Supplementary Figures

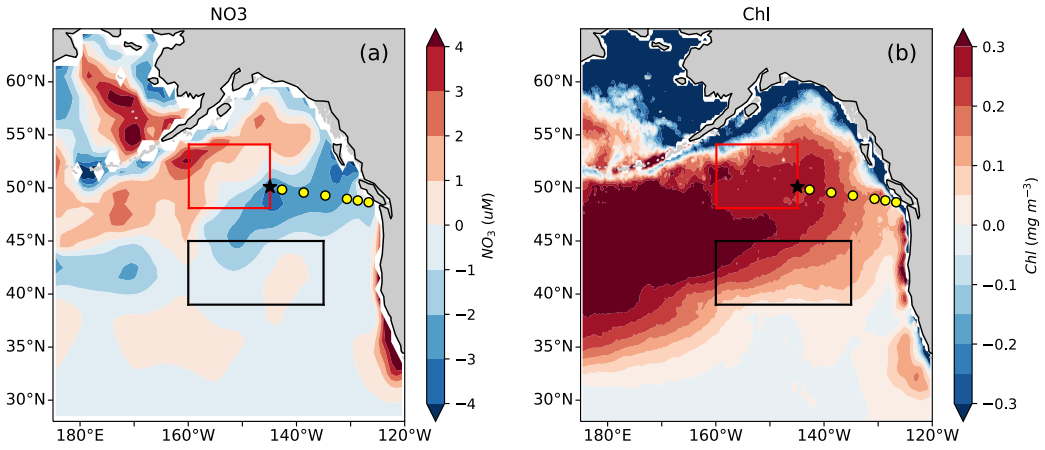
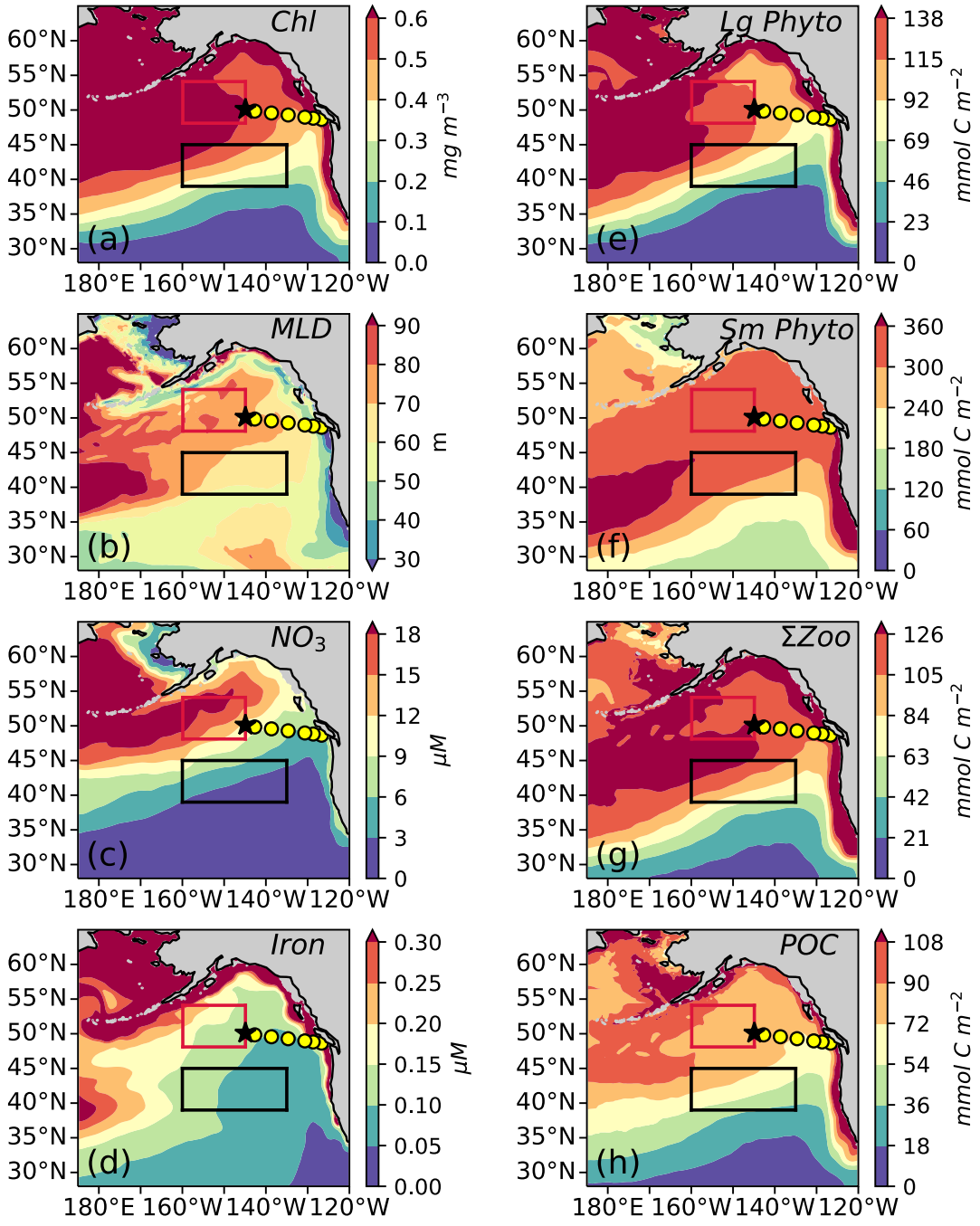


Fig S1. Model annual bias in (a) surface nitrate in comparison to WOA and (b) surface chlorophyll concentration compared to GlobColour. Positive values indicate model concentration exceeds observations. Line P, OSP and boxes for AG and NPTZ are shown as described in Fig 1.



10 Fig S2. Modeled mean state for (a) monthly chlorophyll, (b) winter (Jan-Mar) MLD, (c) winter surface nitrate, (d) winter surface iron, (e) annual depth-integrated large phytoplankton production (0-100 m depth), (f) annual depth-integrated small phytoplankton production (0-100 m), (g) annual depth-integrated zooplankton production (0-100 m), (h) annual POC export at 100 m depth. Line P, OSP, AG and NPTZ are shown as described in Fig. 1.

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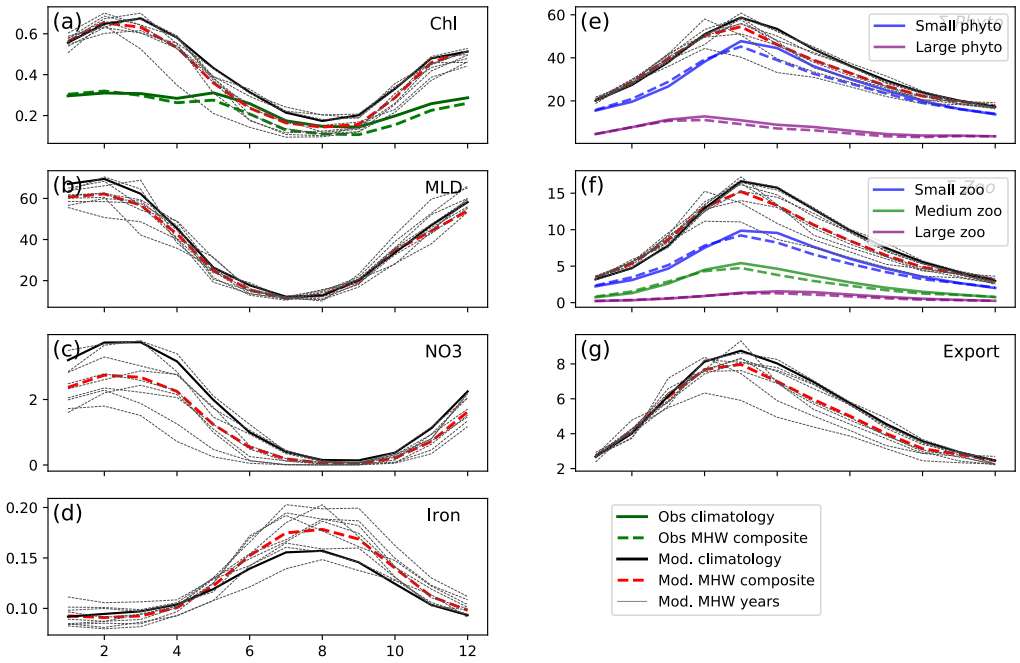

Fig S3. Seasonal cycles in the NPTZ (black box Fig. 1, 38°-48°N and 165°-135°W). The annual climatology (black), the composite of the 9 warm events (red dashed) and individual warm years (gray) for: (a) surface chlorophyll with satellite observations in green, (b) mixed layer depth, (c) surface nitrate, (d) surface iron, (e) depth-integrated total phytoplankton production (0-100 m), (f) depth-integrated zooplankton production (0-100 m), (g) particulate export production at 100 m. Panels (e) and (f) also show climatology (solid lines) and composite (dashed lines) for individual size classes (small in blue, medium in green, large in purple).

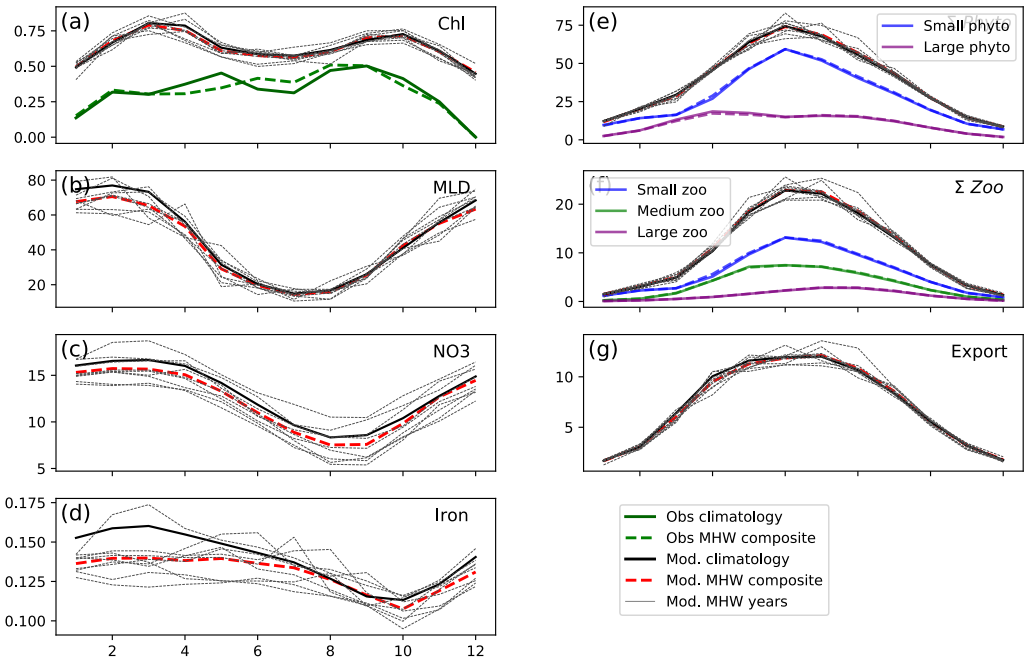

Fig S4. Seasonal cycles in the Alaskan gyre (red box Fig. 1, 39°-45°N and 160°-135°W). Same as Fig. S3 for AG region.