



HAL
open science

eDNA analyses from river sediments to investigate its potential to trace erosion hot spots

Charline Giguet-Covex, William Rapuc, Pierre Sabatier, Fabien Arnaud,
Jérôme Poulenard

► To cite this version:

Charline Giguet-Covex, William Rapuc, Pierre Sabatier, Fabien Arnaud, Jérôme Poulenard. eDNA analyses from river sediments to investigate its potential to trace erosion hot spots. INQUA 2023-Time for change, XXI Congrès de l'Union Internationale pour la Recherche QUAternaire (INQUA) 2023, Jul 2023, Rome, France. hal-04305041

HAL Id: hal-04305041

<https://hal.science/hal-04305041v1>

Submitted on 24 Nov 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

eDNA analyses from river sediments to investigate its potential to trace erosion hot spots

Giguet-Covex Charline, William Rapuc, Pierre Sabatier, Fabien Arnaud, Jérôme Poulenard

1-EDYTEM UMR 5204, CNRS, Le Bourget-du-Lac, France

In recent years, the number of studies using sedimentary ancient DNA (sedaDNA) analyses for palaeoenvironmental/climatic reconstructions or for understanding human-environment interactions has increased dramatically. Technical progresses, promotion of the great potential of the tool to push the boundaries of our knowledge on the past composition of life and strengthening of the scientific community, notably through the sedaDNA society, explain this success.

However, there are still many unknowns about the ability of the tool to reflect past environments, taxonomic composition and diversity. When looking at terrestrial organisms from extracellular DNA (exDNA), one crucial question concerns the processes that are governing the DNA transfer and thus the origin of the sub-fossil sedDNA. The now-preferred hypothesis states that most exDNA is bound to mineral/organic or organo-mineral particles and thus transferred through erosion processes, making the community composition a potential signature of the sediment origin. One consequence of this statement is that, in a sediment cascade system, covering several biomes with contrasted vegetation, the sedaDNA could theoretically be used as a tracer of the sediment origin. In this study we aimed at investigating this potential.

In this aim, we applied a DNA metabarcoding approach targeting plants on the exDNA from modern sediments of the Arve and Rhône Rivers (six samples) and their tributaries (eight samples) upstream of Lake Bourget (a hard-water peri-alpine lake). We performed a Non-metric multidimensional scaling analysis to assess the differences/similarities in the floristic composition of the different tributaries and of the Arves and Rhône Rivers. Because the tributaries drain different vegetation belts characterized by specific taxa, they show distinct signatures. Interestingly, the signature of most tributaries was also detected downstream in the main rivers (Arve or Rhône). However, other tributaries, at the time of sample collection, did not appear to contribute to the DNA signal of the main river, raising the question of their sedimentary contribution. However, despite this remaining complexity which still needs to be addressed, these results strongly support the potential of sedimentary DNA as a new proxy to track erosion hot spots.