

Acquisition of Oceanographic Measurements from Baleen

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Award Number: N00014-13-1-0854

LONG-TERM GOALS

To use large baleen whales as oceanographic sampling platforms and understand how they use oceanographic features to navigate and find prey.

OBJECTIVES

To develop and calibrate CTD satellite transmitters for baleen whales that can collect and transmit data on location, depth, temperature and salinity.

APPROACH

Diving ocean predators equipped with satellite transmitters can act as “real-time autonomous sampling platforms” in remote or ice covered waters. Sampling of oceanographic data, including salinity (conductivity), temperature and depth, by marine mammals is not only relevant to understand the ecology of the animals, but also in oceanography. It has been used widely with seals but to a much lesser extent with cetaceans, i.e. narwhals and belugas. The data can be incorporated into existing oceanographic monitoring of e.g. climate change or they can be used as proxies for prey availability and habitat preferences.

This project is carried out in cooperation with Mads Peter Heide-Jørgensen (Greenland Institute for Natural Resources) and Gisli Víkingsson (Marine Research Institute, Iceland). The study will address the objective by cooperating with the two main manufacturers of satellite transmitters for marine mammals (Sea Mammal Research Unit (SMRU, www.smru.st-andrews.ac.uk), University of St. Andrews, Scotland and Wildlife Computers (WC, www.wildlifecomputers.com), Redmond, WA, USA). A new type of CTD oceanographic satellite tag will be developed for baleen whales under this grant.

WORK COMPLETED

A prototype of the CTD satellite tag has now been produced by Wildlife Computers and initial testing is ongoing per mid November 2014.

Report Documentation Page

Form Approved
OMB No. 0704-0188

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1. REPORT DATE 30 SEP 2014		2. REPORT TYPE		3. DATES COVERED 00-00-2014 to 00-00-2014	
4. TITLE AND SUBTITLE Acquisition of Oceanographic Measurements from Baleen				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Aarhus University, Department of Bioscience, Frederiksborgvej 399, DK-4000 Roskilde, Denmark,				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

RESULTS

The prototype CTD tag without the Argos and GPS modules is being tested under different conditions in the lab and in the ocean to depths down to 700m (Puget Sound and Davis Strait). Drawing of the prototype tag and calibration results are shown below. Results so far are promising, however, some adjustments are still needed.

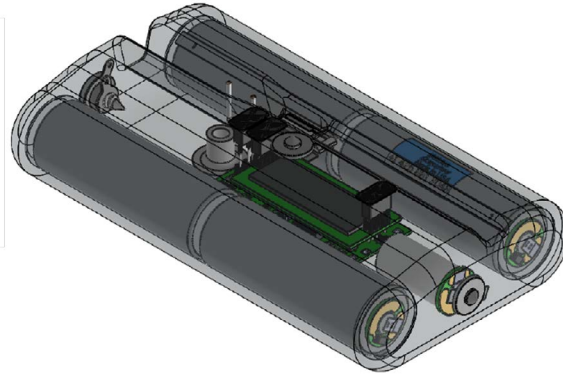


Fig. 1. Prototype CTD tag from Wildlife Computers with electrode reading of conductivity.

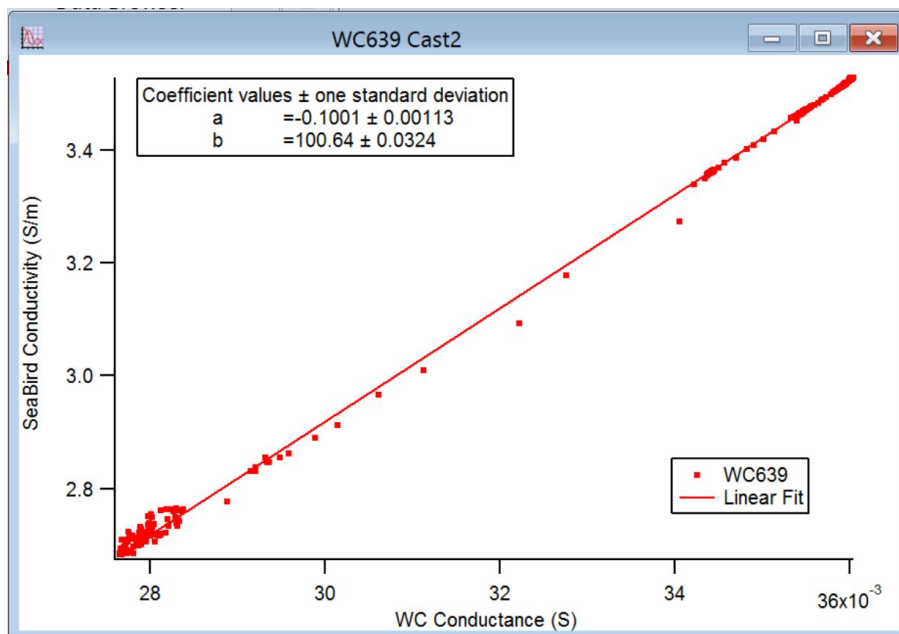


Fig. 2. Conductivity calibration of prototype tag (WC639) against a SeaBird CTD.

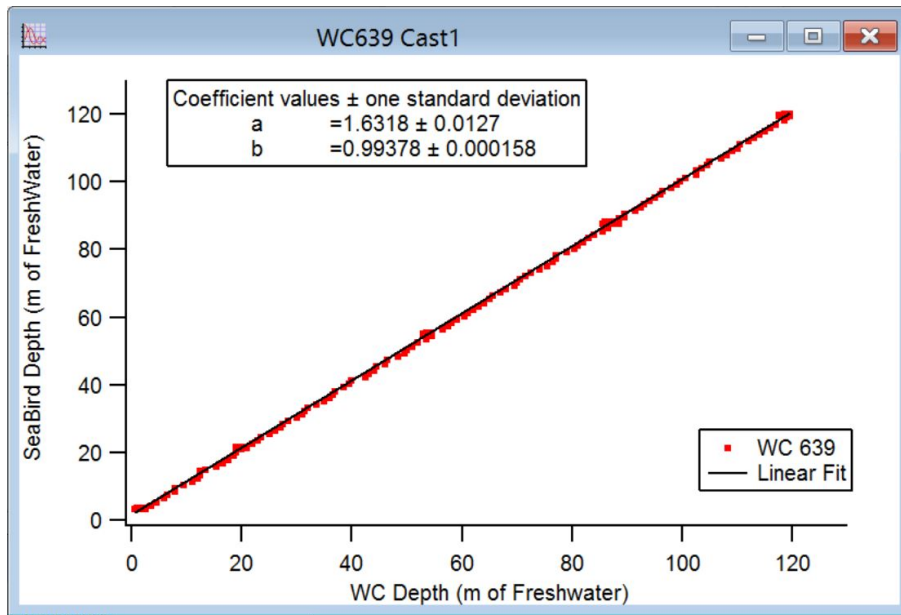


Fig. 3. Depth calibration of prototype tag (WC639) against a SeaBird CTD.

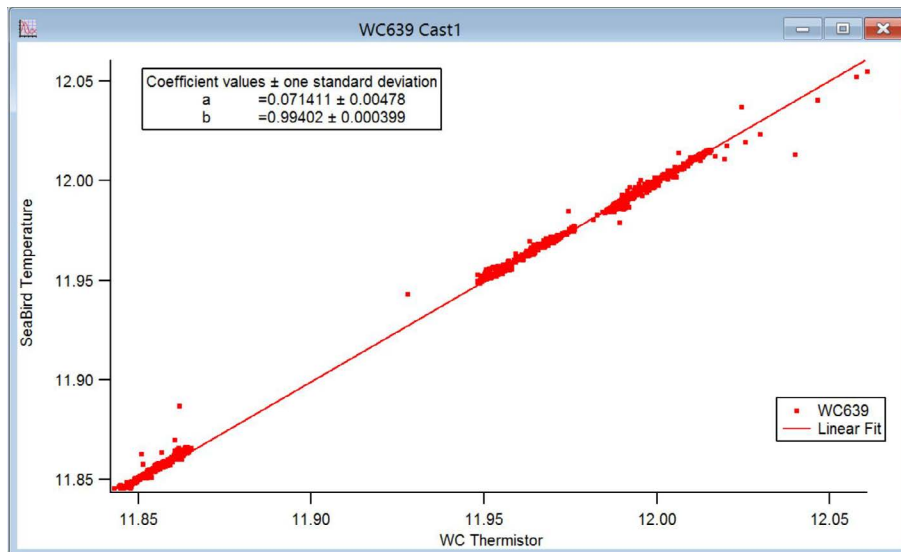


Fig. 4. Temperature calibration of prototype tag (WC639) against a SeaBird CTD.

IMPACT/APPLICATIONS

No satellite based CTD tags have been developed for long term deployments on baleen whales. The main outcome of the project will be a newly developed and tested CTD tags from Wildlife Computers that can be deployed on large baleen whales either by pole or by the ARTS. A deployment system for the SMRU CTD tag will also be developed and documented.

TRANSITIONS

The tags developed will be commercially available from the manufacturers for all research groups interested after completion of this project.

RELATED PROJECTS

A newly funded ONR-project lead by Lars Boehme from SMRU with the aim to modify and improve an existing electrode based miniature conductivity-temperature sensor and incorporate it into the proven design of a Satellite Relay Data Logger. A timely development of this tag will presumably benefit the present project as the new electrode sensor from SMRU could also be tested on cetaceans.