Links between coastal upwelling and deep-sea ecosystems in the California Current System

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Introduction

- California Current Upwelling System: surface productivity is primarily supported by wind-driven coastal upwelling.
- Connections between upwelling and surface processes are well understood, less so for the deep sea (although there are correlations).
- We look at processes by which coastal upwelling is linked to deep-sea particulate organic carbon (POC) flux and ecological variability (right) using long-term time series.
- Upwelling is linked to climatic modes (e.g. NPGO) and expected to be impacted by climate change.
- Pathways:
  - Coastal upwelling and water mass history explain surface export
  - Export is likely a combination of local (phyto) and upstream (zoo) signals
  - Both ocean color and GA (zoo) products are linked to 4000-m carbon flux

(1) Upwelling is connected to surface carbon export and abyssal POC flux

- Coastal upwelling and water mass history explain surface export
- Export is likely a combination of local (phyto) and upstream (zoo) signals
- Both ocean color and GA (zoo) products are linked to 4000-m carbon flux

(2) Upwelling drives deep-sea ecosystem temporal variability

- Coastal upwelling drives ecological variability down to the 4000m seafloor
- Upwelling variability is damped on time scales linked to animal lifespans
- The connection appears to be fast but the signal persists

Context

- California Current: upwelling-driven
- 3 long-term ecological time series in Monterey Bay (surface, midwater) and at Station M (benthos)
- Station M also includes abyssal POC flux (3400 m)

Connections between surface (upwelling) and deep-sea processes?