

FW: Work following our meeting last week

Iain Suthers

Wed 19/06/2019 8:45 AM

To: Hayden Schilling <h.schilling@unsw.edu.au>

 3 attachments (1 MB)

cross shelf boxplots 210519.pdf; LM_and_GLM_210519.html; Biomass_plots at diff levels.pdf;

[Fyi, later.](#)

From: Peter Yates [mailto:Peter.Yates@sims.org.au]

Sent: Wednesday, 19 June 2019 8:16 AM

To: Iain Suthers <i.suthers@unsw.edu.au>

Cc: Jason Everett <jason.everett@unsw.edu.au>; Amandine Schaeffer <a.schaeffer@unsw.edu.au>

Subject: FW: Work following our meeting last week

Hi Iain,

Here is some material that may be useful for Monday...also see email text below.

More coming shortly...

From: Peter Yates

Sent: Wednesday, 22 May 2019 12:05 PM

To: Iain Suthers <i.suthers@unsw.edu.au>; Amandine Schaeffer <a.schaeffer@unsw.edu.au>; Jason Everett <jason.everett@unsw.edu.au>

Subject: Work following our meeting last week

Hi Team,

Just sending through some items following on from our meeting last week. Below are the things we agreed I should try, and my progress on each:

(1) Cross-shelf boxplots:

Iain was interested in seeing some boxplots of cross-shelf variation in the variables. Please see '*cross shelf boxplots 210519.pdf*'. These are for samples collected <30m. The x axes are split into bathymetry bins (40-60, 60-80, 80-100, >100m). The 40-60m bin is not present in the NS and DH transects. Below is what I take from these. It's a complex and variable story and I'm keen for insights you may have for how I can incorporate these into the analyses.

- Change in biomass across the bathy groups is variable between sites (CB and EH are similar with increasing biomass out to ~100m. DH is the opposite).
- Abundance generally decreases moving out across the shelf
- At EH, slope becomes less steep with increasing bathy depth, less clear for other transects.
- Temperature increases across the shelf in all transects
- Changes in oxygen and nitrate are variable among transects
- Higher nitrate and higher fluorescence in nearshore bins at EH and NS

(2) Revisiting LM and GLM with transformation of variables:

I've attached a html document with the summaries, diagnostic plots and fitted relationships for a (1) LM and (2) GLM with the addition of the transformations you requested. In both, the issue of negative fitted values is alleviated, and the fanning of residuals from the LM is slightly improved. From both models, there are still clear non-linear patterns in the residuals (see those plots with the grey polygons).

(3) Plotting the fitted relationships from GAM under different conditions (e.g. what is the effect of temperature at other transects).

Please see attached 'Biomass_plots at diff levels.pdf. Changing the factor levels at which the smooth for temperature is plotted doesn't change the shape of the smooth. Just the CI and intercept. This is the same for gam/gamm.

(4) Convert fluorescence to Chl a (still working on it sorry, but I will do. I don't think this will change the nature of the relationships we are seeing now?)

(5) Retain Nitrate and/or oxygen in models

I've tried adding and removing nitrate and oxygen in the LM and GLM. It might be ok to include Nitrate in the GLM (it only had a moderate effect on the p value of Temp). Oxygen has a much greater influence on multiple variables (see summaries in attached html). I'd be comfortable reinstating nitrate for now, if you like.

Plan and questions:

- Based on the residual plots from LM and GLM with transformations, I still feel that GAM are more appropriate for these data.
- My interpretation is that the unexpected effect of temperature is related to the spatial scale of this analysis – 4 cross-shelf transects at upwelling sites. As we discussed last week the relationship between biomass and temperature isn't easy to predict based on theory given we don't know exactly when the transects took place along the pathway from upwelling – phytoplankton production – zooplankton production – zooplankton advection and mortality. Is that sensible or am I missing the point?
- Happy to try any other suggestions, but the data is still leading me toward the GAM/GAMM and the relationships I showed you last week.
- Are you interested in writing up the GAM results as they are? Would that be a useful paper?

Apologies for the lengthy email and outputs. It's quite difficult to get us all in the same room 😊

Cheers,
Peter



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