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In search of the triggers of increasing sediment loads to Lake Kivu

Ivan Lizaga[1], Samuel Bodé[1], Kristof Van Oost[2], Montfort Bagalwa[2,3], Karume Katcho[4], Honoré Ciraba[3], William Blake[5], Olivier Evrard[6], Borja Latorre[7], Ana Navas[7], and Pascal Boeckx[1]

[1]Isotope Bioscience Laboratory - ISOFYS, Department of Green Chemistry and Technology, Ghent University, Coupure Links 653, 9000, Gent, Belgium

[2]Earth and Life Institute, Université Catholique de Louvain, Louvain-la-Neuve, Belgium

[3]Service Environnement, Observatoire Volcanologique de Goma (OVG), Goma, Democratic Republic of Congo

[4]Centre de Recherche en Géothermie, Bukavu, Democratic Republic of the Congo

[5]School of Geography, Earth and Environmental Sciences, University of Plymouth, UK

[6]Laboratoire des Sciences du Climat et de l'Environnement (LSCE-IPSL), Unité Mixte de Recherche 8212 (CEA/CNRS/UVSQ), Université Paris-Saclay, Gif-sur-Yvette, France

[7]Estación Experimental de Aula-Dei (EEAD-CSIC), Spanish National Research Council, Zaragoza, Spain. Avenida Montañana, 1005, 50059 Zaragoza, Spain

Extensive agriculture and mining practices increase erosion and sediment transport leading to natural disasters, such as flash floods, landslides and water quality degradation. This is especially evident in areas with high and episodic rainfalls and lousy land use and agricultural management, such as the Lake Kivu region in the eastern Democratic Republic of the Congo (DRC). Due to the growing population and the need to increase crop productivity in the region, poor agriculture practices combined with unmonitored mining lead to severe soil degradation increasing erosion rates and sediment and nutrient export to the surrounding water bodies. In this regard, the Kivu Lake area has experienced an increase in sediment export rates of various orders of magnitude in the last ten years without an obvious triggering factor. This increase is noticeable by the vast growth in its river's deltas built by sediment carried by the intense episodic rainfalls. For this reason, understanding the leading factor to the last decade's increase in sediment export is crucial to prevent further degradation of the ecosystems.

A combined approach of sediment sampling and remote sensing was used. Different methodologies were implemented to collect sediments in Lake Kivu close to the outflow of the rivers along the entire Congolese Rivershore of the lake, targeting areas with different landscape attributes. First, volcanic soils and the absence of natural vegetation characterise the northern part. The central part is an area with intensive mining activities, scarce agriculture and frequent landslides. Finally, in the South, we could discriminate two areas, one with high agriculture density but with a natural park at the headwaters, and the area of Bukavu, which combines all previous factors with a high input of pollutants from the city.

The information extracted from the sediment samples, such as nutrients, grain size and pollutants, will be combined with a detailed remote sensing study integrating UAV, Planet and Sentinel imagery to target the possible factors leading to the last decade's increase in sediment export. This

study will enable researchers and policymakers to explore erosion extent, identify possible drivers and hotspots, and work with stakeholders to develop soil conservation strategies.