Using HYCOM for a Coupled Bio-Physical Model for the US West Coast

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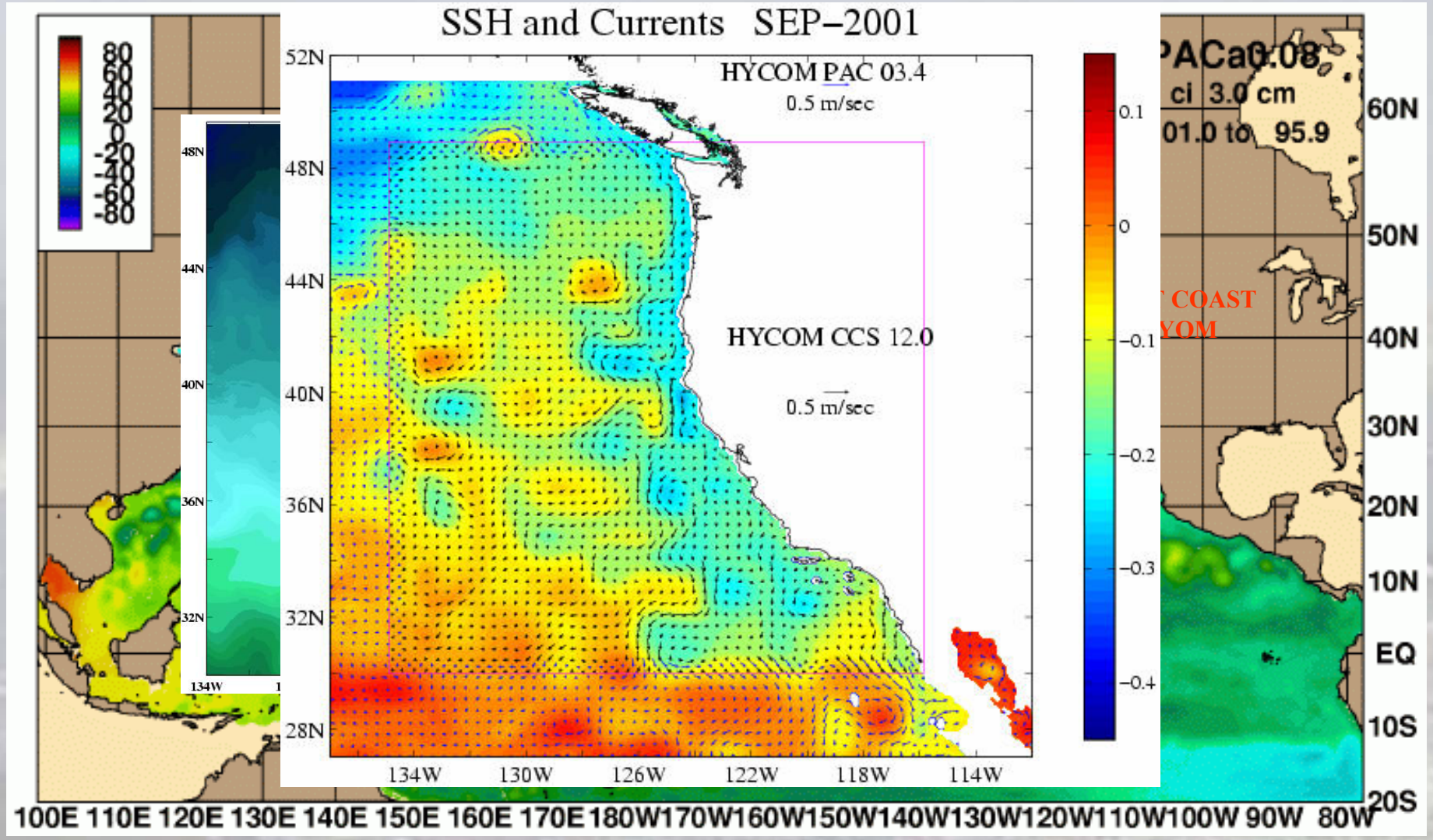
HYCOM West Coast Modeling

- Utilize Boundary values from Pacific Basin HYCOM Run (Metzger)
- Focus on period 1999-2002 +
  - Parallels NRL effort with NCOM
  - Uses High Resolution COAMPS Reanalysis Forcing
    - NRL Monterey/ Air-Sea Coupling project
- Leverage results from
  - NRL CoNESTS: West Coast HYCOM
  - PARADIGM NOPP: Ecosystem Model
  - NRL CoBIOPP: NCOM coupled physical-bio-optical
  - NRL Coupled Air-Sea in Coastal Zone: COAMPS
  - Collaborations(HYCOM modeling, Field Programs,++)

1/12° Pacific HYCOM Basin-scale Circulation

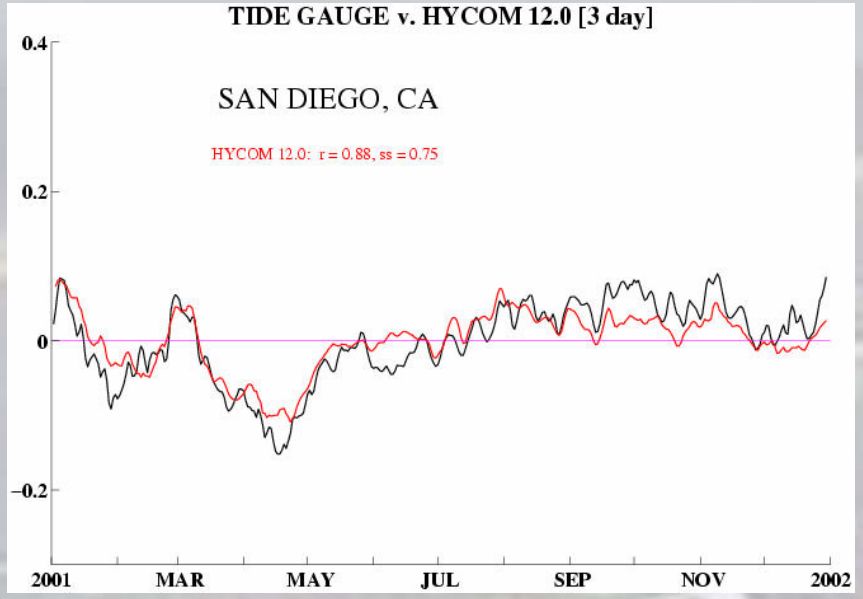
SSH Snapshot



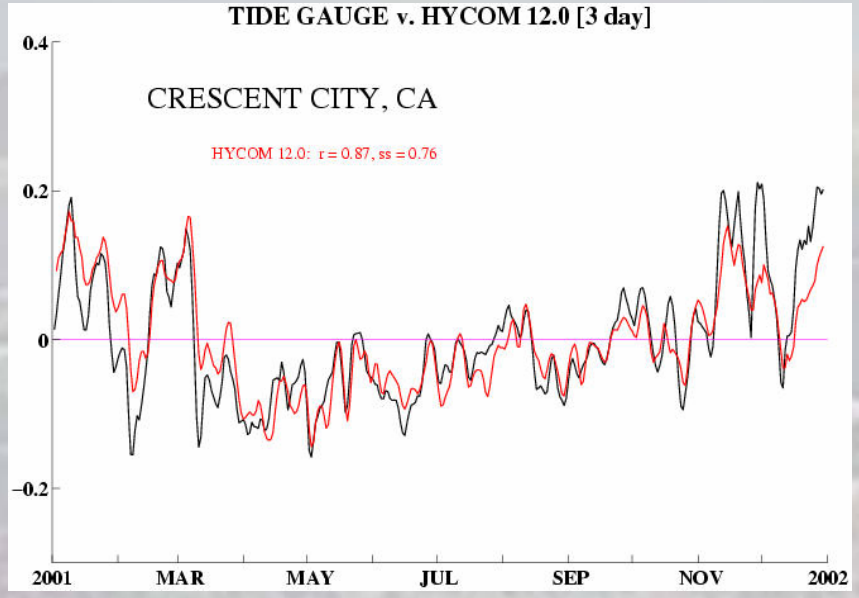
Forced with high frequency climatological ECMWF winds and thermal forcing

HYCOM-CCS: Coastal Sea level

San Diego

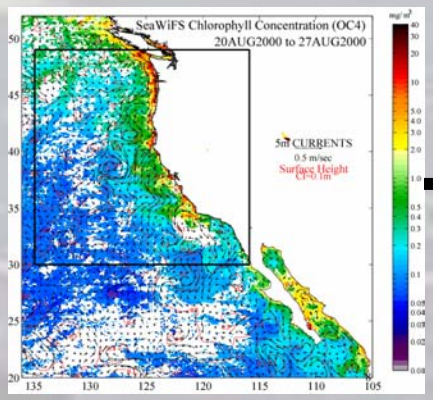


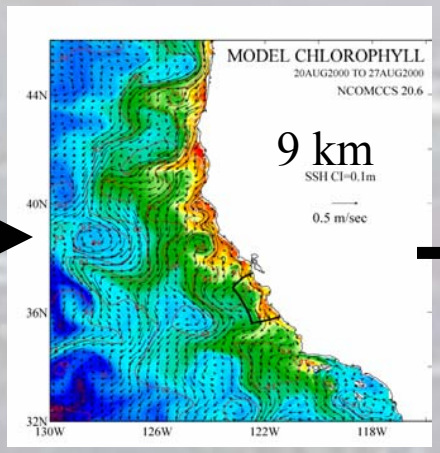
Crescent City

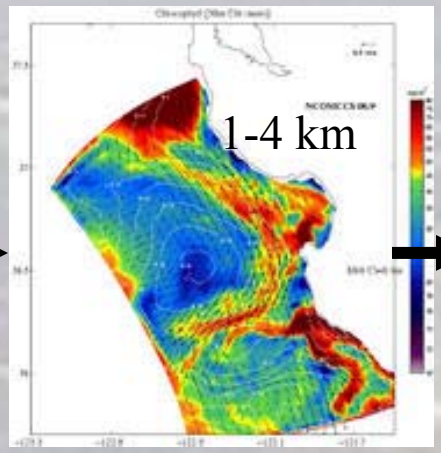


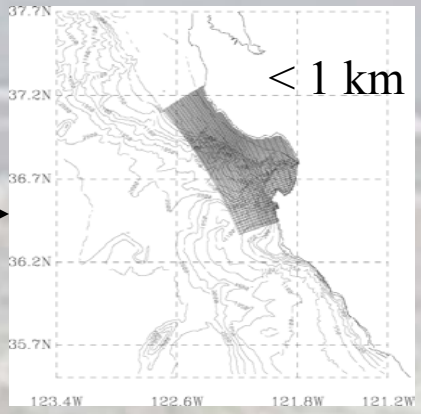
Modeling Approach

- Utilize NCOM/ HYCOM
  - Couple Across scales
    - Global: Regional: Coastal: Local
  - Embedded Ecosystem Model: COSINE
  - Force with High Resolution COAMPS Fluxes: 81/27/9/3 km grid
  - Run in near real-time







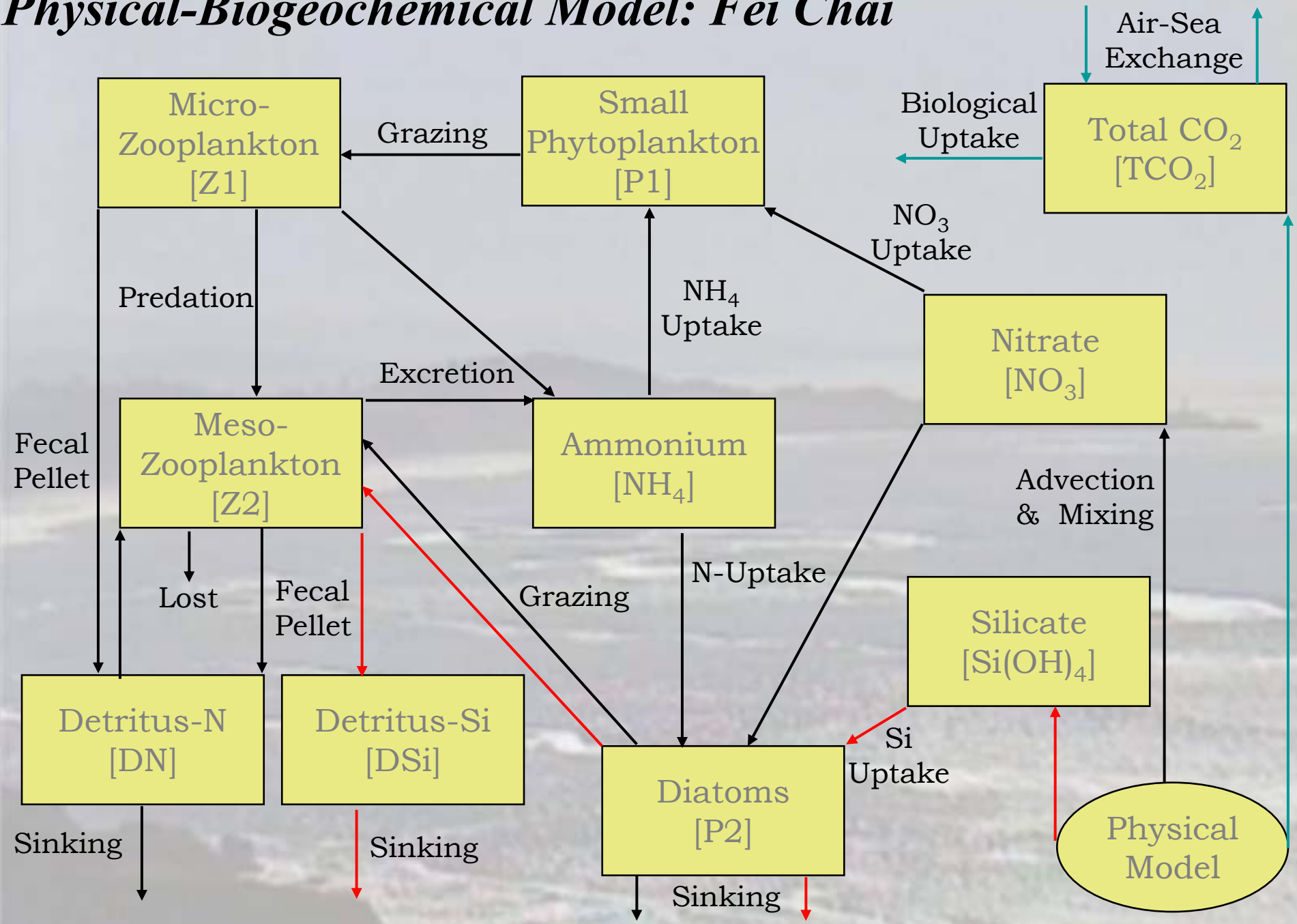


GLOBAL NCOM
GLOBAL HYCOM

REGIONAL NCOM CCS
REGIONAL HYCOM CCS

MONTEREY BAY
ICON Domain

Physical-Biogeochemical Model: Fei Chai



COAMPS Surface Fluxes for US West Coast

COAMPS Reanalysis

COAMPS—AOSN

Oct 98-July 2003

Hourly,

24 Hr Forecasts,

Native Grid 81/27/9 km

July 2003

Present

Hourly, Real-time

72 Hr Forecasts,

Native Grid

81/27/9/3 Km

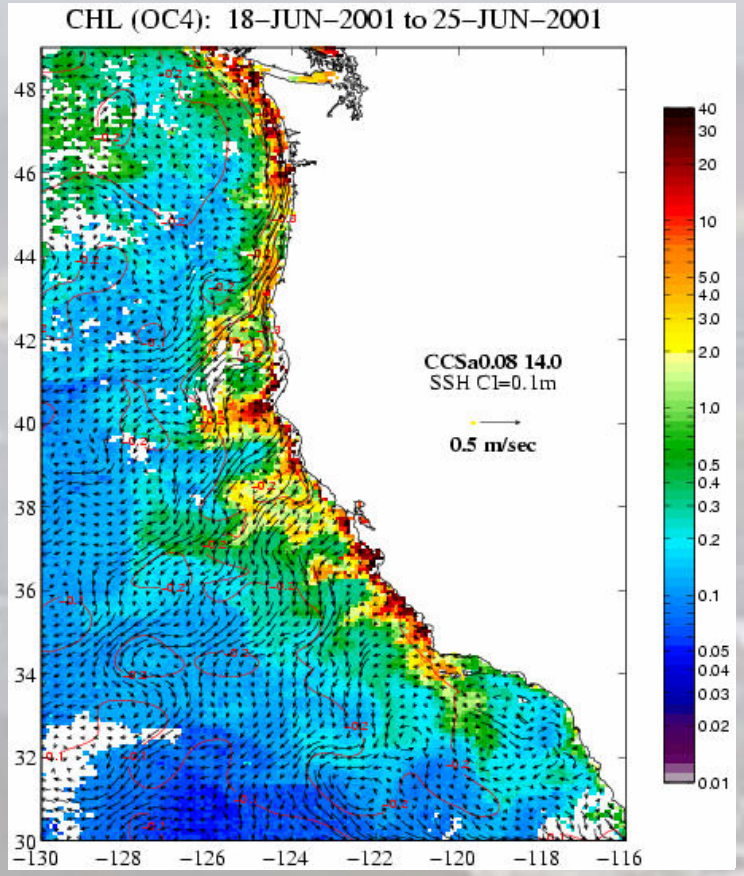
Development Issues for HYCOM Coupled Bio-Physical

- COAMPS Forcing
  - Force with High resolution Regional fluxes
- Forcing with Prescribed Fluxes
  - Force with " Total Heat Flux"
- Boundary/ Initial Values for Tracers
  - Provide IC/BC for tracers
    - Regrid Tracer Climatology to HYCOM grid: Regridded to Reference Density Grid
    - Scripts to generate Input files for tracers: Buggy
    - Passive Tracer flag, " TRCFLG=0" relaxed to climatological surface field.
- Must use Release 34 or greater

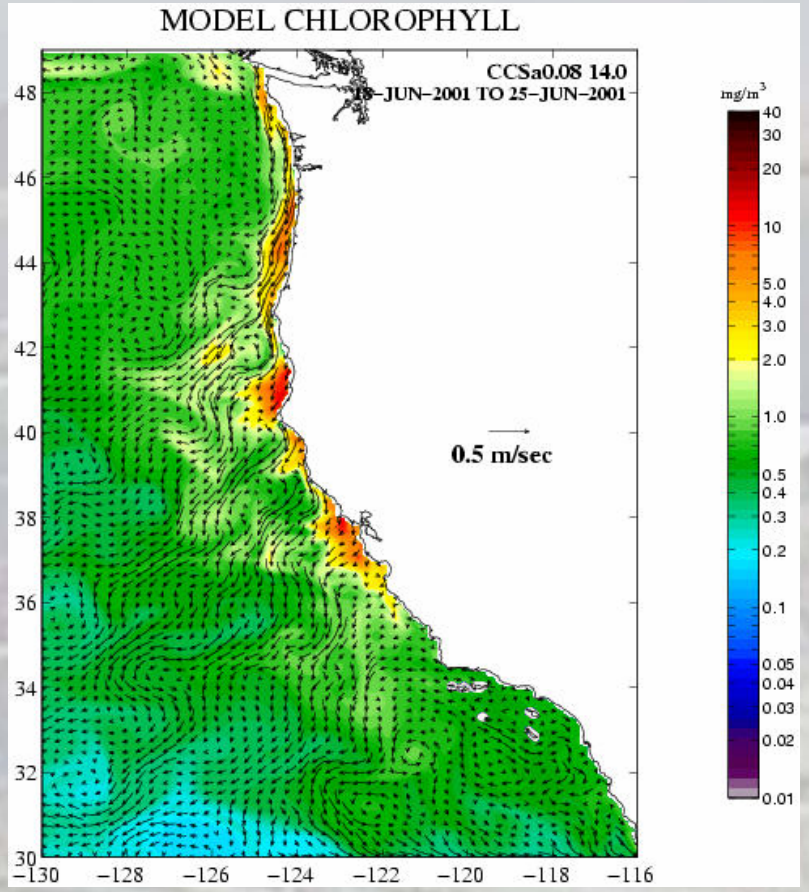
HYCOM Model Simulations vs. SeaWIFS

Chlorophyll

NRL West Coast HYCOM with SeaWIFS Chlorophyll

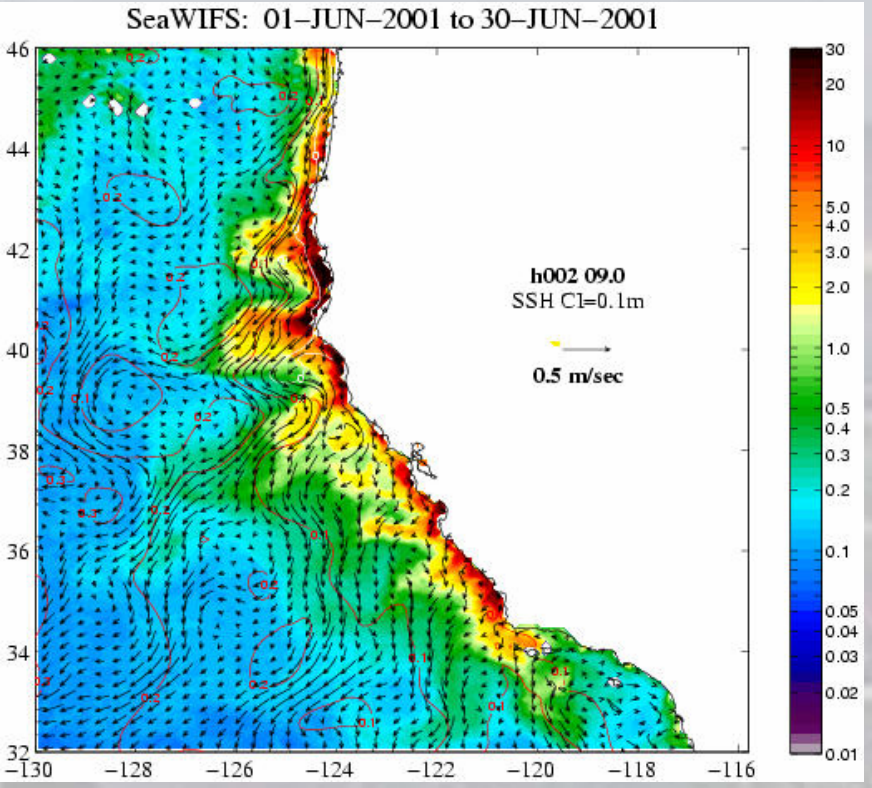


NRL West Coast HYCOM with Model Chlorophyll

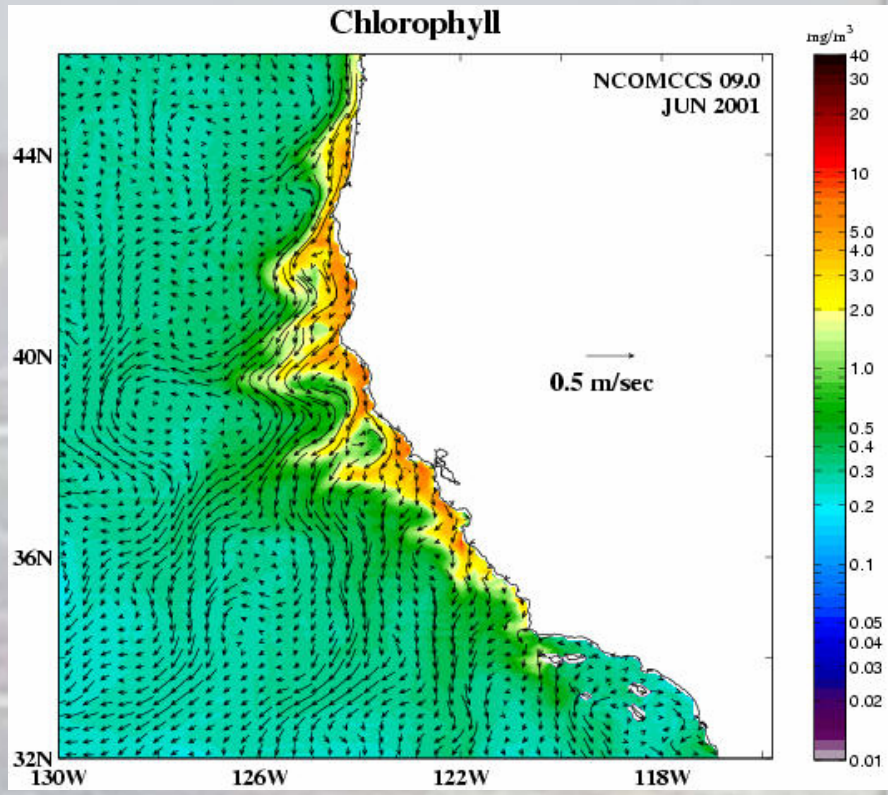


NCOM Results

NRL West Coast NCOM with SeaWIFS Chlorophyl

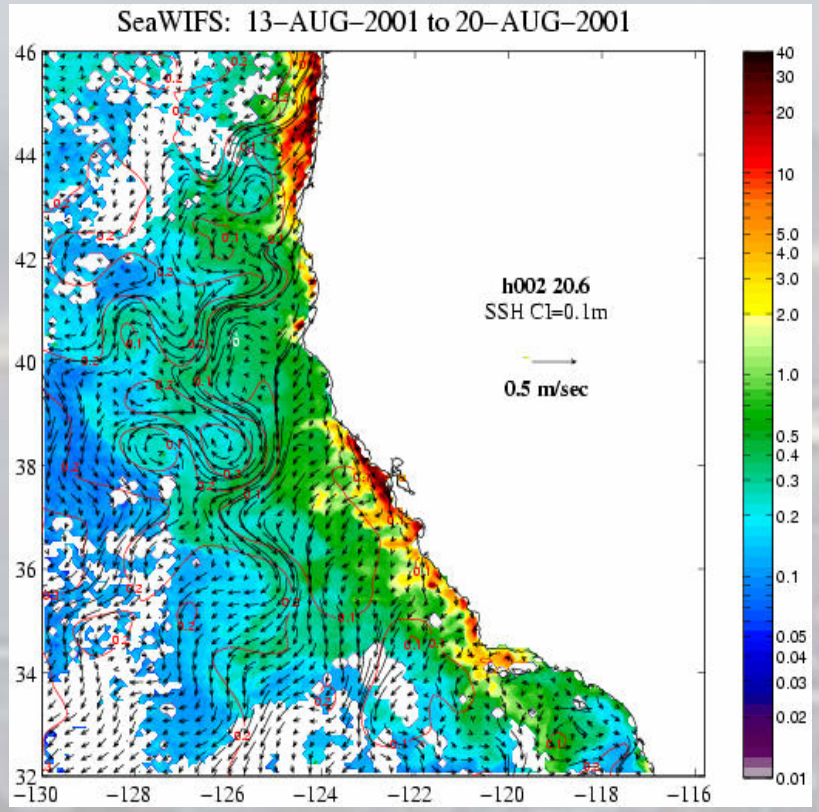


NRL West Coast NCOM with Model Chlorophyl

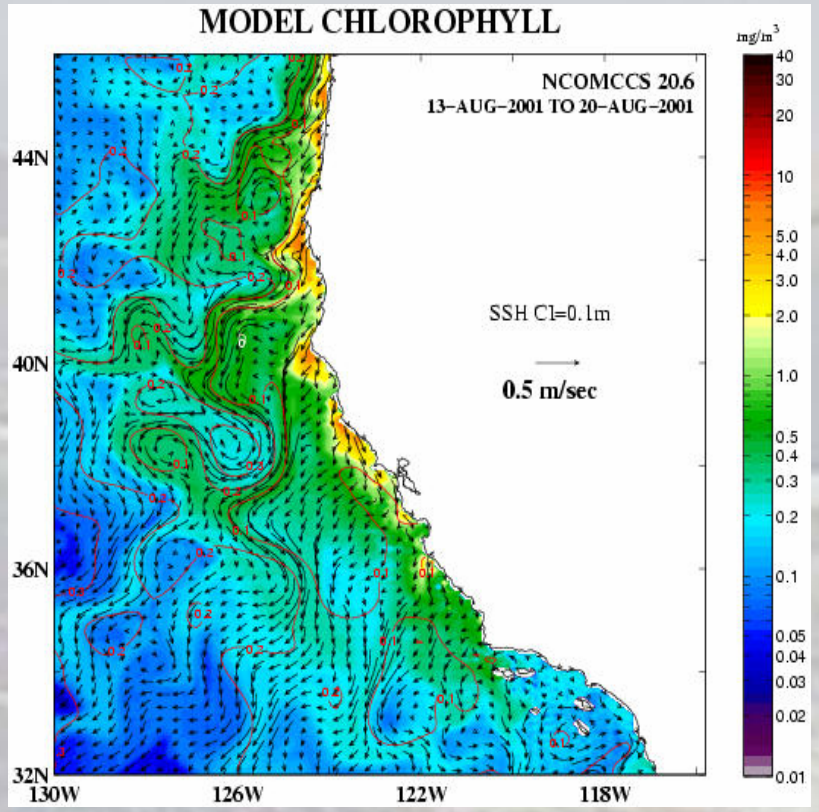


Model Simulations vs. SeaWIFS

NRL West Coast NCOM with SeaWIFS Chlorophyll



NRL West Coast NCOM with Model Chlorophyll



PLANS

- Non-Assimilative Runs
  - Complete Development
  - Parameter studies/ comparisons with NCOM
- Nest to Monterey Bay Sub-domain
  - Curvilinear Coord. Implementation
  - Force with Archive files for Tracers
- Data Assimilative runs
  - Data Assimilation for Pacific & Regional HYCOM
- Real-time implementation
  - HYCOM CCS & Monterey Bay Domains
- Sensitivity of Coupled Model to Vertical Coordinate,..