Characterization of environmental variability at the San Pedro Ocean Time-series station

**Introduction**
Long term time-series studies are integral in understanding the natural variability of environmental parameters, a critical component in conceptualizing ecosystem dynamics and human influences on the environment (Ducklow, Doney, & Steinberg, 2009). The USC Wrigley Institute has been collecting monthly data of environmental parameters at the San Pedro Ocean Time-series station (SPOT) since 1998.

**Objectives**
- Organize and analyze over 15 years of environmental data to construct a baseline of natural variability at the SPOT station.
- Create a user-friendly and publically accessible database

**Results**
- Sea surface temperatures were seasonal and ranged between 12°C and 20°C (Figure 3).
- The depth of the thermocline varied seasonally (Figure 4).
- Chlorophyll-a concentrations were generally less than 1 µg/L and showed modest increases in April (Figure 5).
- Chlorophyll-a concentrations of > 10 µg/L at the SPOT station were detected by SeaWiFS (Figure 5).
- Monthly averages of nitrate concentrations were low (0.1-0.6 µM) throughout the year, with modest increases in April (Figure 7).
- Nitrate concentrations increased with depth (Figure 8). Silicate and phosphate concentrations showed similar trends (figures not shown).
- Depths of subsurface peaks in nitrite concentrations varied seasonally (Figure 8).
- Subsurface chlorophyll-a maximum varied in depth and shape by season (Figure 6).
- Oxygen concentrations at the surface peaked in April and were lowest during summer (Figure 8).
- An oxycline beginning at ~100 m and hypoxic conditions below ~350 m were present throughout the year (Figure 10).

**Materials and Methods**
- Data were collected onboard the R/V Seawatch or Yellowfin at approximately monthly intervals.
- **SPOT bottle data (discrete depths)**
  - **Parameters measured:** Nutrient concentrations (SiO3, PO4, NO3, NO2), chlorophyll-a concentration, oxygen concentration, temperature.
  - **Collected seawater samples using Niskin bottles (Figure 2) from 12 depths:**
    - 2 m, 10 m, 20 m, 30 m, 40 m, 50 m, 60 m, 100 m, 250 m, 500 m, 750 m, 885 m
  - **Data range:** 4/14/1998 – 12/11/2012
- **In situ continuous measurements**
  - CTD (conductivity, temperature, depth), oxygen, fluorescence
  - **In situ measurements (every meter)**
  - **Data range:** 4/14/1998 – 11/17/2004
- **NOAA satellite data**
  - Parameters: Sea Surface Temperature (SST), chlorophyll-a (SeaWiFS)
  - Obtained data from the Coastwatch browser [http://coastwatch.noaa.gov/](http://coastwatch.noaa.gov/)
  - **Data range:** 1/01/1998 – 3/23/2009

**Conclusions and Ongoing Work**
- The SPOT station is an oligotrophic environment with low phytoplankton biomass.
- Seasonal changes in temperature, oxygen, nutrients and chlorophyll-a were modest.
- This study provides environmental context for research at the SPOT station by faculty at USC.
- Environmental data from the SPOT station is currently being compiled into a user-friendly format that will be publicly available to download at [http://dornsife.usc.edu/spot](http://dornsife.usc.edu/spot).

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**Literature Cited**

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