emys trinacris have been investigated for the first time in order to recognise effects of the chemistry of the environment on the composition of biological fluids. Representing radionuclides a potential health risk for living organisms in case of incorporation in tissues and being REE geochemical analogues of actinides in hydrosphere, this study was focused on investigation of REE behaviour in whole blood and esoskeleton of selected individuals of Emys trinacris. The choice of this species is related to its amphibian character that allowed us to evidence environmental stress in terms of composition of environmental freshwaters whose REE compositions were investigated and compared with blood samples. Moreover effects induced by different environmental conditions were investigated collecting samples in two sites characterised by absence of an anthropogenic signature (GT site) and subjected to strong anthropogenic pressure in terms of wastewater input (SIC site), respectively.

In both sites REE contents in whole blood samples of studied turtles are quite similar even if in GT site the highest REE contents have been recognised. Shale-normalised REE patterns show very similar REE behaviour with light REE (LREE) enrichments with respect to heavier REE (HREE), mainly in samples from anthropized site. If REE concentrations in whole blood are normalised to the composition of environmental waters, calculated REE patterns show upward concave shapes centred on Gd that are more pronounced in samples from GT site because their patterns are more enriched in LREE. The last features observed in blood samples from GT can be related to larger REE contents occurred in environmental water from this site with respect to waters collected in SIC site, suggesting that a relationship occurs between REE contents in environmental and biological fluids.

Since MREE depletions were observed in waters experiencing phosphate crystallization, observed REE features in whole blood samples suggest that behaviour of these elements can be influenced by vital effects, probably related to the phosphate deposition during formation of turtle skeleton. In order to corroborate this suggestion a portion of esoskeleton sample coming from an Emys trinacris individual was analysed and REE concentrations normalised to the environmental water. Observed features of REE pattern from this material strongly agree with above the mentioned hypothesis being MREE enriched, from Nd to Ho, with respect to LREE and HREE. Therefore collected data indicate that REE contents in blood of Emys trinacris is influenced by exposure to environmental conditions but elemental behaviour in whole blood is driven by biological processes, probably associated to formation of esoskeleton that can be subjected to the incorporation of radionuclides.