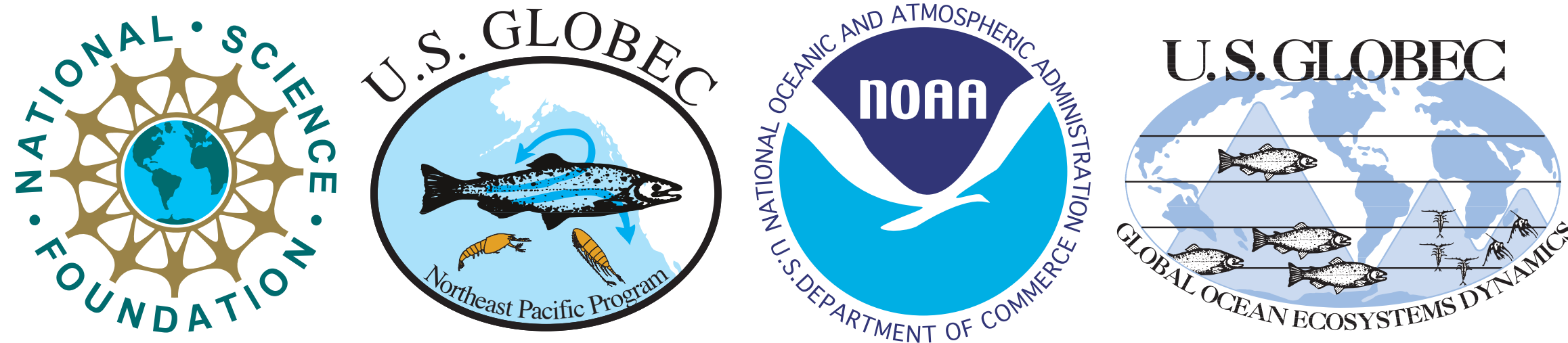


Model Validation : A Preliminary Thermal Assessment of the NEP ROMS



Brendan A Reser
Harold P Batchelder



breser@coas.oregonstate.edu
Oregon State University
College of Oceanic and Atmospheric Sciences

Observations & Motivations

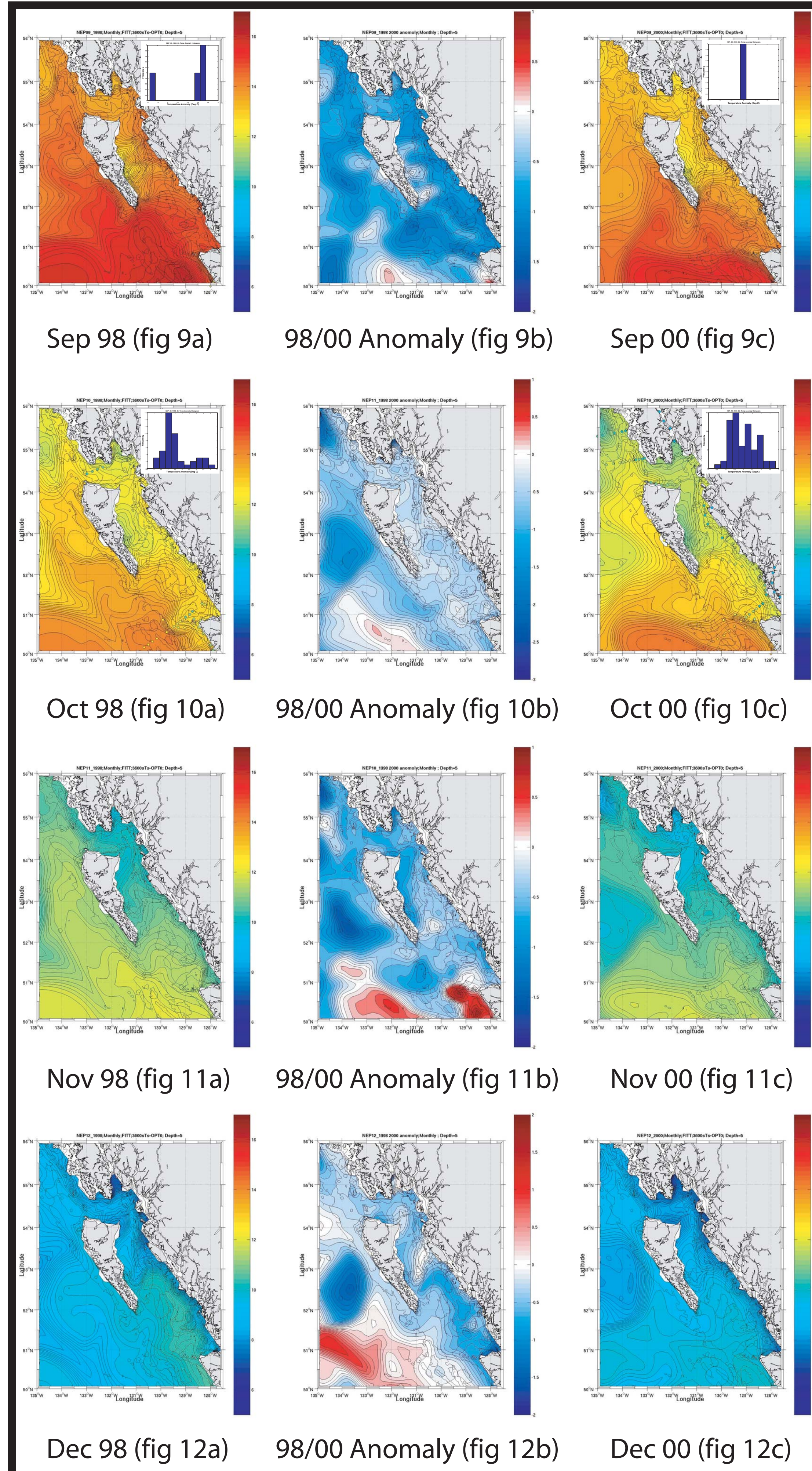
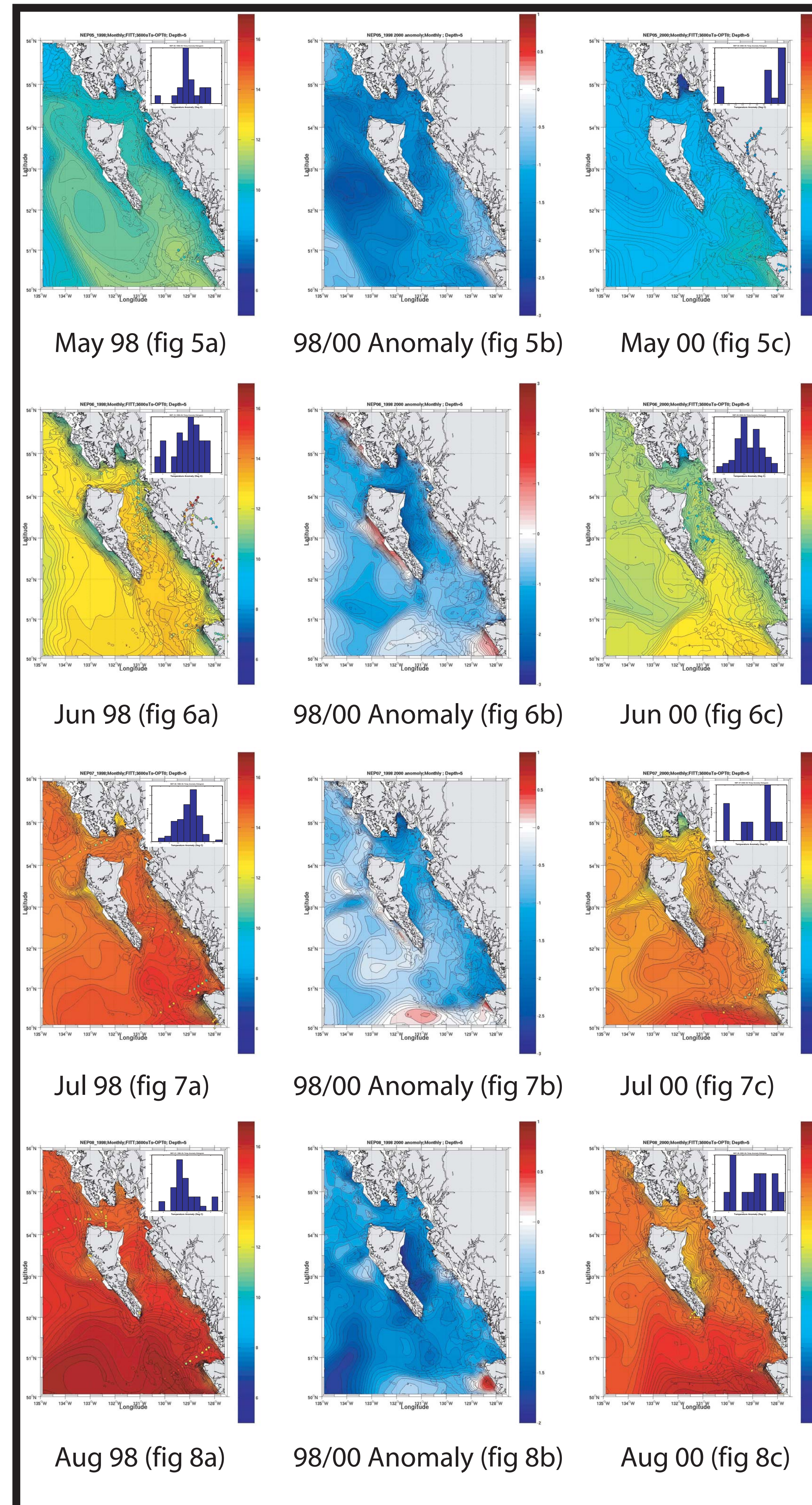
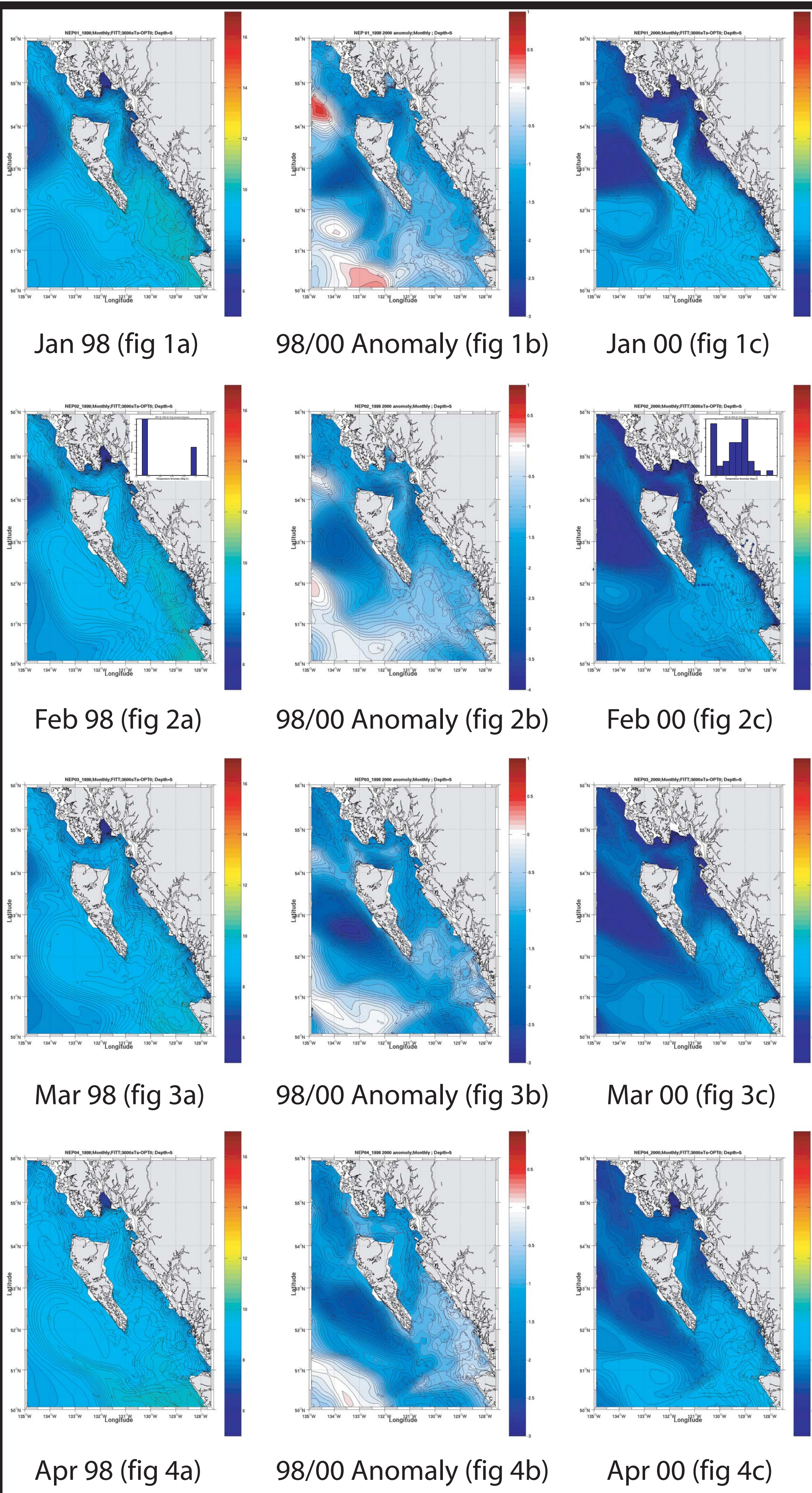
To determine how closely the North East Pacific (NEP) Regional Ocean Modeling System (ROMS) temperature fields compare to observations of the real ocean, we examined two years within the GLOBEC study period that exhibited different temperature extremes. 1998 was an El Niño year, and was characterized by warm seasonal temperatures, whereas 2000 was comparatively cold. Field observations from CTD casts taken off of SE Alaska and British Columbia (obtained from Canadian Archives at IOS) were compared to the temperatures predicted from the ROMS model. Our analysis is limited to the region between 50 and 56 deg North and 128 to 135 deg West. Additionally, temperature differences (year 2000 - year 1998) for depths from 5m to 150m are shown for every month between January and December.

Conclusions and Future Directions

The ROMS NEP temperature fields agreed with observations for most months, with a slight tendency for the model to overestimate near-surface temperatures, esp. in the southern part of the analyzed domain. This agreement suggests that the ROMS temperatures can be used in bioenergetic modeling in this region. Moreover, it indicates that the ROMS fields provide a basis for comparing interannual variability in coho bioenergetics. For example, August 1998 temperatures at 5m depth NW of Vancouver Island were 2°C warmer than in August 2000. For a Q10 of 2.0, fish metabolic costs would be 15% higher in 1998 than 2000. Assuming similar prey availability, this would result in a slower growth rate, and perhaps lower survival in 1998. Such applications of bioenergetics modeling with 3D-fields from ROMS provide an exciting new area for study.

Acknowledgements

Enrique Curchitser (Rutgers Univ.) for providing the ROMS output
Joe Linguanti and Bill Crawford (IOS) for Canadian CTD Data.



Results

With a few exceptions, such as seen in the November and December anomaly plots (fig 11b & fig 12b), ROMS model temperatures were consistently cooler in all months of 2000. This is consistent with regime shift and ocean cooling observed during this period. Model temperatures were generally within ± 1 to 2°C of the CTD temperatures. However, the CTD data were sparse, and varied spatially, seasonally, and interannually. Winter and early spring months (Nov-Apr) had very few cruises on which CTD data were recorded. In some months, the agreement (or bias) in the model fields was regionally specific. In addition, the CTD data was taken from a number of cruises throughout the month. The model data was an average of the entire month, and consequently could have masked daily or weekly fluctuations or trends during a month. Therefore, while it does not conclusively prove that the model predictions exactly mimic the real ocean, this analysis suggests that the model provides adequate temperature fields for future bioenergetic assessments of salmon foraging and growth.