

# Investigations of fine-scale diel migration of phytoplankton populations in King Harbor, Redondo Beach.

Beth Stauffer, Ivona Cetinic, Lindsay Darjany, Xuemei Bai, David Caron  
University of Southern California, Marine Environmental Biology

## Introduction: Dynamics of Red Tide Events

### King Harbor, Redondo Beach, CA

- Massive fish kills during 2005 following intense and prolonged red tide events.
- Harbor contains abundant and diverse community of potentially harmful dinoflagellate and raphidophyte species with highly heterogeneous spatial and temporal distributions.



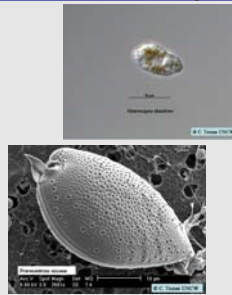
### Dynamics of Red Tides still largely unknown

- **High spatio-temporal variability in phytoplankton abundance & composition**
  - Several shallow basins in King Harbor, which often have different plankton communities present at differing abundances.
  - Population composition changes rapidly, on order of hours – days

## Roles of Vertical Migration & Photoacclimation in Bloom Dynamics

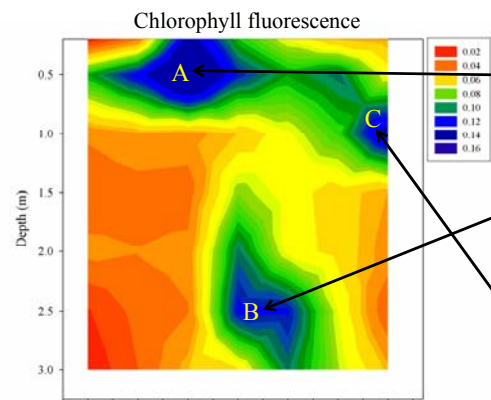
### Concentrations of bloom organisms near surface

- Vertical Migration & Photoacclimation as behavioral and physiological concentration mechanisms, respectively
- Investigated the role of these mechanisms over 24-hour diel cycle in June 2007 in King Harbor Marina

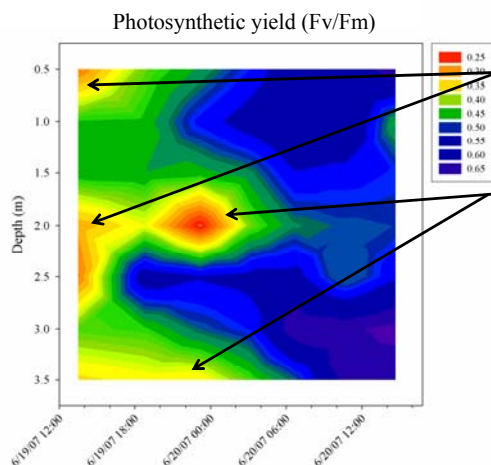


- Every 4h for 24h, measured:
  - Plankton composition
  - Chlorophyll/pigments
  - Absorption & backscattering
  - Nutrients
  - Photosynthetic efficiency
  - Standard water quality parameters –CTD, DO, etc.

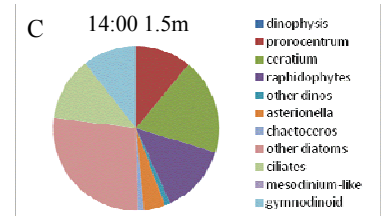
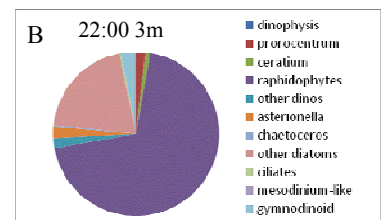
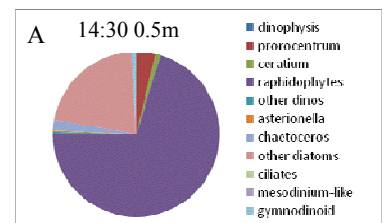
## Pronounced Vertical Migration and Photoacclimation over Diel Cycle in King Harbor



- Chlorophyll distribution shows distinct peak of phytoplankton near surface midday.
- Distinct population near bottom at night/early morning.
- Deeper subsurface accumulation following afternoon.



- Photosynthetically stressed population @ surface (& subsurface) in afternoon
- Deeper stressed population at night
  - Same population as afternoon??
- Populations photosynthetically recover (or are replaced?) during night/morning



- Same populations near surface in afternoon and deep at night (A, B), dominated by Raphidophytes (*Heterosigma akashiwo*)
- Distinctly different population comprised subsurface chlorophyll peak following afternoon, dominated by *Prorocentrum spp.*, *Ceratium spp.* dinoflagellates