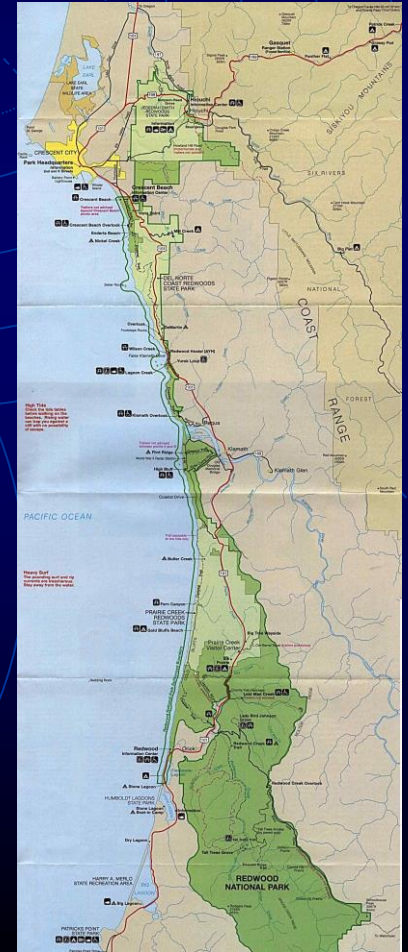
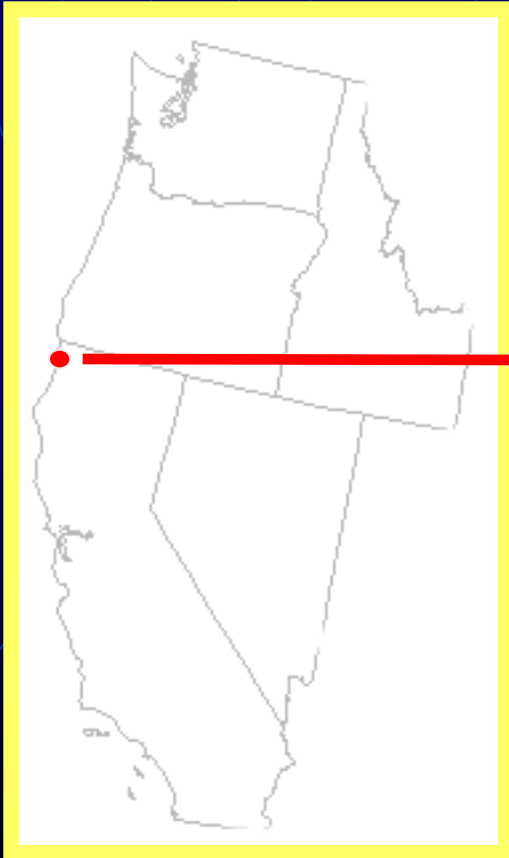


Coastal Ocean Dynamics in the Vicinity of Redwood National and State Parks



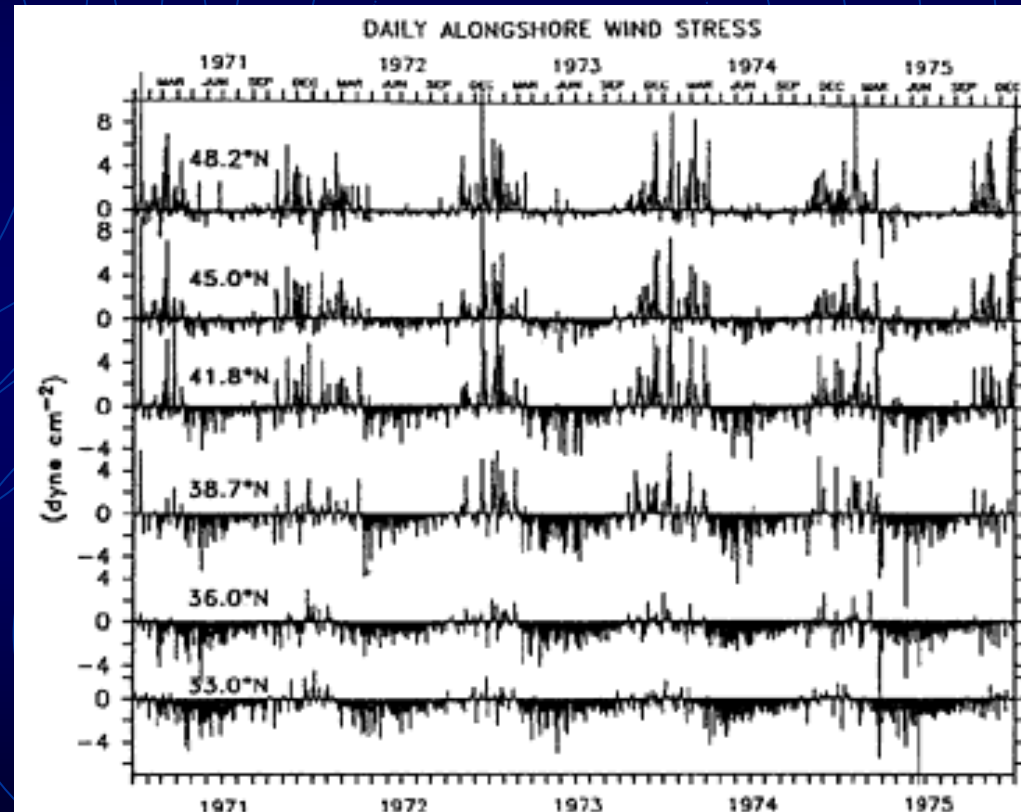
Dr. Greg Crawford
Humboldt State University
Arcata, CA

Outline

- Winds
- Waves
- Currents
- Tides and water level
- Riverine influences

Seasonal Winds

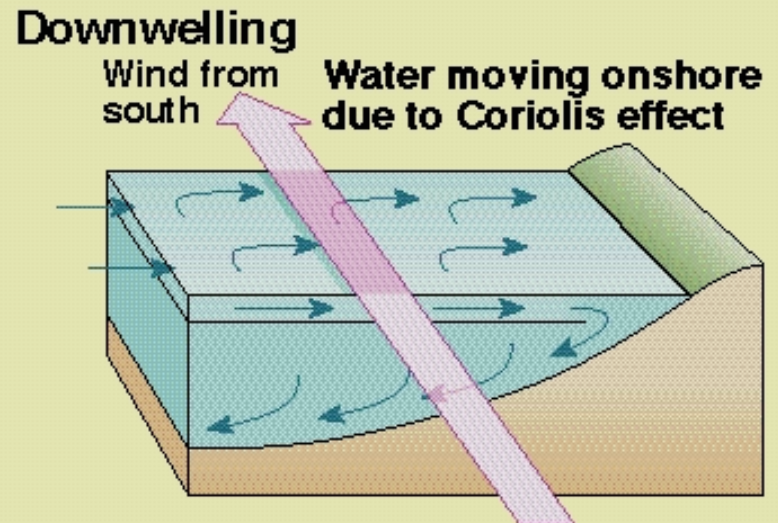
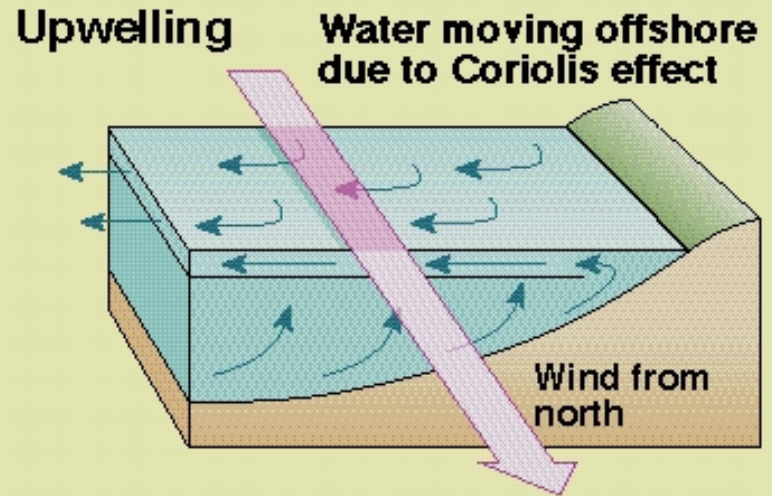
- Winter (downwelling) season: strong S/SW winds
- Upwelling season (spring/early summer): strong NW winds
- Oceanic (variable) season (late summer/fall): lower, variable winds



Strub et al. 1987

Upwelling and Downwelling

- **Upwelling season:** surface waters first move away from shore; nearshore sea level decreases; upwelling; surface flow southward
- **Downwelling (winter) season:** surface waters first move towards shore; nearshore sea level increases; downwelling; surface flow northward (“Davidson Current”)



Seasonal Waves

- **Winter (downwelling) season:**
Large waves from S/SW
- **Upwelling season**
(spring/early summer): Large waves from W/NW
- **Oceanic (variable) season**
(late summer/fall): Moderate waves, variable direction

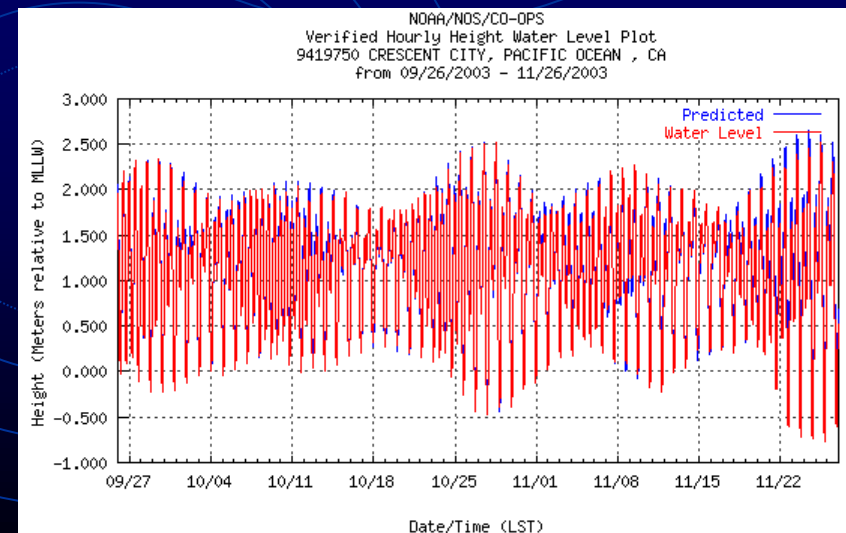
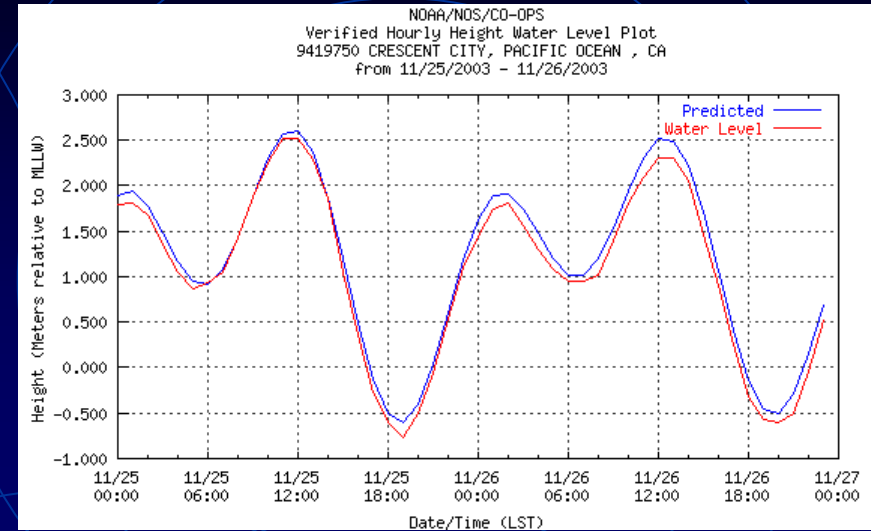
	Mean Significant waveheight, H_s	Mean Dominant Period, DPD
Jan	3.1 m	13.2 s
Apr	2.4 m	11.3 s
Aug	1.7 m	8.7 s

[after Harris, 1998]

Large wave events ($H_s > 7\text{m}$) annually!

Tides

- Daily: mixed tides (two low, two high tides per day, of unequal height)
- Fortnightly: spring/neap cycle



Offshore Currents

WIND-DRIVEN CURRENTS

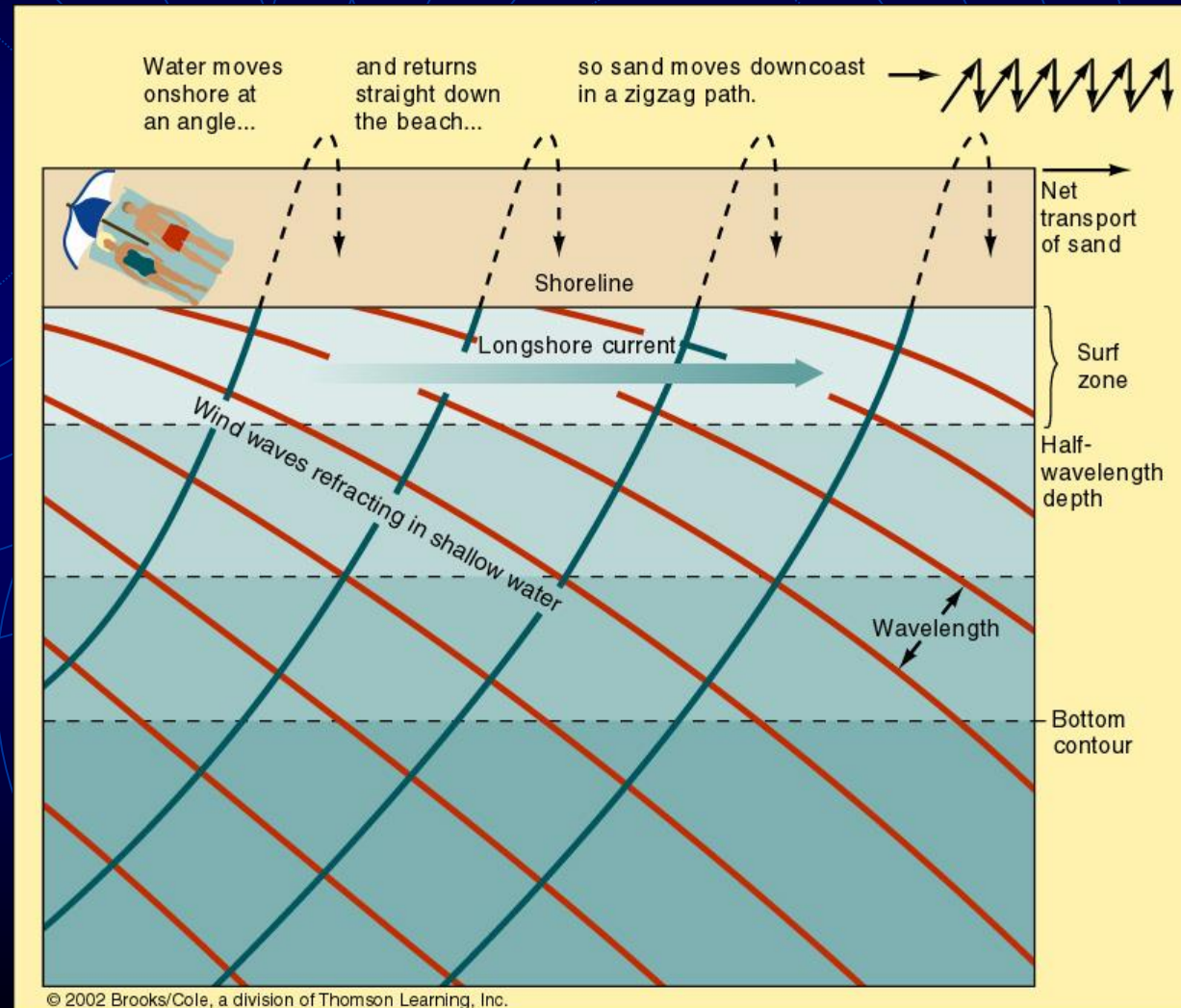
- **Winter season:** initially onshore; subsequently northward (“Davidson Current”)
- **Upwelling season** initially offshore; subsequently southward
- **Oceanic season:** variable

TIDAL CURRENTS

- Roughly north-south; varying

Longshore Current

- Waves breaking nearshore or onshore generate longshore current
- **Winter season:** northward longshore current?
- **Upwelling season** southward longshore current?
- **Oceanic season:** variable



River Plumes

- Seasonal variability of river flow (rainfall / snow melt / regulation)
- Influence of nearshore and longshore currents

Klamath River Plume

May 20, 2003



Klamath River Plume

May 20, 2003



Klamath River Plume

May 20, 2003

