How low can you go?

(Can you get to permanent El Niño?)
The Pliocene “permanent El Niño”

Normal present-day Pacific SSTs
The Pliocene "permanent El Niño"

December 1997 El Niño
The Pliocene “permanent El Niño”

Wara et al., 2005; Mg/Ca

ODP 847 - eastern Pacific
ODP 806 - western Pacific
New view based on alkenones

Shown with 95% CI
Pacific zonal gradient

Tierney et al., in review

Shown with 95% CI

*Wara05 estimate was below zero
Going back further...

Shown with 95% CI
How low can you go?

Simulations with CESM1.2

Zonal Gradient

CO₂

LGM

Pliocene

Pliocene proxies

Eocene 1X

Eocene 3X

Eocene 6X

Permanent El Niño