

Activity 5

Using The Weather Page To Predict Ocean Conditions

Introduction: This is an exercise to evaluate and explain daily changes in weather (water, temperature, wind and waves). By understanding the general characteristics of weather and recording a few days of weather, you can begin to predict the ocean conditions for your trip. If you were to chart data from the weather page throughout the year, you would notice:

Seasons: check your paper for...

- Changes in positions of high and low pressure ridges with the different seasons
- Movement of the Jet Stream (see graph on right)
- pressure gradients
- A very low pressure system anywhere in the Pacific that might send us weather or waves. If it is over Dana Point, we will experience clouds, rain and wind.

Surface water temperature: check your paper for...

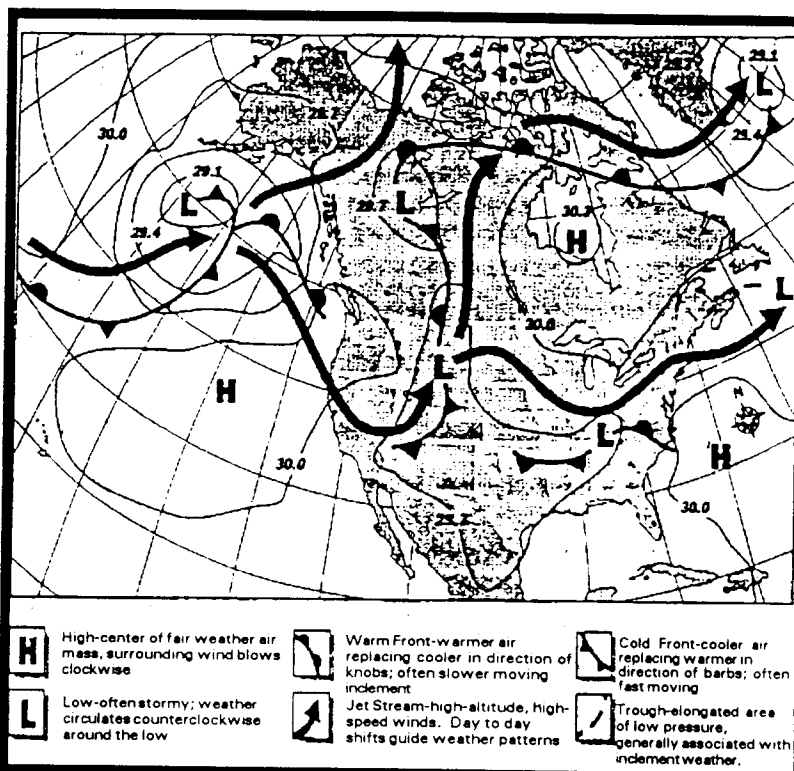
- Surface water temperatures will change with different seasons.
- Sunlight is most intense during the summer season and least intense during the winter season.
- Winter storms mix the warm surface water with the colder bottom water lowering the surface temperature (**isothermal conditions**).
- Surface water temperatures will increase in the summer season when there is little storm activity and no mixing with the colder ocean bottom. This creates a **thermocline**.
- El Nino episodes displace fish populations. During the 1992 El Nino it was not uncommon to find tropical puffer fish off Catalina Island. Fish that require colder water temperatures are displaced up to 100 miles off the California Coast.

Wind: check your paper for...

- Wind direction (seasonal offshore NE winds like "Santa Anas") can cause cold deep bottom waters to rise to the surface cooling down the surface ocean temperatures (**upwelling**).
- Strong local winds create wave chop. These "seas" are different from wave swell.

Waves: check your paper for...

- Long period wave swells (12 - 17 seconds) that are created by winds generated from storm cells far off in the Pacific ocean.
- Low Pressure cells (< 29) where winds and wave swells are generated by storm activity in the Northern Pacific ocean during the winter season off California.



National Weather Report and Forecast: illustrates a large storm shifting into the Gulf of Alaska. A high pressure ridge is centered between Hawaii and California.

Research Application: Data on wind, weather, waves and water temperature serve as a standard for oceanic researchers. Monitoring basic indicators help scientists to better understand seasonal fluctuations in kelp forest densities and fish populations off the California Coast. "El Nino" is a term used to describe warm water events that occur every few years off the California coast. Telltale patterns of wind, water and temperature may indicate an El Nino. During El Nino years, global wind patterns shift displacing warm water from the equator to the coast of Western North America. The cold, nutrient rich water usually found off California is displaced offshore. The National Oceanic Atmospheric Administration (NOAA) monitors surface temperatures along the entire Western Coast of North America to predict warm water "El Nino" events. For more information check out their web address! <http://cwatchwc.ucsd.edu/cwatch.html>

The Challenge: Predict the sea conditions for your voyage to sea off Dana Point aboard the *R/V Sea Explorer*. To make an accurate prediction, use the data sheet provided on the reverse side to record the water temperature, wave swell and direction, wind speed and wind direction for Southern California for 3 days prior to your program. Compare your predicted data to the actual conditions recorded during your program. How good of a weather forecaster are you?