# USE OF PHOTOGRAMMETRIC TECHNIQUES AND BINOCULARS WITH RANGEFINDER TO ESTIMATE RADIAL DISTANCES IN MEGAFAUNA SHIP SURVEYS

297

José Antonio Vázquez Bonales, Paula Gutiérrez-Muñoz, José Martínez-Cedeira, and Camilo Saavedra.
Spanish Institute of Oceanography (IEO-CSIC), Subida a Radio Faro 50, 36390, Vigo, España.

## INTRODUCTION

In distance sampling cetacean ship surveys, the most common methods for estimating radial distances are the use of marked sticks and reticulated binoculars. In this work, two alternative methods to estimate radial distances have been tested: the photogrammetric method (Leaper, R & Gordon, J.,2001), adapted to megafauna protocol used in the Spanish and French multipurpose ship surveys, and the use of rangefinder binoculars.

## METHODOLOGY

The photogrammetric method is based on the conversion of the number of pixels between the detected signal of cetacean presence and the horizon of a still image captured from a continuous recording video system, in units of distance (meters) taking into account the height of the observation platform and the focal length of the camera lens method. To do this conversion Validation software is used (figure 1). We have adapted this photogrammetric system to the MEGASCOPE ship surveys data collection protocol (*Authier et al., 2018*), which is focused not only in cetaceans but also in marine birds, turtles and debris, by using the images taken from a digital reflex Canon EOS camera. We have also assed the use of Swarovski El Range rangefinder binoculars by comparing the distances obtained with them and real distances to fixed objects calculated with GPS.

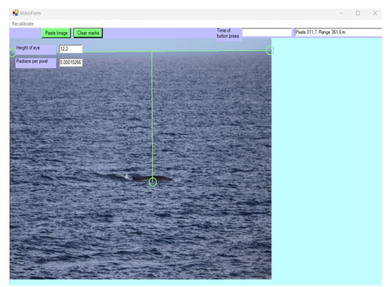


**Figure 1. Validation software.**

### RESULTS – VALIDATION REGRESION PLOTS

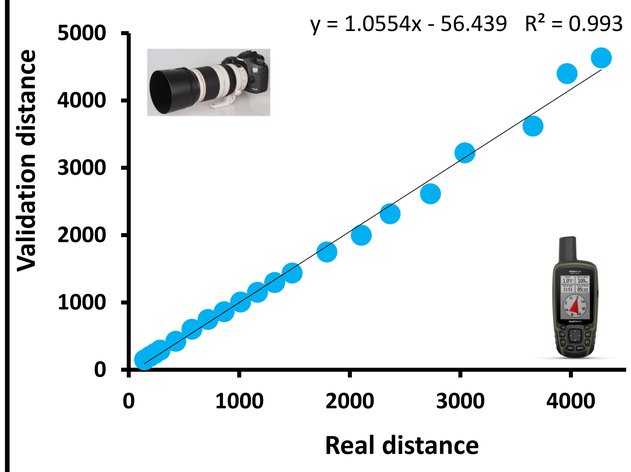



**Figure 2. Linear regression GPS vs CANON distances.**

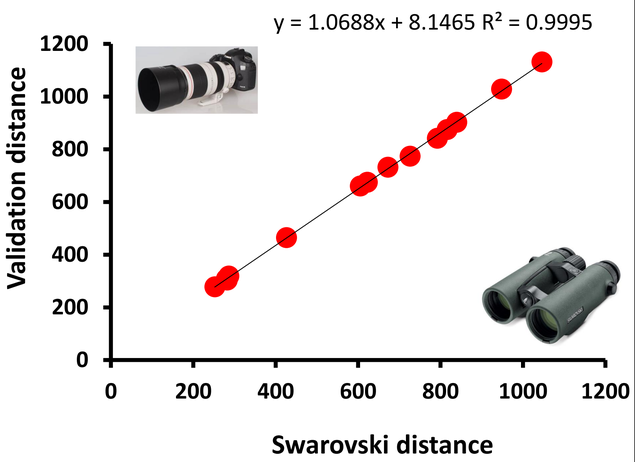
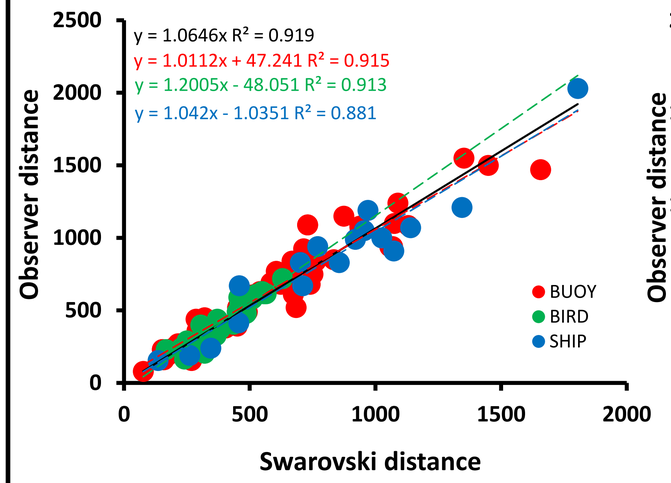



**Figure 3. Linear regression SWAROVSKI vs Camera distances.**

### RESULTS – FIELD EXAMPLES

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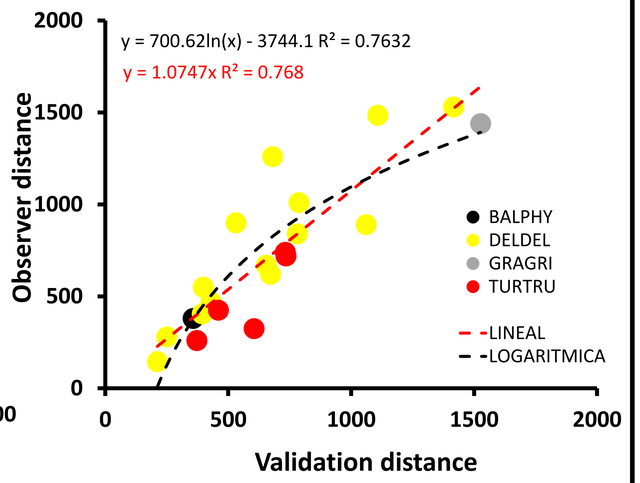


**Figure 5. Linear regression CANON vs Observer distances.**

## CONCLUSION

- **THE TWO METHODS TESTED IN THIS WORK HAS BEEN VALIDATED TO ESTIMATE RADIAL DISTANCES IN SHIP SURVEYS USING THE MEGASCOPE PROTOCOL**
- **THE PRELIMINAR RESULTS WITH FIELD DATA SUGGEST THAT SWAROVSKI "EL RANGE" RANGEFINDER BINOCULARS ARE SUITABLE TO GET ACCURATED DISTANCES UP TO AROUND 1000M FOR SOME MARINE BIRDS, FISHING BUOYS AND SHIPS. HOWEVER THIS METHOD IS NOT SUITABLE FOR CETACEANS.**
- **THE MODIFIED PHOTOGRAMMETRIC METHOD DEVELOPED IN THIS WORK IS SUITABLE TO GET ACCURATTED DISTANCES OF CETACEANS SIGHTINGS. HOWEVER TO APPLY IS NECESSARY TO GET PICTURES OF THE ANIMALS WITH THE HORIZON AT THE VERY FIRST MOMENT OF THE ENCOUNTER.**

## BIBLIOGRAPHY

1.- Authier M., Dorémus G., Van Canneyt O., Boubert J.-J., Gautier G., Doray M., Duhamel E., Massé J., Petitgas, P., Ridoux V., Spitz J. (2018) Exploring change in the relative abundance of marine megafauna in the Bay of Biscay, 2004-2016. Progress in Oceanography, https://doi.org/10.1016/j.pocean.2017.09.014.

2.- Leaper, R & Gordon, J (2001). Application of photogrammetric methods for locating and tracking cetacean movements at sea. Journal of Cetacean Research and Management 3: 131-141

*34 Annual European Cetacean Society Conference, O Grove, Galicia, Spain.*

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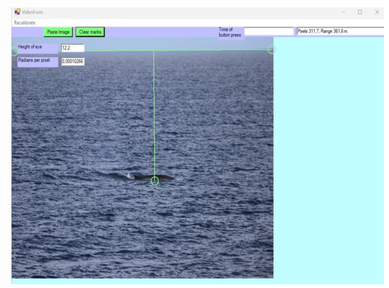

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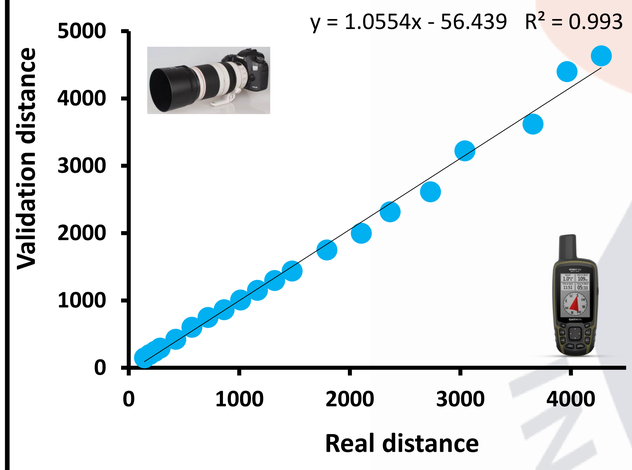


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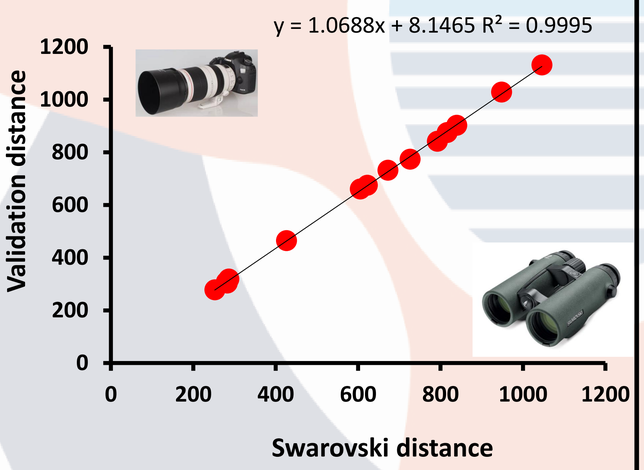


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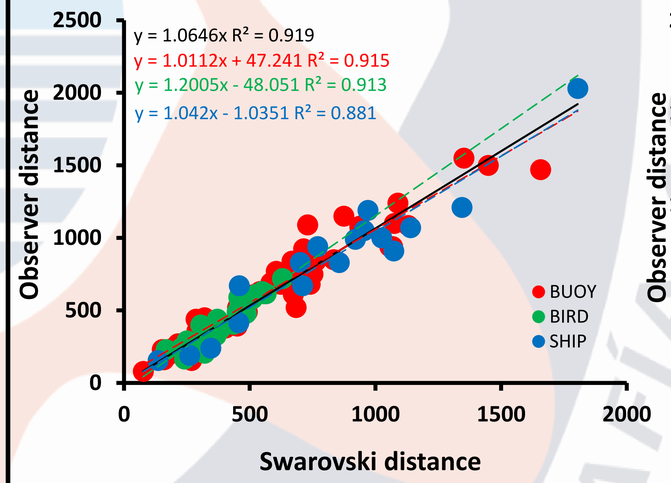


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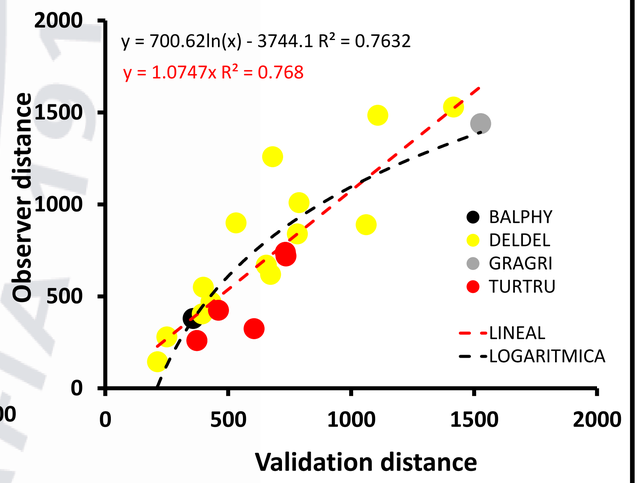


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