The role of oceanic currents in the dispersal and connectivity of the mangrove *Rhizophora mangle* on the Southwest Atlantic region

André Guilherme Madeira[1], Yoshiaki Tsuda[2], Yukio Nagano[3], Takaya Iwasaki[4], Maria Zucchi[5], Tadashi Kajita[6], and Gustavo Mori[1]

[1]UNESP
[2]University of Tsukuba
[3]Saga University
[4]Ochanomizu University
[5]Agencia Paulista de Tecnologia dos Agronegocios
[6]University of the Ryukyus

December 2, 2022

Abstract

Dispersal is a crucial mechanism to living beings, allowing them to reach new resources such that populations and species can explore new environments. However, directly observing the dispersal mechanisms of widespread species can be costly or even impracticable, which is the case for mangrove trees. The influence of ocean currents on the mangroves' propagules' movement has been increasingly evident; however, few studies mechanistically relate the patterns of population distribution with the dispersal by oceanic currents under an integrated framework. Here, we evaluate the role of oceanic currents on dispersal and connectivity of *Rhizophora mangle* along the Southwest Atlantic. We inferred population genetic structure and migration rates based on single nucleotide polymorphisms, simulated the displacement of propagules along the region and tested our hypotheses with Mantel tests and redundancy analysis. We observed a two populations structure, north and south, which is corroborated by other studies with *Rhizophora* and other coastal plants. The inferred recent migration rates do not indicate gene flow between the sampled sites. Conversely, long-term migration rates were low across groups and contrasting dispersal patterns within each one, which is consistent with long-distance dispersal events. Our hypothesis tests suggests that both isolation by distance and isolation by oceanography (derived from the oceanic currents) can explain the neutral genetic variation of *R. mangle* in the region. Our findings expand current knowledge of mangrove connectivity and highlight how the association of molecular methods with oceanographic simulations improve the interpretation power of the dispersal process, which has ecological and evolutionary implications.

Hosted file

`Madeira_2022_mangrove_dispersal[1].doc` available at https://authorea.com/users/561967/articles/609315-the-role-of-oceanic-currents-in-the-dispersal-and-connectivity-of-the-mangrove-rhizophora-mangle-on-the-southwest-atlantic-region