Coastal Southern California Sea Surface Winds and Along Coast Pressure Gradient Related to Mid-Level Atmospheric Structure

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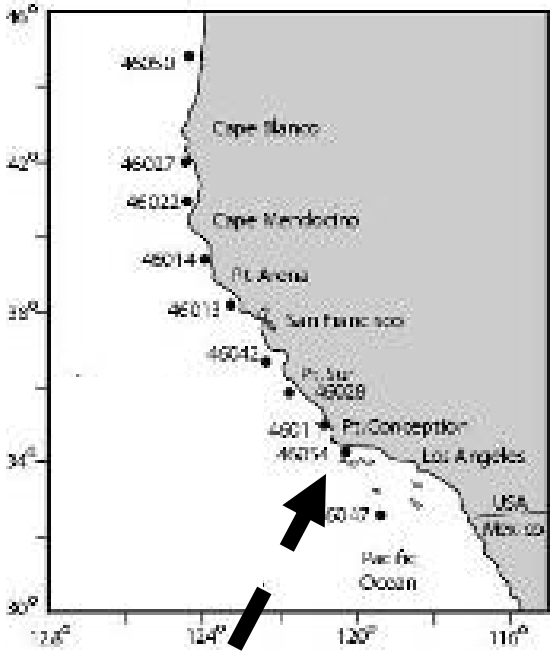
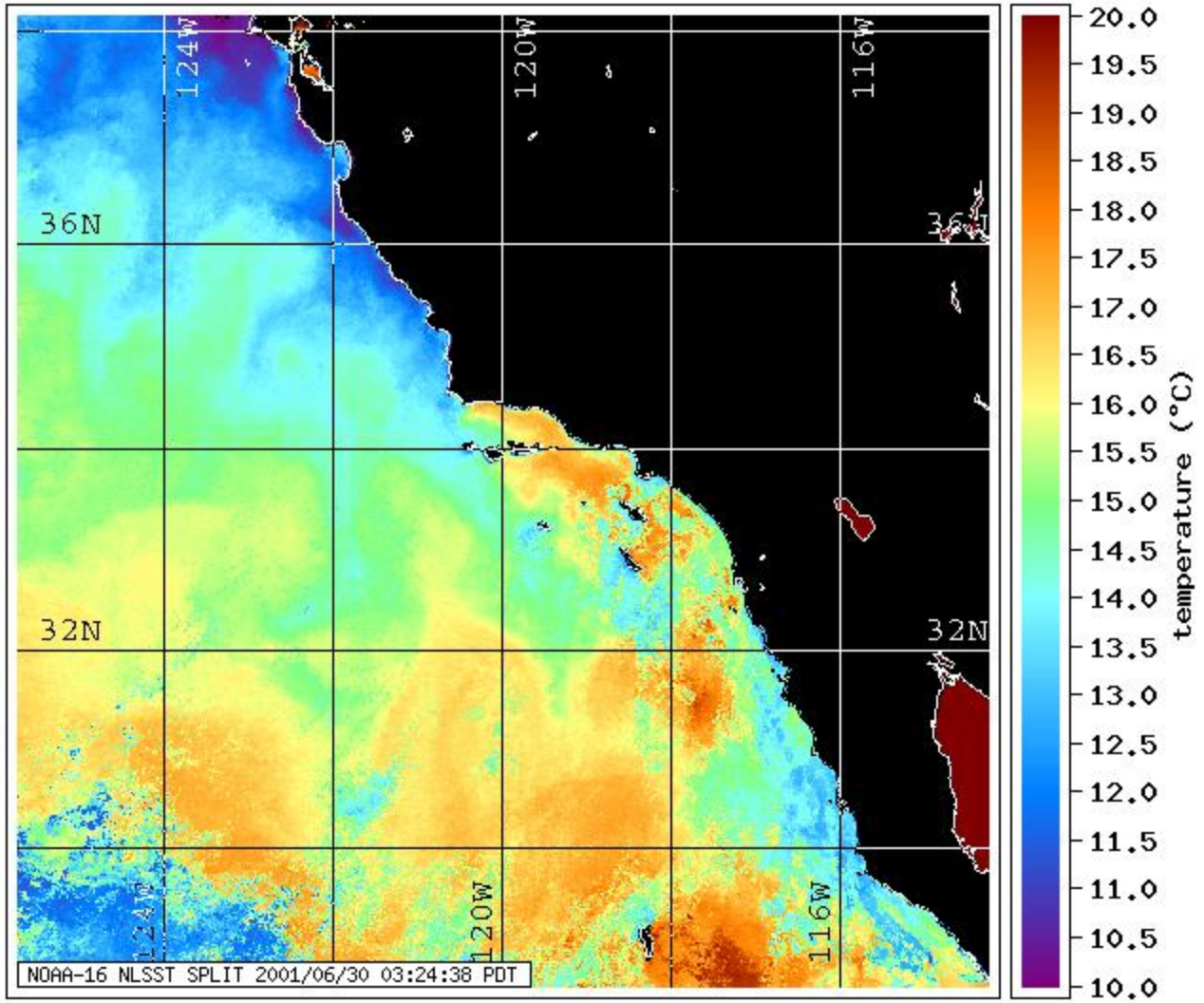


Wind Relaxation
And
Current Reversal
Event About
Pt Conception CA



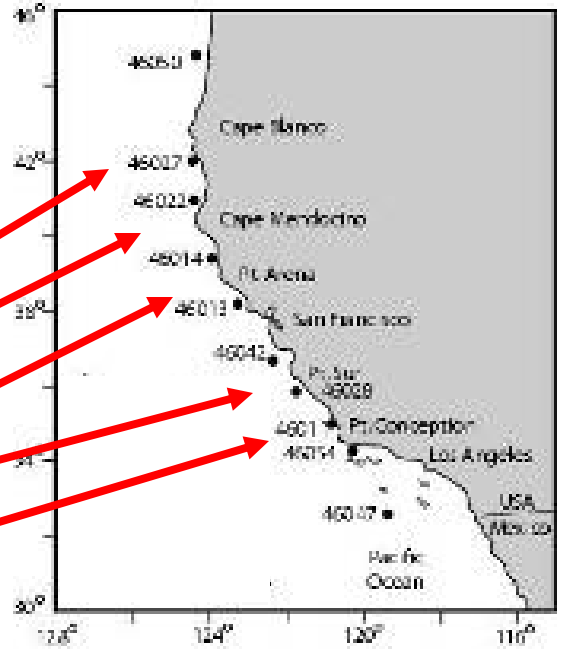
CoastWatch Satellite Data for June 2001
Month Composite / CalCOFI Synoptic Region

May – Aug 2001 NDBC Buoys About Major Capes

36-hour, low pass filtered time series

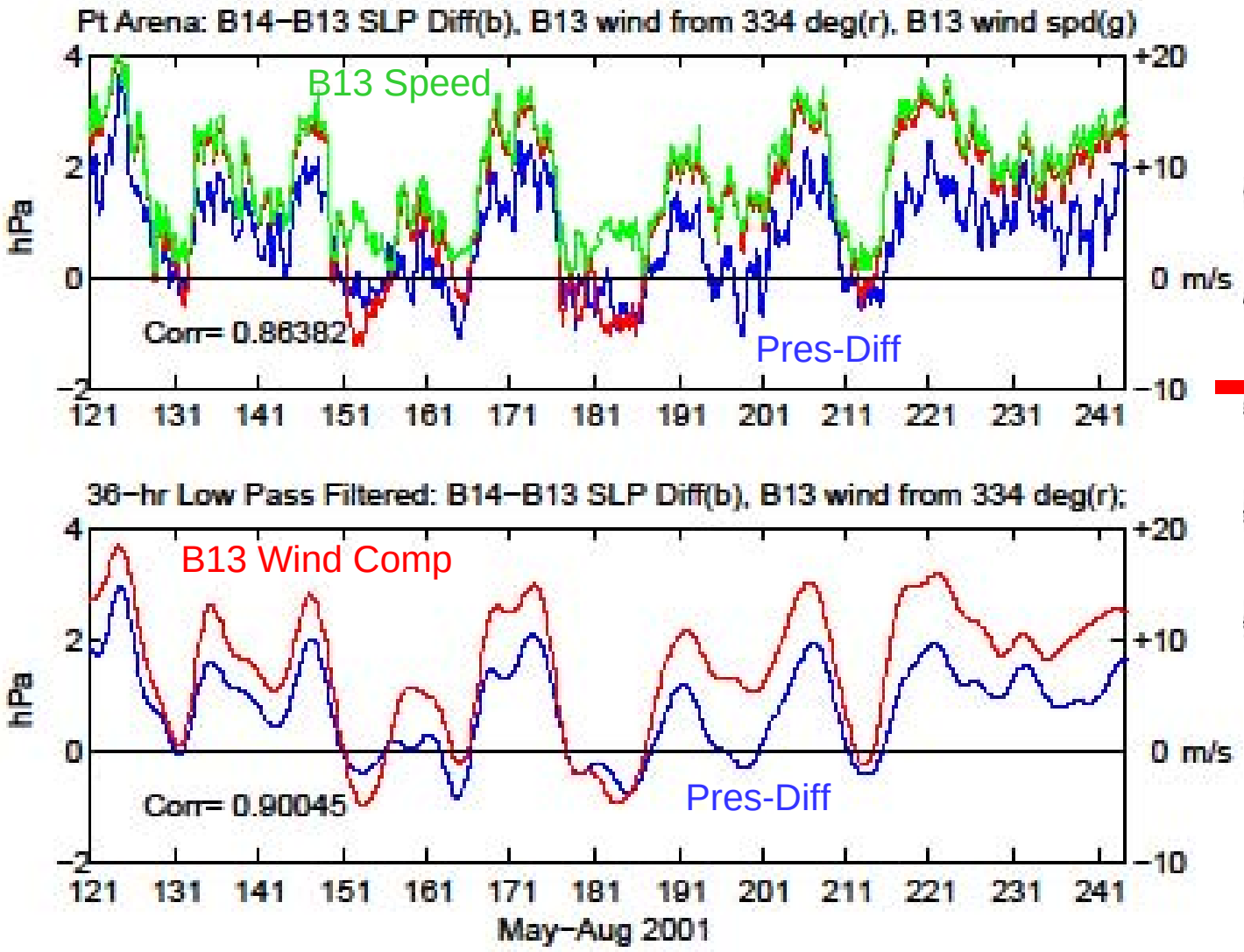
Along coast pressure difference drives Along coast wind component

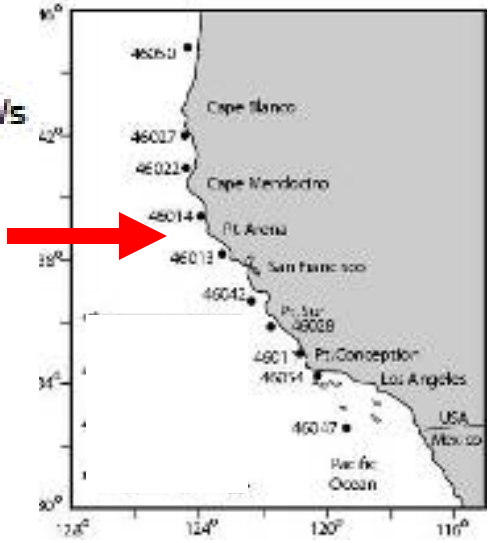
Cape	Buoy				P Diff		South Buoy Comp 50%	Corr	
	N #	S #	Dist km	Line Deg T	50% hPa	Std hPa		Pdiff-Comp	Filter Pdiff-Comp
Blanco	50	47	308	358	0.9	1.1	2.6	0.79	0.85
Mendo	22	14	174	344	1.6	1.1	6.7	0.80	0.84
Arena	14	13	134	334	0.5	0.9	8.6	0.86	0.90
Sur	42	28	123	337	1.0	0.7	7.6	0.78	0.82
Concept	11	54	78	330	1.8	1.0	7.2	0.84	0.90



Median value

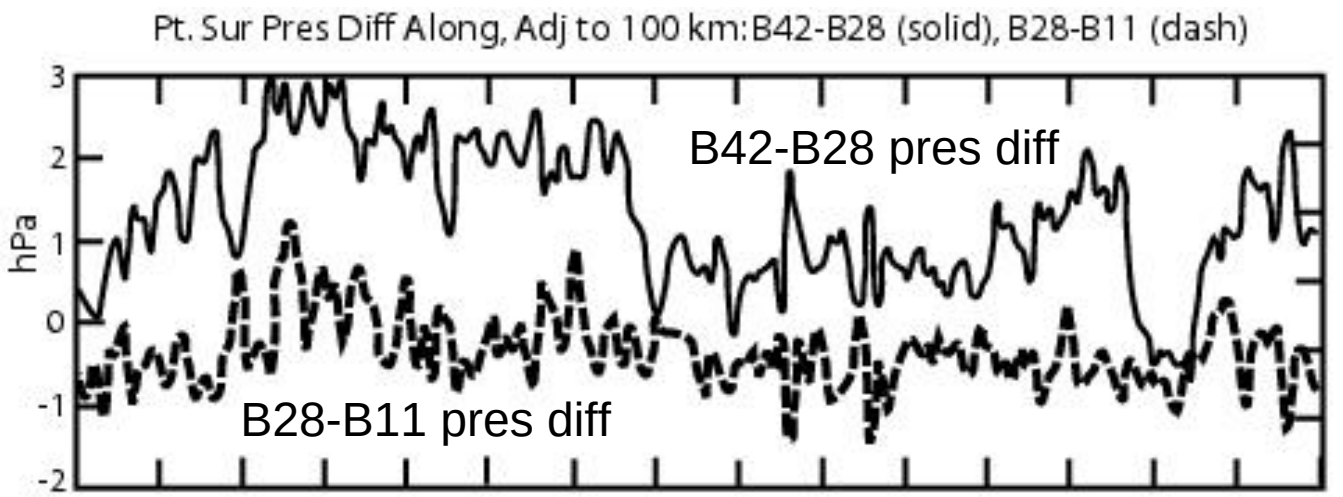
Pt Arena Buoy Pressure Difference, Along Wind Component, Speed June 2001

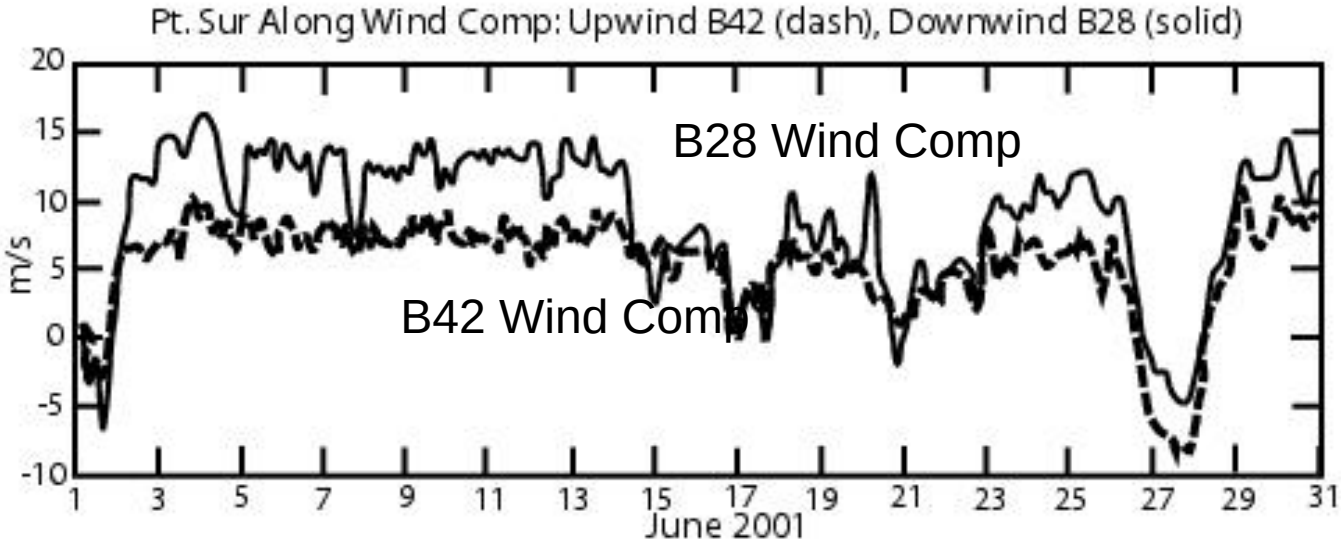




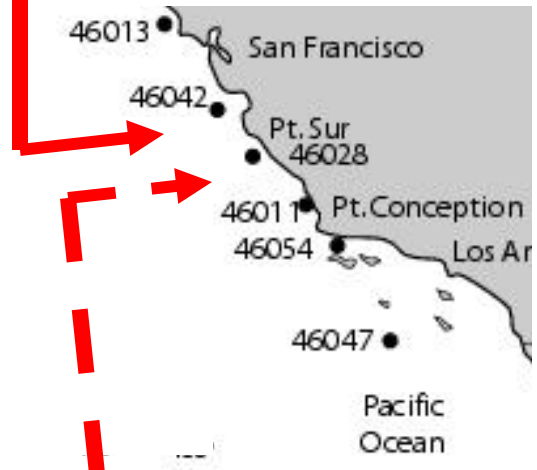
Similar For Each West Coast Major Cape

Pt Sur and Central Coast Buoy Pres Differences & Along Wind Components, June 2001



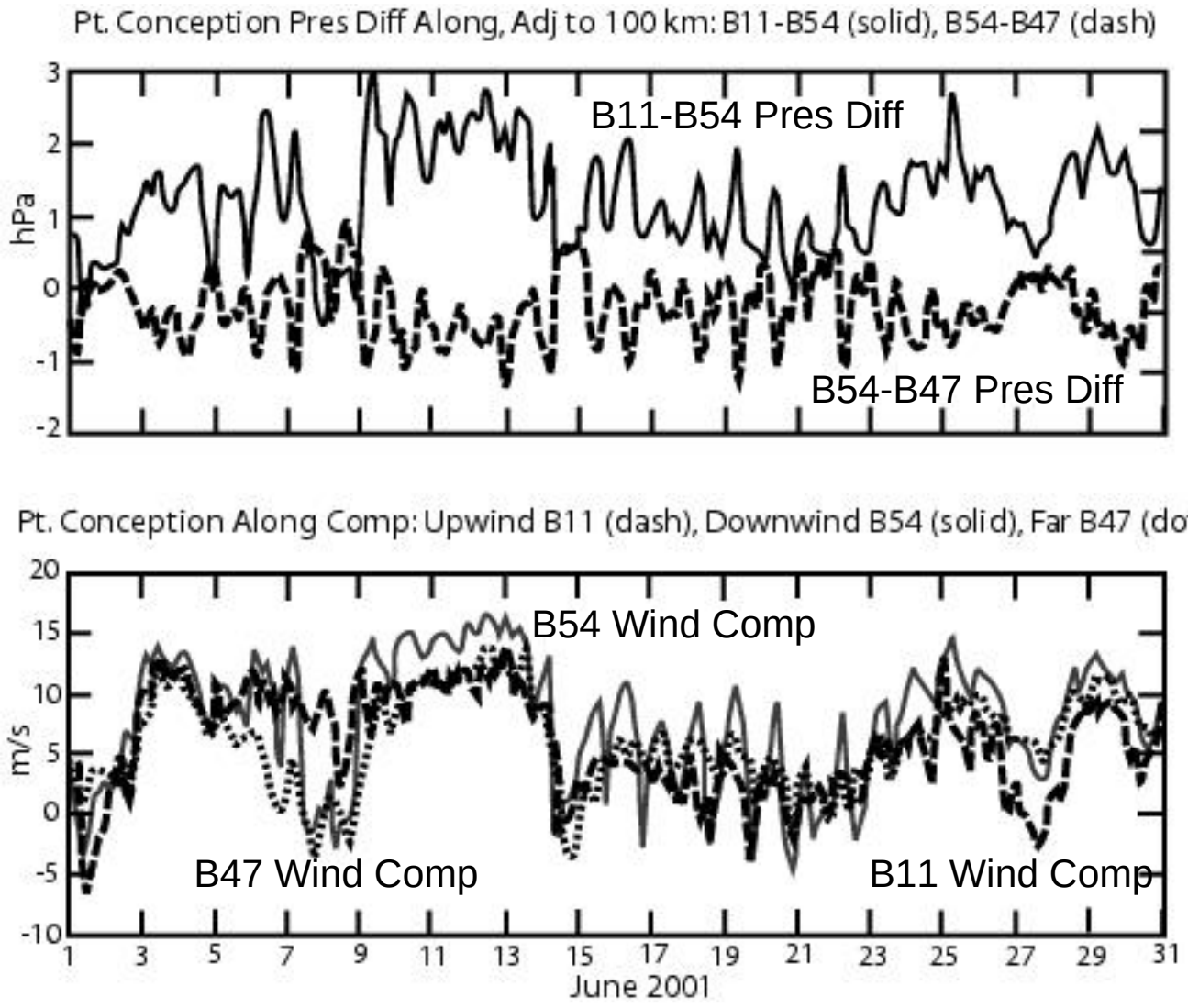


B42-B28
Pt Sur

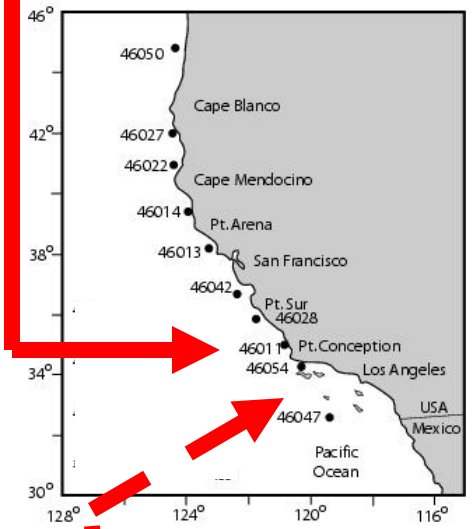


B28-B11
Central Coast

Pt Conception and Open Water Buoy Pres Differences & Along Wind Components, June 2001



B11-B54
Pt Conception

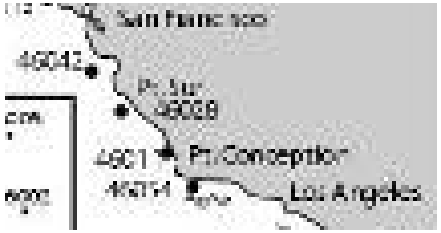


B54-B47
Open water

South Coast Pressure Gradient & Wind Events

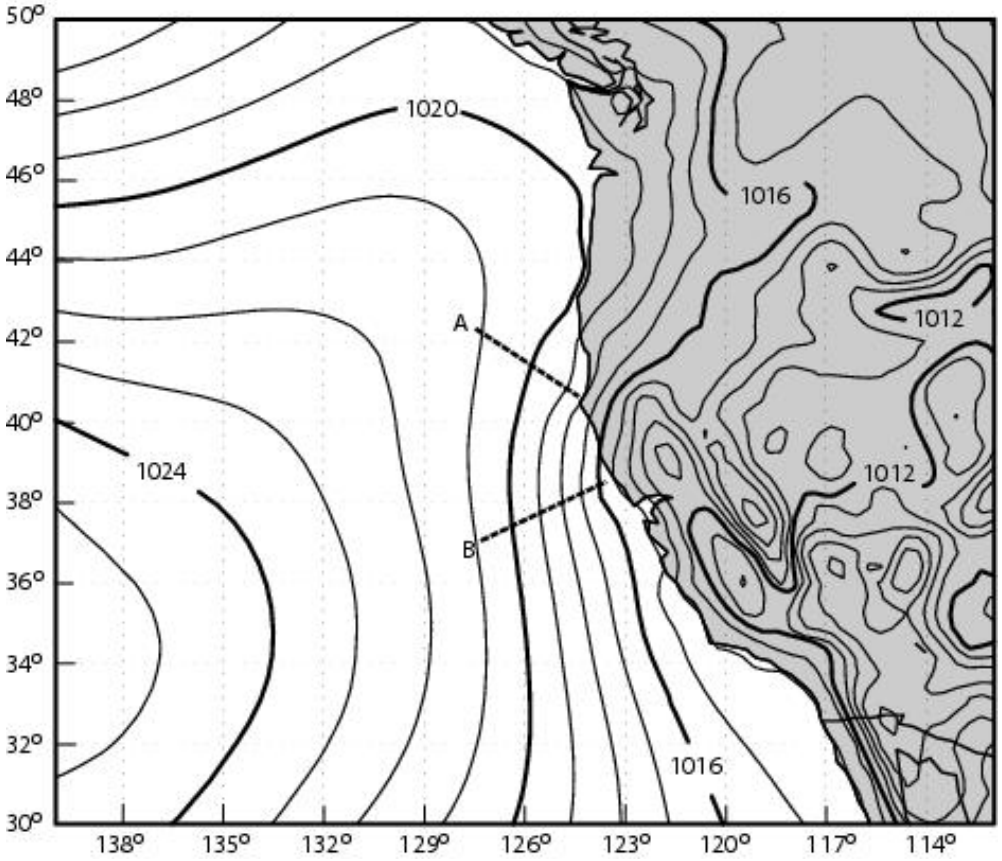
June day	NDBC Buoy Data			
	Pt Sur		Pt Conception	
	B42-B28 Pres hPa > 0.8	B28 Spd m/s ≥ 8	B11-B54 Pres hPa ≥ 0.8	B54 Spd m/s ≥ 8
1				
2	0.9			
3	1.6	14.3	1.4	12.7
4	1.9	16.3	1.4	13.6
5	1.1	11.1		8.6
6	3.0	14.4	1.0	12.0
7	2.8	13.9	1.3	12.0
8	2.2	12.7		
9	1.7	12.0	1.4	12.2
10	1.1	11.5	2.1	14.6
11	2.5	14.4	2.1	14.9
12	2.5	14.4	2.4	16.0
13	1.8	13.2	2.1	16.6
14	2.3	12.6	1.1	11.5
15			0.9	

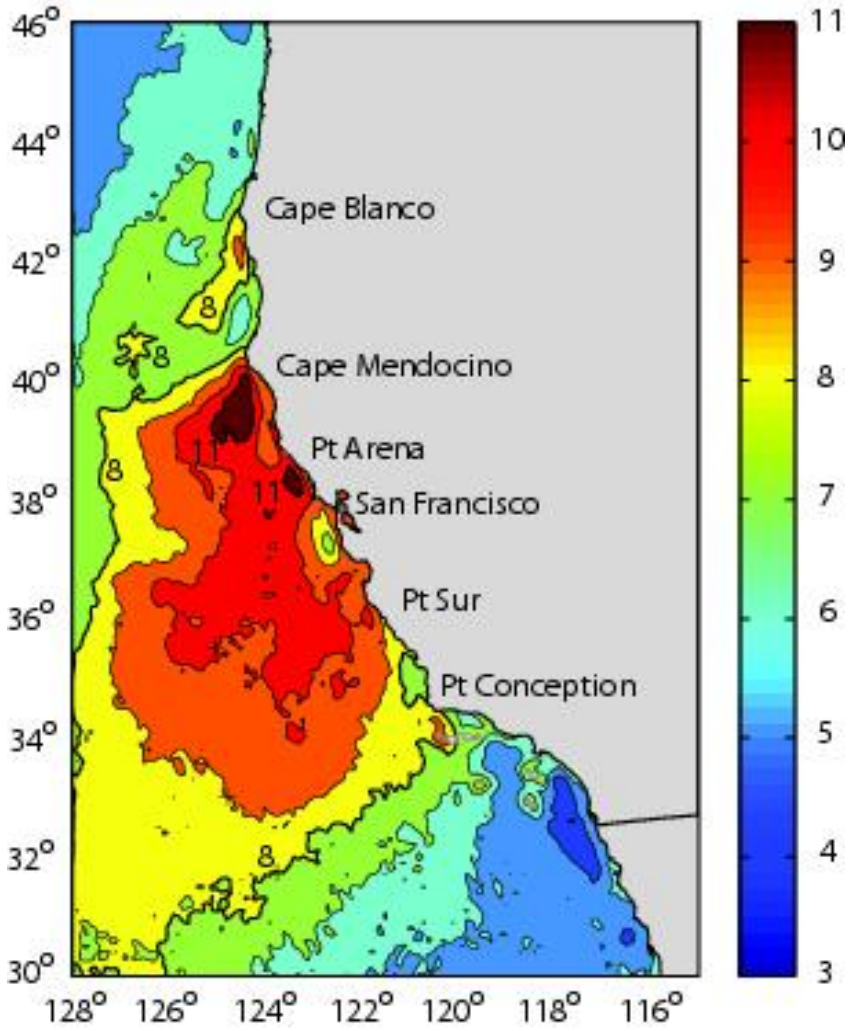
June day	NDBC Buoy Data			
	Pt Sur		Pt Conception	
	B42-B28 Pres hPa > 0.8	B28 Spd m/s ≥ 8	B11-B54 Pres hPa ≥ 0.8	B54 Spd m/s ≥ 8
16		(7.9)	1.5	9.4
17			1.1	
18			1.0	
19	(0.7)	(7.8)	0.8	7.1
20		(7.7)		
21				
22				
23		8.8	0.8	
24		9.1	1.7	10.7
25	1.6	11.7	1.6	13.3
26	1.3	9.9	1.6	12.0
27			0.9	7.2
28			1.3	7.1
29	1.0	10.5	1.9	12.5
30	1.3	12.3	1.8	12.3



Result:
Higher speeds
Always with
Greater
Alongcoast
Pressure
Difference

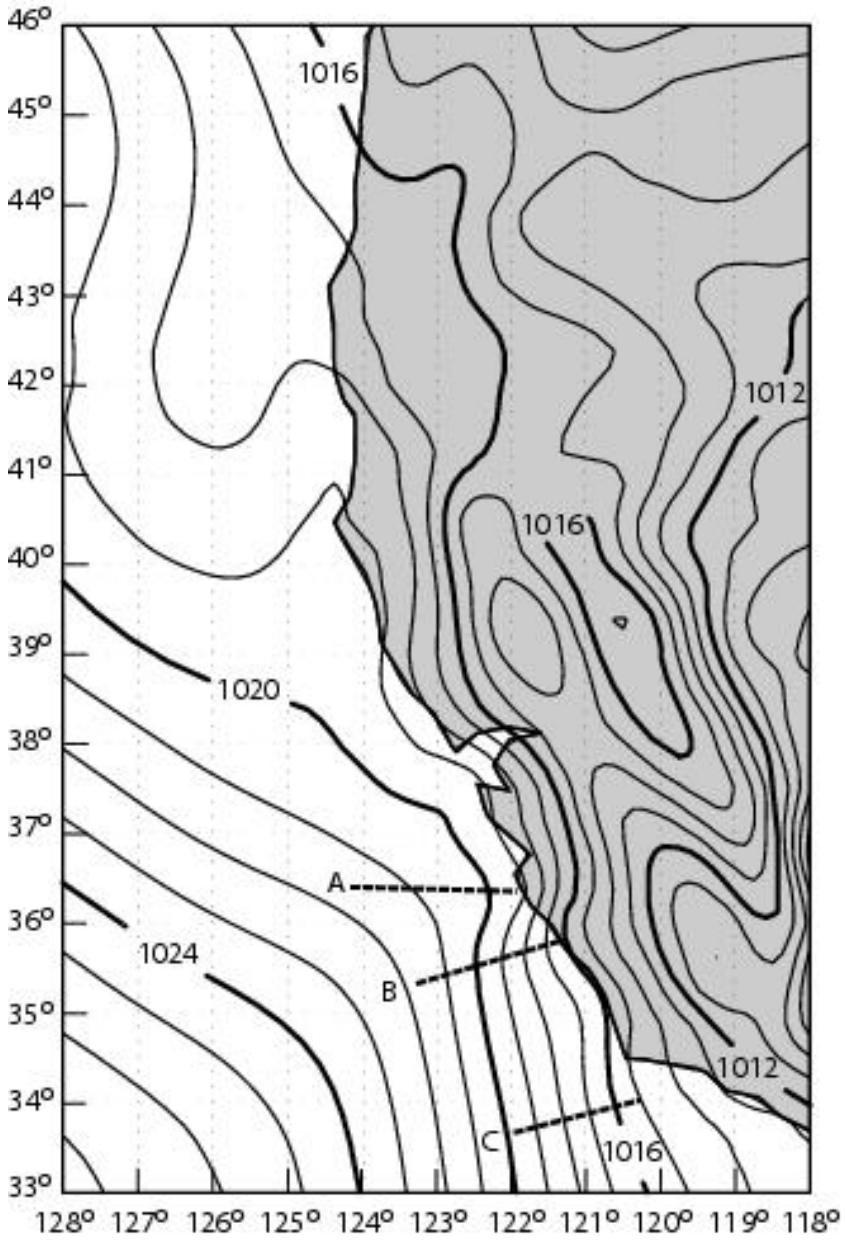
June 2001
NARR Sea Level Pressure & QuikSCAT Wind Speed

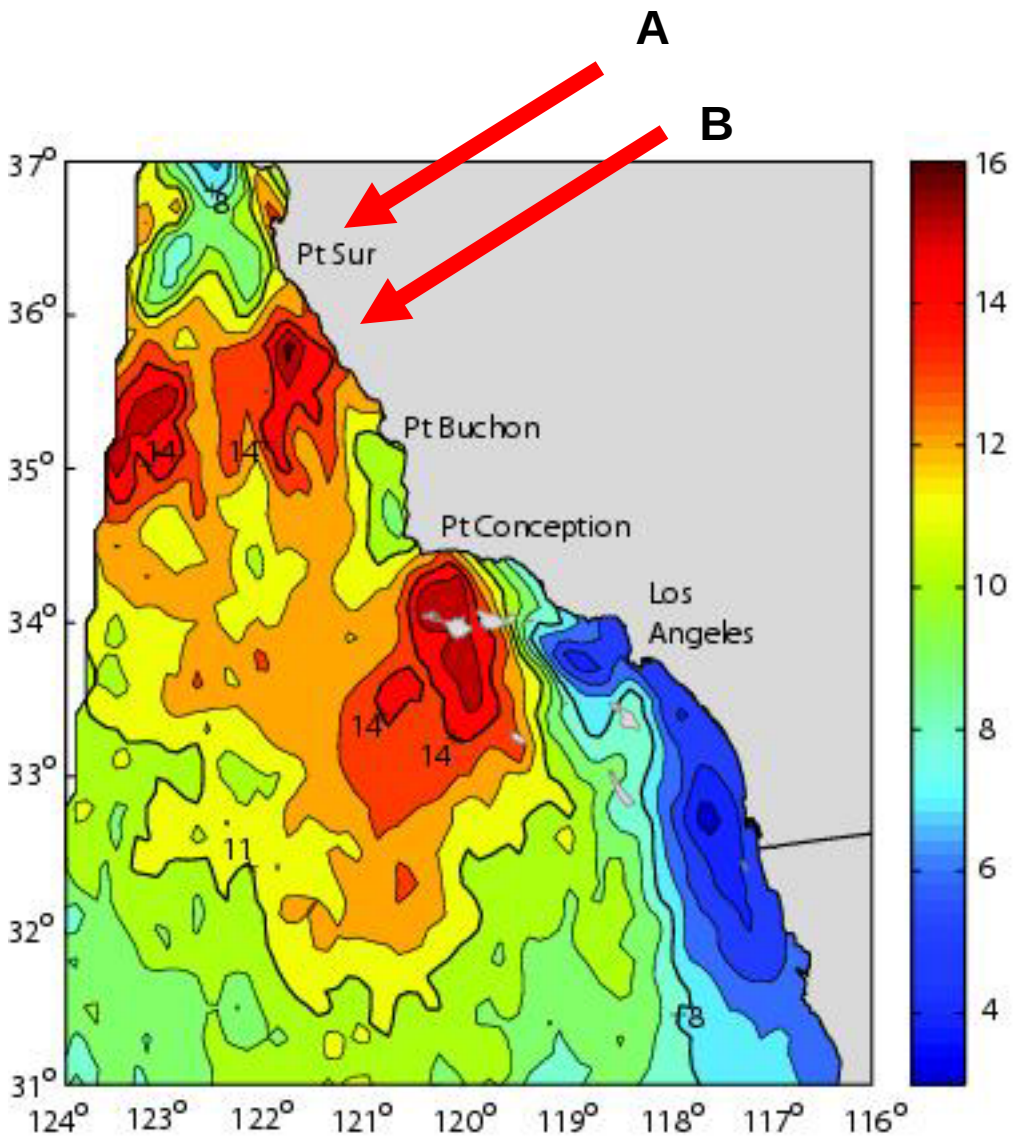




NARR images from
http://www.esrl.noaa.gov/psd

00 UTC NARR & 03 UTC QuikSCAT 12 June 2001





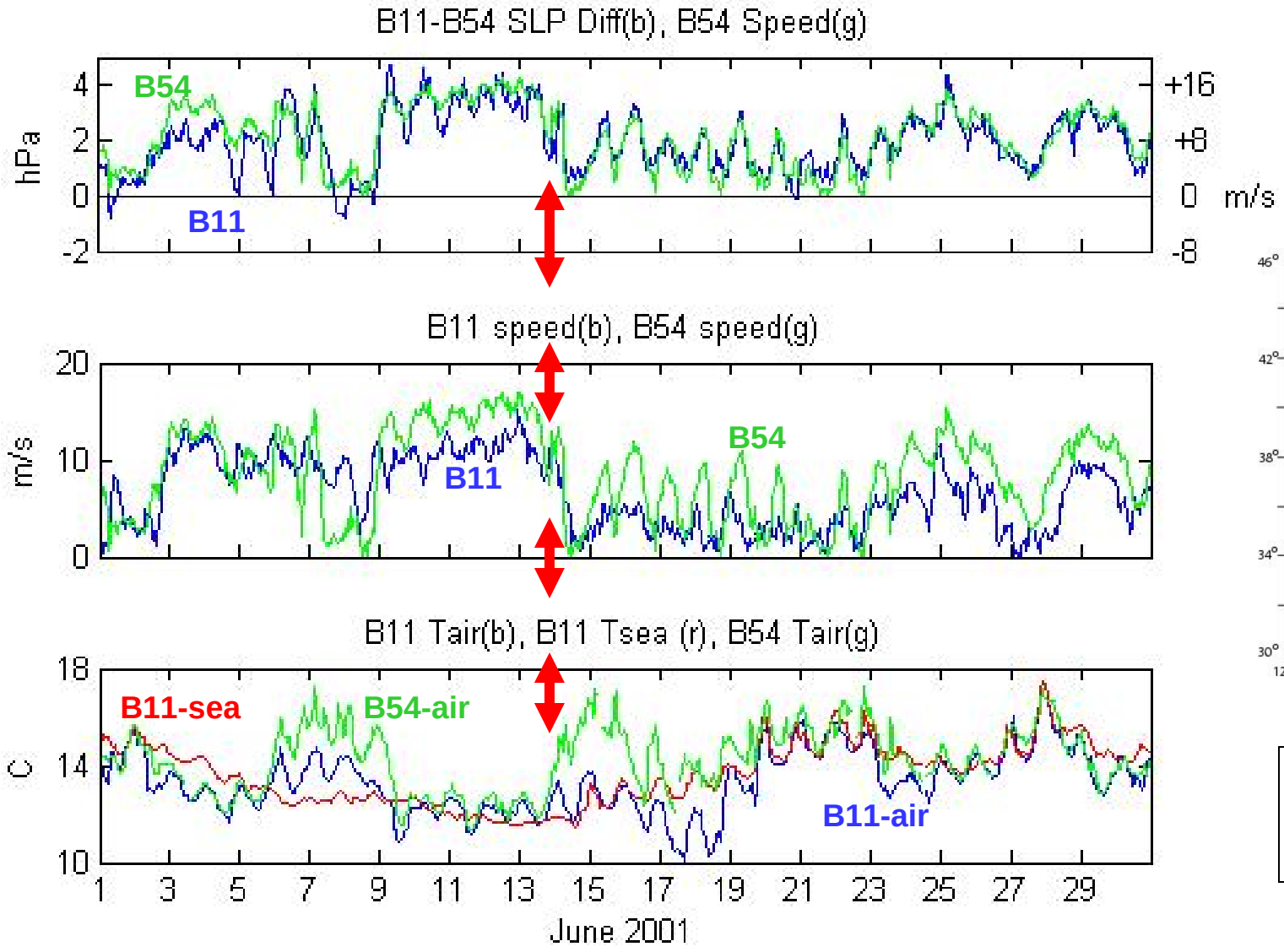
NARR images adapted from
http://www.esrl.noaa.gov/psd

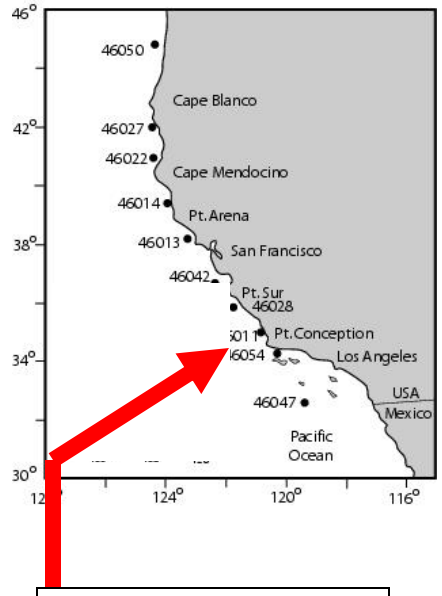
2001 Wind & Current Reversals at Pt Conception, California

- May 3, 18,30
- June 14,26
- July 2, 23, 31
- Aug 8, 28

Pt Conception Buoy Pres Differences & Wind Speeds, June 2001

Ocean Reversal Event 14 June

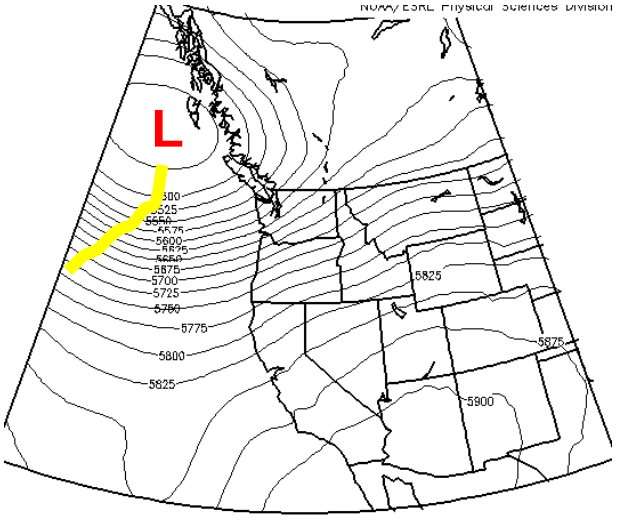




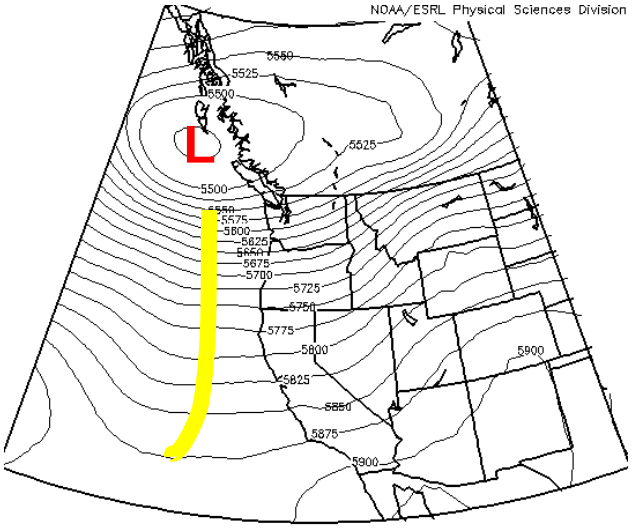
B11-B54
Pt Conception

NARR 500 hPa 2001 June 10-16, wind Reversal on June 14

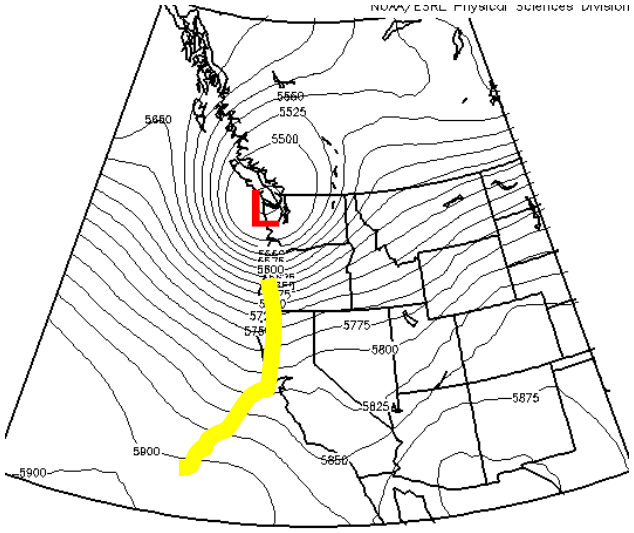
NARR images from http://www.esrl.noaa.gov/psd



10 June 00 UTC



11 June 00 UTC



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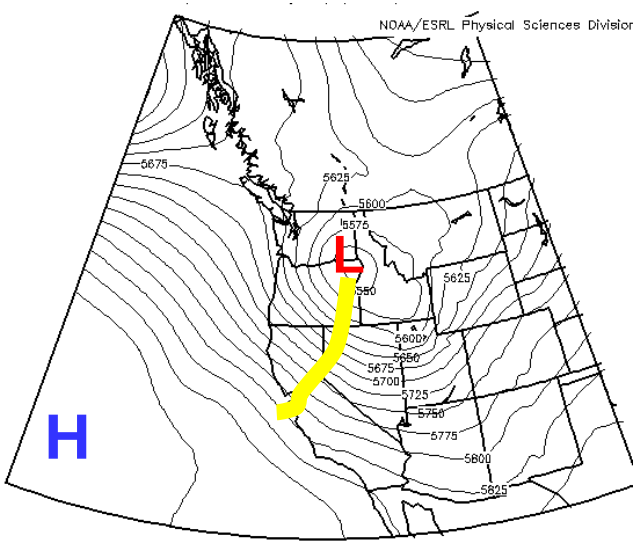

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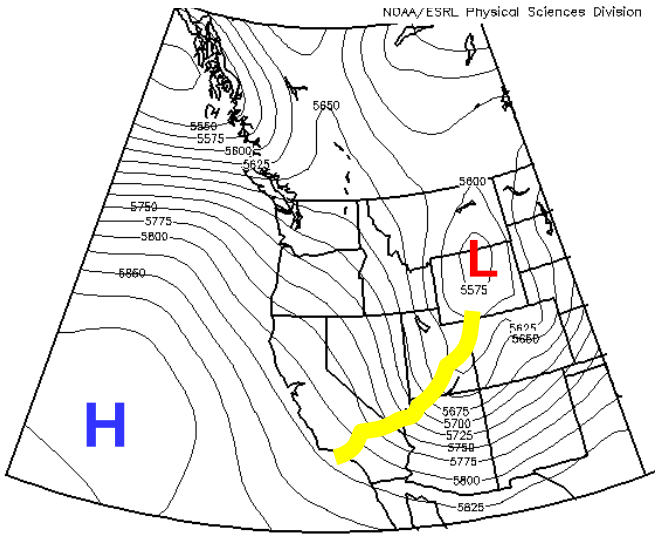
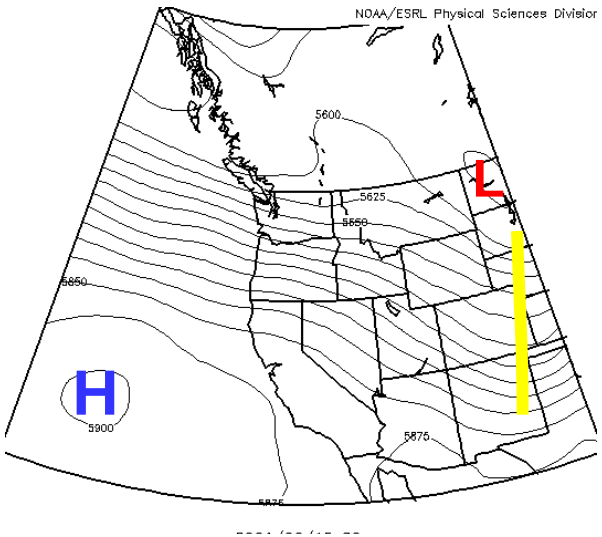


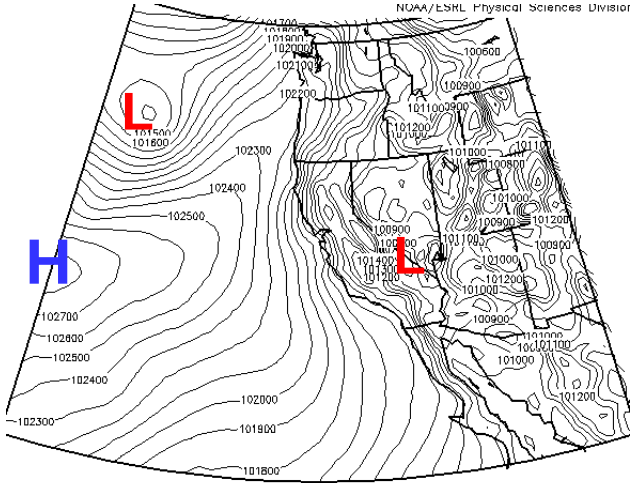
14 June 00 UTC



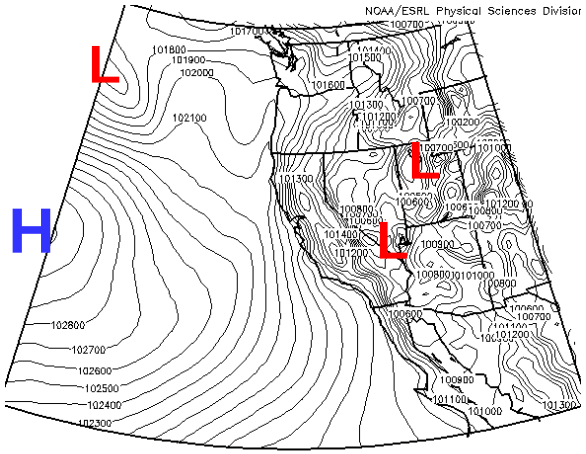
15 June 00 UTC

NARR Sea Level Pressure 2001 June 10-16, wind Reversal on June 14, 09 UTC

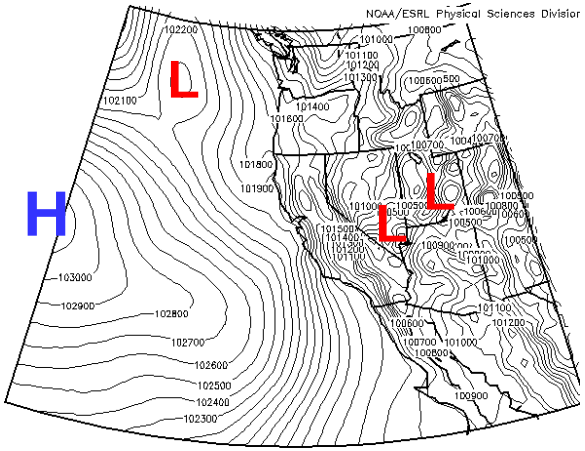
NARR images from http://www.esrl.noaa.gov/psd



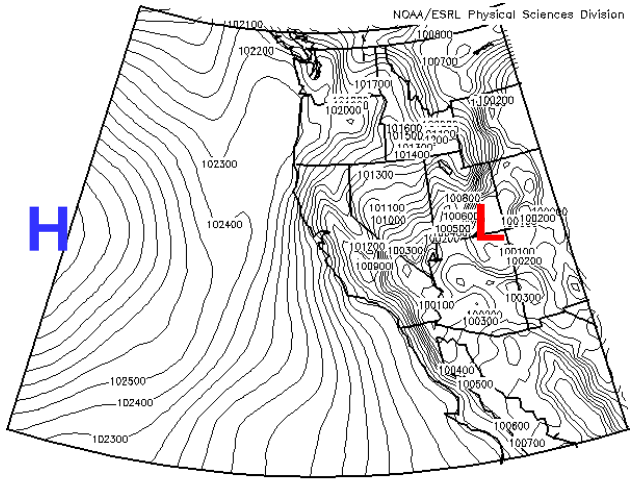
10 June 00 UTC



11 June 00 UTC



12 June 00 UTC



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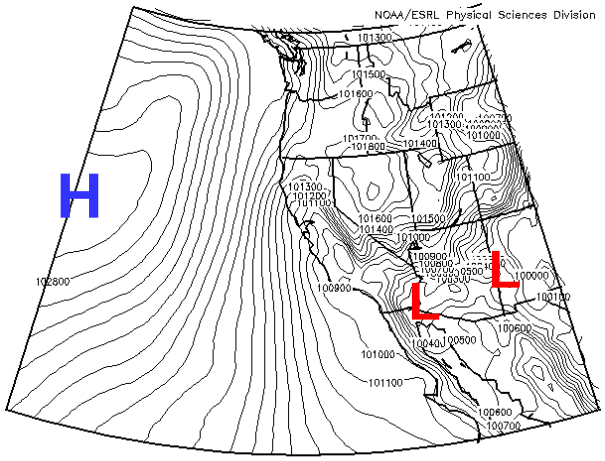

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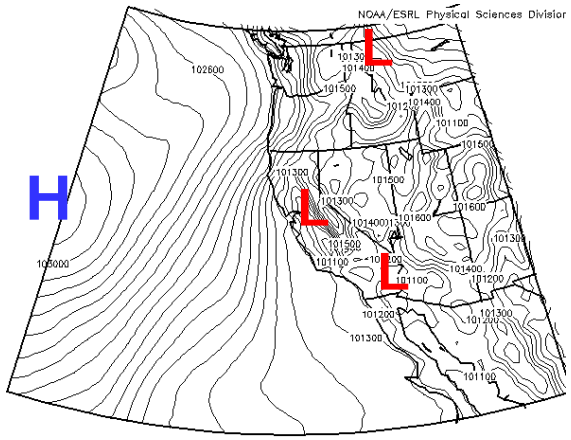
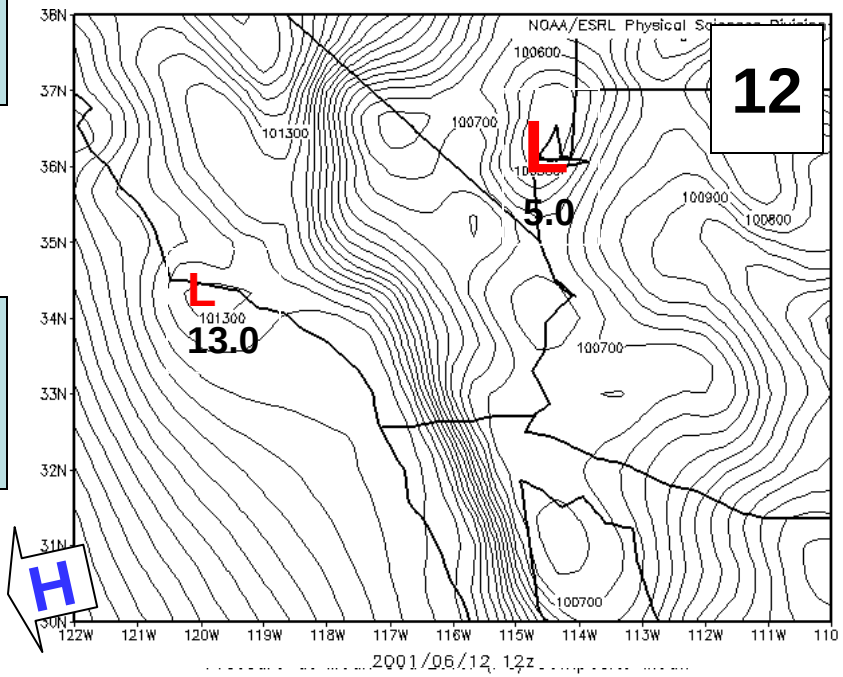


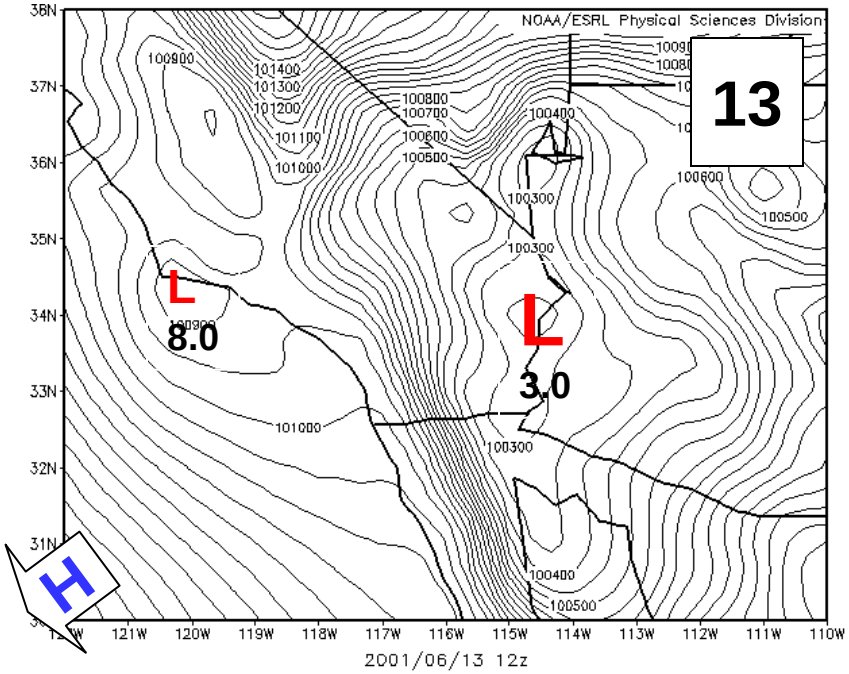
15 June 00 UTC

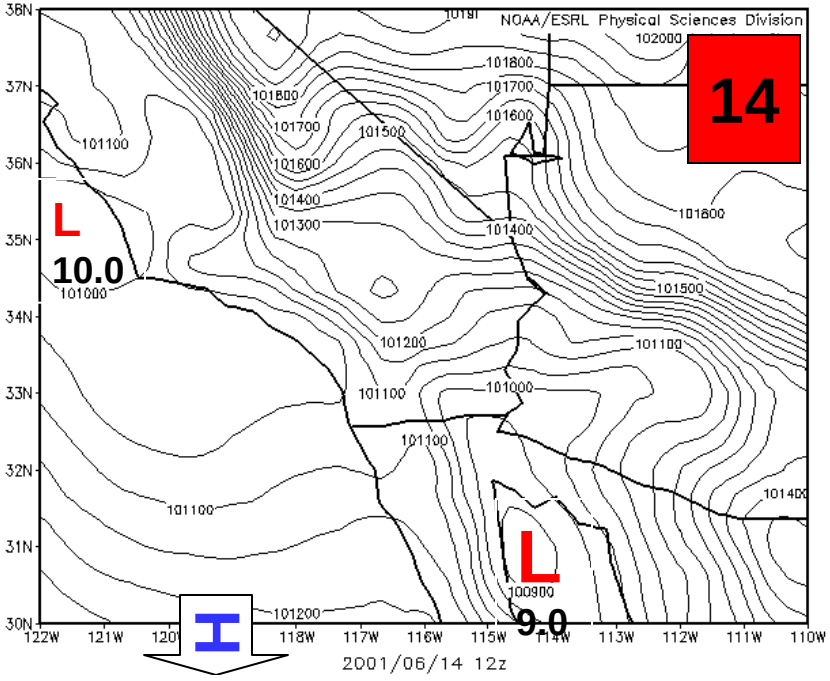
NARR SLP 2001 June 12-15, 12 UTC

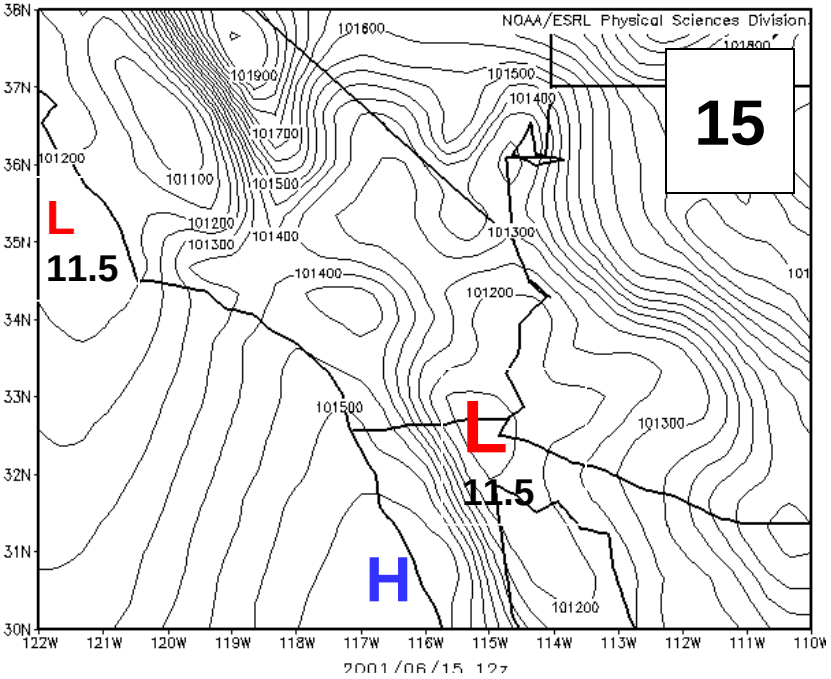
Interior Lowest Low

Coastal Low

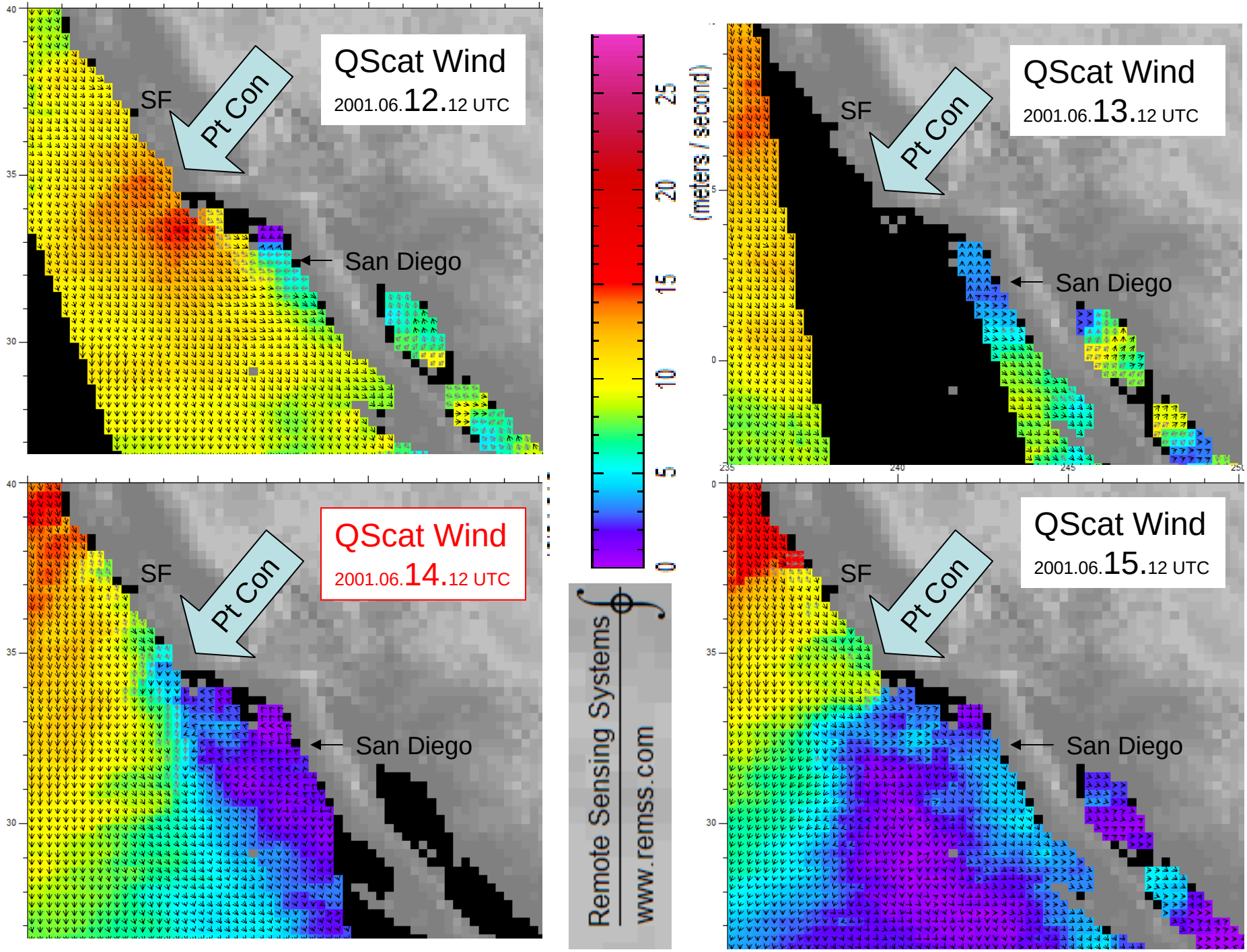








NARR images from http://www.esrl.noaa.gov/psd


QScat Wind
2001.06.12.12 UTC
SF
Pt Con
San Diego
QScat Wind
2001.06.13.12 UTC
SF
Pt Con
San Diego
QScat Wind
2001.06.14.12 UTC
SF
Pt Con
San Diego
QScat Wind
2001.06.15.12 UTC
SF
Pt Con
San Diego
(meters / second)
0
5
10
15
20
25
Remote Sensing Systems
www.remss.com

Summary

- Summer along the central California coast and Point Conception winds are dominantly along-coast and equatorward
- Buoy-measured measured wind speeds stronger than 7 m/s are driven by an along-coast pressure gradient of greater than 0.8 hPa/100 km
- During the passage of the 500 hPa trough over Point Conception, the upwelling-favorable wind pattern altered and coastal winds relax
- Wind reversals initiate with wind shifts in the Southern California Bight, then progress northward around Point Conception.
- The North American Regional Reanalysis (NARR) atmospheric does well in simulating weakened along-coast pressure gradient, the areas of higher and weakened wind speeds and the wind direction reversals.