This is a lengthy and detailed paper describing a potential multidisciplinary long term observatory in the eastern Weddell Sea close to the Antarctic coast along the Dronning Maud Land. Eberhard Fahrbach would be proud of this legacy. I enjoyed the bringing together of all the disciplines. The paper is a useful concept and is publishable, although I think it can and should be further strengthened.

Major or general comments:

1. The whole paper focuses a bit too much on what we know and not enough on what we *don't* know.
2. I think it would be helpful to be more consistent with present day literature, in distinguishing between the Antarctic Coastal Current (along the coast or ice shelf front, on the continental shelf) and the Antarctic Slope Current (along the slope). I appreciate that many of us have not been careful in our usage and in the proposed region these often merge. But this is not the case elsewhere round Antarctica, and it might lead to confusion if these phenomena are not defined carefully and distinguished appropriately.
3. There is no mention of the Antarctic Slope Undercurrent. Personally I think this is an important (though small) current, that can play a role in eastward transport of nutrients, trace elements, larvae, biota, etc, beneath the westward-flowing Slope Current. The proposed region would provide an excellent opportunity to study this role (see for example Chavanne et al. (2010) at 18W).
4. I found it frustrating that the paper doesn't actually say where the survey sites should be, or how many sections/stations there should be. Everything is "to be determined". It is tempting to say that it would be better for the authors to propose locations for surveys before they publish this. Otherwise what is the use of the paper?
5. All places that are referred to anywhere in the text should be labelled on a map. For example Gunnerus Ridge and Atka Bay.
6. I found the distinction between LTO and LTER unclear. Since it's clearly based around Neumeyer, I wondered why you weren't calling it the Neumeyer LTER analogous with Palmer LTER? For me at least, I know where Neumeyer is roughly, whereas I'd struggle with the unpronounceable acronym and where it refers to?
7. There is mention of fisheries; how are you going to monitor fish populations, age distributions, species, etc?

Comments by section:

Section 1 Introduction

I found the Introduction quite unfocussed. I recommend shortening this section and thinning out the references considerably. Many of the paragraphs read like a random selection of papers and results from different places round Antarctica and it was unclear why they were relevant to this paper? For example, we are told about mortality of sponges in McMurdo Sound. All very interesting, but why is this relevant? The link to this paper, or lessons learnt, need to be stated. For example it might be "we were able to learn about the mass mortality of sponges because someone made measurements every year", or whatever.

Perhaps it would be better to think of each paragraph as conveying a key message or answering a specific question. For example, the Introduction could have 3 paragraphs: (1) what is the international context for the proposed LTO/LTER? (2) what can we learn about good observing system design from the other LTOs/LTERs? (3) what is the background of historical research in the proposed LTO/LTER region?

The first two paragraphs of the paper are really just a list of a large number of previous reports and programmes, which is quite dull to read and doesn't give a sense of excitement. It would be good if this could perhaps be shortened to "what the reader needs to know for what comes later"?

The next paragraph (L71-80) gave a series of sentences that seemed disconnected; it was unclear what the message of the paragraph was. What is the relevance to this paper of changes seen at the WAP?

The paragraph about the observatory (L117-138) seemed out of place? Should you not explain why it is needed first, and this comes later? I would shorten this paragraph considerably and ensure this information comes in later where appropriate.

Section 2 Overarching concept

I found the statements of knowledge gaps underwhelming; if I received this as a grant proposal I would find it difficult to support it. It would be good if this section could be strengthened since it is surely a key contribution of the paper? Many of the points made are vague.

For example, what do you mean by "long-term" in (1)? Why are these data lacking, and what do we have now to alleviate this lack that we did not have before? Maybe these data were not collected before because it's not important to do so? (ok I know that is not the case, but you don't say why they are important). Maybe we only now realise the importance? Maybe only now do we have the tools?

Point (2) is rather aggressive? If these protocols are often ignored, why will establishing an LTER help? I wonder if this could be phrased more positively?

Section 3

Section 3.1.2 in particular talks about "lack of understanding" but all we have been told about is what we do know. We've not been informed what we lack understanding of. The section about biology (3.2.1) is better in this respect, identifying key knowledge gaps. Section 3.2.1 needs to be refocused on clarifying what these knowledge gaps are.

Somewhere in the paper, I'd like to have seen a brief critical assessment of what design knowledge can be transferred from the Palmer LTER to the system design of this LTER. E.g. what horizontal, vertical and temporal resolutions are needed. Are there lessons that can be learnt about what worked and what didn't?

Could you add more justification for three sites? Why 3? Why not 2 or 4? You argue that the conditions in the region are typical of the East Antarctic coast, but this argument is undermined by suggesting three sites. What do you learn (or gain) by having more than one?

The methodology section 3.1.3 has oddly almost no references and yet this is where I would have found these useful to envisage what you have in mind.

Schematics or diagrams of the proposed observing system would be very useful. E.g. what depths will you monitor? Where might moorings be? What water depth? Moorings are great but presumably you won't risk sensors in the upper few hundred metres because of the iceberg snag risk. How will you monitor the upper ocean critical for biology? I'd have liked more information about technologies envisaged.

I agree that a mooring through Ekstrom Ice shelf would be great, but you need to articulate why. If you're only interested in shelf water properties as you state, you could instead make really comprehensive mooring arrays at the entrance and exit of the ice shelf for the same cost and effort as one hot water drilled hole.

I found no mention of bathymetry? Key for all disciplines. Is the bathymetry sufficiently well known? Has the whole region had multibeam surveys?

There was no mention of meteorology? Is there the local met monitoring and might it need supplementing?

No mention of ice shelf monitoring? What about ApRES on ice shelves, as meltwater is important for e.g. iron and stratification?

Section 3.3.3, how will you monitor surface pCO2 in 'a coastal region' hourly year-round? This will have major logistical challenges, e.g. sea ice and ice bergs, and a single location might not be representative of the region. How will you choose the location? This methods section would benefit from more detail; it is very short. Add references.

How will you ensure you can obtain winter time measurements? Does it matter if the CTD sections are occupied at different times of year each year? How will you ensure study of the whole plankton bloom?

Section 4

Section 4.1. It would be useful to state how the data will be made available – storage in a data centre is not the same as that data centre making the data freely and openly available. You might identify which data will be made available in (near) real time, and which will be available are an embargo period.

Section 4.2 states that a comprehensive data set will be obtained from sea ice, water column and sea floor. I may have missed it, but I don't recall discussion of measurements of the ecosystem of sea ice? I only read about measurements of the ecosystem beneath sea ice, from ice stations? How will you be accessing ice stations? How will you choose locations for sea ice stations? Will they be on fast ice or ice floes? How frequently will they be monitored? Throughout the year? More explanation is needed (probably in section 3).

Section 4.3 would benefit from references.

Minor comments:

L34 I wouldn't call it easterly – not clear what is meant here – omit?

L37 I didn't understand what was meant by "and sound data can act as a model to develop and calibrate projections". What do you mean by sound? How can data act as anything? How can a model develop or calibrate a projection?

L108-110 Repetition of HAFOS, rephrase sentence.

L125 can you give an idea of how many "a number" will be?

L126 what does sensu mean?

L182- 183 You have east and west round the wrong way – the ASC flows west and the ACC flows east.

Numbering of section 3.3.2 is incorrect, p23

L710 I wasn't sure what this sentence meant. Grammatically the first line (l710) didn't seem to make sense.

Figures:

Fig.1 This is a nice introductory figure. However it is not much described. To be useful to readers, especially those who do not know the currents and water masses, this figure needs

further explanation. The relevance of the water masses and circulation to the ecology/biogeochemistry should be stated.

Fig. 2. Label for Kapp Norwegia is needed. The caption is confusing because it says there are three areas but the highlighted region is all one? Are the three labels meant to be on top of the survey sites? I'd like to see a map where the boundaries and properties for the three regions are clearly shown. It might be helpful to have a map of the three regions showing sea ice minima and maxima, SST, or something similar?

Fig 3 - check that the acronym soup is already defined, and define in caption for maximum readability.

I couldn't find where figure 4 is discussed?

Karen J. Heywood
University of East Anglia