

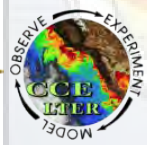
# Is every El Niño the same?

El Niño-related zooplankton community variability in the southern California Current System

LAURA E. LILLY AND MARK D. OHMAN

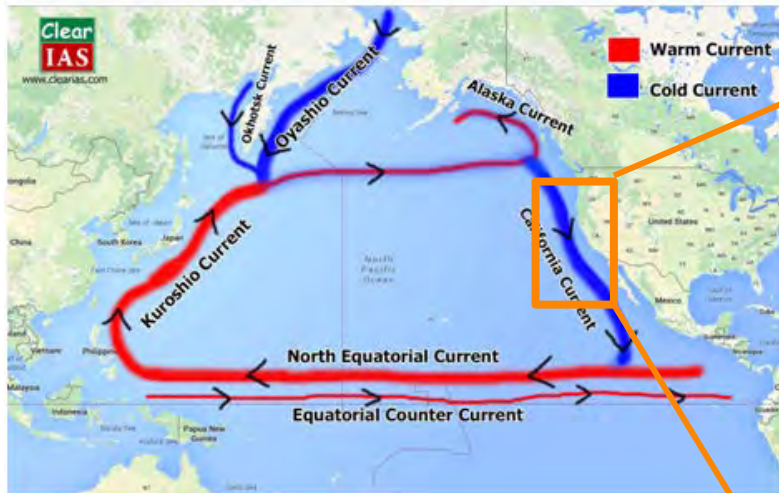
SCRIPPS INSTITUTION OF OCEANOGRAPHY

PICES SYMPOSIUM, LA PAZ, BCS  
23 APRIL 2018



FACES  
— of —  
ENSO

# California Current System: water mass convergence, El Niño



ClearIAS



Oregon Conservation Strategy

## Southern California Current System

- Convergence of water masses
- El Niño = dominant signal
  - Increasing frequency, intensity?
- Commercially-valuable fisheries (zooplankton consumers)

# 2014-16 Warm Anomaly-El Niño

## Unusual species sightings → future?

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**Northern Anchovy**

Douglas Alden, SIO



<http://www.trbimg.com/img-57c0b9a8/turbine/sdljl-red-crabs-2016jun08>

**Pelagic Red Crabs**



*N. simplex*

© Jaime Gómez-Gutiérrez

SIO PIC

**Subtropical euphausiids**



M. Stukel, FSU

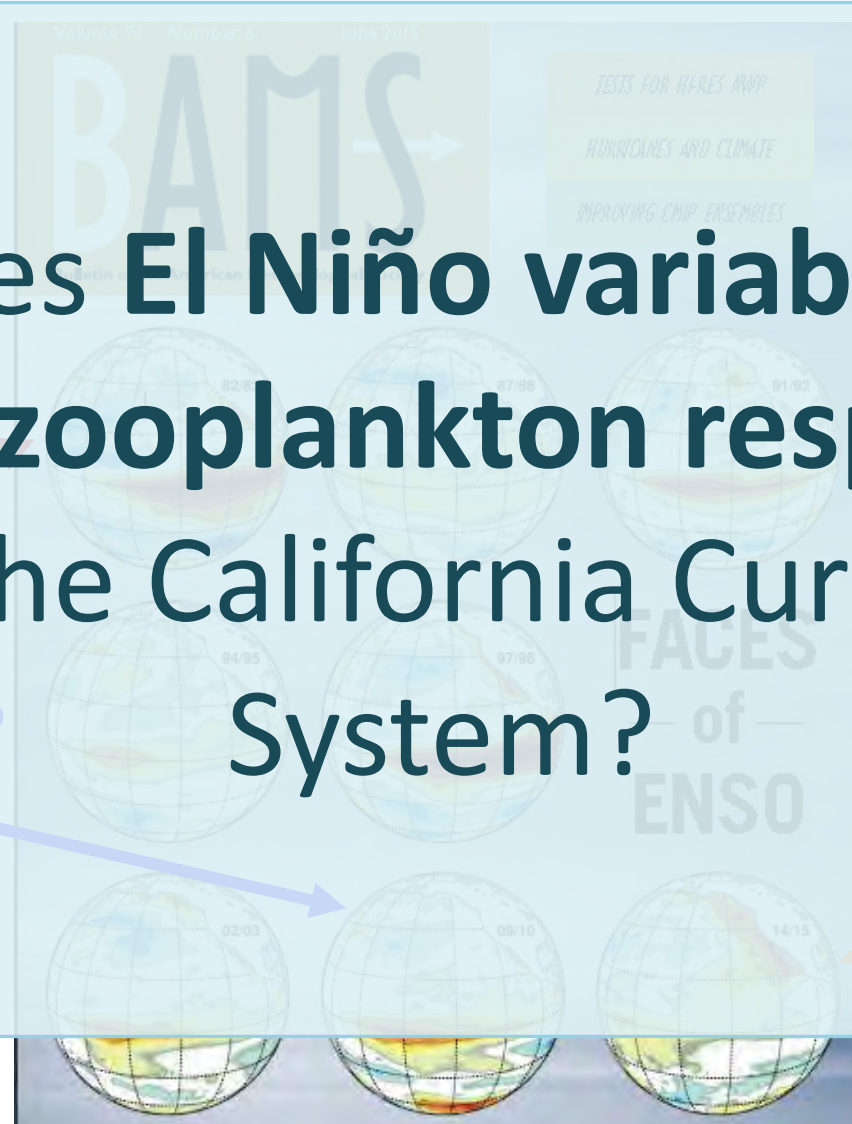
**Pelagic tunicates**

# El Niño variability?

Does **El Niño variability**  
affect **zooplankton responses**  
in the **California Current**  
**System?**

Eastern Pacific (E)  
VS.  
Central Pacific (CP)?

Pacific Warm  
Anomaly (WA)

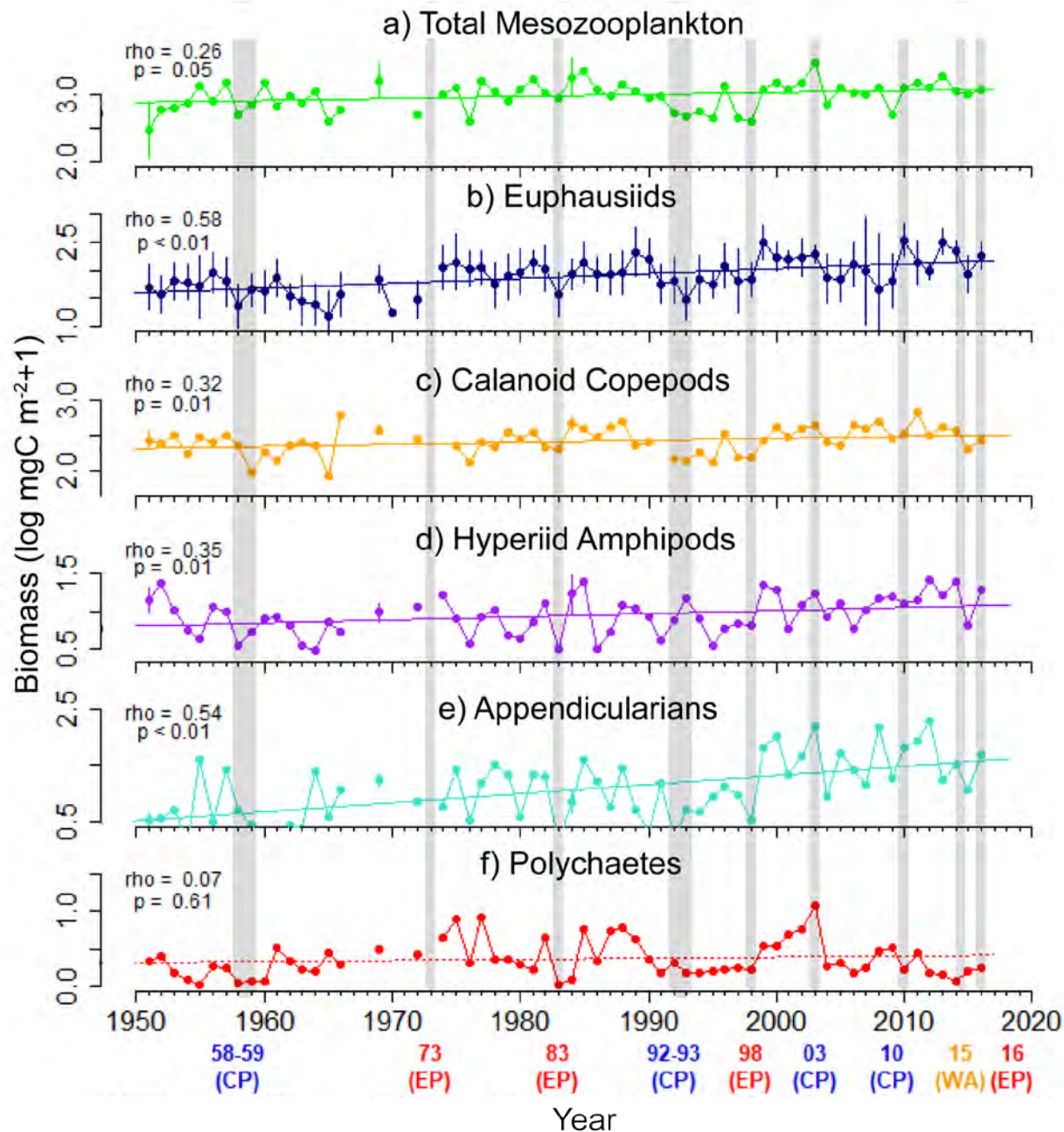


# Questions

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1. Do CCS zooplankton communities respond consistently across El Niño events?
2. Zooplankton responses to 2014-15 Warm Anomaly vs. 2015-16 El Niño?
3. How resilient are zooplankton communities to El Niño?

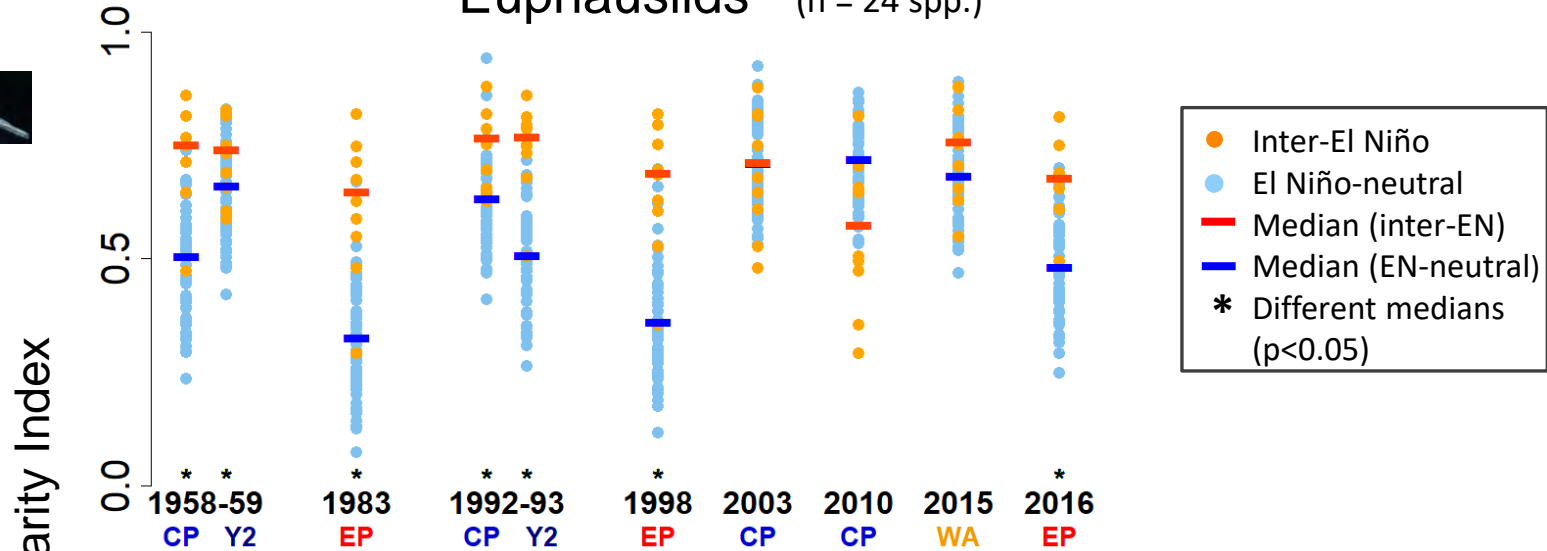
# Zooplankton taxa decline during El Niño



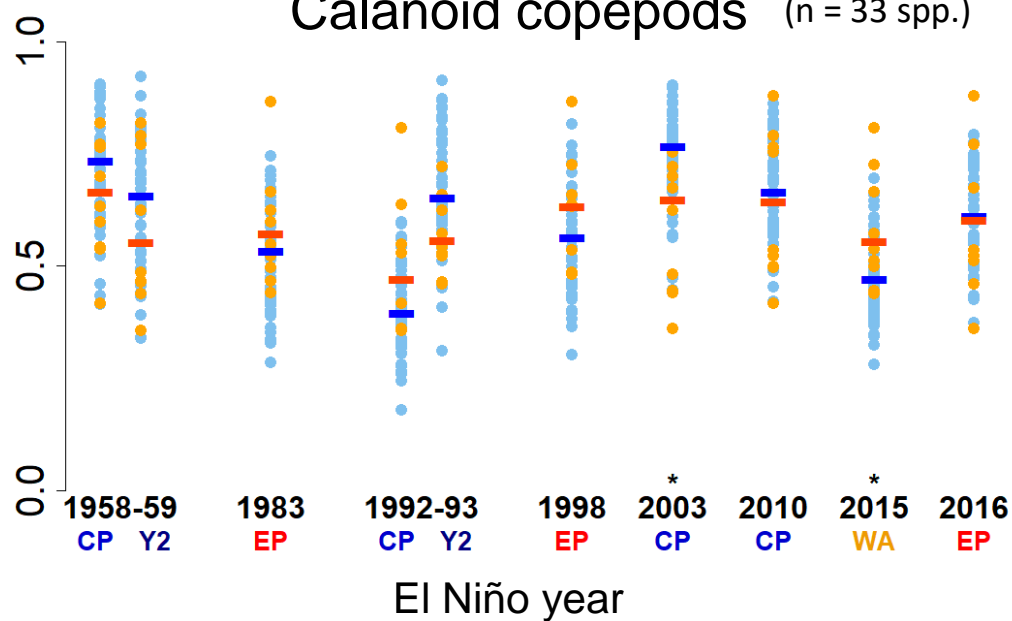
# Community similarity across El Niños



### Euphausiids (n = 24 spp.)

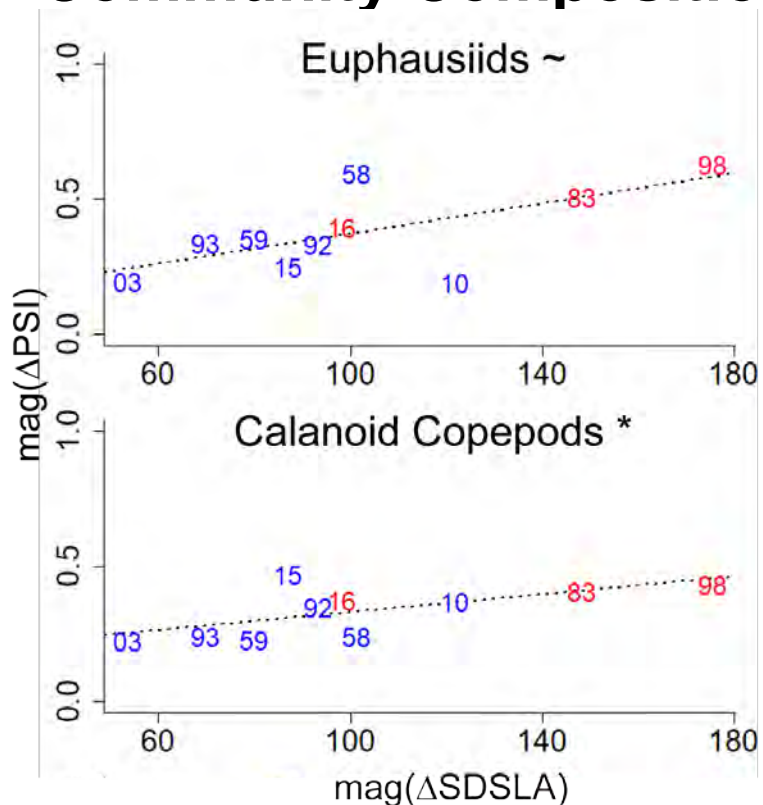


### Calanoid copepods (n = 33 spp.)

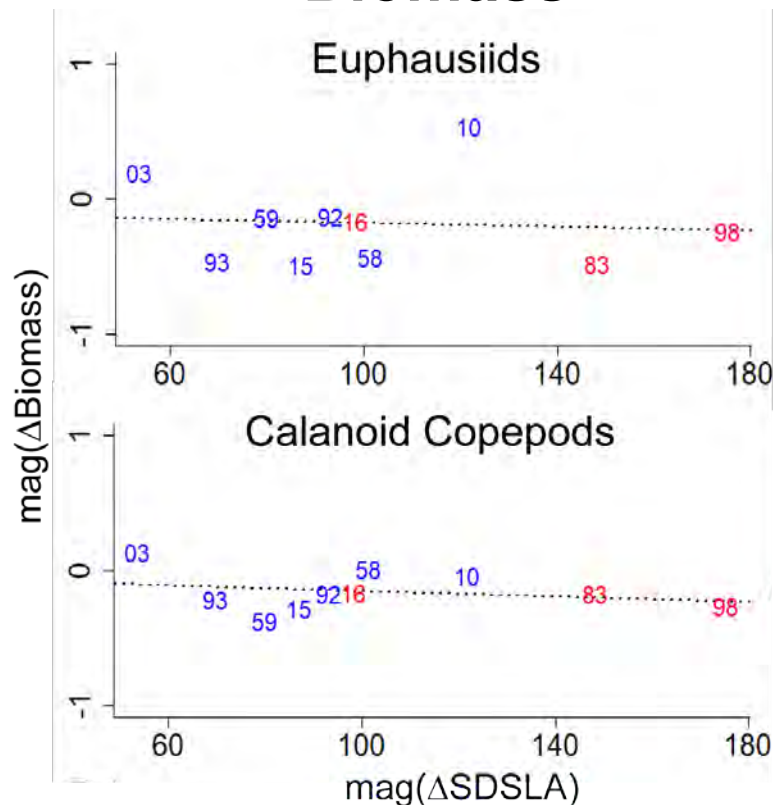


# Event magnitude correlates with community change

## Community Composition



## Biomass



~  $p < 0.05$  w/o 2010

\*  $p < 0.05$

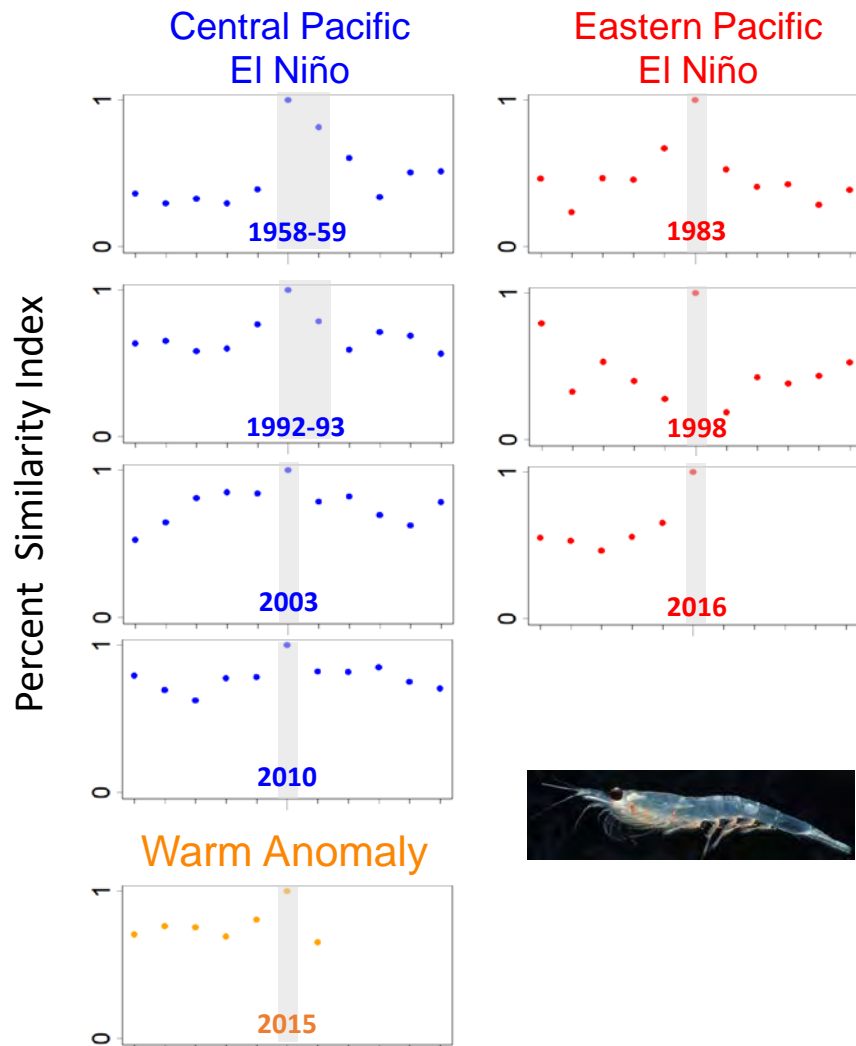
58 CP El Niño

83 EP El Niño

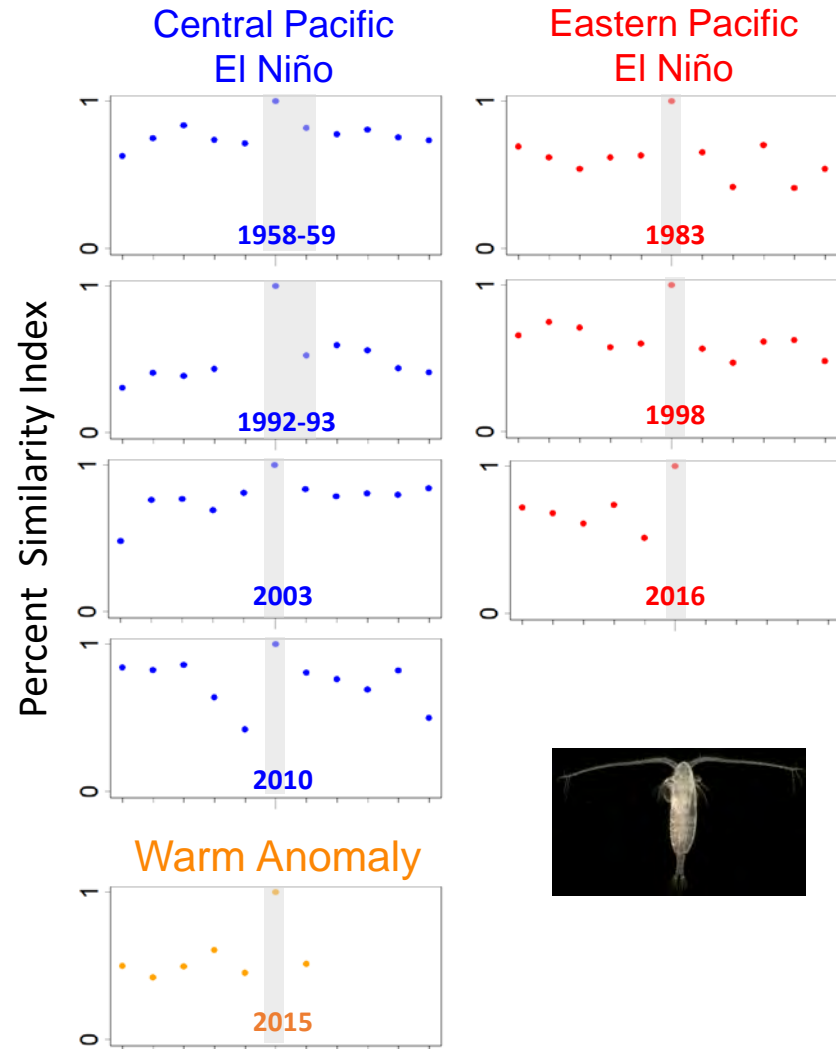


# Communities recover 1 yr post- El Niño

## Euphausiids



## Calanoid Copepods



# 1. Do CCS zooplankton communities respond consistently across El Niño events?

- **Euphausiids** – distinct El Niño community, EP vs. CP categorizations
- **Calanoids** – no distinct El Niño community, but correlation with event magnitude

# 2. Zooplankton community responses to 2014-15 Warm Anomaly vs. 2015-16 El Niño?

- **2014-15 Warm Anomaly**
  - Euphausiids – moderate change
  - Calanoids – greatest change
- **2015-16 El Niño**
  - Euphausiids – major change (EP-like)
  - Calanoids – no change

# 3. How resilient are zooplankton communities to El Niño?

- Recovery within **1-2 years**, regardless of event magnitude

# Implications of El Niño variability

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1. Need **species-level** identification and analysis
  - Affects marine mammal & seabird foraging
2. No **single** El Niño response
  - EP vs. CP – rough categories
  - 2014-15 Warm Anomaly
3. CCS zooplankton communities are **adapted** to El Niño signals