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Quantifying the tropical Island Mass Effect and its seasonal variability: the case of Guadeloupe (French West Indies)

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Tropical islands are located in oligotrophic gyres, where nitrogen is the primary limiting macronutrient for phytoplankton growth. Those oceanic provinces can also be co-limited by low inputs of nutritive metals such as iron. However, intense phytoplankton production is frequently observed around islands due to nutrient inputs from terrestrial sources (rivers, groundwater, runoff) and oceanic processes (upwelling, vertical mixing, sediment resuspension). Yet, such *island mass effects* remain largely unexplored in the Caribbean, including Guadeloupe (French West Indies).

Here we present results from two field campaigns conducted in June 2023 and January 2024 in the rivers and coastal waters of southern Basse-Terre, Guadeloupe. Saharan dust deposits, Sargassum drift, sediment resuspension from the wide continental shelf, banana plantations and wastewater discharges are potential additional sources of macro- and micro-nutrients on the Atlantic coast. In contrast, hydrothermal activity from La Soufrière volcano, as well as oceanic advection from Orinoco and Amazon rivers can influence the biogeochemical inputs on the Caribbean coast.

The distribution of iron (Fe) and nitrate (NO_3^-) in the rivers and in the surface waters will be presented to identify and quantify their sources. An island-wide flux balance was established to identify the predominant sources and their seasonal variability. Finally, we evaluated the impact of macro- and micro-nutrient inputs on the coastal phytoplankton assemblage and primary production.

Overall, two island effects were identified depending on exposure to the Caribbean Sea or the Atlantic Ocean, but in both cases they were not exported offshore. Furthermore, there was no marked seasonality in either nutrient inputs or phytoplankton response.