

***Interactive comment on* “Technical Note: Animal-borne CTD-Satellite Relay Data Loggers for real-time oceanographic data collection” by L. Boehme et al.**

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Responses to G. Griffiths’ (Referee) comments

We welcome the very insightful comments from the referee, and thank for the generally positive comments on the paper and for pointing out some aspects of the paper that were not clear or sufficiently emphasised. We have responded to each of the issues raised, as described in detail below. We have clarified the text in a number of places and believe the paper is improved as a result.

The referee mentions that the paper ‘does not describe a new concept’. We think, generally speaking, that this paper does describe a new concept: an instrument for

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high accuracy temperature and salinity data from marine mammals in near real-time. CTD-SRDLs are used now for more than 7 years and although data have been used in several publications, the instrument has never been introduced to the scientific community and has been described in detail. With this technical note we try to catch up.

The main concern is the lack of information about the energy budget of the CTD-SRDL. Indeed, this is vital information and we added a section explaining the energy consumption of the CTD-SRDL in its three main states: transmitting (6.9 Ah over the deployment), full CTD sampling (1.7 Ah) and only pressure sampling (2.0 Ah). We also added a link to the data sheet of the Li-SOCl₂ cell. This paragraph also highlights that the bulk of energy is used for transmitting data. Another concern are the intercomparisons of accuracies. We amended the text to improve its analytical rigour.

Specific points:

There is no mention of the ethical issues or permission issues connected with adding this instrument to a marine mammal.

We added a section about ethical issues.

P1262 line 11 – it is not clear to me how minimizing size maximises energy efficiency.

We agree that this sentence is out of the concept here and removed it.

P1262 line 14 – it is not clear to me why the paucity of comparison data means the accuracy of the CTD is reduced, surely that it an intrinsic property of the sensors?

There seems to be a misunderstanding. We did not mean that the accuracy of the CTD is reduced, but that real-time data are afflicted with a higher uncertainty. We modified the sentence to make our point clearer.

P1264 line 22 – the risk of spatial aliasing is not discussed.

We added a sentence explaining that the high spatial resolution sampling across areas of strong gradients can help minimise spatial aliasing.

P1265 line 5 – the battery is unlikely to be a “lithium-ion”. That is the term usually

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reserved for secondary lithium cells. I doubt that the cell used here is rechargeable. Primary lithium cells use lithium metal rather than lithium-ion, it would be useful to know the exact type of chemistry, e.g. lithium thionyl chloride, or sulphuryl chloride etc.

We added a special section on the energy budget (see above).

P1266 line 20 – it is an oversimplification to state that small non-pumped sensors are inevitably less accurate. The (now admittedly little used) Neil Brown Instrument Systems Mk3 4-electrode conductivity cell was both smaller and more accurate than the larger cell described here.

We agree with the reviewer, having used a Neil Brown CTD ourselves. However, here, we refer to small self sufficient instruments. Again, we modified the sentence to make our point clearer.

P1267 line 18 – remote sensing specialists would, I think, disagree strongly that the accuracy of space-borne SST measurements renders them insufficient for climate change studies.

We agree with the reviewer. The "not" should not have been there. We apologise for the mistake and modified the sentence.

P1268 line 1 – there is no discussion of the temperature sensitivity of the pressure sensor.

We added this information by giving the link to the data sheet and adding this information in this paragraph.

P1270 line 19 – here, and elsewhere, satellite data 'bandwidth' is mentioned. It is strictly not 'bandwidth' but 'throughput' that is meant.

We agree with the reviewer, but the term 'bandwidth' is often (and also in this case) used instead of "digital bandwidth". Digital bandwidth is similar to the bit rate or the rate of data transfer. However, we amended the text to make it clearer.

P1274 line 25 –The authors have shown enough of a quantitative analysis to convince me that the initial target of 0.02 accuracy in salinity has been achieved.

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There seems to be a misunderstanding. The statement in this paragraph has nothing to do with the initial target of sensor accuracy. Here, we discuss the effect of the instruments attachment, which results in an offset in the conductivity readings. This needs to be mentioned as it is specific to this kind of attachment.

Typographical errors etc.

Thanks for all the spelling corrections; we fixed them in the manuscript.

Interactive comment on Ocean Sci. Discuss., 6, 1261, 2009.

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