A tropical Pacific role in global climate change: lessons from the past.

Yair Rosenthal
Rutgers University
Historic record of atmospheric $p\text{CO}_2$

The recent increase in atmospheric $\text{CO}_2$ concentration due to human activities raise concern about the possibility of global warming.
Why should we care about Paleoceanography and Paleoclimatology?

To know better about the day after tomorrow!
CO₂ and climate: Tales from an Ice Core
(a) Global-Mean Surface Temperature Anomaly (°C)

- Annual Mean
- 5-year Mean

The CLIMAP Paradigm

Modern

Last Glacial Maximum
Atmosphere and ocean conditions during ENSO

**Normal**

**El Niño**

**La Niña**
Tropical forcing, regional impacts
Twentieth-Century Sea Surface Temperature Trends
Mark A. Cane et al., Science 275, 957-960. 1997

So………
Is El Niño Changing?
Alexey V. Fedorov and S. George Philander

0.14-0.66°C/century zonal anomaly
Geochemical Proxies

Foraminifera

Mg/Ca

$\delta^{18}O$

Temperature & $\delta^{18}O_{SW}$

$\delta^{18}O_{SW}$

Salinity
Equatorial Pacific SST during glacial maxima were \(~2-3^\circ C\) colder than at present.

The global conveyor belt
Relationships among SOI, thermocline average temperature and volume transport of the ITF through the Makassar Strait

Cooler / shallower thermocline = lower ITF transport

After Ffield et al., 2000
Evidence that El Niños increased in frequency during the late Holocene e.g. Moy et al. (2002) Consistent with cooling/shoaling of the thermocline implying lower ITF transport

![Graph showing evidence of increased El Niño frequency during the late Holocene with corresponding changes in thermocline and ITF transport.](image-url)
Rutgers paleo-research:

Rob Sherrell
Jim Wright
Liz Sikes
Carl Swisher
While more research is needed to understand natural vs. anthropogenic effects, the magnitude of recent trends require us to make NOW the “SMART” Choice.