Supplementary Material

View from below: inferring behaviour and physiology of Southern Ocean marine predators from dive telemetry

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**MATERIALS AND METHODS**

Since 1950 nearly 3000 studies investigating diving and foraging behaviour of predators in the SO have been carried out. However the majority of this work was carried out in the decade 2006-2016. Recent advances in telemetry have facilitated this investigation greatly.

In our study, we conducted a qualitative literature analysis to gain insights to assess the diving behaviour of SO predators based on data obtained through a variety of data loggers and sensors. A systematic literature review was conducted of the last 10 years of published work on the diving telemetry of marine mammals and seabirds of the SO. Online databases such as Google Scholar, Medline, Web of Science, were searched for peer-reviewed literature containing the words: dive data, tag, TDR, Southern Ocean, Antarctic, marine mammals, penguins, seabirds, seals, cetaceans, species name. Publications were only included in the analysis if written in English and published from 2006 to 2016. Furthermore we only considered studies that employed data loggers designed to measure the underwater behaviour within the SO region and on SO species (pinnipeds, cetaceans or seabirds). No fish or turtles were considered in this study. These criteria were chosen to limit the amount of literature to analyse.

For the purpose of the analysis we created a database using the Mendeley - Reference Manager (www.mendeley.com). We chose this software over others because of the possibility to search words or full-text in all whole documents added to the library.

First we imported all publications that fullfilled out criteria (n = 218) into the database.

From each article we collected the following metadata: author and year, species studied, subject (foraging, physiology, energetic, other), location of data logger deployment, aim of the study, type of data logger used, analysis software used, plots shown and diving variables collected.

We entered all metadata into an excel spreadsheet (Microsoft Excel 2010) and identified and synthesised the most commonly used basic dive parameters (dive duration and depth, see **Table 2**) and derived parameters (see **Table 3**). Note that not all publications reported all possible dive variables. Based on the publications that reported mean dive duration and depth, we used R sofware (Ihaka and Gentleman, 1996) to carry out a compartive analysis of the relationship between these two variables for all species (see **Figure 4**).

Publications were grouped according to the fundamental question being addressed: characterization of the diving behaviour as the vertical component of animal movement (30 %), foraging as diving activity linked with food research and acquisition (56 %), energetics (14 %). The latter refered to allocation of energy for maintenance functions, metabolic work, growth, reproduction, and locomotion. From this we examined which variables and methods were used to answer those questions.

**REFERENCES**

Ihaka, R. and Gentleman, R., (1996). R: a language for data analysis and graphics. *J. Comp. Graph. Stats.*, 5, 299–314.

**LIBRARY ACCESS**

A public access to the review library is available at www.mendeley.com, mendeley group name: “ Supplementary Material: View from below” plase email the corrisponding Author for further details.