Geophysical Research Abstracts
Vol. 13, EGU2011-13451, 2011
EGU General Assembly 2011

Long term preservation of biological molecules under acidic conditions supports their persistence in the old acidic sediments of Mars

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Around 3.5 Gy ago, Early Mars was exposed to acidic and aridic conditions that promoted the formation of extensive deposits of salt and iron oxides in different regions of the planet. These conditions are the same that have been considered to prevent the preservation of the biological information for two different reasons: 1) Life would have never emerged from a prebiotic chemistry in acidic habitats and, 2) biological information in form of biomolecules and organics is destroyed by low pH solutions, which usually are highly oxidizing as well. Both reasons have been used by some part of the planetary community to claim that the acidic deposits of Mars should not be considered a consistent target to search for life, but the phyllosilicate deposits which have a great potential for preservation of organics. Although phyllosilicates are a matrix for organic preservation, their greater resistance to dissolution and chemical alteration in comparison to salts give little information about the preservation state of the organics that might have been produced by ancient microbial communities. On the contrary, acidic salts are highly soluble and their presence in the geological record evidences negligible hydrological activity during the diagenesis. Therefore, whereas the phyllosilicates on Mars could have been exposed to meteoric solutions, which degrade organics, the acidic salty deposits suggest an absence of water activity after their production and a great preservation potential for the produced biomolecules. Having this in mind the acidic salts should be considered as a first-class target for preserving ancient traces of life in the red planet.