SOCIETY FOR MARINE MAMMALOGY: SMALL GRANTS IN AID OF RESEARCH (2018) GRANT REPORT

Project Title: "Trophic relations and habitat use along the ontogenetic development of the bottlenose dolphin's ecotypes in the southern Brazil."

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Outcomes: This study is part of a master degree's thesis. The funding received allowed the payment for stable isotope analysis of great part of the 194 samples obtained for this study, the results derived from them have already been presented in two international conferences (11th International Conference on the Applications of Stable Isotope Techniques to Ecological Studies - IsoEcol 2018; and XII Congreso de la Sociedad Latinoamericana de especialistas en Mamíferos Acuáticos – RT18) and a manuscript has already been submitted to a international journal, beeing currently under review. Following, you can verify the main ideas and results from this study.

Abstract

In the western South Atlantic Ocean, two subspecies of bottlenose dolphin co-occur in a narrow coastal area (contact zone), suggesting competition for resources. Difficulties in understanding this co-occurrence can be assessed by an isotopic approach, and teeth are a good matrix for this evaluation. We analysed carbon and nitrogen isotopic values ($\delta^{13}C$ and $\delta^{15}N$) of dentin growth layer groups in teeth of *Tursiops truncatus truncatus* (offshore ecotype) and *Tursiops truncatus gephyreus* (coastal ecotype) stranded along the coast of Santa Catarina, southern Brazil (Fig. 1), in order to investigate the trophic, spatial and temporal dimensions of their isotopic niches. For each subspecies, we calculated isotopic niche width and the possible

overlap in resource use between them. We modelled $\delta^{13}C$ and $\delta^{15}N$ according to age to verify ontogenetic variations in resources use. We measured the ratio of individual variation by that of the population to estimate the degree of individual specialization within each subspecies. Mean isotopic values differed significantly only for carbon values ($\delta^{13}C_{Ttg}$ = -12.7 ‰; $\delta^{13}C_{Ttt}$ = -14.3 ‰; Fig. 2), and a small overlap in resource use between subspecies was observed (Fig. 3). Individual specialization was evident in both subspecies (Fig. 4), indicating they present temporal consistency in resource use and they forage upon various preys. Although weaning age and feeding habit seem similar, subspecies diverge especially in habitat use, indicating they adapted for feeding in different environments. These results suggest a certain degree of habitat partitioning, but support the hypothesis of a parapatric distribution, with a “contact zone” of both subspecies in this region of the western South Atlantic Ocean.

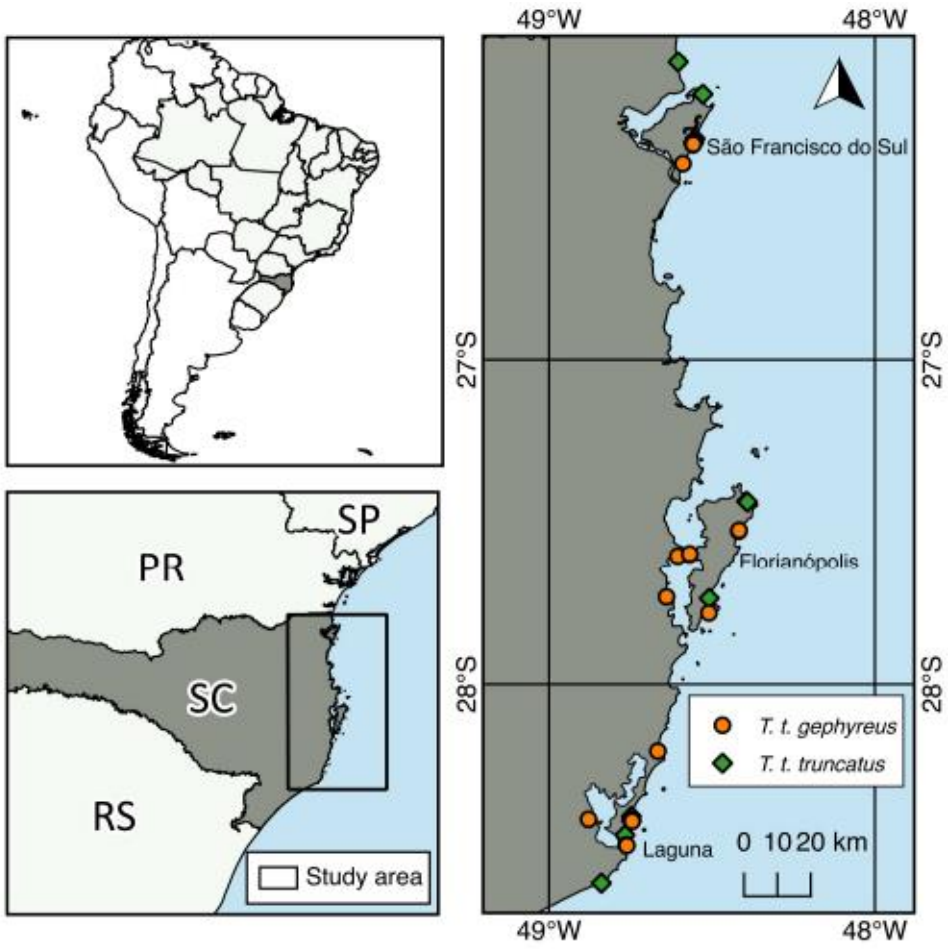

Fig. 1 Study area and stranding points of the 28 specimens (15 *T. t. gephyreus* and 13 *T. t. truncatus*) analysed for this study. Some stranding points are overlapped. Orange circles represent stranding location of *T. t. gephyreus* and green lozenges represent stranding location of *T. t. truncatus*. The upper map at the left side represents South America and the Brazilian states of São Paulo (SP), Paraná (PR), Santa Catarina (SC) and Rio Grande do Sul (RS) are shown at the lower map to the left

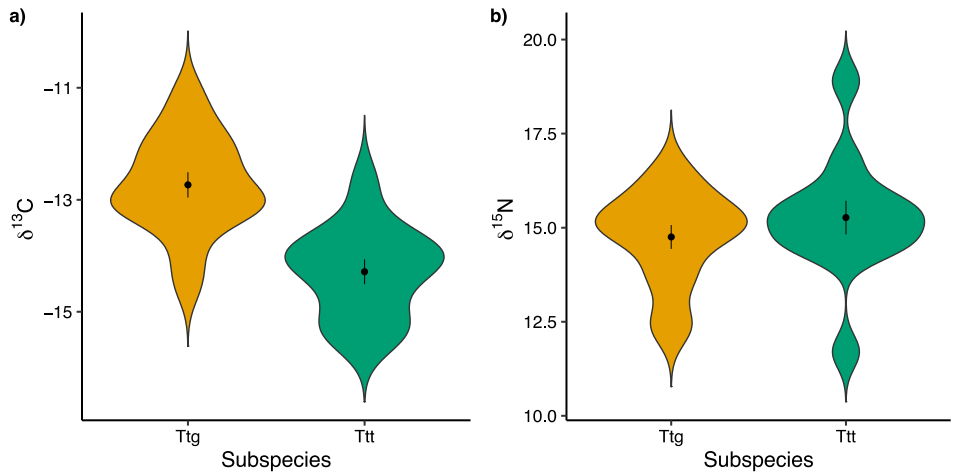

Fig. 2 Violin-plot with distribution of $\delta^{13}C$ (a) and $\delta^{15}N$ (b) values for *T. t. gephyreus* (Ttg) and *T. t. truncatus* (Ttt). Points represent mean values with standard deviation. Difference between mean values was only significant for $\delta^{13}C$ values ($p < 0.0001$)

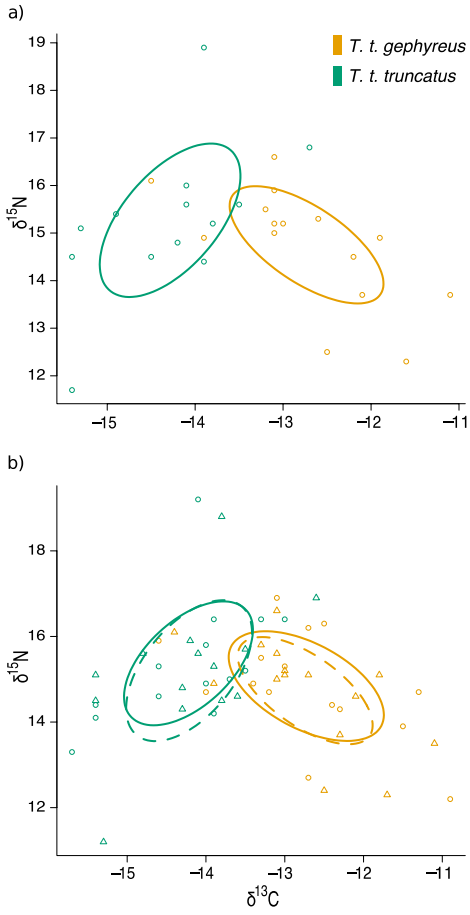

Fig. 3 Isotopic Standard Ellipses adjusted for small sample sizes (SEAc) for *T. t. gephyreus* and *T. t. truncatus*, generated with individual's mean $\delta^{13}C$ and $\delta^{15}N$ values excluding GLGs 1 and 2, considering all individuals sampled (a) and separated by age class (b). Calves ellipses (solid lines) are defined by circles, and young/adults ellipses (dashed lines) are defined by triangles

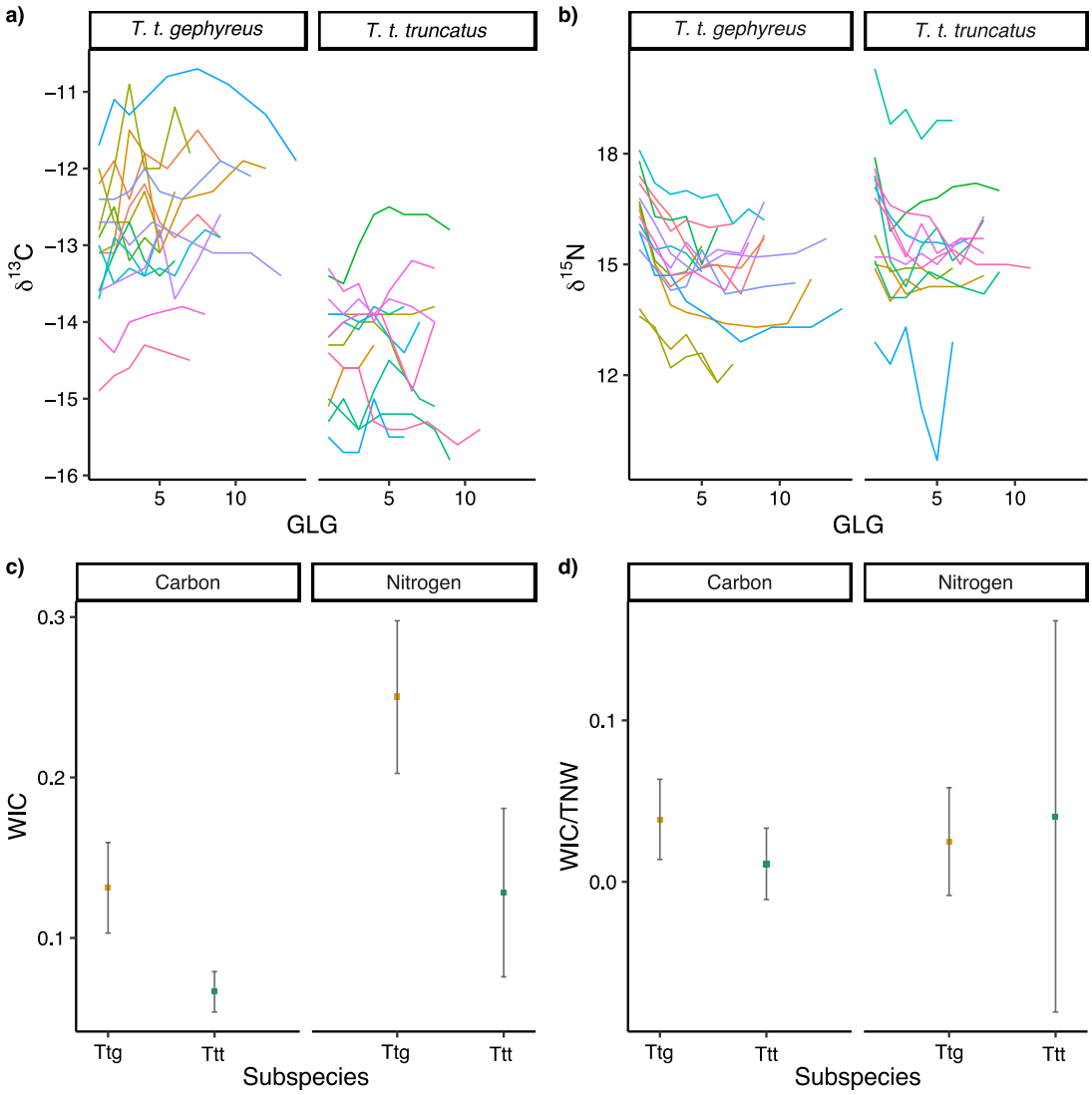

Fig. 4 Individual carbon (a) and nitrogen (b) isotopic ontogenetic profiles from *T. t. gephyreus* (Ttg, n = 15) and *T. t. truncatus* (Ttt, n = 13) (each line represents the total of samples for each individual). Within individual component (WIC) (c) and the degree of individual specialization (WIC/TNW) (d), calculated for carbon and nitrogen isotope compositions in both bottlenose dolphin subspecies. WIC/TNW ratio range from 0 (all individuals are specialists) to 1 (all individuals are generalist). Squares represent mean ± SD. Pairwise comparisons of WIC and WIC/TNW were conducted separately for $\delta^{13}C$ values and $\delta^{15}N$ values by a bootstrap with 1000 replicates; no significant difference was observed between subspecies.