Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04565, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04565
EGU General Assembly 2008

Astrobiological implications of microbes in basaltic pillow lava crusts (Atlantic Ocean)

Barbara Cavalazzi1, Frances Westall2, Roberto Barbieri1 and Frédéric Foucher2

1Dipartimento di Scienze della Terra e Geologico-Ambientali, Univeristà di Bologna, Via Zamboni 67, I-40127 Bologna, ITALY, barbara.cavalazzi@unibo.it; roberto.barbieri@unibo.it, 2Centre de Biophysique Moléculaire-CNRS and Université d'Orléans, F-45071 Orléans cedex 2, FRANCE, westall@cnrs-orleans.fr, frederic.foucher@cnrs-orleans.fr

Discoveries of microorganisms living within the vitreous crusts of modern oceanic lava have expanded the range of known extreme microbial environments and demonstrated the crucial role of microbes in bio-alteration processes [1-4]. Microbes can bioerode and colonize surfaces and fractures in the glassy selvages of pillow lavas, leaving behind fossil traces of their activity [1, 2]. Microbial alteration features described from Early Archaean oceanic crusts are claimed as a biosignature for life on early Earth and perhaps on Mars [3, 4]. Palagonite, an alteration product of basaltic glass that can be produced both abiogenically and biogenically, has been detected on the martian surface [5] suggesting the presence of liquid water and subaqueous (bio?) alteration of basaltic glass. The understanding of microbial alteration processes and the recognition of their fossil remains from pillow basalts is an important target in the exploration for life on Mars and elsewhere in the solar system. To recognize evidence of microbial life in the rock record requires the understanding of modern analogues. Here we describe the use of a combination of observational and analytical techniques that are non destructive and only slightly invasive, such as laser scanning, environmental scanning electron microscopes and atomic force microscopes (LSM, ESEM, AFM), that was used to detect potential microfossil biosignatures in the altered rims of recent basaltic pillow lava, and to test their biogenicity. The samples investigated were collected during the scientific cruise SWIM 2004- R/V URANIA. We examined dredged samples from the station 29 along the cruise track across Coral Patch

Seamount, off Morocco in the Gulf of Cadiz, Atlantic Ocean.

ACKNOWLEDGMENTS. The Authors would like to thank Nevio Zitellini and Lucilla Capotondi, CNR Bologna, for providing the samples used in this investigation. Thanks are due to Gilles Breuzard, CBM-CNRS Orléans, Massimo Tonelli, CIGS-Università di Modena, and Roberto Braga, DSTGA-Università di Bologna, for their support during the LSM, ESEM observations and for petrographical data interpretations, respectively. This study was partially supported by a CNR (Italy) – CNRS (France) 2006-2007 International Program.

REFERENCES. [1] Furnes, H., Banerjee, N.R., Staudigel, H., Muehlenbachs, K., McLoughlin, N., de Wit M., Van Kranendonk, M. (2007) *Precambrian Research 158,* 156-176. [2] Mcloughlin, N., Brasier, M.D., Wacey, D., Green, O.R., Perry, R.S. (2007) *Astrobiology 7,* 10-26. [3] Furnes, H., Banerjee, N.R., Muehlenbachs, K., Staudigel, H., de Wit M. (2004) *Science 304,* 578-581. [4] Banerjee, N.R., Furnes H., Muehlenbachs, K., and Staudigel, H. (2004) *LPS XXXV,* Abs. 1248. [5]**.** MichalskiJ. R., Kraft, M. D., Sharp, T. G., Williams,L.B., Christensen, P.R. **(**2005) *Icarus 174,* 161-177. [6] Westall, F. (1999) *Journal of Geophysical Research 104(E7),* 16437-16451.