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Using Paleoecology of Planktic Foraminifera to Interpret the Thermocline Behavior of the Kuroshio Current Extension across the Mid-Piacenzian Warm Period

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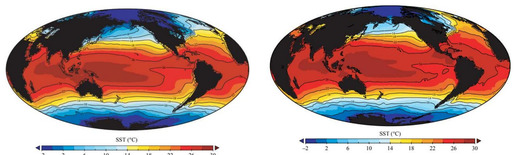
Background

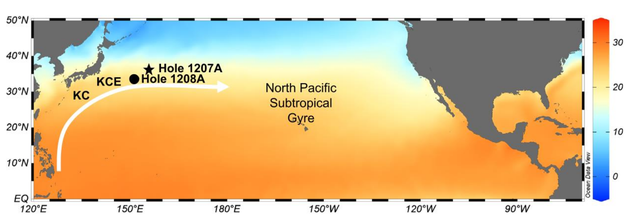
- Sea surface temperature data from the past century indicates that the Kuroshio Current Extension (KCE) has warmed by approximately 1-2℃ (Wu et al., 2012)
- Time periods like the mid-Piacenzian Warm Period (3.3 Ma-3.30 Ma) can be used as an analogue to quantify the behavior of the KCE under increased warming
- **This study will be the first investigate the thermocline behavior of the KCE across the mPWP at a high resolution (~3,000 year)**



Modern mean annual sea surface (left) temperatures and reconstructed sea surface temperatures during the mPWP (right) (Dowsett et al., 2009).

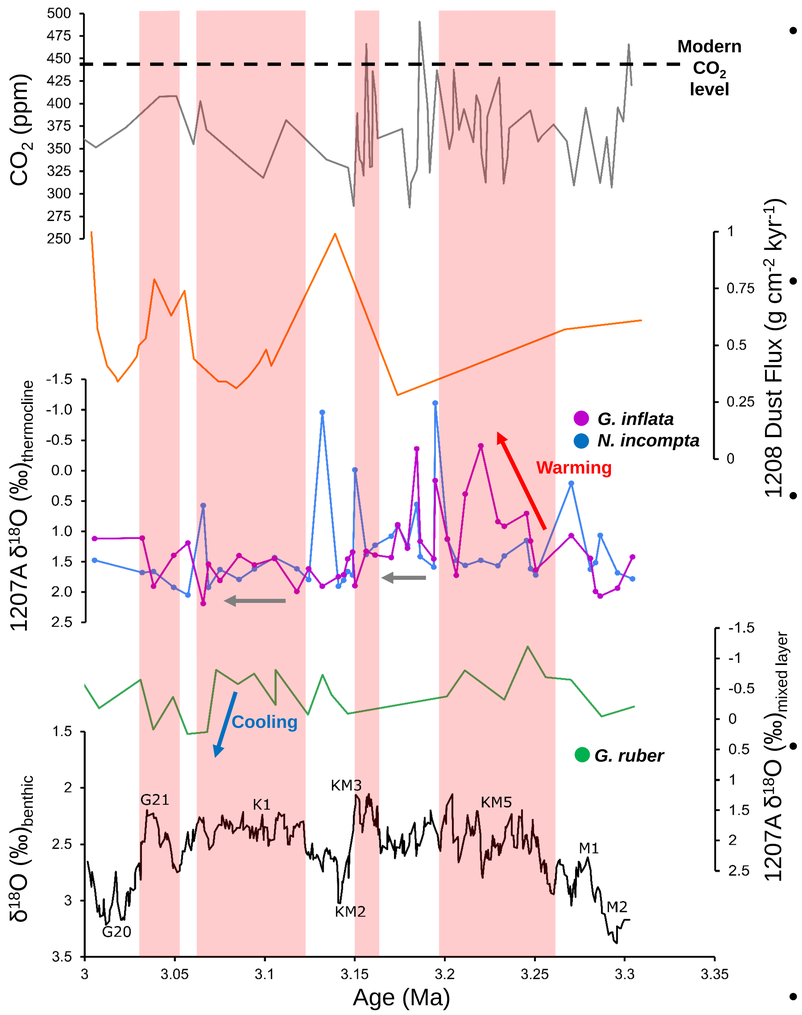
Methods

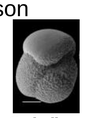
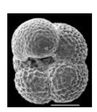
- We used **stable isotopic data** from two species of thermocline-dwelling planktic foraminifera *Globoconella inflata* and *Neogloboquadrina incompta*, from Ocean Drilling Program Hole 1207A
- **$\delta^{18}O$** is influenced by temperature, salinity, and ice volume
- **$\delta^{13}C$** is influenced by water productivity



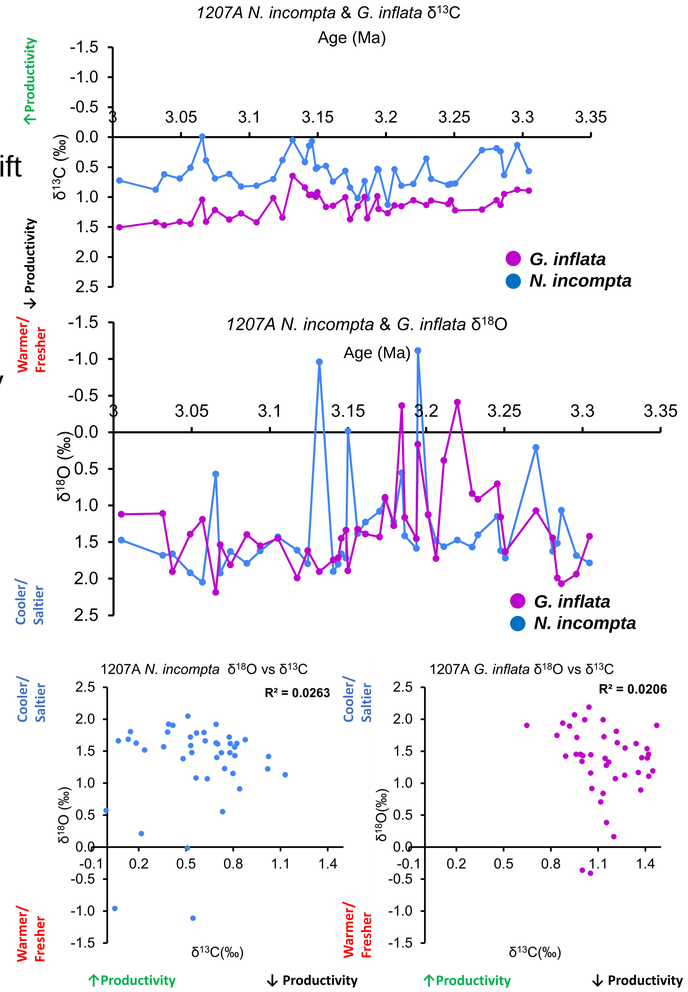
Mean annual sea surface temperature map of the North Pacific Ocean. Black star and circles indicate the position of ODP Holes 1207A and1208A used in this study.

Results & Discussion



G. inflata	*N. incompta*
•Thermocline Dweller •Highest Flux During Winter Season	•Thermocline Dweller •Highest Flux During Year Round
 ***G. inflata*** *(Lam & Leckie, 2020)*	 ***N. incompta*** *(Lam & Leckie, 2020)*

- High CO_2 corresponds with decreased dust flux over site 1208 indicating westerlies shift north under warming
- High spikes in $\delta^{18}O$ correspond to high frequency CO_2 changes
- Within KM5 it appears that there is winter thermocline warming but yearly averages remain stable
- Thermocline stability during K1indicates asynchronous surface ocean responses to Pliocene warming
- **The KCE responds differently to different warming events**
- *N. incompta* and *G. inflata* records reveal seasonal differences therefore, **seasonality and paleoecology matters when conducting paleoceanographic studies**



- *N. incompta* plots as cooler/saltier and generally ↑ productivity
- *G. inflata* plots as cooler/saltier and generally ↓ productivity
- This may indicate that winter productivity at hole 1207A is lower than yearly average productivity

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