Late Pleistocene cryptotephras offshore the East African Rift

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Résumé

In the East African Rift System (EARS), onshore tuff dating has proven to be an extremely useful tool to date hominin fossils, therefore improving our understanding of human evolution. Most of them are dated using Ar-Ar. However, such technique requires pure feldspar crystals, which are not always found in pyroclastic deposits, and the uncertainty may be high (e.g. ± 47 ka). This has led scientists to correlate deposits and to identify widespread pleistocene volcanic events in Ethiopia. The aim of the present work is to search for cryptotephras in marine records in the Western Indian Ocean which could be distal correlatives of onshore tuffs, and to date them using d18O-derived age models.
The focus is on three 34 m piston cores, from the Owen Ridge in Arabian Sea (core MD00-2355) to the Somali Basin (MD96-2073 and MD96-2071). Based on the d18O benthic stratigraphy, core MD96-2073 spans more than 300 ka. Preliminary XRF-derived age models show that the other cores span _˜600 ka. For the cryptotephra search, sediment was sieved at 45 μm, at a 10 cm resolution, then 1 cm, and shards were counted under stereo microscope. Shards were analysed with EPMA and LA-ICPMS.

Two MD96-2073 cryptotephras have been firmly correlated to onshore deposits, Youngest Toba Tuff from Indonesia (d18O age of 74,2 ± 2,8 ka) and Konso Silver Tuff from Ethiopia (155,2 ± 5,6 ka). They correspond to the highest glass shards counts (160000/g and 20000/g respectively). Three other cryptotephras are dated around _˜300, _˜350 and _˜600 ka. Glass shards counts are between 1300 to 10000 shards/g. They have unimodal rhyolitic rift-like composition, but cannot so far be correlated to a known source/tuff from literature.
This study shows that recent (< 1 Ma) volcanic ashes from the EARS can be found offshore. These are probably onshore regional tephrostratigraphic markers. These distal cryptotephras offer the unique opportunity to correlate onshore and offsore paleoclimate proxies.

Mots-Clés: East african rift, cryptotephras, marine sediments, volcanoes

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