Environmental predictors of bottlenose dolphin (*Tursiops truncatus*) abundance in the Algarve, Portugal.

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INTRODUCTION

Bottlenose dolphins (*Tursiops truncatus*) are a widespread **keystone species** & bioindicator of ecosystem health. Yet, the factors shaping their abundance & habitat use in southern Portugal's Algarve region remain poorly understood. **This study explores how two key oceanographic variables, SST & Chl-a, may influence their occurrence across four age classes,** providing baseline data against a background of changing oceans [1, 2].

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METHODOLOGY

- **Data** were collected **from 2015 to 2023** using dedicated & opportunistic vessels **in the Algarve (Fig. 1A).**
- **Abundance rates (AR) for adults, juveniles, calves, & neonates** were calculated as the minimum number of *T. truncatus* per sighting divided by monthly survey hours.
- **Monthly SST & Chl-a** data (4 km, NASA MODIS-Aqua) served as **environmental predictors** in **Generalized Additive Models (GAMs)** & **Generalized Linear Mixed Models (GLMMs) in R.**

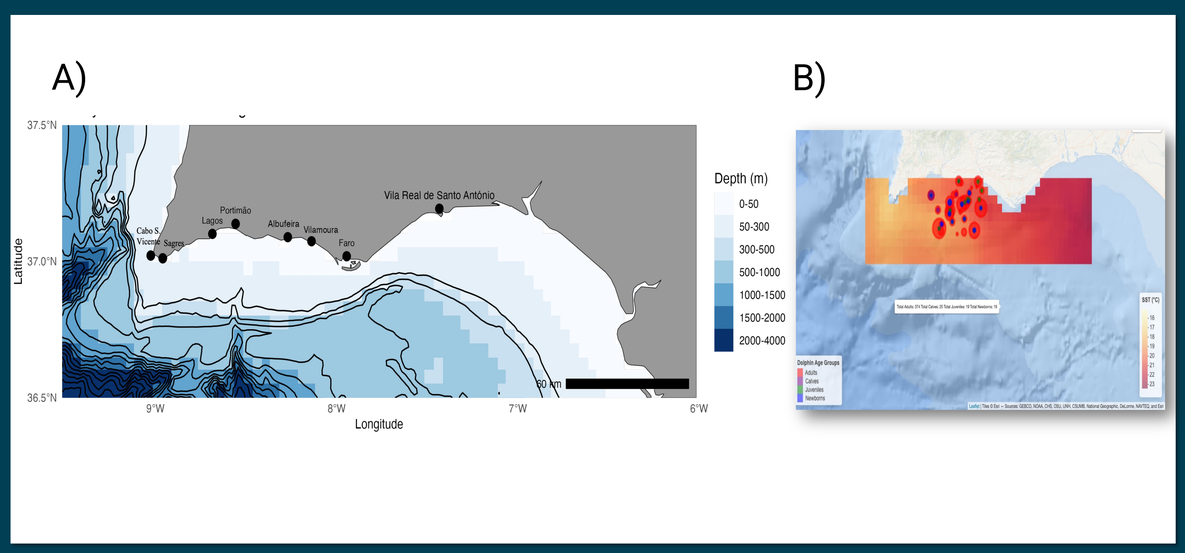

Fig. 1 – A) Study area; B) *T. truncatus* sightings overlaid on August 2023 SST heatmap.

RESULTS

- **1,097 sightings** over 4,646 hours (**13,910** *T. truncatus* individuals).
- **Mean AR** across all age groups: **3.1** ± 1.5 dolphins/hour (n = 67).
- **AR peaked** in spring & autumn, **when SST was lowest** & **Chl-a highest**.
- Neonate sightings were more prevalent in warmer eastern waters; juvenile sightings in cooler western waters near the open Atlantic **(Fig. 1B).**
- **GLMM & GAM results (Fig. 2) revealed…**

ADULTS' AR POSITIVELY CORRELATED WITH CHL-A & NEGATIVELY WITH SST*

NEONATES' AR POSITIVELY CORRELATED WITH SST

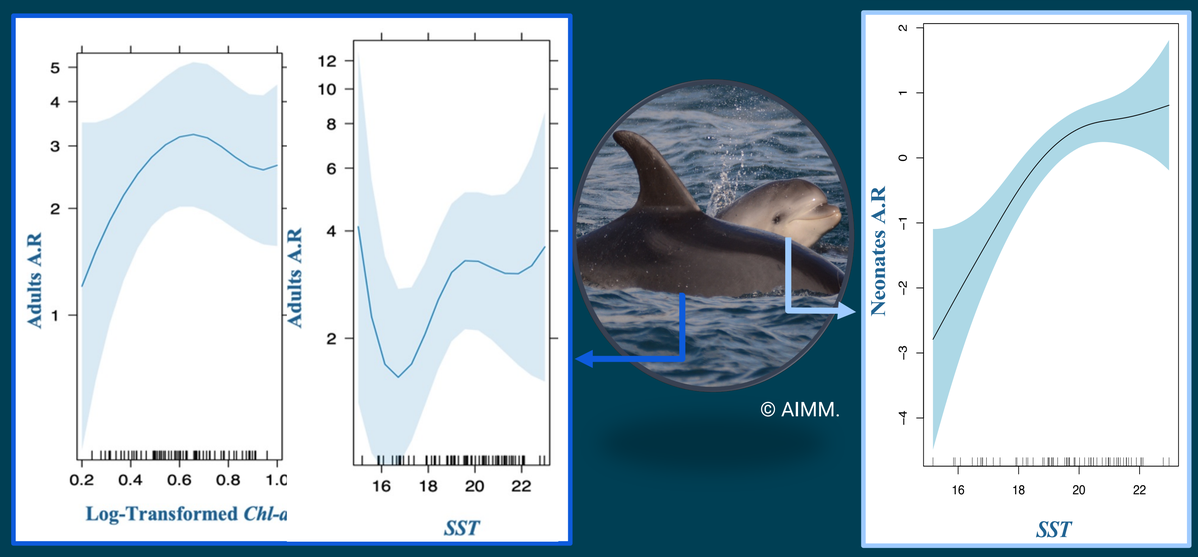

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Fig. 2 – Adults' AR vs. log(Chl-a) & SST (GLMM, left); Neonates' AR vs. SST (GAM, right).
**Juveniles' AR also negatively correlated with SST (GLMM not shown here).*

DISCUSSION & CONCLUSION

This study shows the **influences of SST & Chl-a on *T. truncatus* abundance in the Algarve[1,5]. Cooler, Chl-a rich** waters may **boost prey availability** for adults & juveniles, while **warmer SST** can act as a **thermal barrier**, limiting their occurrence[1,3]. **Higher SSTs** may serve as a **thermal 'cushion' for neonates**, enhancing thermoregulation, given their thinner blubber & smaller size which increases cold-stress vulnerability[4]. These findings suggest **the Algarve** is likely an **important nursery area for *T. truncatus***, warranting **further research** and the development of **predictive models** to guide **age-specific conservation** strategies in a changing climate[1].

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More info here!