Direct Observations of Currents off the NW Gulf of Mexico Shelf and Slope

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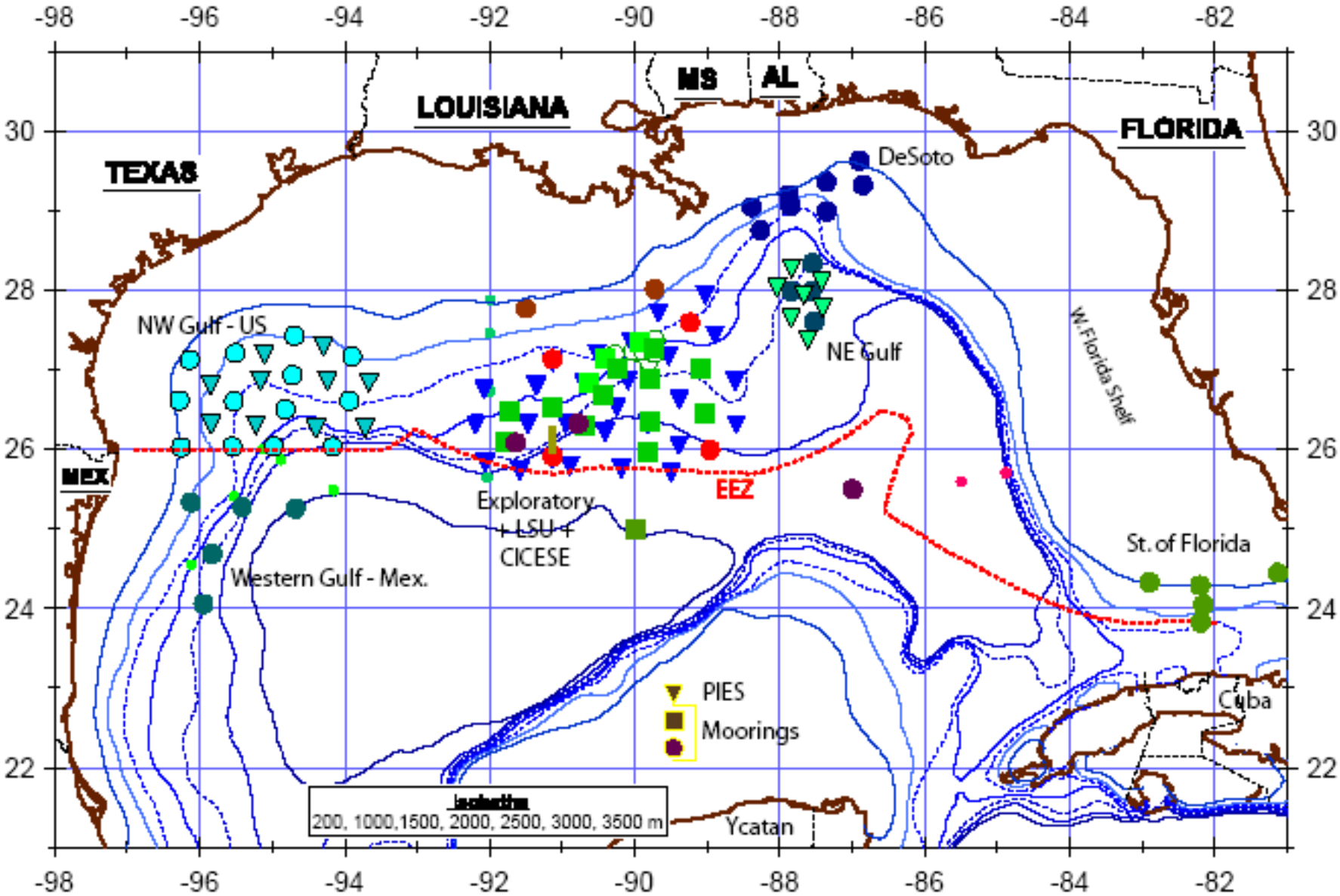
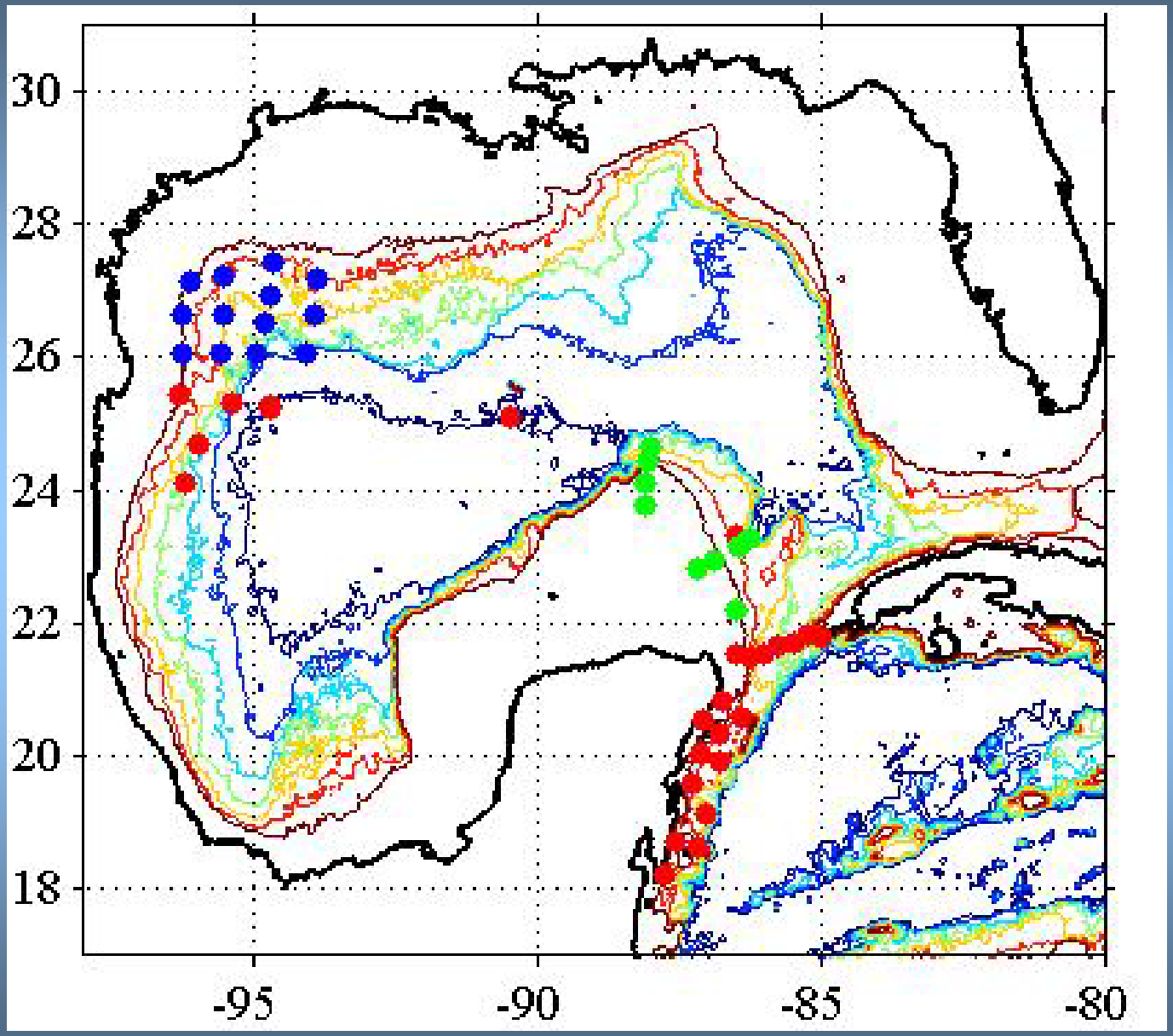
OCEANOGRAFÍA FÍSICA

MMS-funded and cooperative moorings and PIES in water depths greater than 200 m.



Small circles show location of moored observations take in the 1980's.

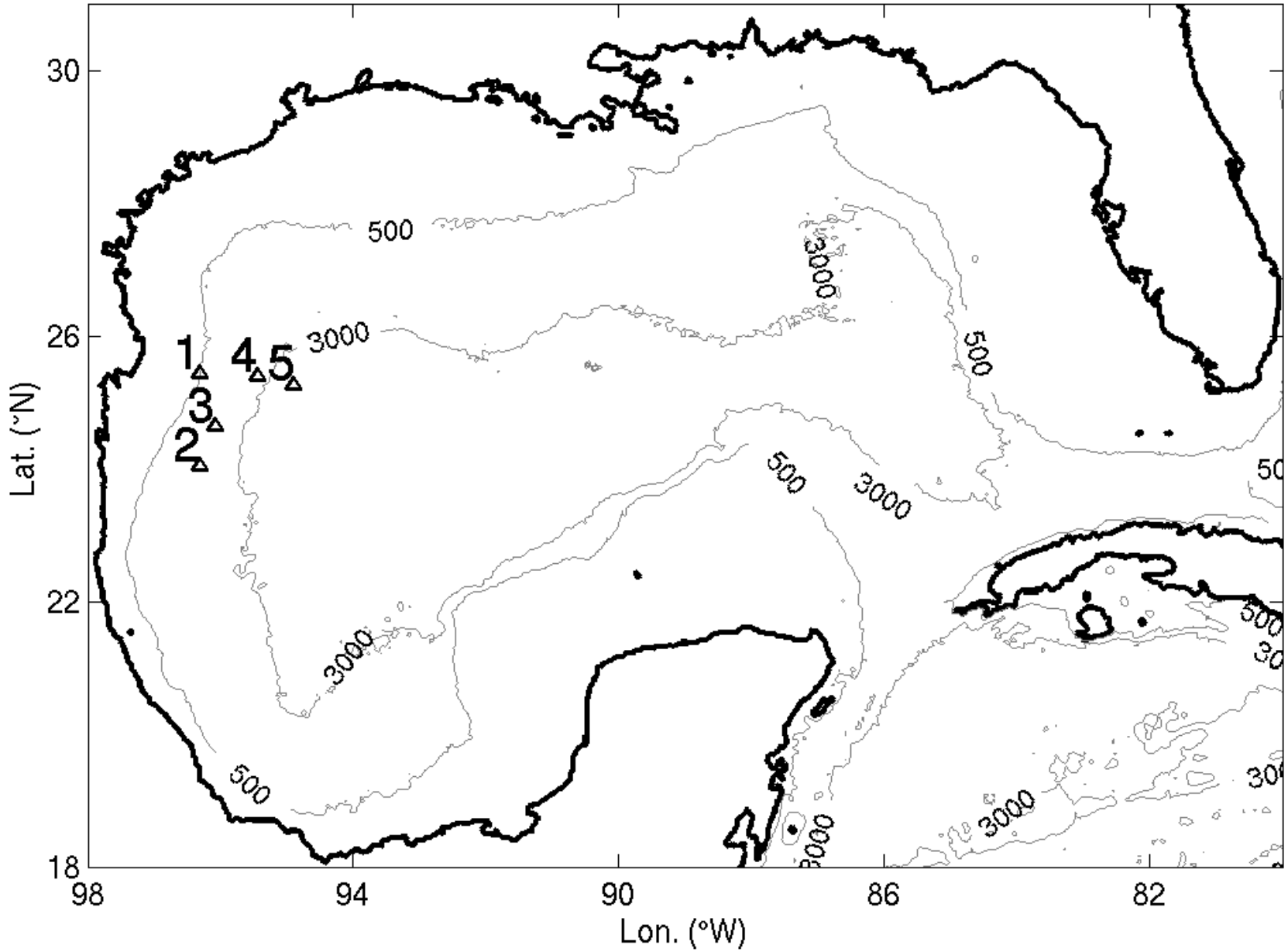
Placement of Moorings



latitude north

longitude west

Deployment: Aug 2004 – Nov 2005



Central Gulf Mooring #1, Canekito, deployed 11/05/2003

depth	component	S/N	length	rope
335 m	ADCP+FI51	en cubierta 1:39:41 — S/N ADCP 3551		
			200 m	1/4" wire jc
538 m		en cubierta 1:30:57 — S/N 223		
			200 m	1/4" wire jc
741 m		en cubierta 1:23:40 — S/N 222		
			450 m	1/4" wire jc
1194 m	ADCP+FI51	en cubierta 1:03:43 — S/N ADCP 3452		
			250 m	1/4" wire jc
1449 m		en cubierta 0:50:08 — S/N 220		
			500 m	1/4" wire jc
1955 m		en cubierta 0:34:52 — S/N 224		
			500 m	1/4" wire jc
2460 m		en cubierta 0:16:40 — S/N 213		
			500 m	1/4" wire jc
2965 m		en cubierta — S/N 218		
			570 m {370, 200}	1/4" wire jc
3540 m	ADCP-up	S/N 3423 — en cubierta 23:14:45		
			10 m	chain 13mm
3552 m	Benthos	(10) 2x5		
3562 m	Benthos	(10) 2x5		
3571 m	Benthos	(10) 2x5		
			3 m	chain 13mm
3583 m	2-AR	S/N 1123, S/N 1124 — 23:11:42		
			4 m	chain 13mm
3590 m	anchor 2357.5 kg	el que liberó		

27/ago/2004
Se liberó 21:56:54
en superficie 21:58:59

en superficie 22:21:15

a partir de este este → 28/Ago/2004 → 0:01:25

en superficie 22:31:45
en cubierta 22:55:08

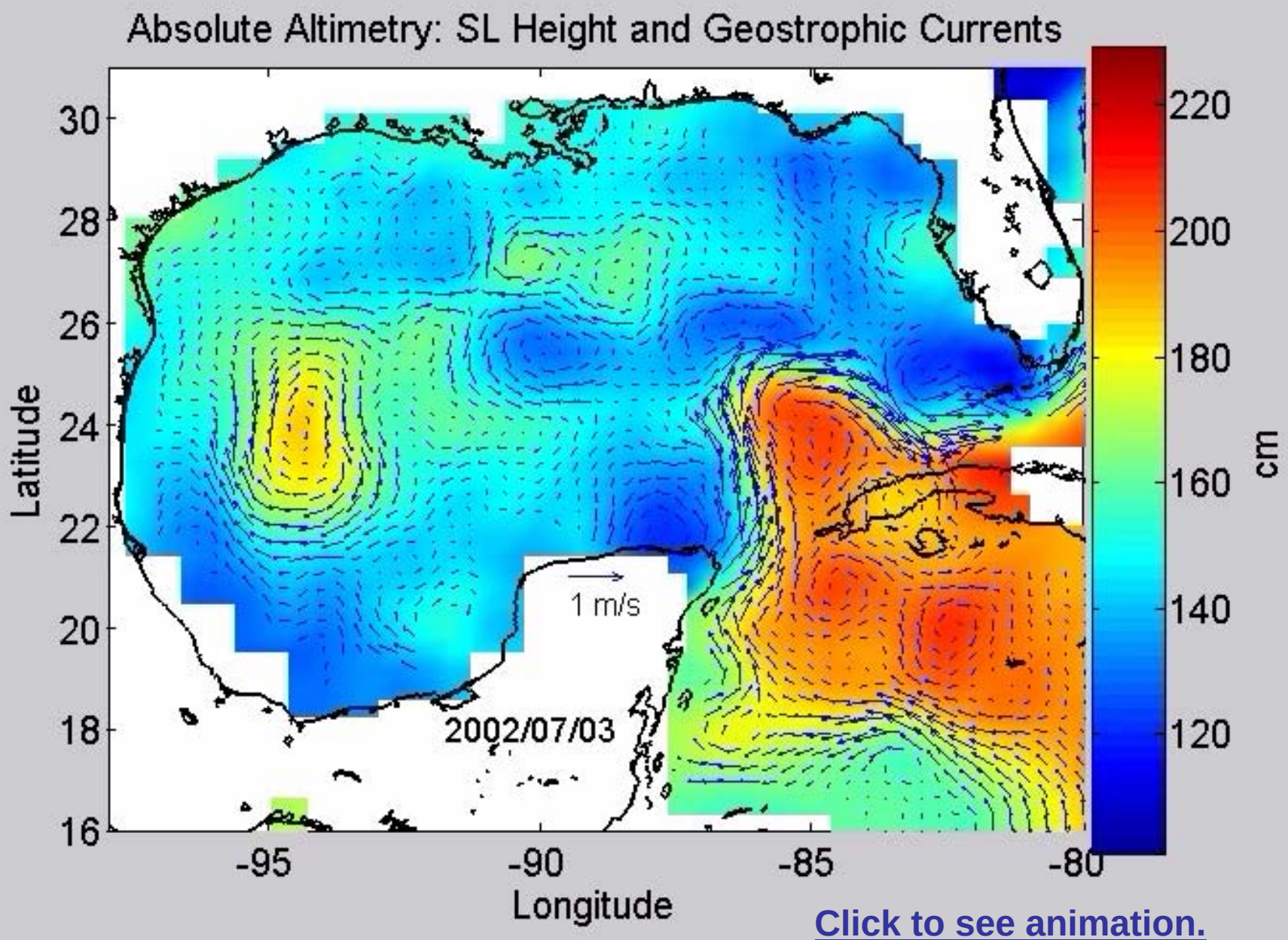
A/R 1123 Rx 11 KHz TX 10KHz EN: A RE: B

A/R 1124 Rx 11.5 KHz Tx 10KHz EN: E RE: F → código que liberó

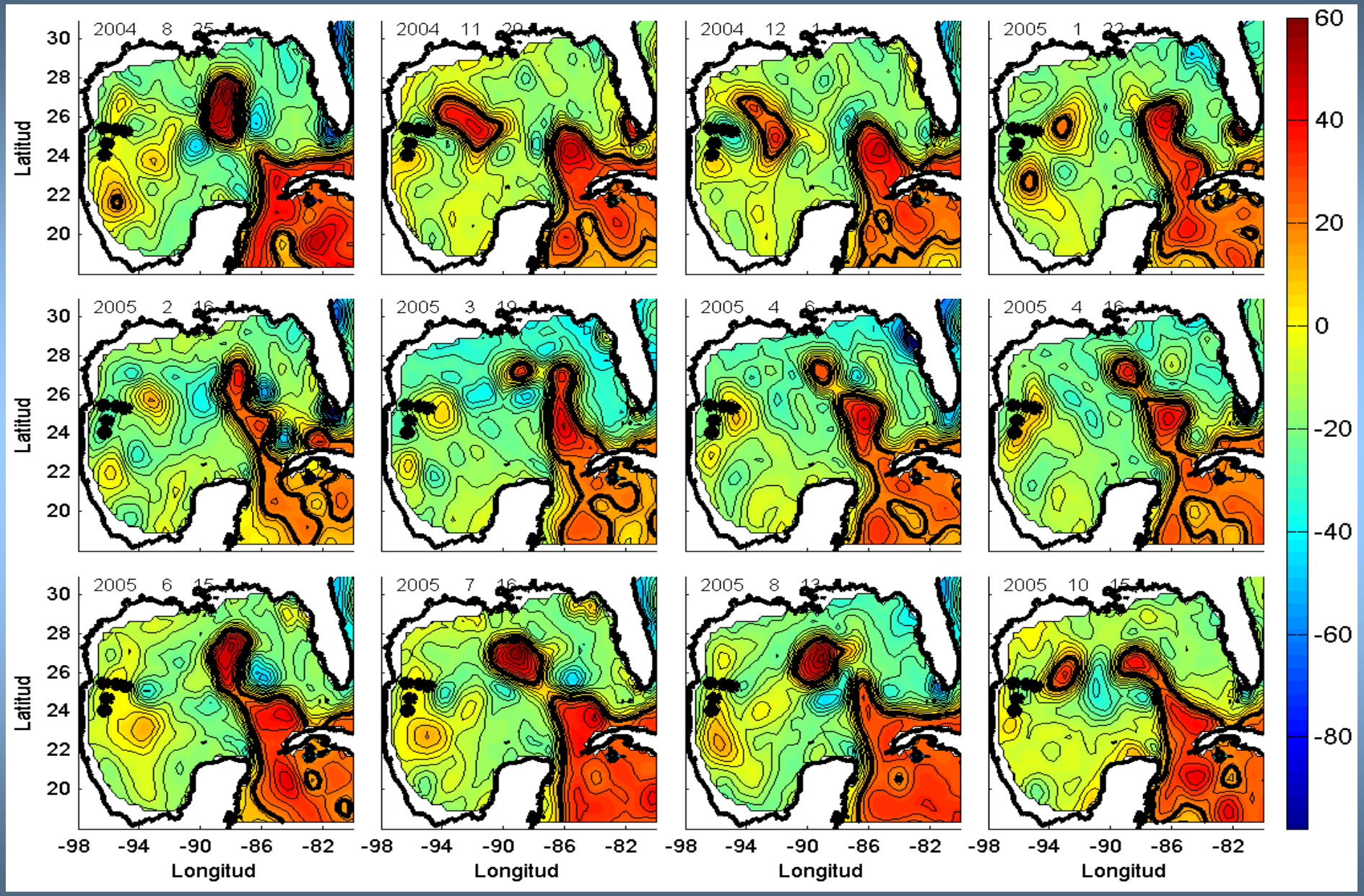
position: 25° 05.147'N, 90° 30.000'W

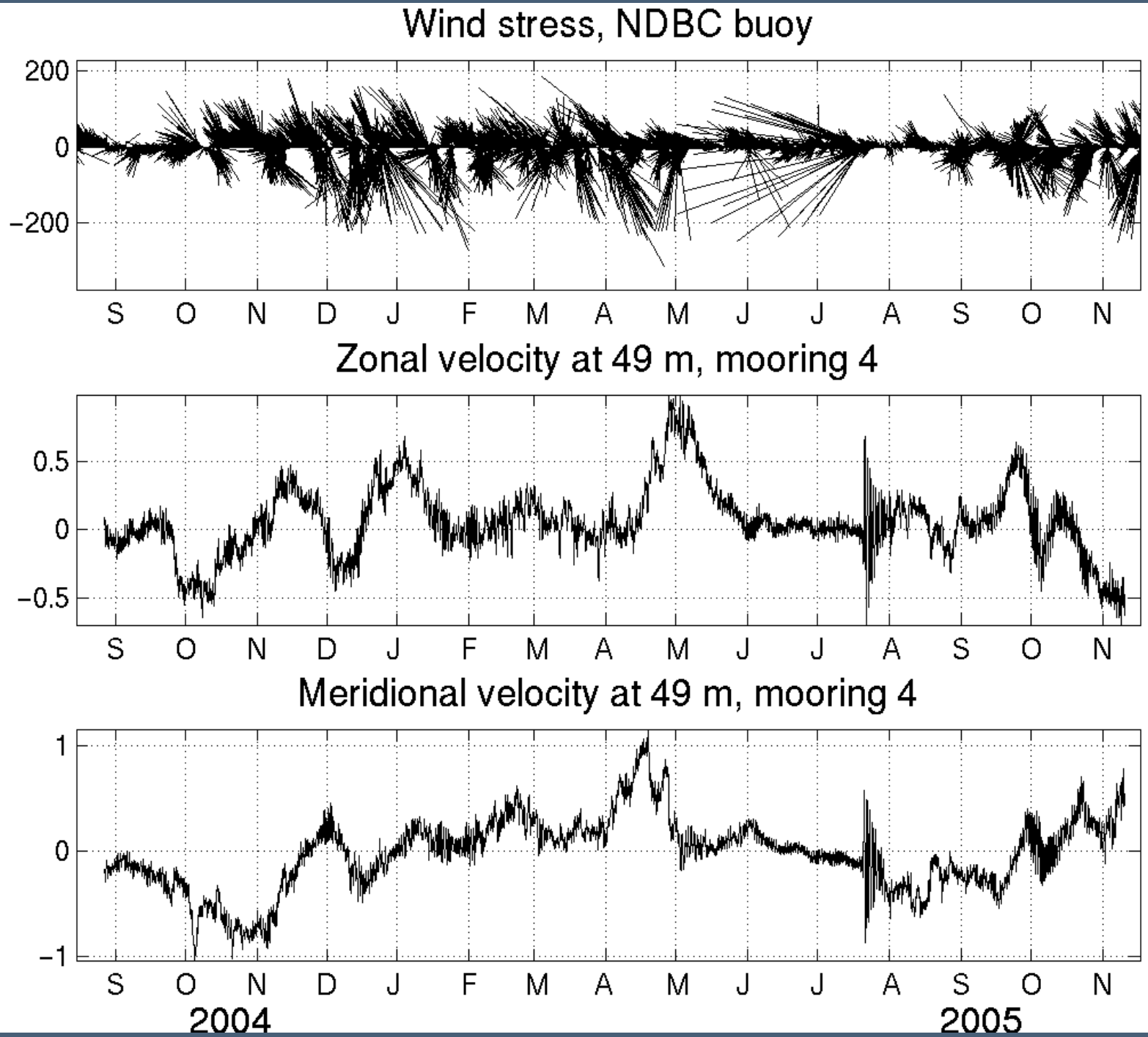
Results

- Motions off the Tamaulipas shelf appear mostly driven by eddies or their remnants, after they disintegrate between the deepest and intermediate moorings. The CICESE moorings were well positioned to capture oncoming eddies.
- The shallowest mooring (500m) shows motions that are aligned with the topography. The levels of energy increase offshore from there.
- Within the bottom boundary layer, fluctuations show a maximum in shallow water and a secondary maximum in very deep water.
- Deep currents are similar to TRWs.
- The intermediate region (in 2000m of water) shows an energy minimum but with the strongest southward mean flow (the Sturges countercurrent?).
- Lots of diurnal/inertial energy (Poincare waves?).

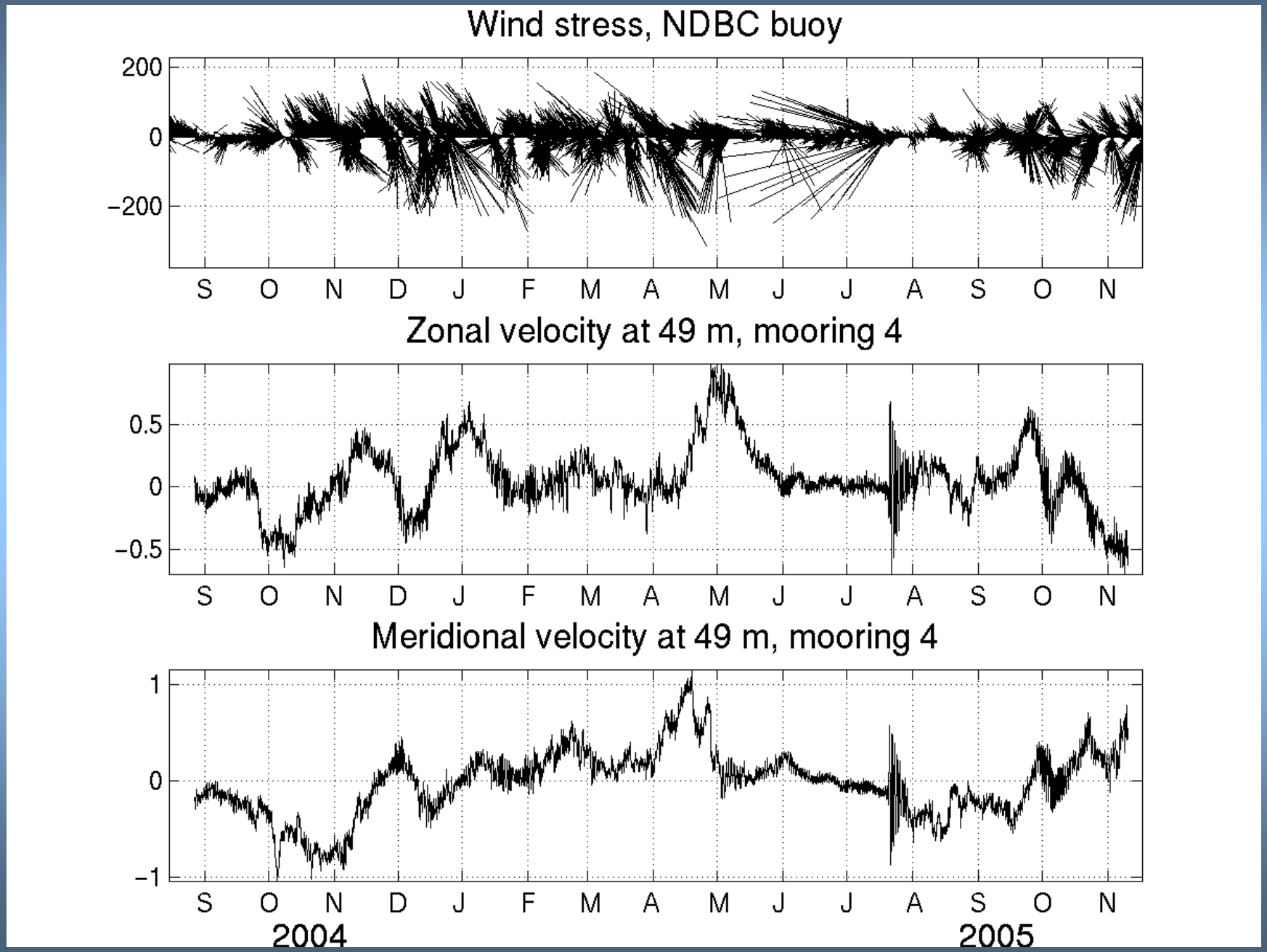


Click to see animation.

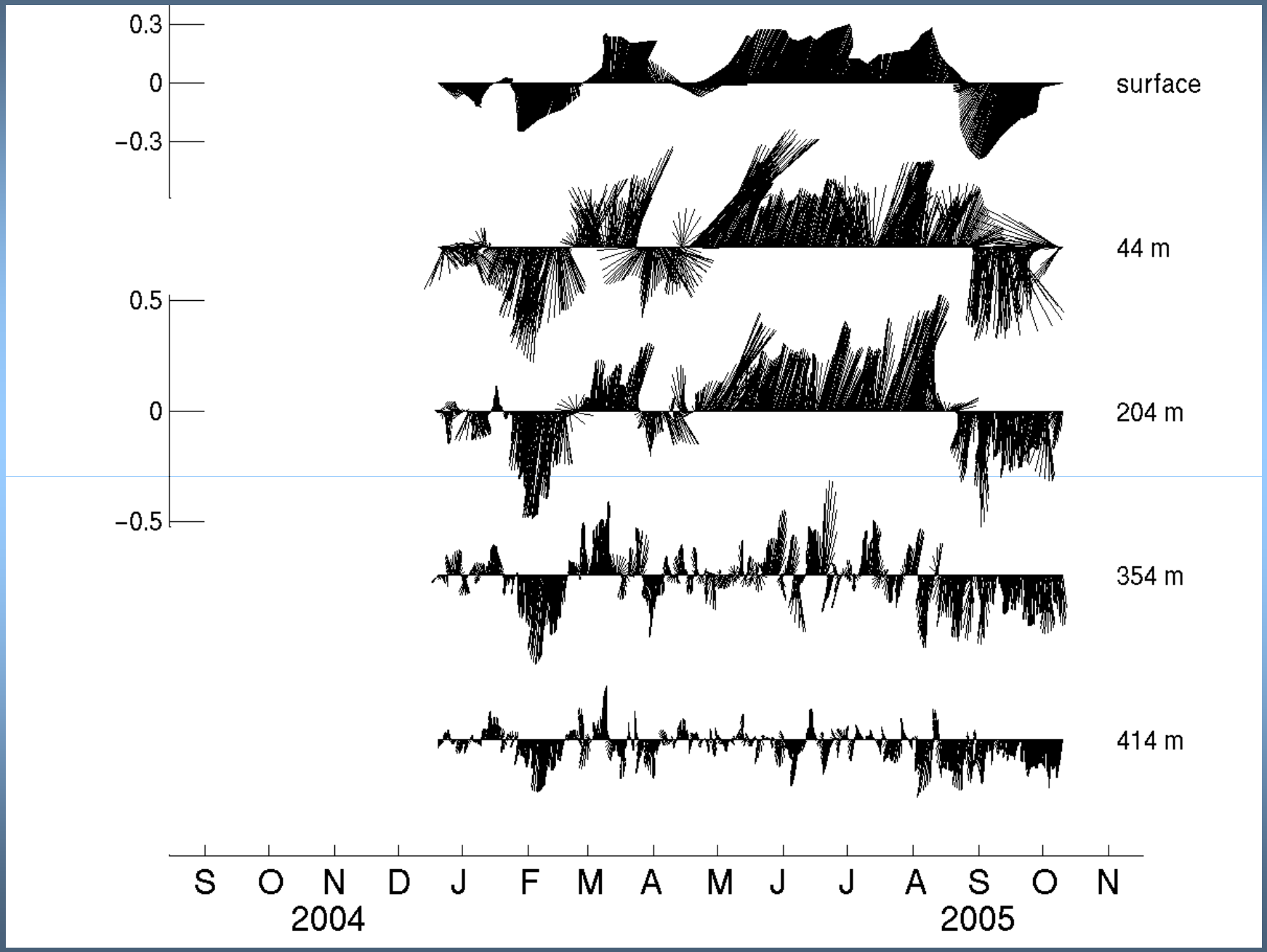

2004 8 25
2004 11 20
2004 12 1
2005 1 22
2005 2 16
2005 3 19
2005 4 6
2005 4 16
2005 6 15
2005 7 16
2005 8 13
2005 10 15
Latitud
30
28
26
24
22
20
Longitud
-98
-94
-90
-86
-82
60
40
20
0
-20
-40
-60
-80


Wind stress, NDBC buoy
200
0
−200
S O N D J F M A M J J A S O N
Zonal velocity at 49 m, mooring 4
0.5
0
−0.5
S O N D J F M A M J J A S O N
Meridional velocity at 49 m, mooring 4
1
0
−1
S O N D J F M A M J J A S O N
2004
2005

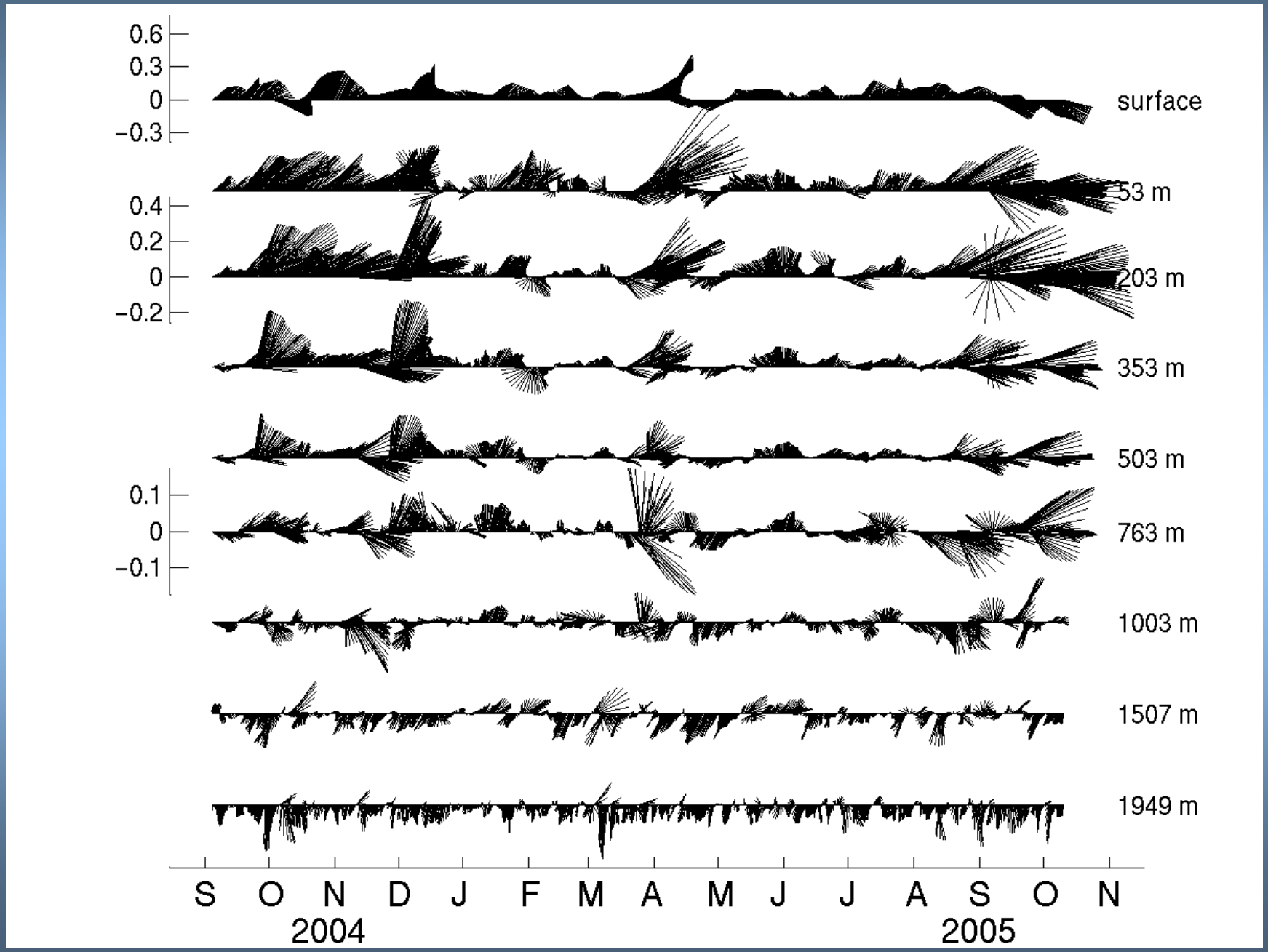
Mooring 1


Wind stress, NDBC buoy
200
0
−200
S O N D J F M A M J J A S O N
Zonal velocity at 49 m, mooring 4
0.5
0
−0.5
S O N D J F M A M J J A S O N
Meridional velocity at 49 m, mooring 4
1
0
−1
S O N D J F M A M J J A S O N
2004
2005

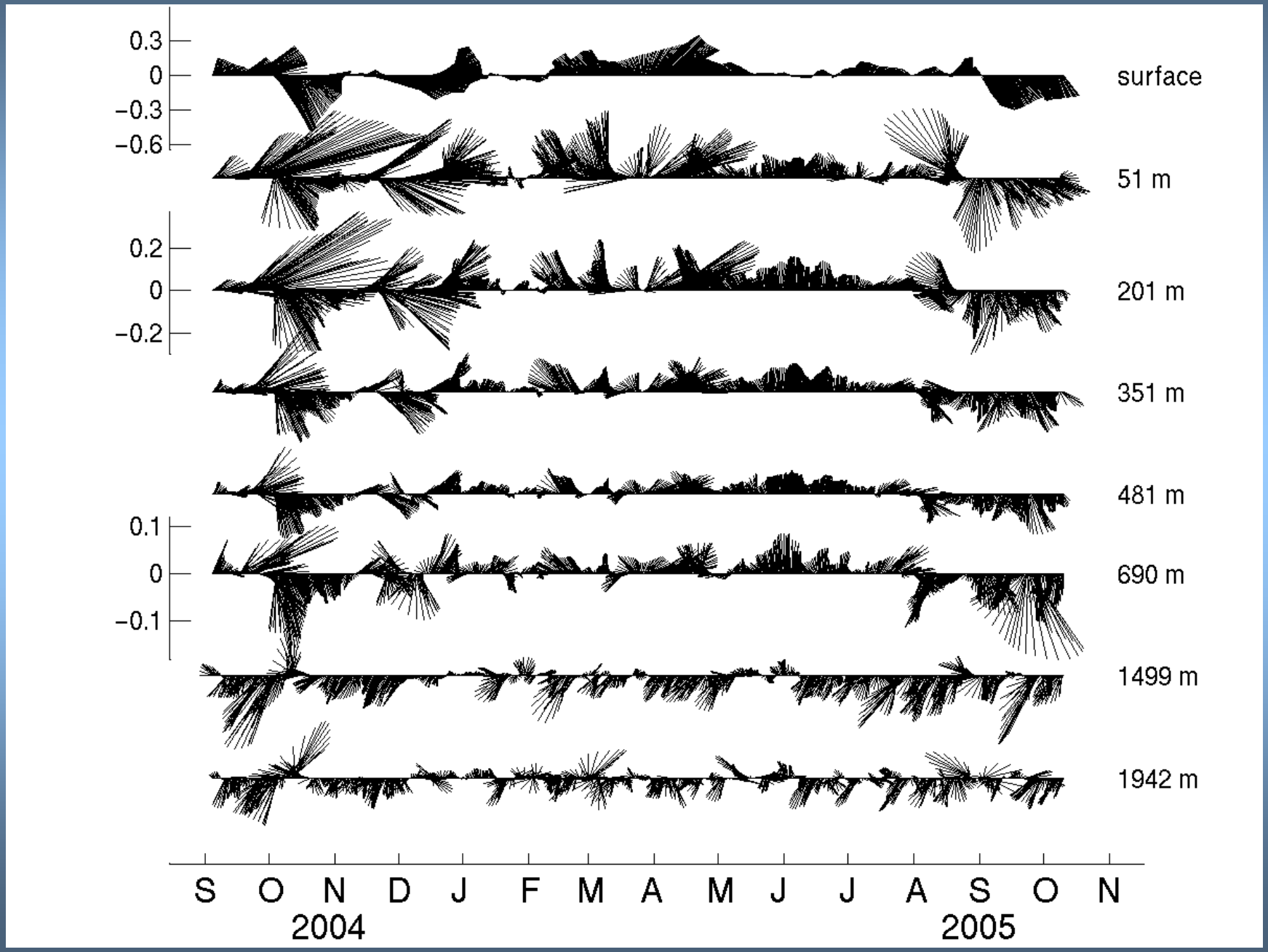
Mooring 1

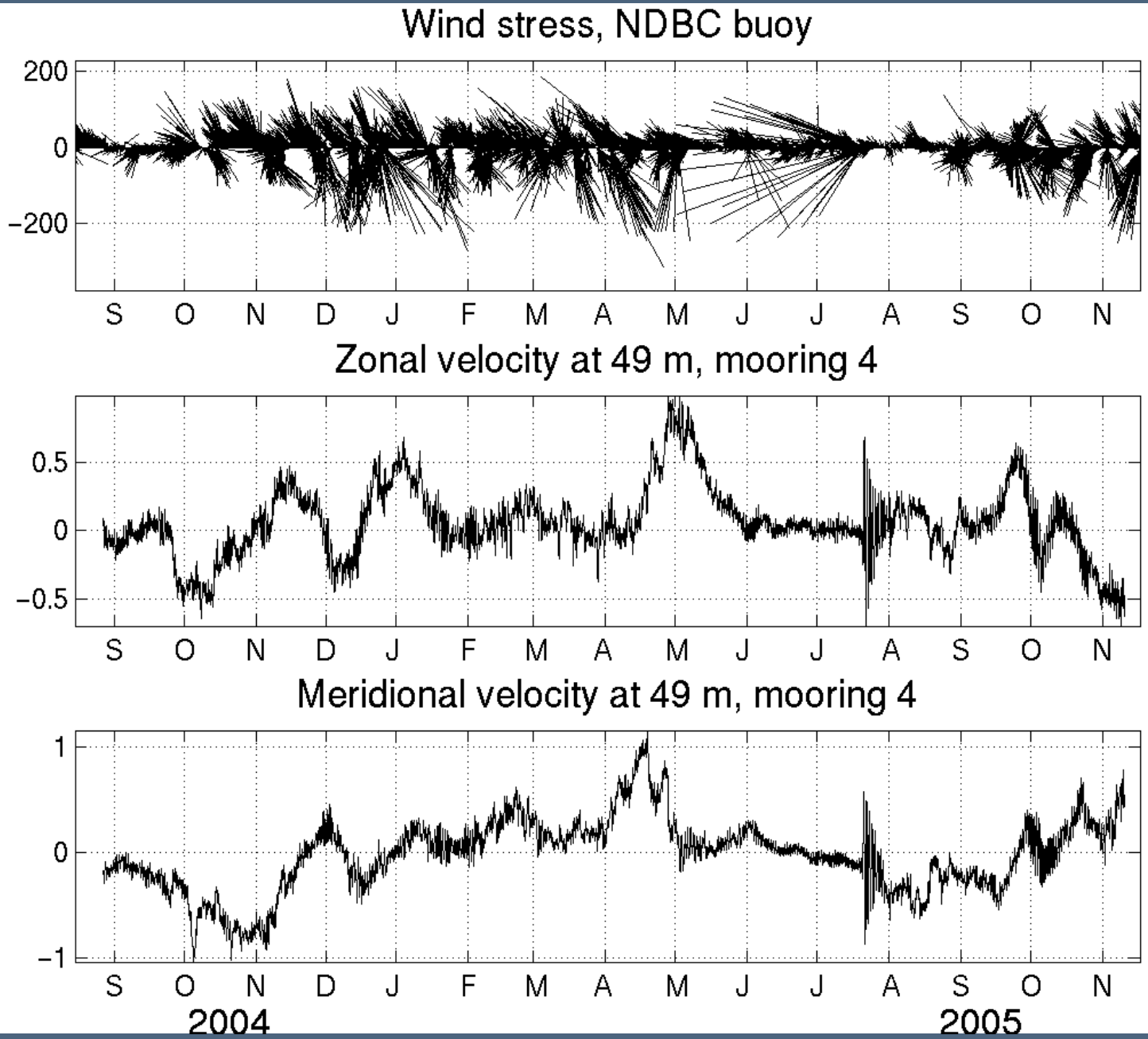

0.3
0
−0.3
surface
44 m
0.5
0
−0.5
204 m
354 m
414 m
S O N D J F M A M J J A S O N
2004
2005

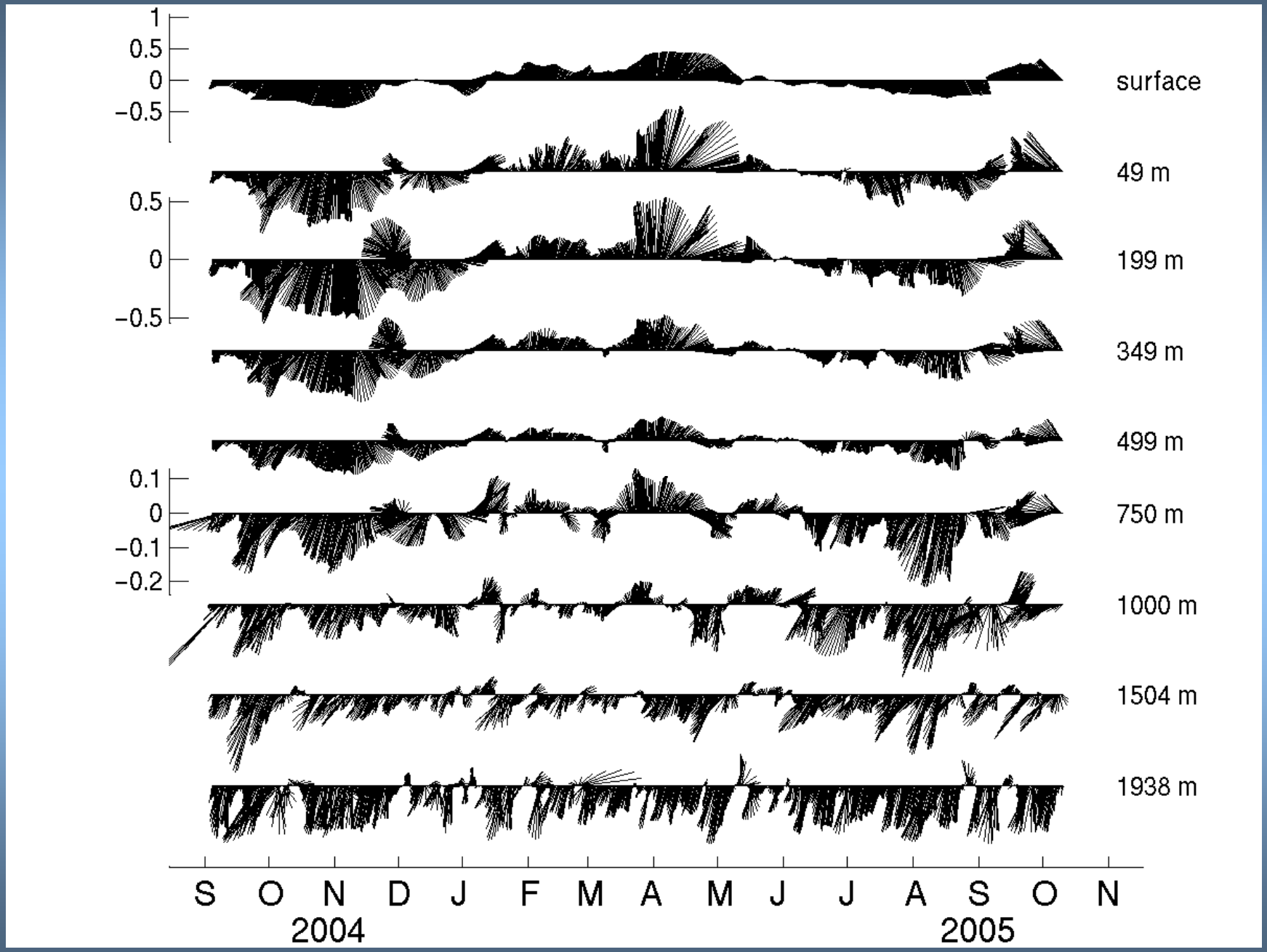
Mooring 2


0.6
0.3
0
−0.3
surface
0.4
0.2
0
−0.2
53 m
203 m
353 m
503 m
0.1
0
−0.1
763 m
1003 m
1507 m
1949 m
S O N D J F M A M J J A S O N
2004
2005

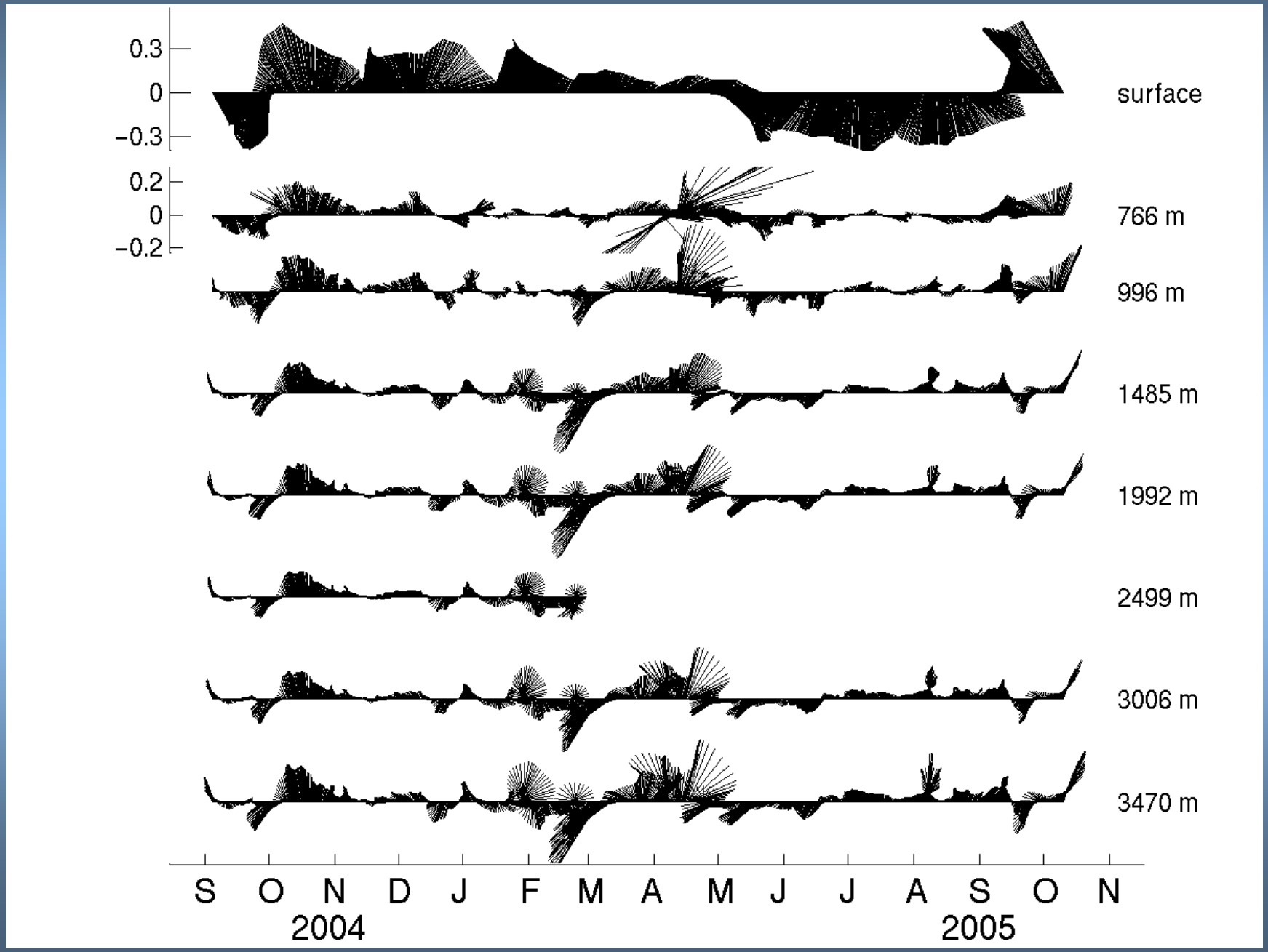
Mooring 3

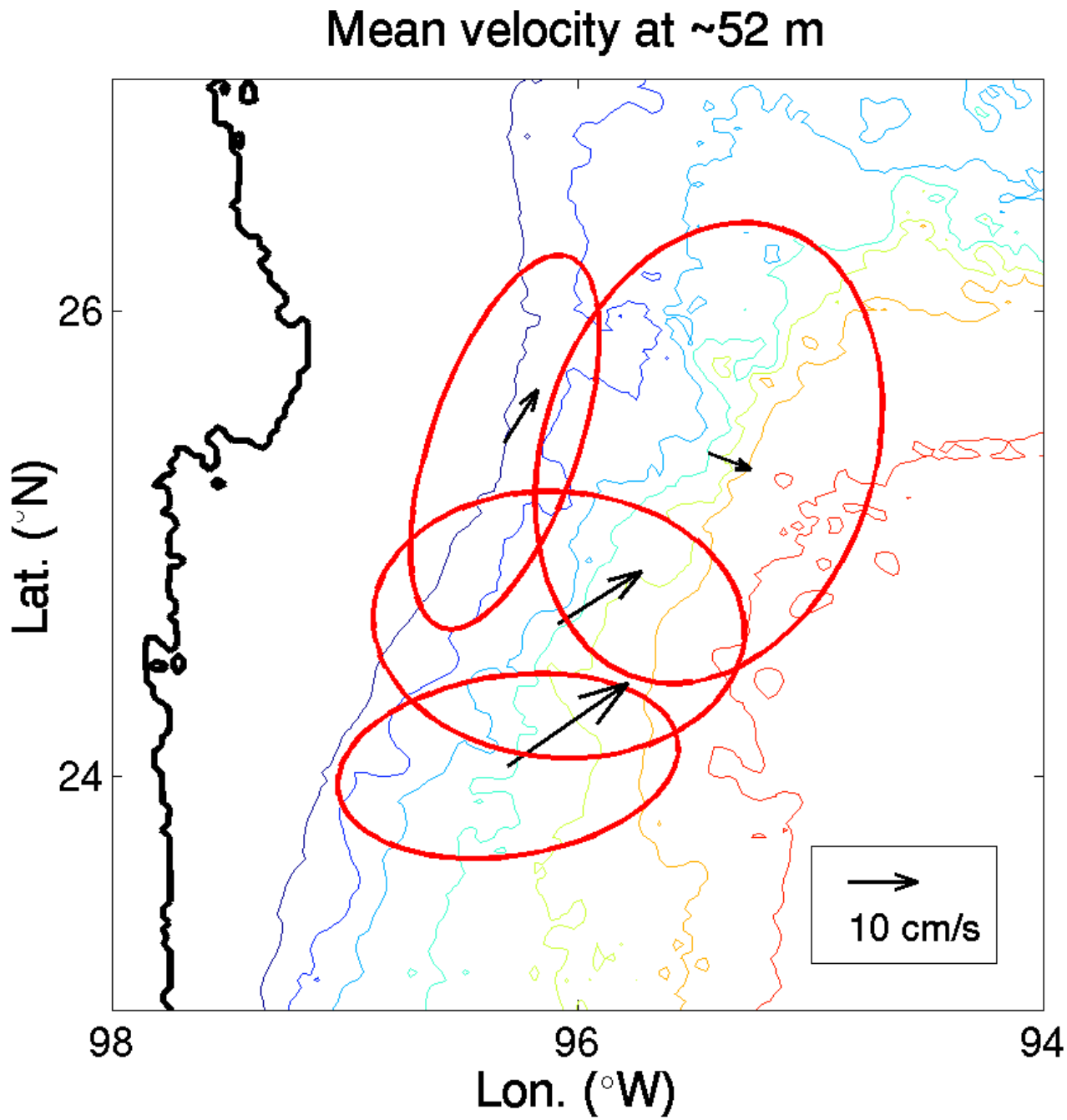

0.3
0
−0.3
−0.6
surface
51 m
0.2
0
−0.2
201 m
351 m
481 m
0.1
0
−0.1
690 m
1499 m
1942 m
S O N D J F M A M J J A S O N
2004
2005

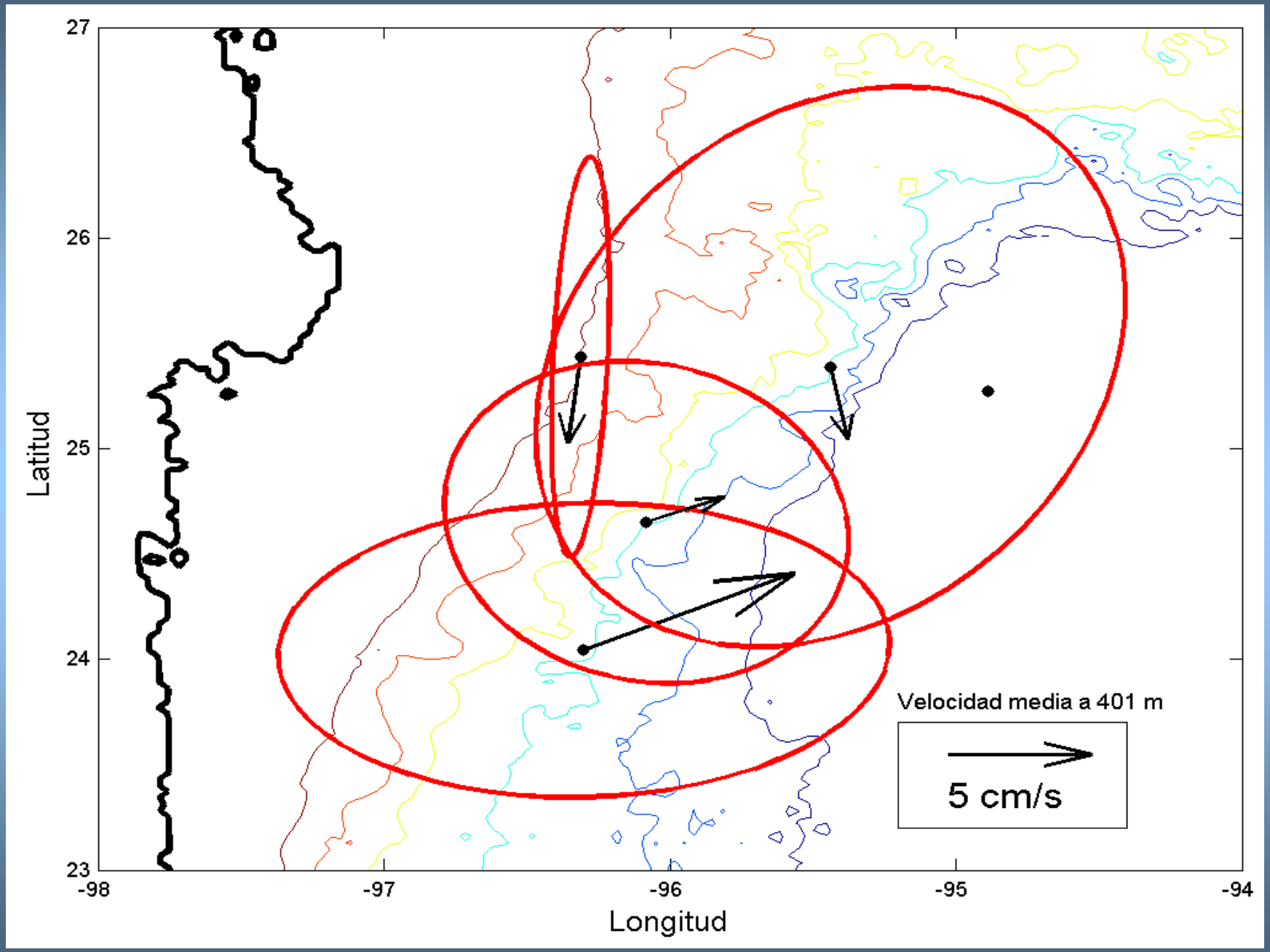

Wind stress, NDBC buoy
200
0
−200
S O N D J F M A M J J A S O N
Zonal velocity at 49 m, mooring 4
0.5
0
−0.5
S O N D J F M A M J J A S O N
Meridional velocity at 49 m, mooring 4
1
0
−1
S O N D J F M A M J J A S O N
2004
2005

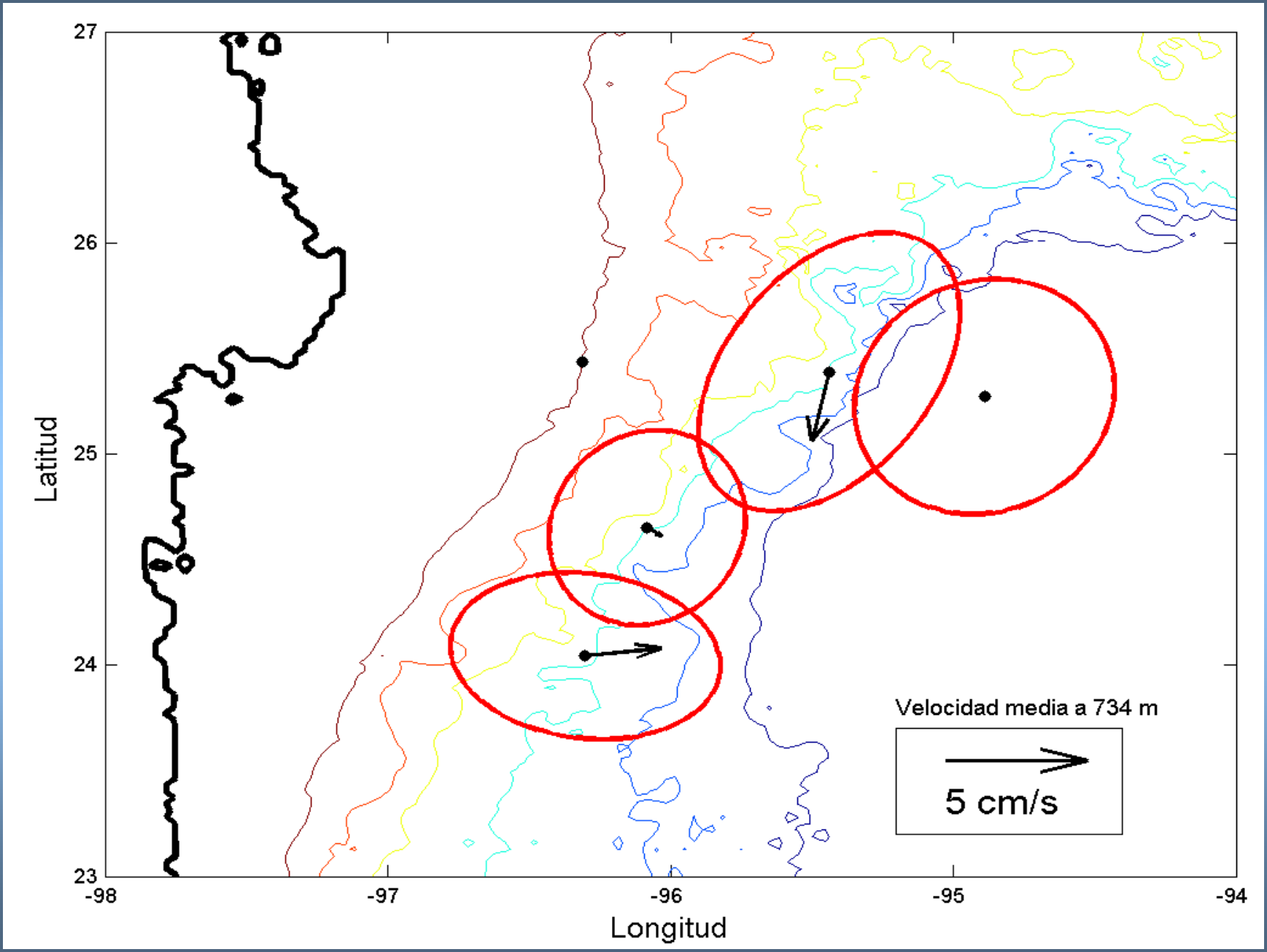

1
0.5
0
−0.5
surface
49 m
0.5
0
−0.5
199 m
349 m
499 m
0.1
0
−0.1
−0.2
750 m
1000 m
1504 m
1938 m
S O N D J F M A M J J A S O N
2004
2005

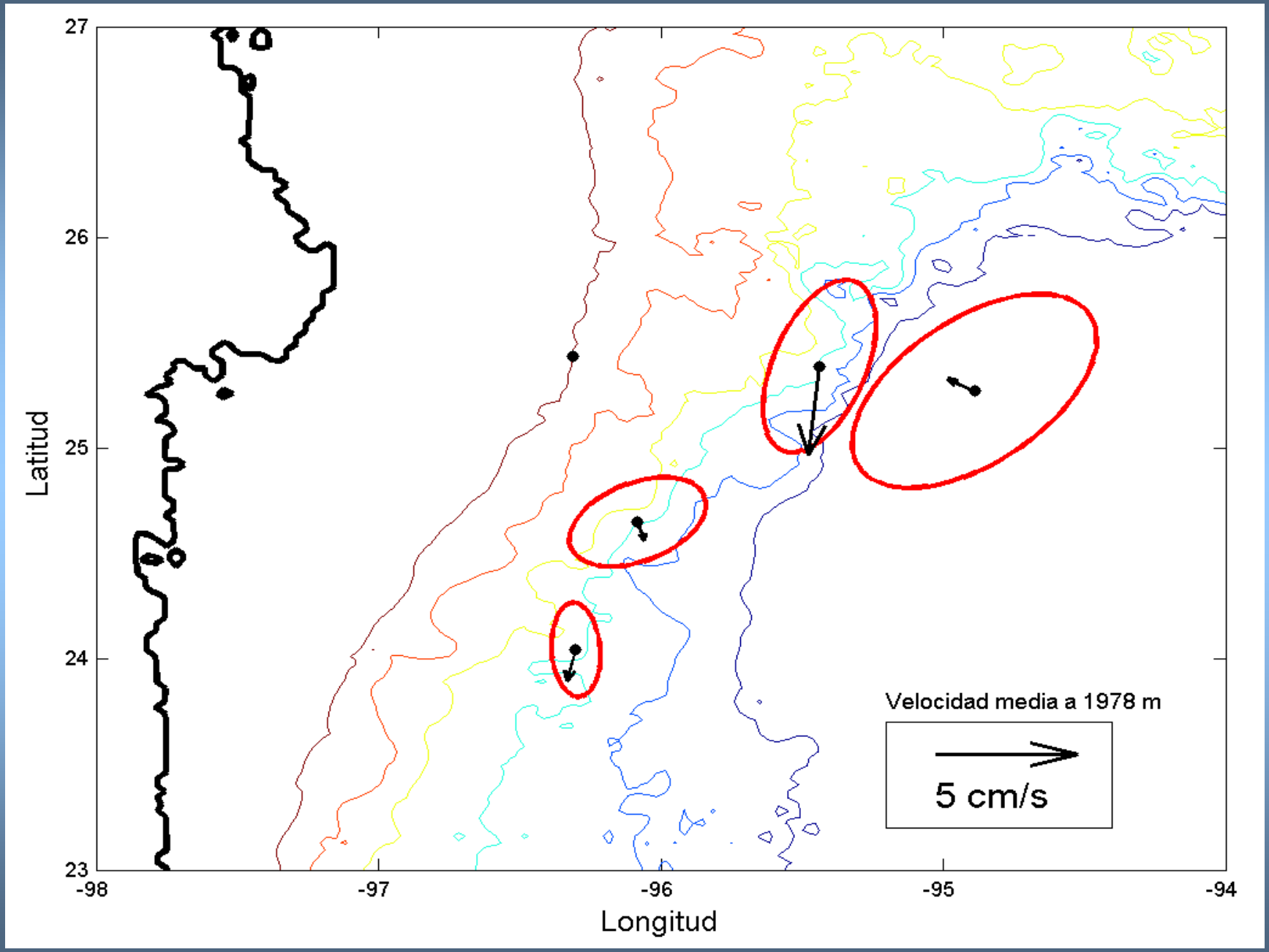
Mooring 5

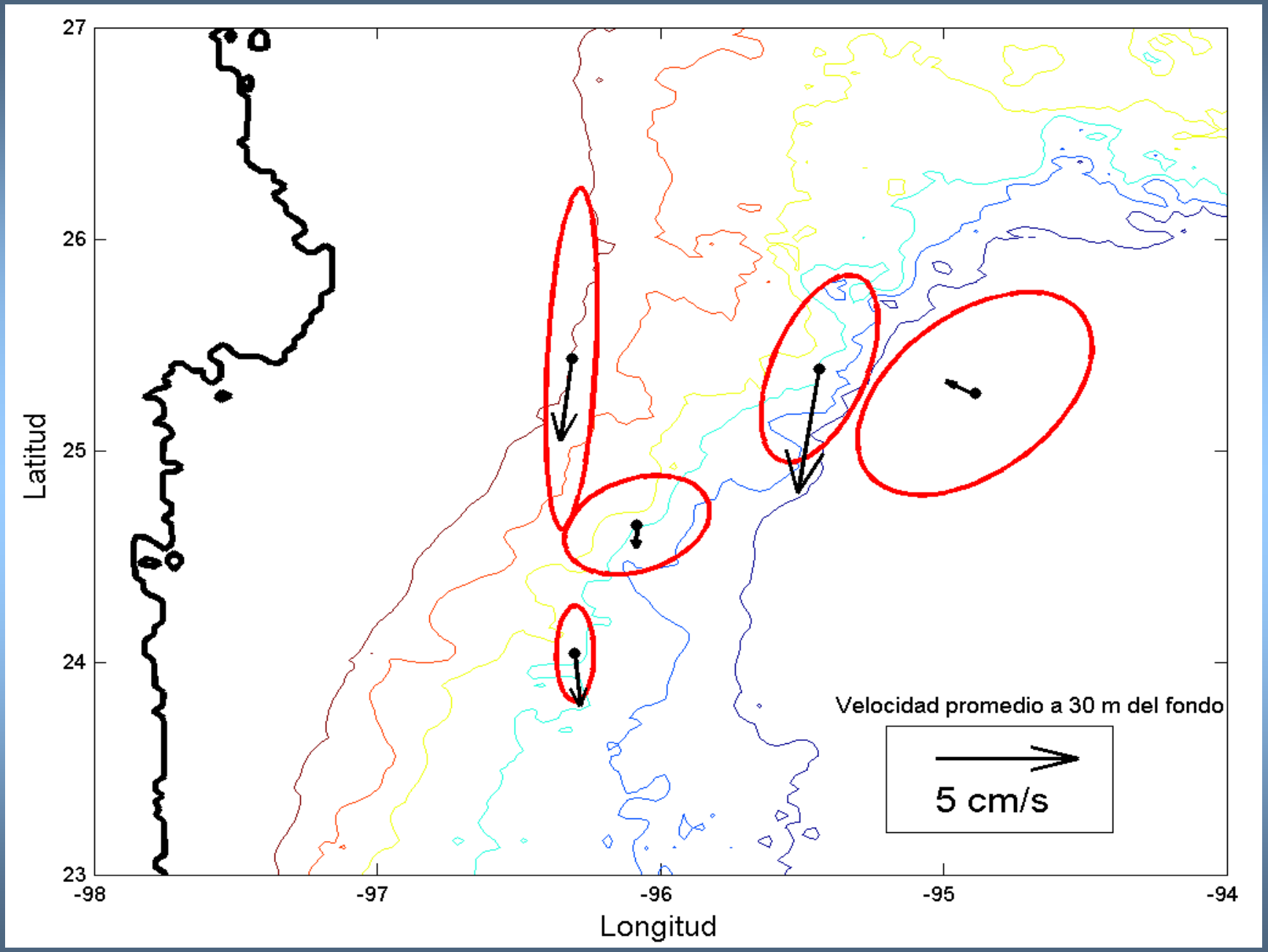

0.3
0
−0.3
surface
0.2
0
−0.2
766 m
996 m
1485 m
1992 m
2499 m
3006 m
3470 m
S O N D J F M A M J J A S O N
2004
2005

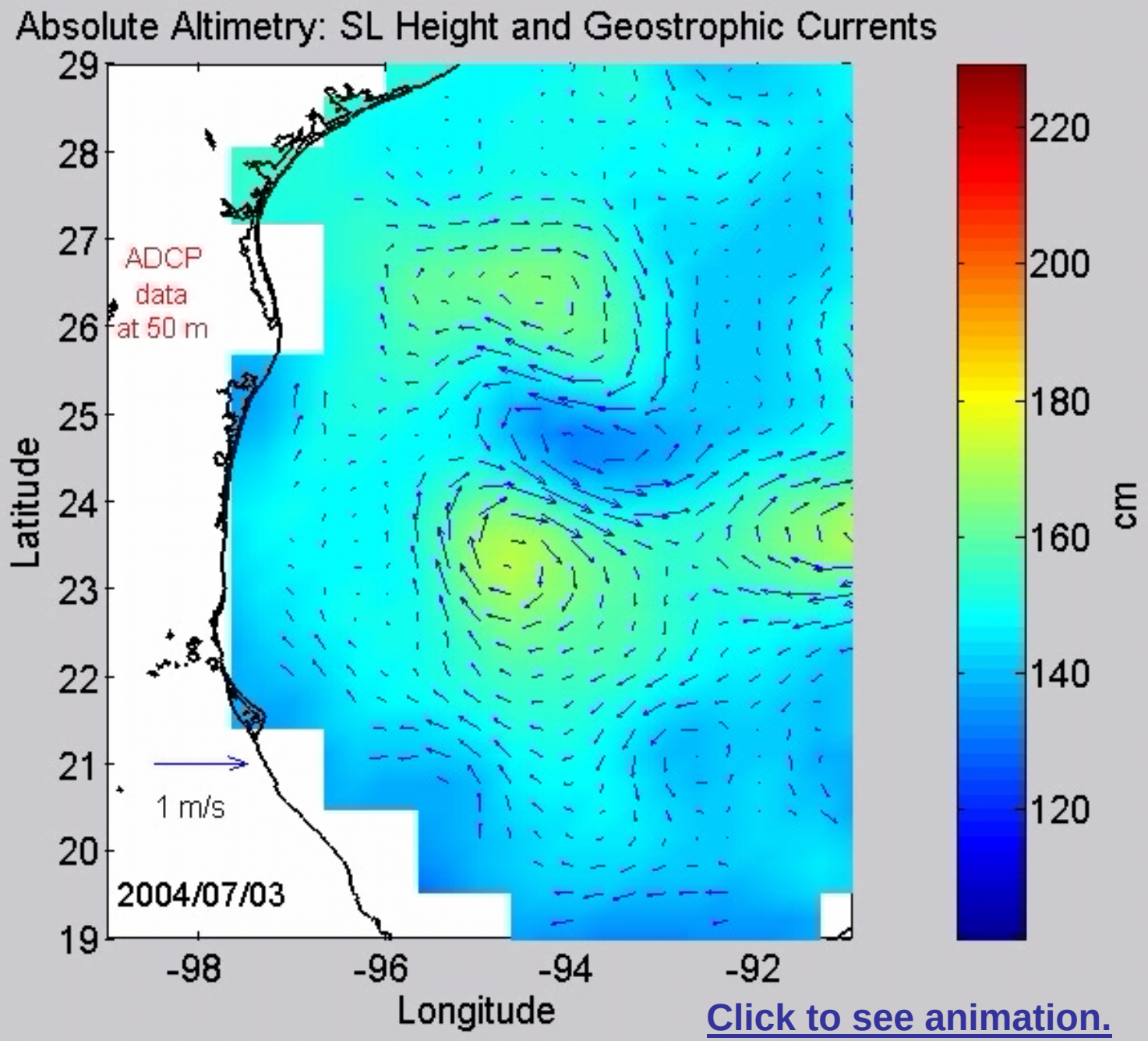

Mean velocity at ~52 m
26
24
Lat. (°N)
98
96
94
Lon. (°W)
10 cm/s


27
26
25
24
23
Latitud
-98
-97
-96
-95
-94
Longitud
Velocidad media a 401 m
5 cm/s


27
26
25
24
23
Latitud
-98
-97
-96
-95
-94
Longitud
Velocidad media a 734 m
5 cm/s

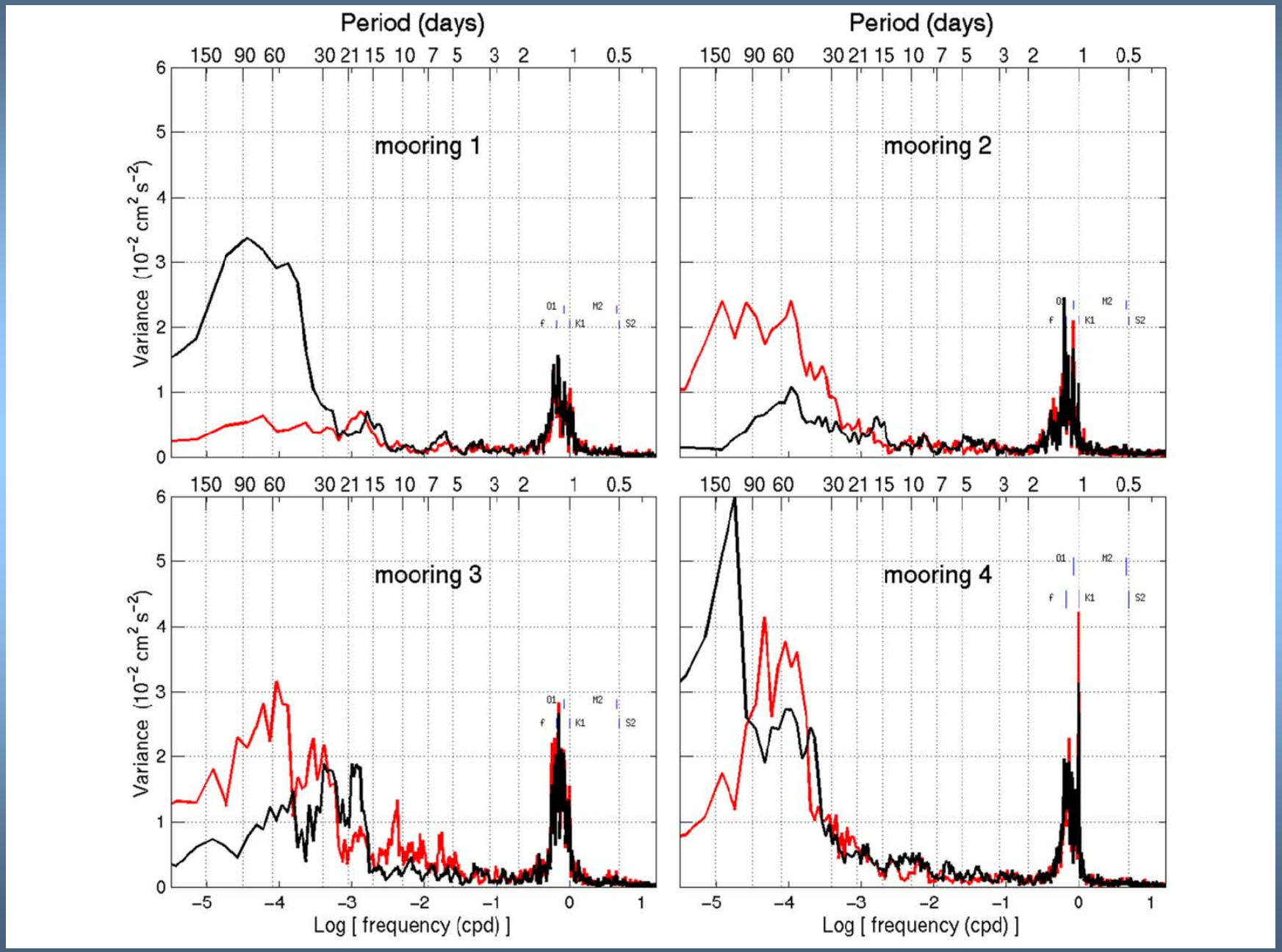

27
26
25
24
23
Latitud
-98
-97
-96
-95
-94
Longitud
Velocidad media a 1978 m
5 cm/s


27
26
25
24
23
Latitud
-98
-97
-96
-95
-94
Longitud
Velocidad promedio a 30 m del fondo
5 cm/s

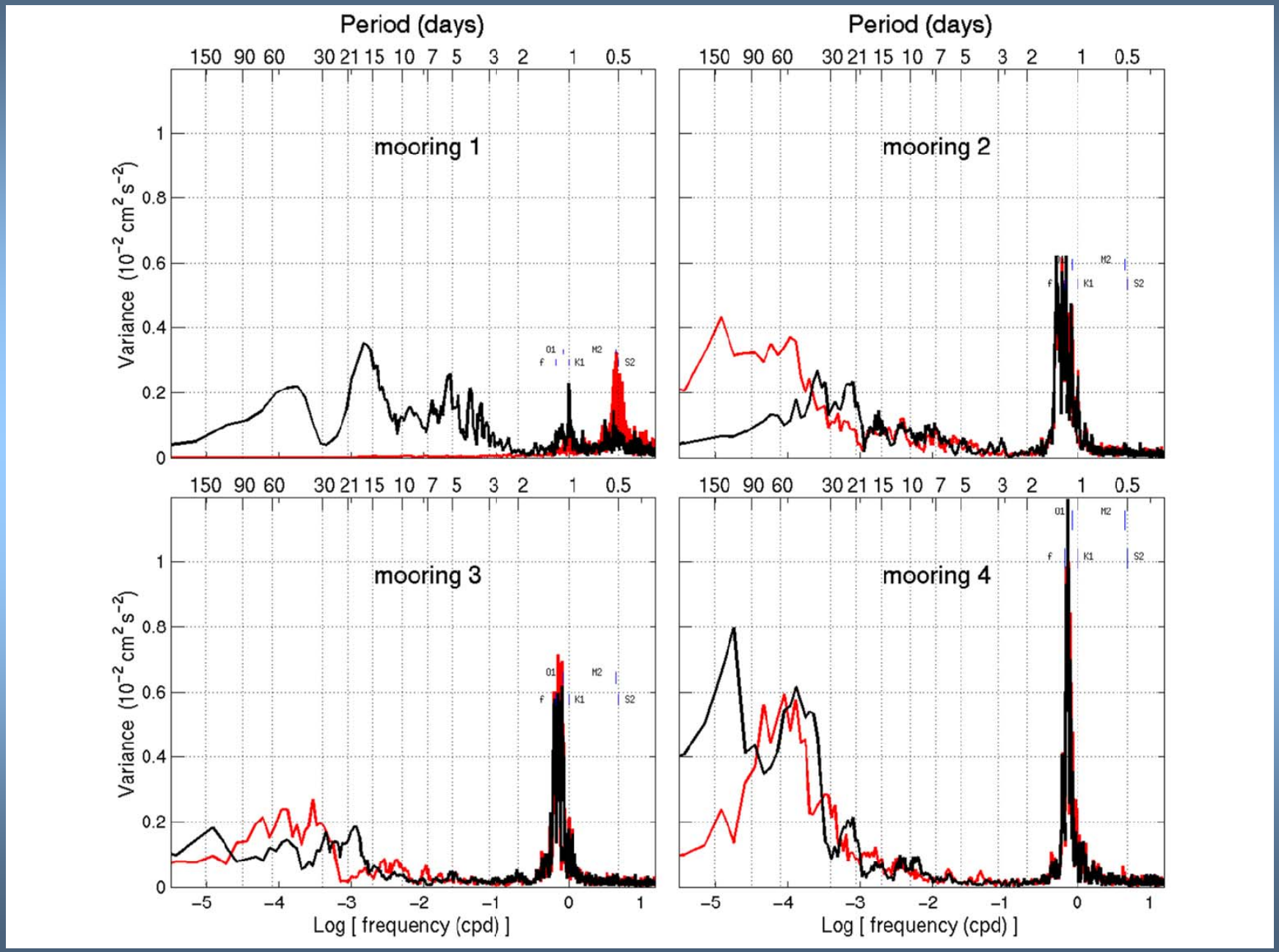


Click to see animation.

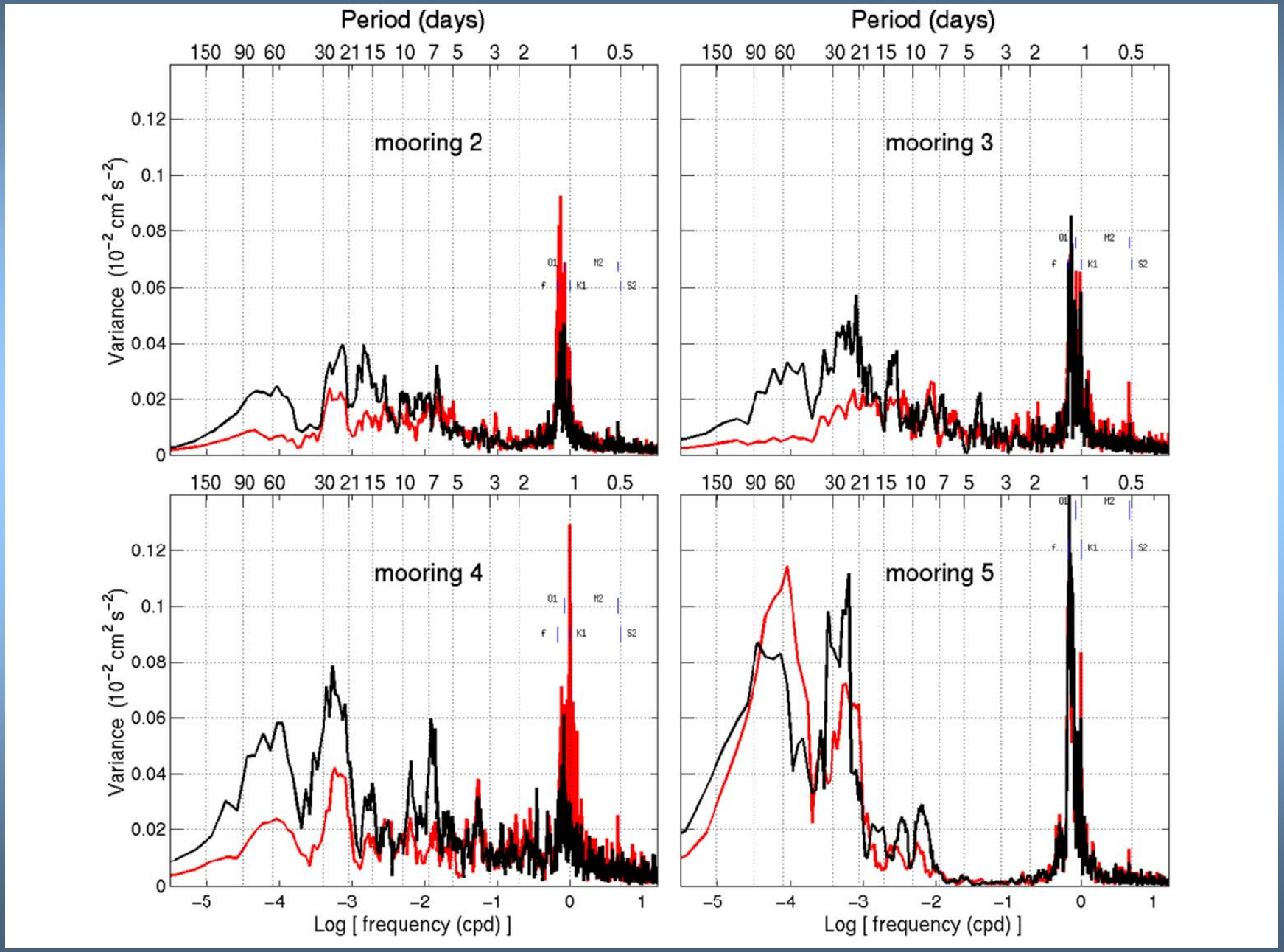
Variance-preserving spectra of zonal (red) and meridional (black) velocities at ~ 52 m



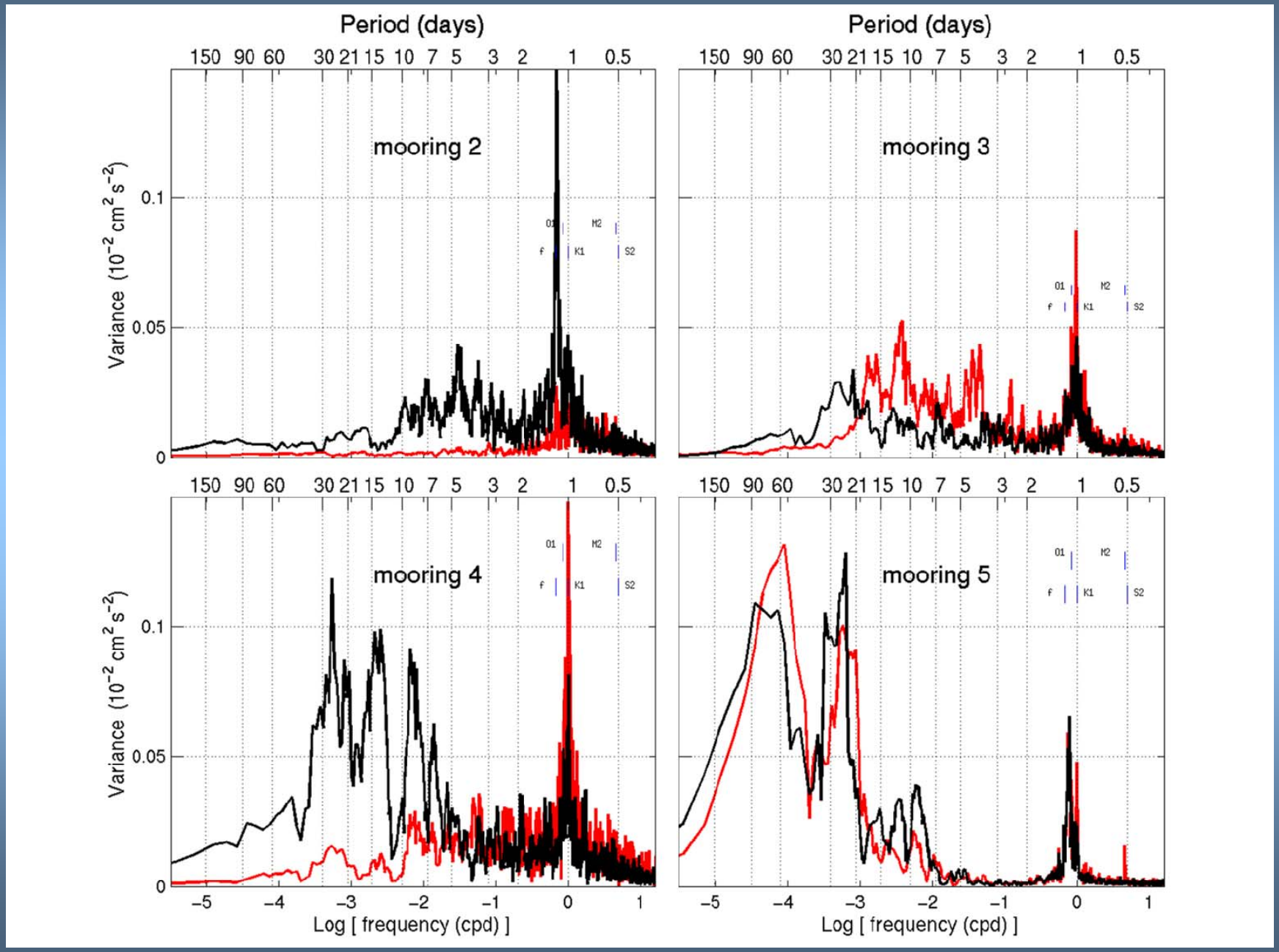
Variance-preserving spectra of zonal (red) and meridional (black) velocities at ~ 414 m



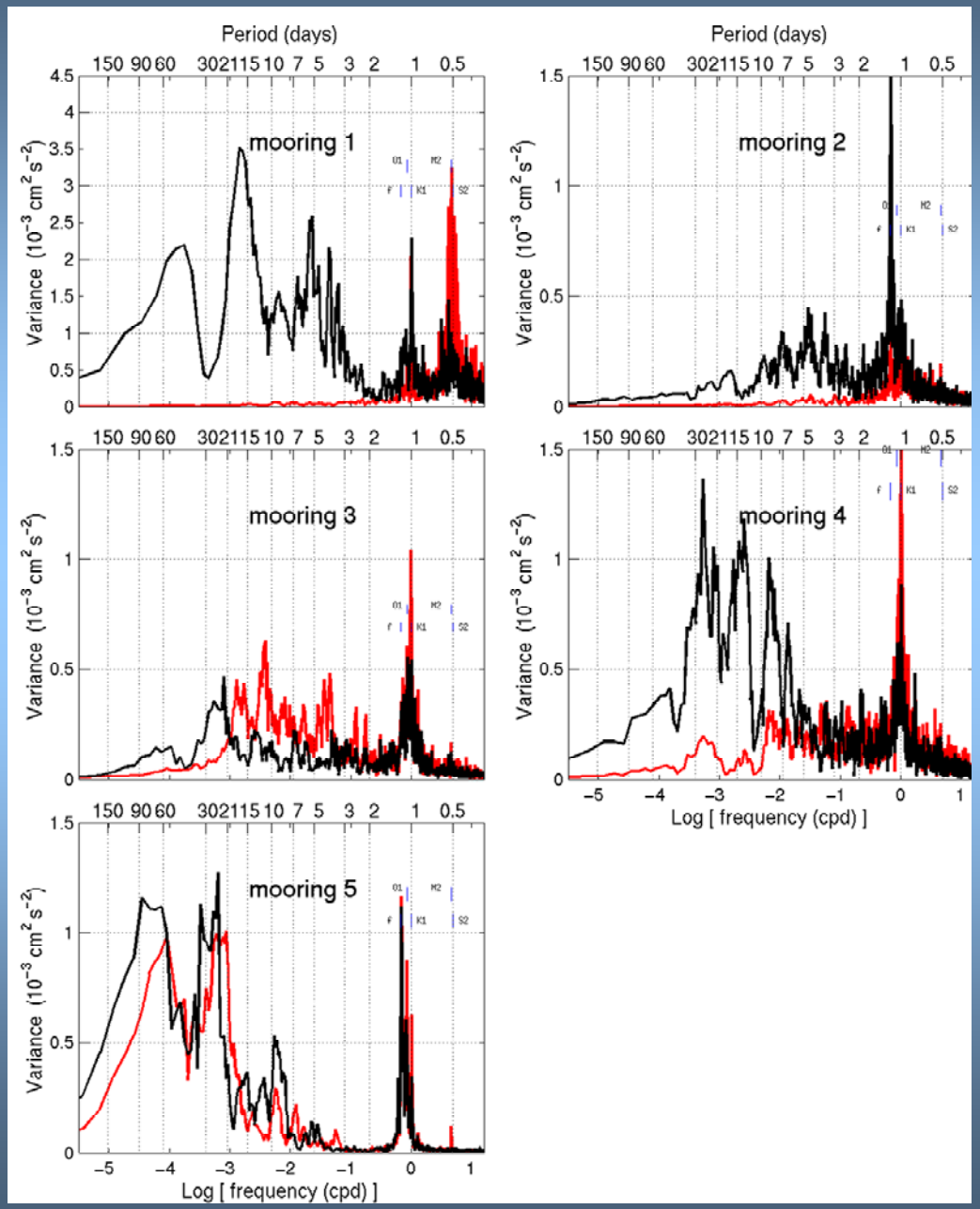
Variance-preserving spectra of zonal (red) and meridional (black) velocities at ~ 1499 m

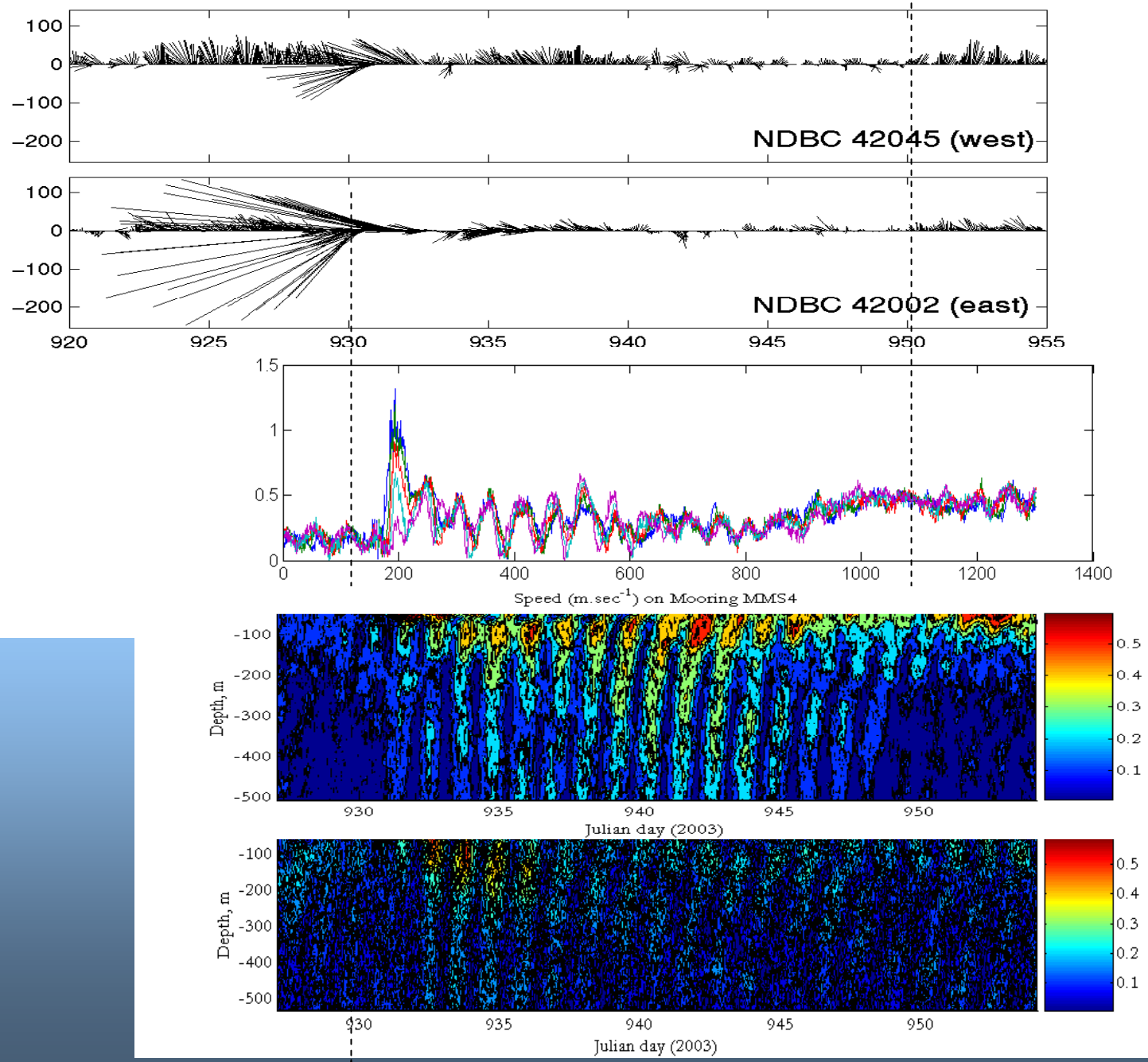


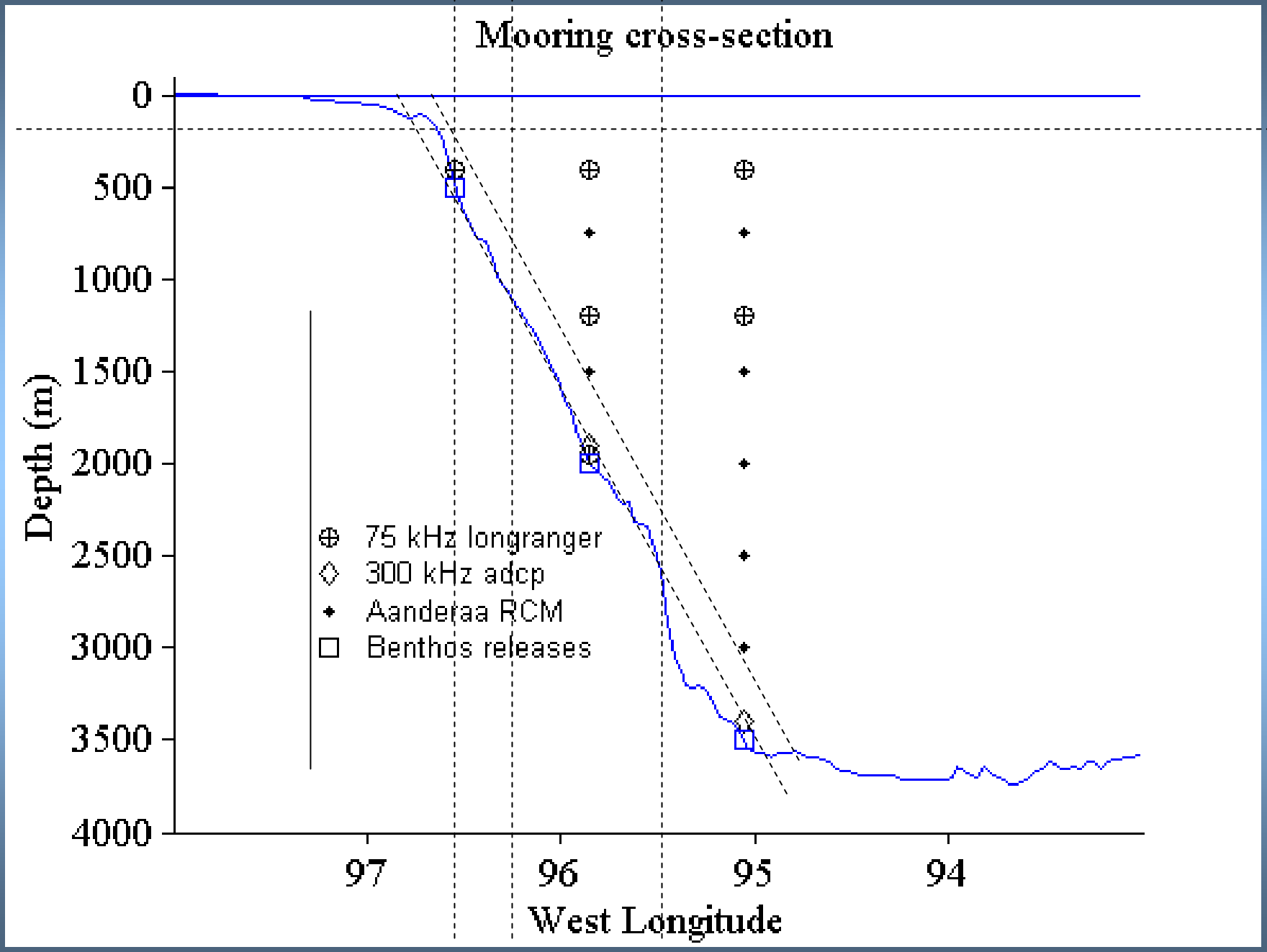
Variance-preserving spectra of zonal (red) and meridional (black) velocities at ~ 1981 m



VPS of zonal (red) and meridional (black) velocities at ~ 30 m from the bottom




NDBC 42045 (west)
NDBC 42002 (east)
Speed (m.sec^{-1}) on Mooring MMS4
Depth, m
Julian day (2003)
Depth, m
Julian day (2003)


Mooring cross-section
Depth (m)
0
500
1000
1500
2000
2500
3000
3500
4000
97
96
95
94
West Longitude
75 kHz longranger
300 kHz adcp
Aanderaa RCM
Benthos releases