

Acquisition of Oceanographic Measurements from Baleen Whales: Field Deployments of Tags Developed Under Grant ONR (N00014-13-1-0854)

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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 CTD satellite transmitters for baleen whales that can collect and transmit data on location, depth, temperature and salinity at specific depths.
- To develop and test the deployment techniques for two tag designs on bowhead whales in West Greenland and on blue and humpback whales in Iceland.
- To evaluate the reliability and quality of CTD data collected in arctic ice covered waters by slow swimming bowhead whales and from the open ocean by fast swimming blue and humpback whales.

APPROACH

Diving ocean predators can act as “real-time autonomous sampling platforms” in remote or ice covered waters when fitted with satellite transmitters. 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 and to a lesser extent with narwhals and belugas. These 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 deployed on baleen whales under this grant.

WORK COMPLETED

The project has just started and adjustments of the prototype tag is carried out to make the final field tag ready for spring 2015. All permits to conduct the work have been obtained.

RESULTS

The project has succeeded in developing a prototype of the first CTD Argos satellite tags for large cetaceans. This is now going through rigorous testing before the final field version of the tag can be designed in cooperation with Wildlife Computers. Contact have also been established with Lars Boehme from SMRU who is leading another ONR-grant on CTD tag development. As Lars Boehmes project may not reach the stage where it can be deployed in the field spring/summer 2015 we may not be able to test this new tag within the timeframe of our project. The development of the SMRU project will be followed closely and it is the hope that this new logger will benefit the present project.

Time schedule:

December 2014: Tags will be tested in deep water (700m).

January-February 2015: Controlled test of long-term drift in conductivity measurements.

February 2015: Transmission testing of sampled data through Argos and decision on transmission protocol. Development of delivery systems for tags.

March 2015: Final decision on shape of tags and development of the final field tag models.

April-May 2014: Deployment of tags on bowhead whales in Disko Bay.

June-July 2015: Deployment of tags on blue and humpback whales in Iceland.

April-December 2015: Collection of data via satellite from the tagged whales.

January-September 2016: Analysis of data and preparation of scientific paper and final reporting.

IMPACT/APPLICATIONS

The main outcome of the project will be a newly developed and tested CTD Argos satellite tag 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 may 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. The development of this tag may benefit the present project.