

Can Saharan dust explain extensive clay deposits in the Amazon Basin? radiogenic isotopes as tracers of transatlantic transport

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Previous studies have shown that Saharan dust transport across the Atlantic acts as an important source of mineral nutrients to the Amazon rainforest. The Belterra Clay, which outcrops extensively across the Amazon Basin, has been proposed to result from dry deposition of African dusts. We have investigated this hypothesis by measuring the radiogenic isotopic composition (Sr, Nd and Pb) of a suite of samples from the Belterra Clay, African source regions, dusts deposits from various locations along the air mass transport, and some Caribbean islands to characterize dust in the source and receptor regions.

Our results identify distinct isotopic signatures in the Belterra Clay samples and the African sources. The Belterra Clay displays radiogenic Sr and Pb isotope ratios associated with low ϵ_{Nd} values. In contrast, Bodélé samples and dusts deposits show lower Pb isotope ratios, variable $^{87}Sr/^{86}Sr$, and relatively homogeneous Nd isotopic compositions, albeit more radiogenic than those of the Belterra Clay.

Our data show unambiguously that the Belterra Clay is not derived from African dust deposition, but results from weathering and erosion under humid tropical conditions. That Saharan dust contributes to the fertilization in the Amazon Basin cannot be ruled out, however, since the African dust isotopic signature is expected to be entirely overprinted by local weathering sources. In contrast, radiogenic isotope data obtained on aerosol filters collected in the US Virgin Islands and Tobago are similar to those of aerosols from Mali, demonstrating that the African dust isotope signal is detectable and transported as far as Central and South America. We conclude that radiogenic isotope systems are powerful tracers of provenance and can be used to fingerprint dust sources and atmospheric transport patterns.

Hymenoptera pollinator effect on environment

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There are several studies reporting the evidence that pollinators are declining as a result of local and global environmental degradation. Operation Pollinator is an international biodiversity program, supported by Syngenta, to boost the number of pollinating insects on commercial farms. It works by creating specific habitats, tailored to local conditions and native insects.

The aim of this work is to increase the ecological suitability of pollinator populations through improved food availability for pollinator employing strategies for surrounding landscape.

Two cherry orchards, located in Fundão, Portugal, were studied: one was installed a patch meadow with flowery prairie with the purpose of increasing pollinator's number; other with poor native biodiversity. It was identified the main groups of insects visiting the cherry blossoms and the surrounding flora, during the flowering cherry trees.

This review was conducted through observation and analysis of pollen in pollinator's nests, artificially placed in the orchards in order to evaluate the visiting flowers.

There was a greater number of pollinating insects in the orchard with higher biodiversity and it was found that insects visited other flora along with the cherry blossoms. The Hymenoptera identified belong to genus: *Andrena*; *Apis*; *Eucera*; *Tropinota*; *Anthophora*; *Osmia*; *Xylocopa*. The orchard where haven't been installed the patch meadow, shows a lower number of visiting insects as well as lower species variability. The increasing of pollinators protects the environment and increases the fruit production and quality. The findings of the sweeter fruit, with the increased number and diversity of insects leads to the conclusion that the environment benefits from the increase in pollinators with more balanced environment, it's a winning environment for everyone.

The conservation of pollinator habitat can also enrich overall biodiversity and the ecosystem services, protect soil and water quality.

Keywords: pollinators hymenoptera; biodiversity; pollen.
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