Impact of climatic changes on organic carbon dynamic in wet tropical watersheds (Guadeloupe)

E. LLORET[1]*, M.F. BENEDETTI[1], C. DESSERT[2] AND J. GAILLARDET[2]

[1]Equipe de Géochimie des Eaux, Institut de Physique du Globe de Paris (IPGP), Université Paris-Diderot, Paris, France (*correspondence: lloret@ipgp.jussieu.fr)
[2]Observatoire Volcanologique et Sismologique de Guadeloupe, Equipe de Géochimie et Cosmochimie, IPGP, Guadeloupe, French West Indies

To better understand the global carbon cycle and the impact of changing climatic conditions, it is important to constrain the different sources, sinks and fluxes of carbon. The soil organic matter ($\approx$ 1500 Gt) is a major pool of carbon at the Earth surface, it is therefore important to understand its dynamic.

If the increase of the frequency and/or intensity of extreme meteorological events (storms, cyclones) is confirmed [1, 2], it could lead to an increase of the export of dissolved and suspended material derived from soils.

Wet tropical provinces have optimal climatic conditions for the weathering [3], including high temperature and high runoff, and account for 30% of the total soil organic carbon and could be disrupted by climatic changes. Guadeloupe has been selected for its geographical location, geology and high rates of chemical weathering and mechanical denudation.

High temporal resolution sampling of small rivers was performed in 2007. Dissolved and particulate organic carbon (DOC, POC) and dissolved inorganic carbon (DIC) concentrations and fluxes, and DOC characteristics (Specific UV Absorbance: SUVA) were measured. DOC values range from 0.4 to 5.0 mg/L and increase with increasing discharge of the rivers. A negative correlation between DIC and DOC concentrations is observed. SUVA values show that carbon with different chemical characteristics, and/or different origin, is transported by the rivers, during different types of hydrologic event. An annual flux of DOC $\approx$5.4t/km²/yr for one watershed was estimated, and one extreme event can represent up to 4% of this flux. Our annual value is close to the maximum flux calculated at Puerto Rico (5.2t/km²/yr, [4]) and the average flux of the Grey River in New Zealand under temperate oceanic climate (5.2t/km²/yr, [5]).

[1] Emmanuel (2005) *Nature* **436**. [2] Webster *et al.* (2005) *Science* **309**. [3] Dessert *et al.* (2003) *Chem. Geol.* **202**. [4] McDowell & Asbury (1994) *Limnol. Oceanogr.* **39**. [5] Carey *et al.* (2005) *Geoph. Res. Lett.* **32**.

Life at the interface: Mechanisms and impact of microbial redox transformations of metals and radionuclides

JONATHAN R. LLOYD

School of Earth, Atmospheric and Environmental Sciences, University of Manchester, Manchester M13 9PL, UK (jon.lloyd@manchester.ac.uk)

The redox cycling of metals by subsurface bacteria has attracted recent interest as these transformations can play crucial roles in controlling the mobility of both inorganic and organic species in a range of environments and, if harnessed, may offer the basis of a wide range of innovative biotechnological processes. These include the bioremediation of metal contaminated land and water, the oxidation of xenobiotics under anaerobic conditions, metal recovery in combination with the formation of novel functional bionanominerals, and even the generation of electricity from anoxic sediments. Under certain conditions, however, microbial redox transformations can also mobilise toxic metals with potentially calamitous effects on human health. Rapid advances over the last decade have resulted in a detailed understanding of some of these transformations at a molecular level, with added impetus expected from the imminent availability of complete genome sequences for key subsurface bacteria, in combination with genomic and proteomic tools.

Focusing on “dissimilatory” processes, I will discuss recent advances in the understanding of the mechanisms of anoxic Fe redox cycling in the subsurface, and the impact of these biotransformations on sediment biogeochemistry and the mobility of trace metals, metalloids and radionculides. The biotechnological application of Fe(III)-reducing bacteria for the generation of commercially useful bionanominerals will also be discussed, alongside their use in a range of innovative *ex situ* applications.