Wave propagation characteristics along the south-west African shelf as revealed by mooring observations

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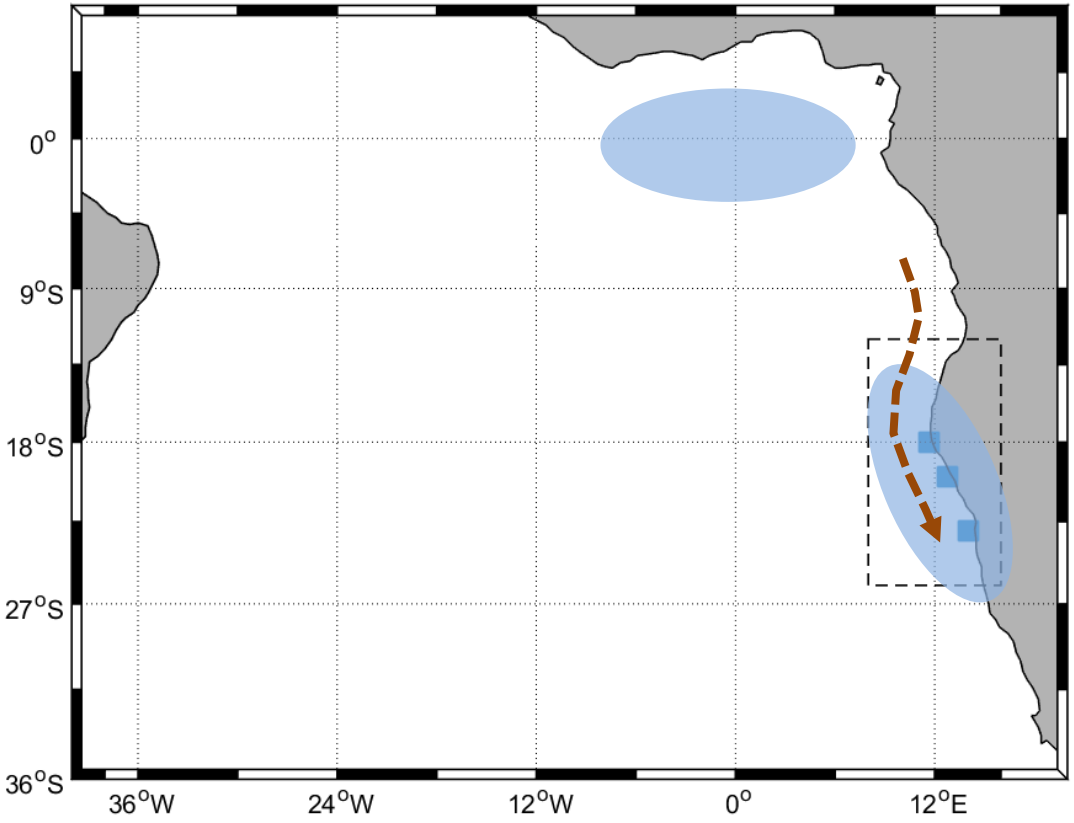
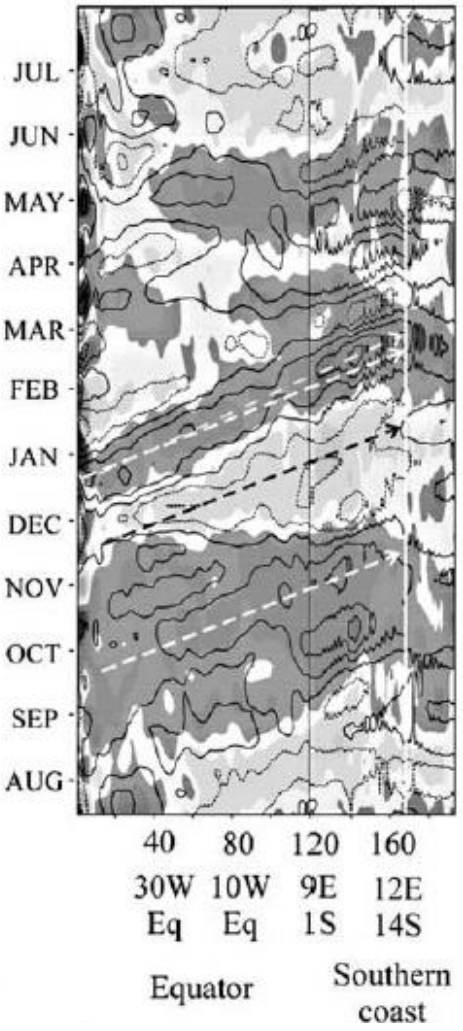
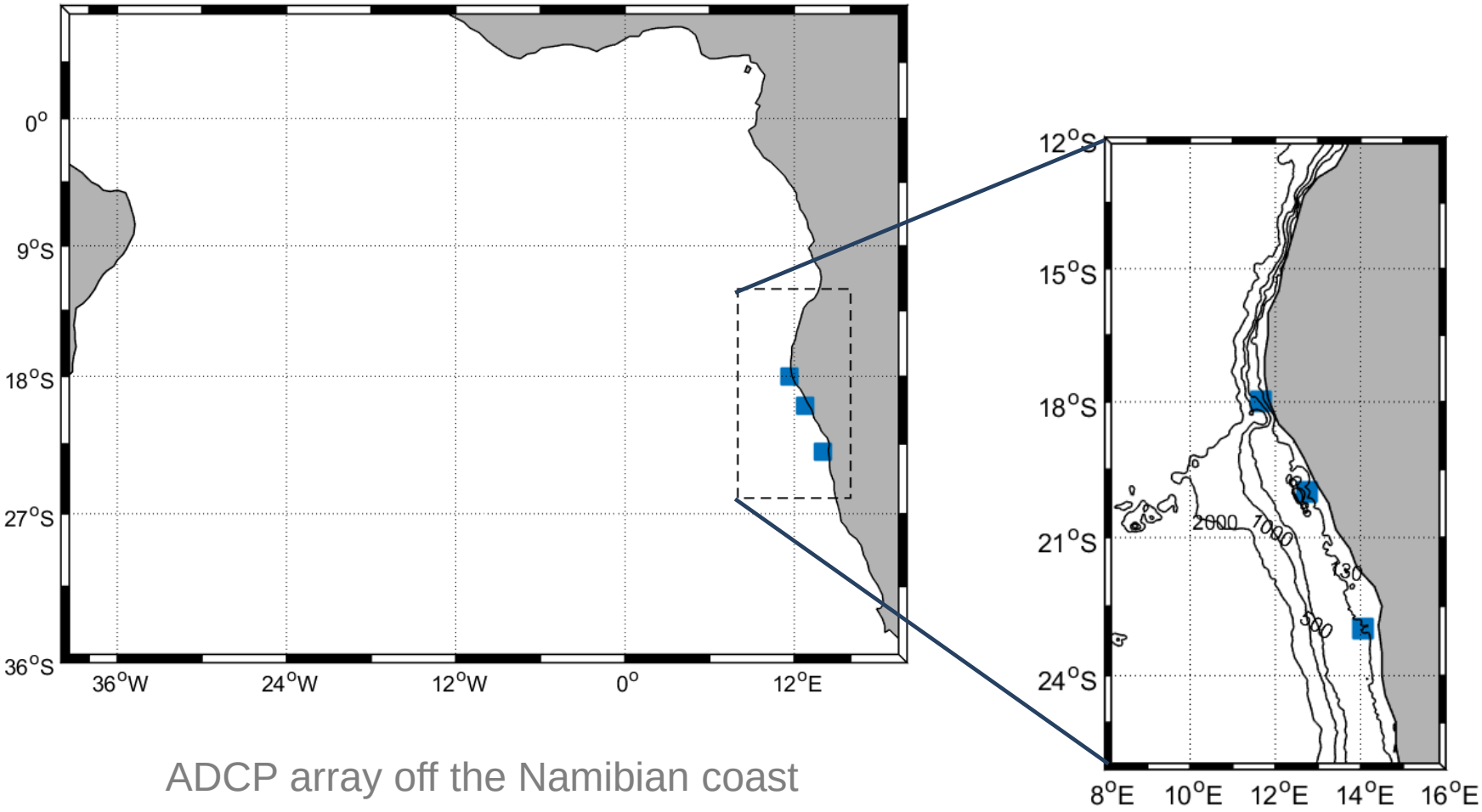
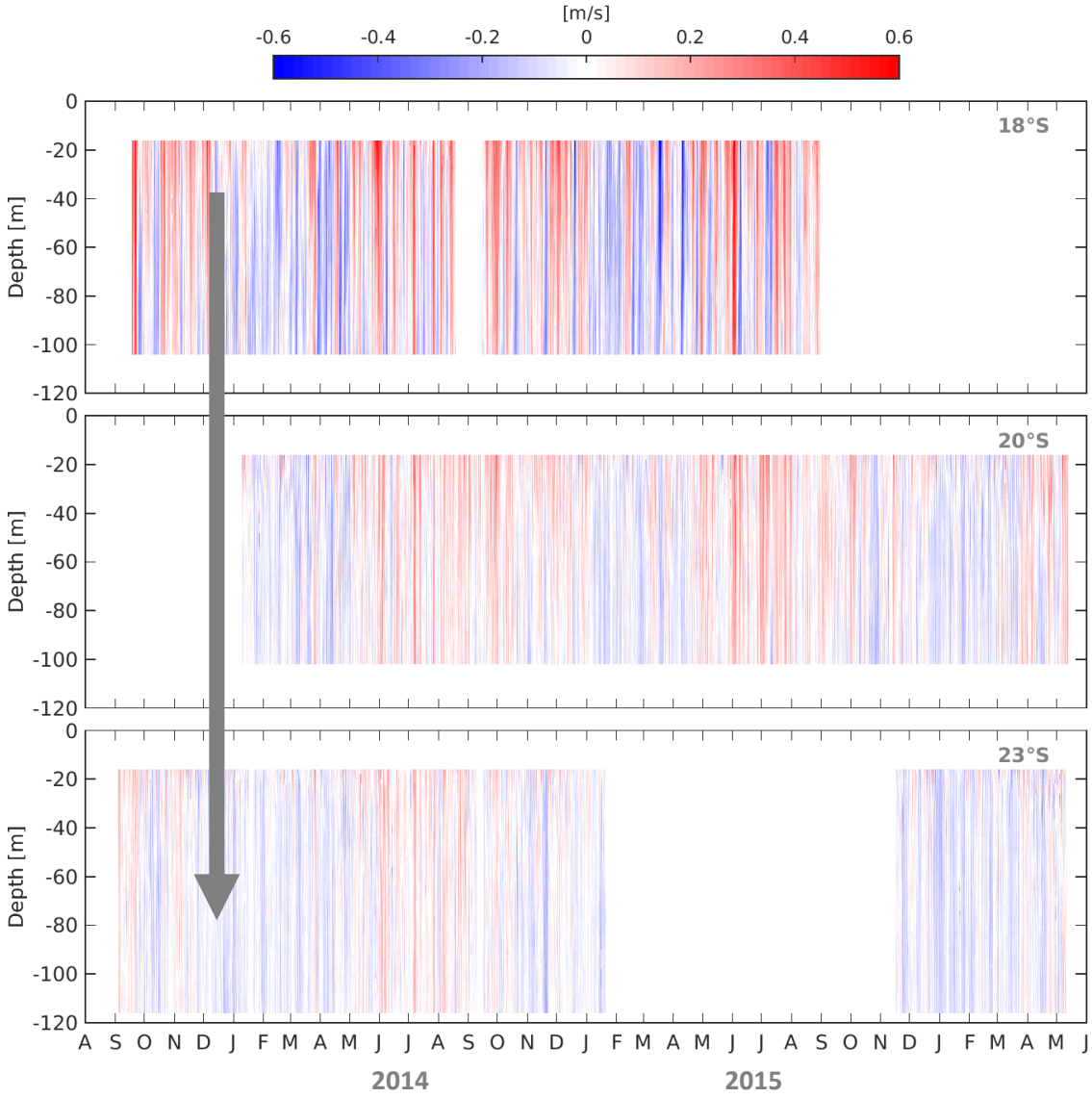


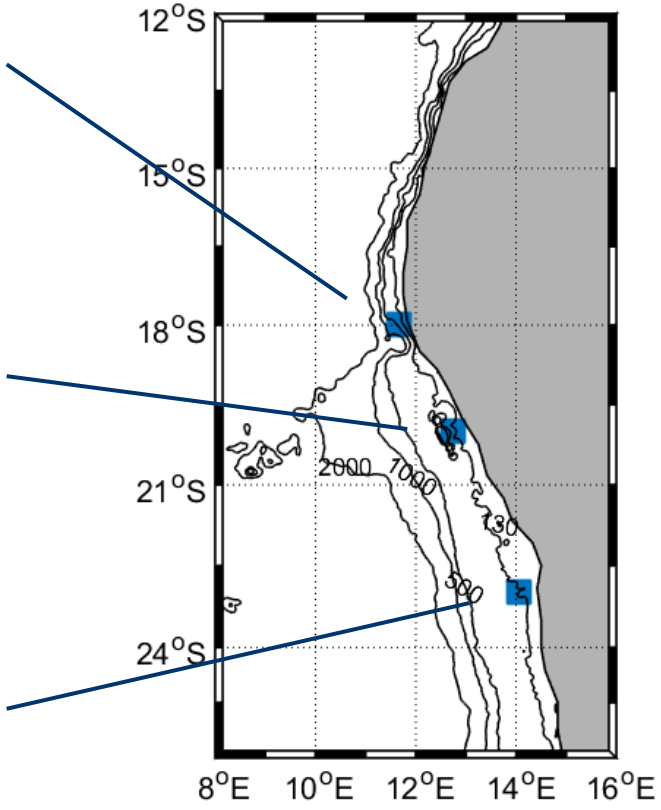


Polo_et_al_2008

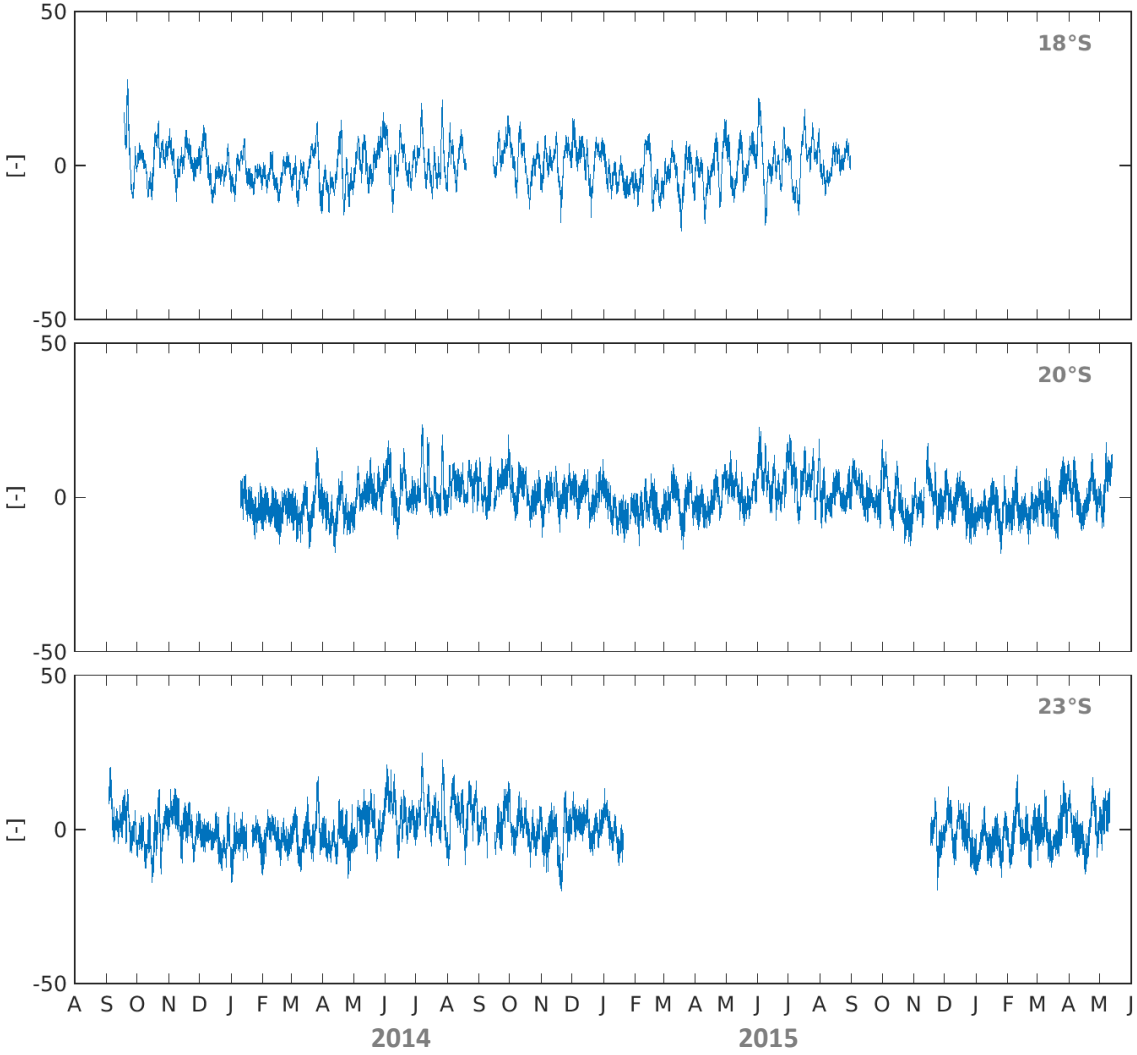


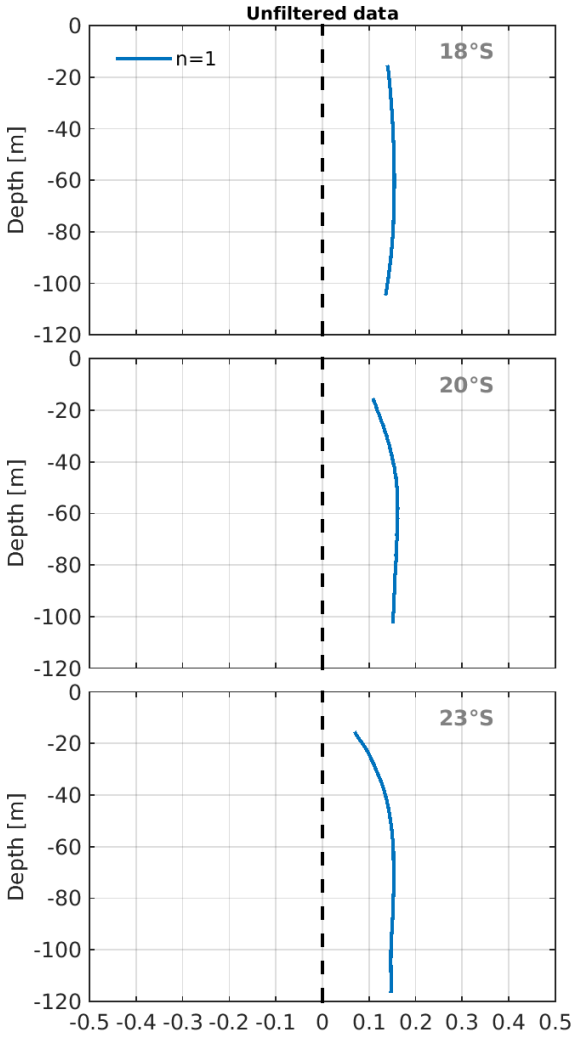
ADCP array off the Namibian coast

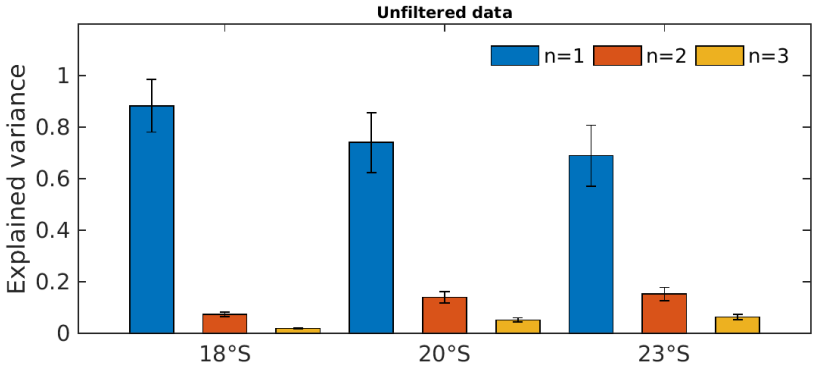

[m/s]
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
18°S
20°S
23°S
Depth [m]
0
-20
-40
-60
-80
-100
-120
A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J
2014
2015

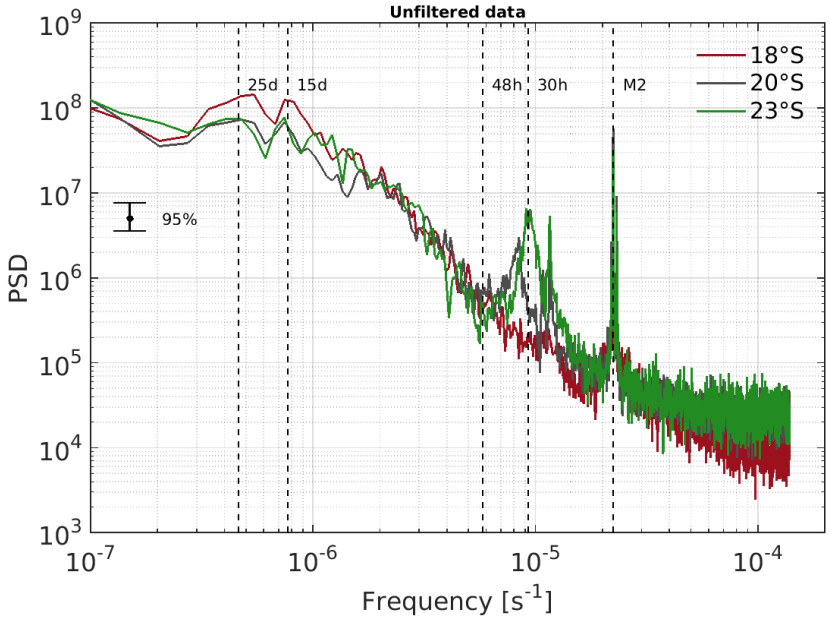

12°S
15°S
18°S
21°S
24°S
8°E
10°E
12°E
14°E
16°E
2000
1000
500

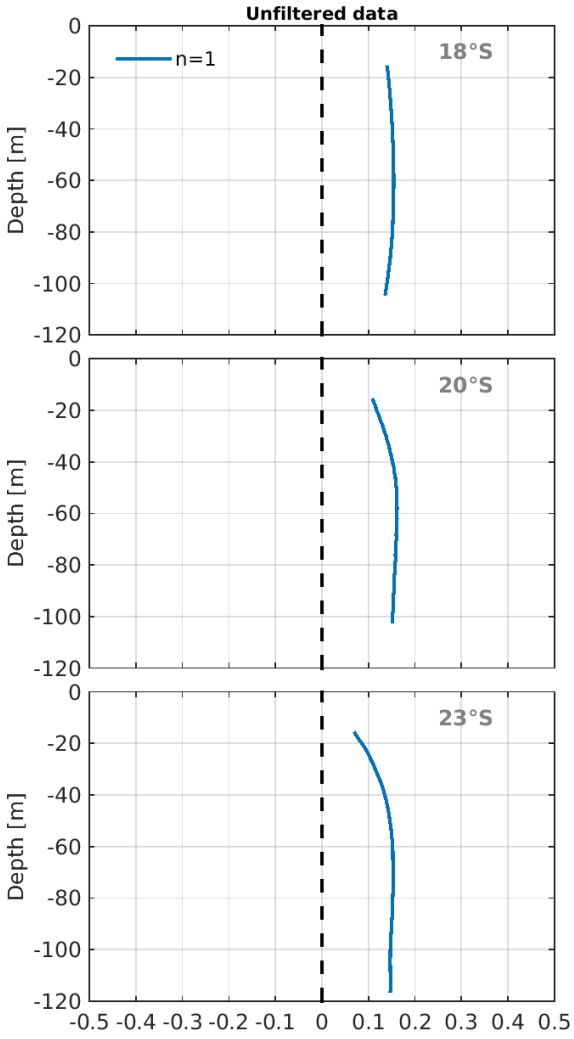
Amplitudes

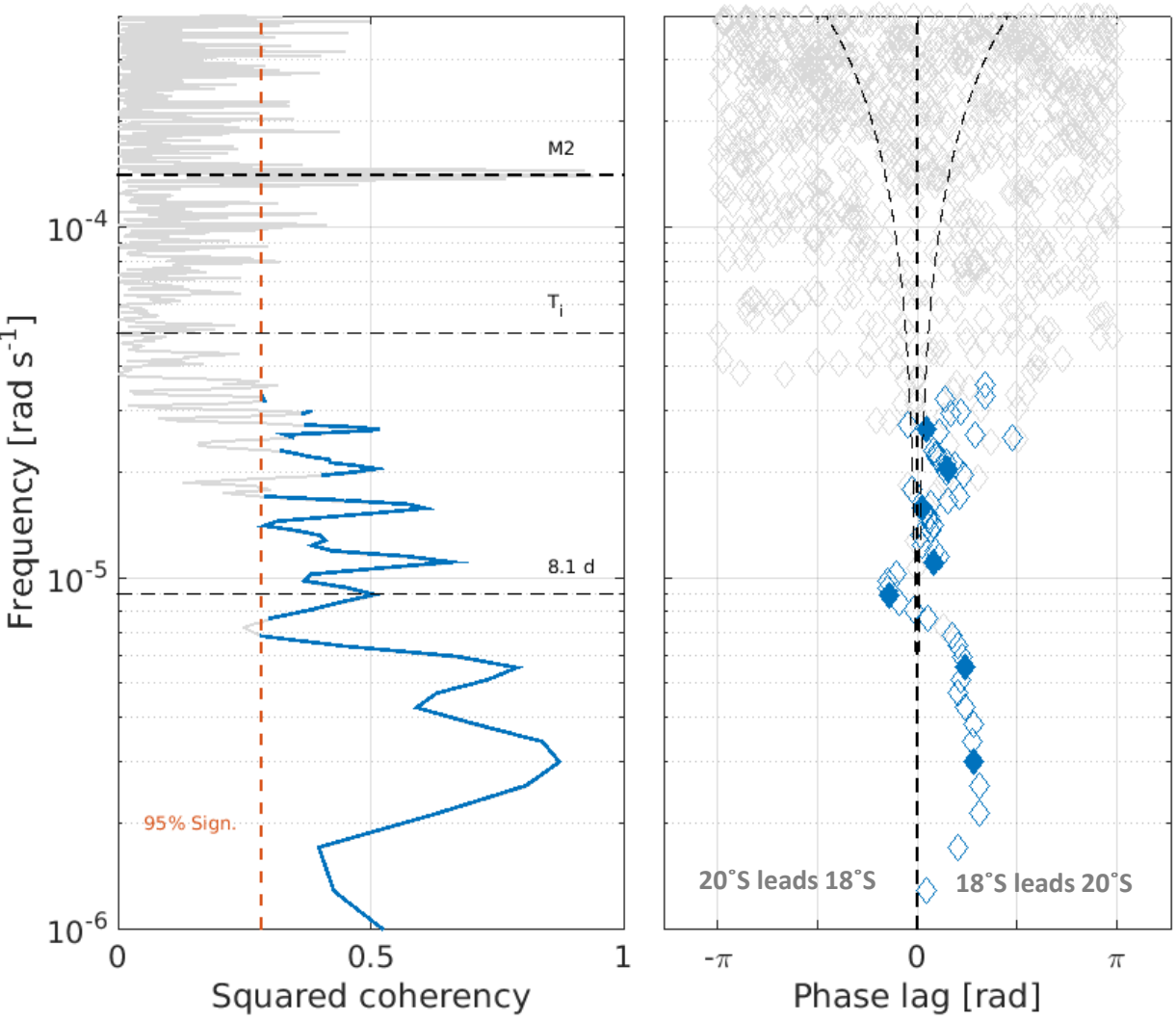

18°S
20°S
23°S
[-]
50
0
-50
A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J
2014
2015

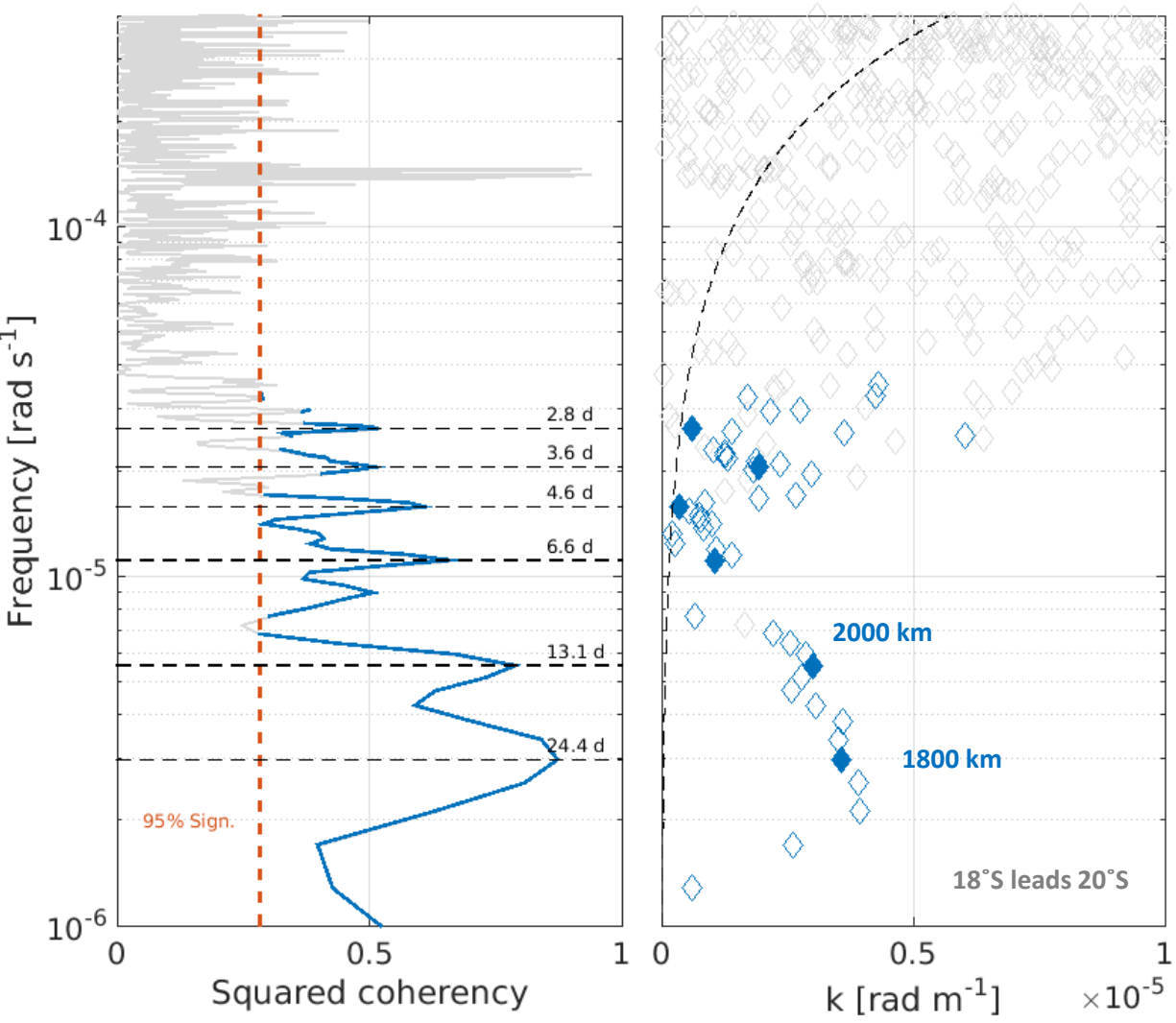

Unfiltered data
n=1
18°S
20°S
23°S
Depth [m]
0
-20
-40
-60
-80
-100
-120
-0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5

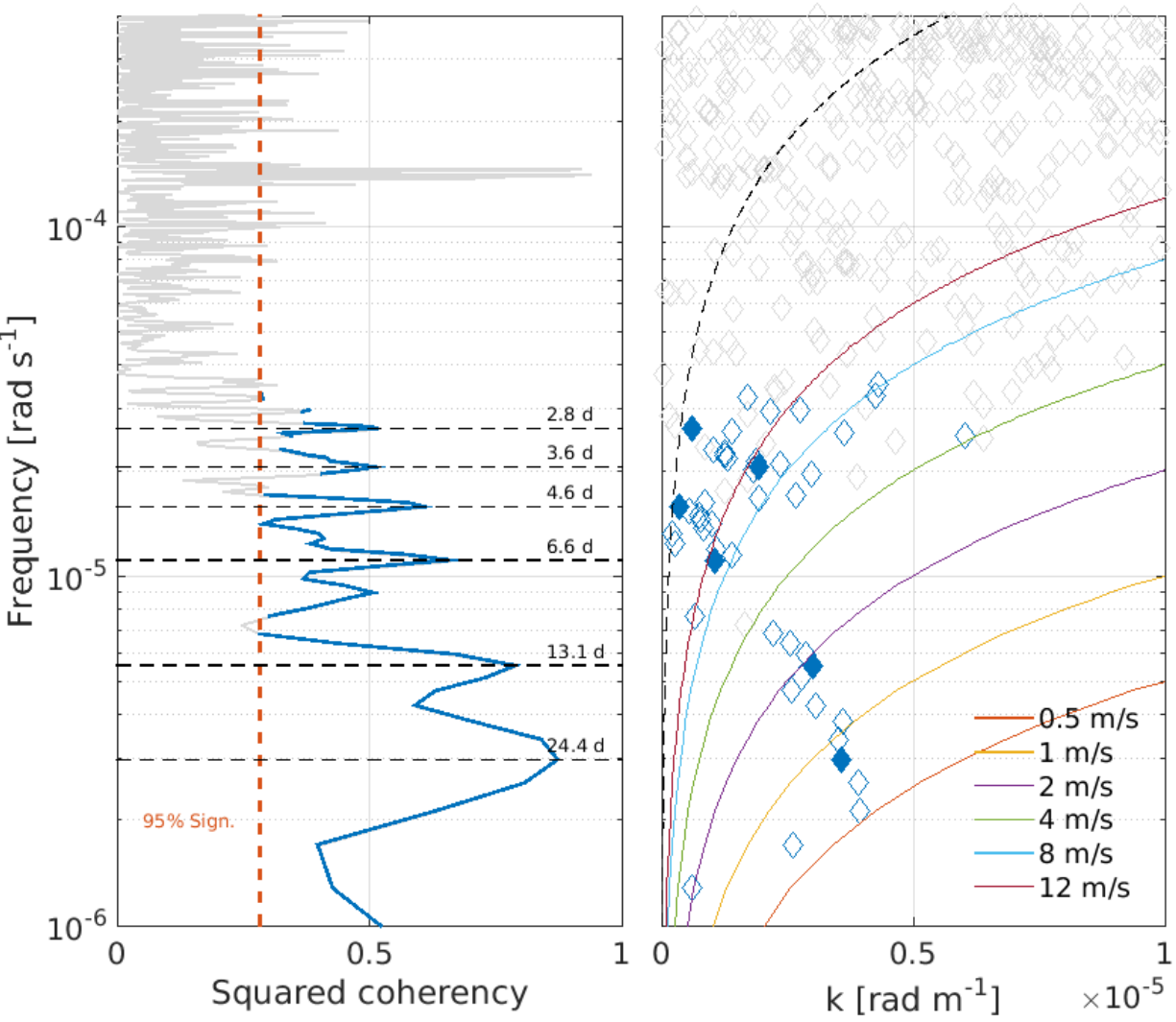

Unfiltered data
n=1
n=2
n=3
Explained variance
0
0.2
0.4
0.6
0.8
1
18°S
20°S
23°S


Unfiltered data
25d
15d
48h
30h
M2
18°S
20°S
23°S
95%
PSD
Frequency [s-1]


Unfiltered data
n=1
18°S
20°S
23°S
Depth [m]
0
-20
-40
-60
-80
-100
-120
-0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5


M2
T_i
8.1 d
95% Sign.
10^{-4}
10^{-5}
10^{-6}
Frequency [rad s^{-1}]
0
0.5
1
Squared coherency
20°S leads 18°S
18°S leads 20°S
-π
0
π
Phase lag [rad]


Frequency [rad s-1]
10-4
10-5
10-6
2.8 d
3.6 d
4.6 d
6.6 d
13.1 d
24.4 d
95% Sign.
0
0.5
1
Squared coherency
2000 km
1800 km
18˚S leads 20˚S
k [rad m-1]
×10-5


Frequency [rad s-1]
10-4
10-5
10-6
2.8 d
3.6 d
4.6 d
6.6 d
13.1 d
24.4 d
95% Sign.
0
0.5
1
Squared coherency
0
0.5
1
k [rad m-1]
×10-5
0.5 m/s
1 m/s
2 m/s
4 m/s
8 m/s
12 m/s

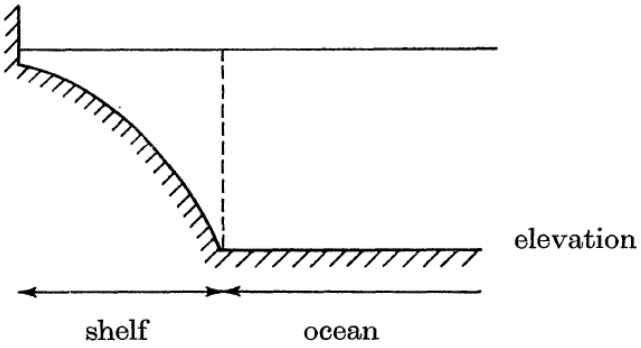
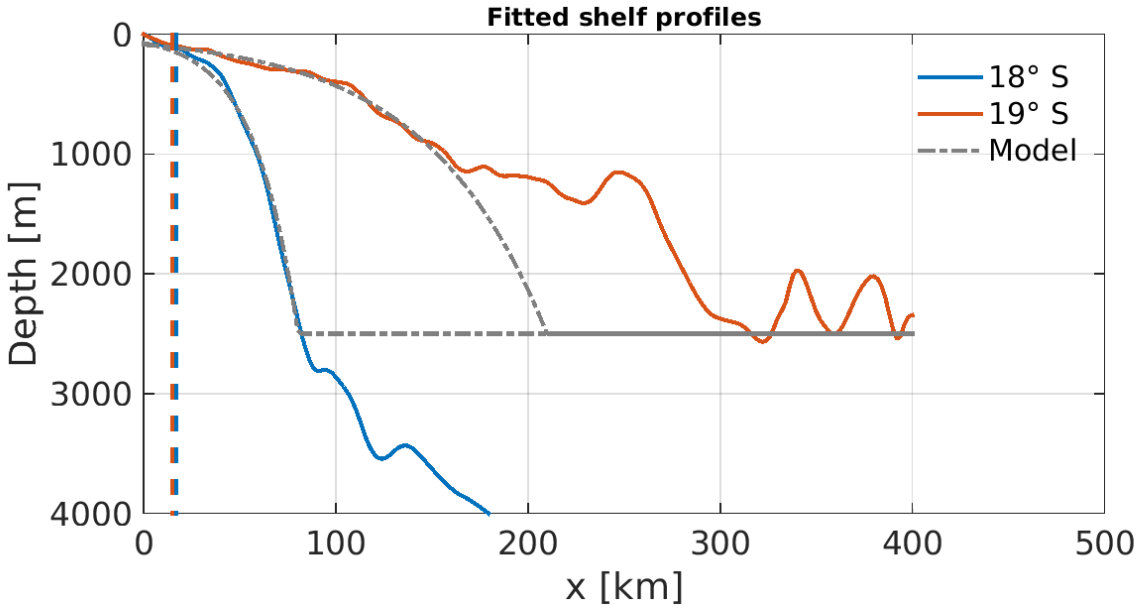
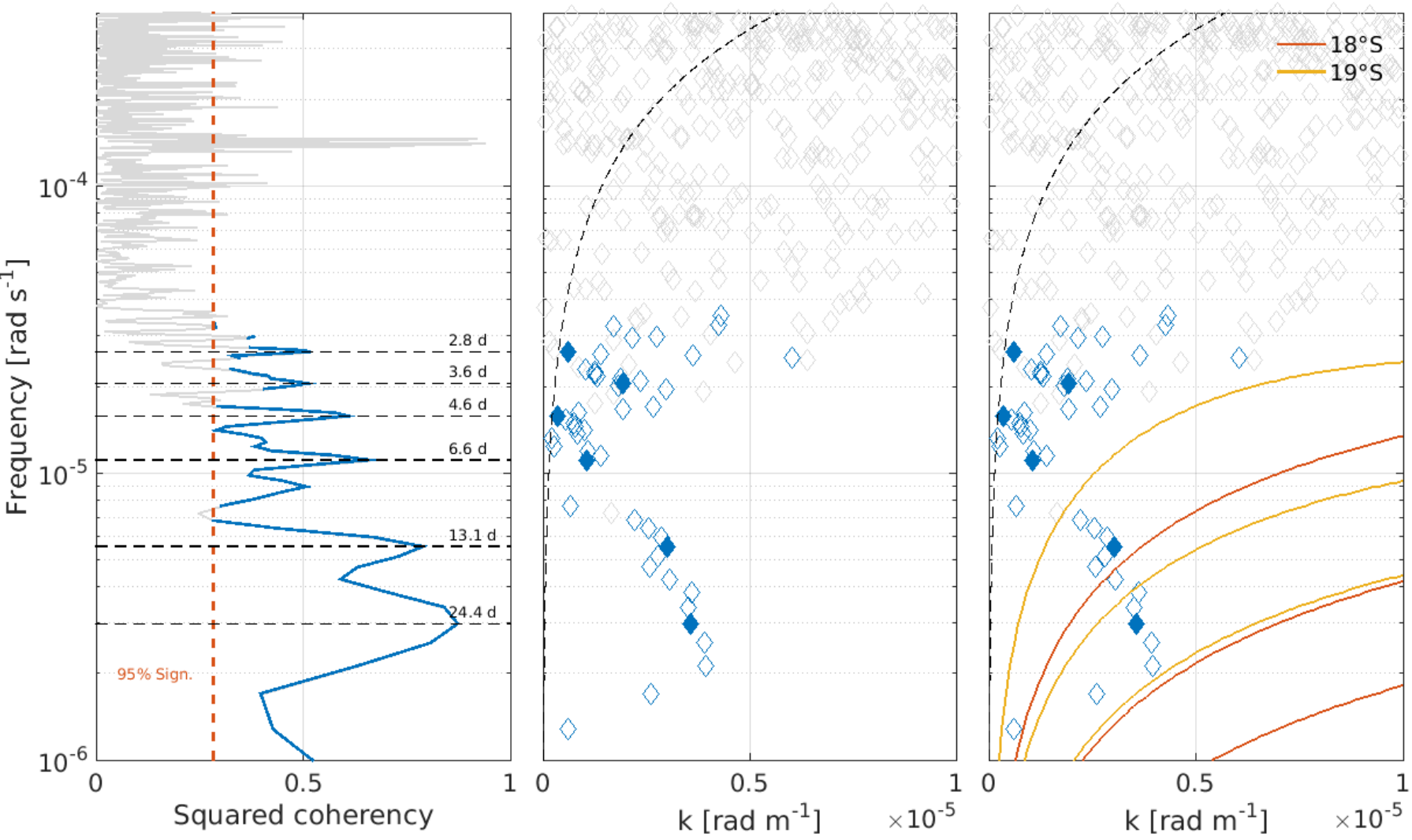


FIGURE 1. Shelf model in plan and elevation.

Buchwald_and_Adams_1968

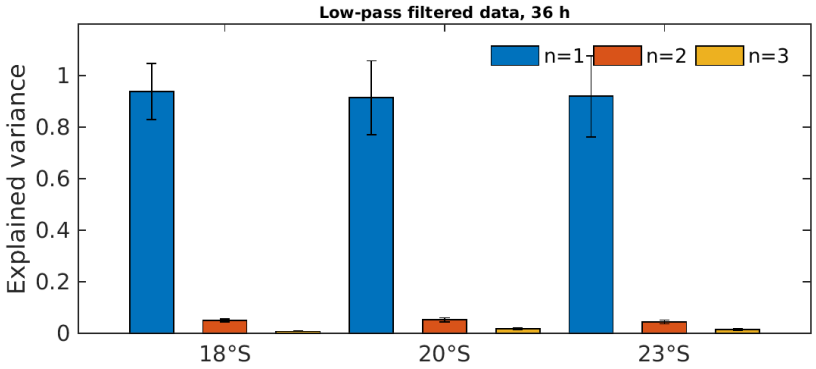


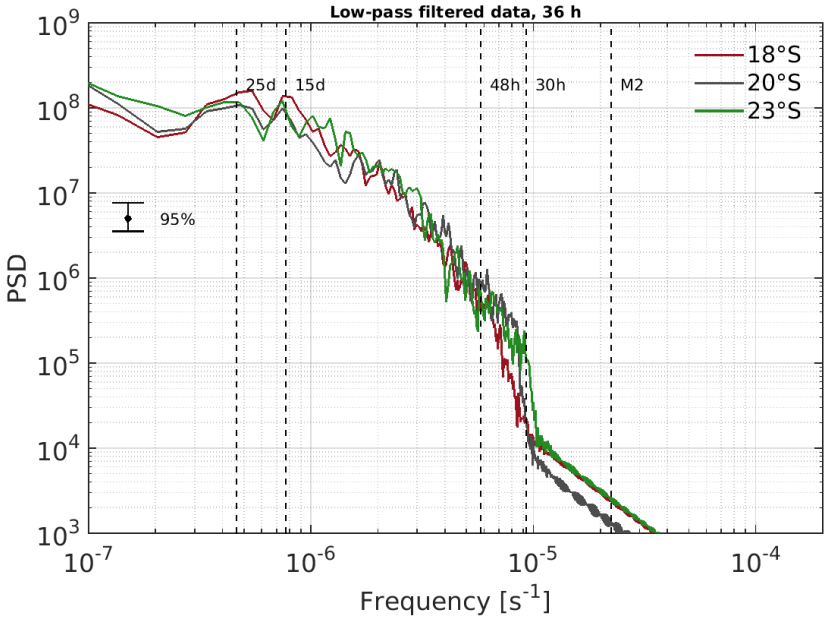

Frequency [rad s-1]
10-4
10-5
10-6
2.8 d
3.6 d
4.6 d
6.6 d
13.1 d
24.4 d
95% Sign.
0
0.5
1
Squared coherency
k [rad m-1]
×10-5
18°S
19°S

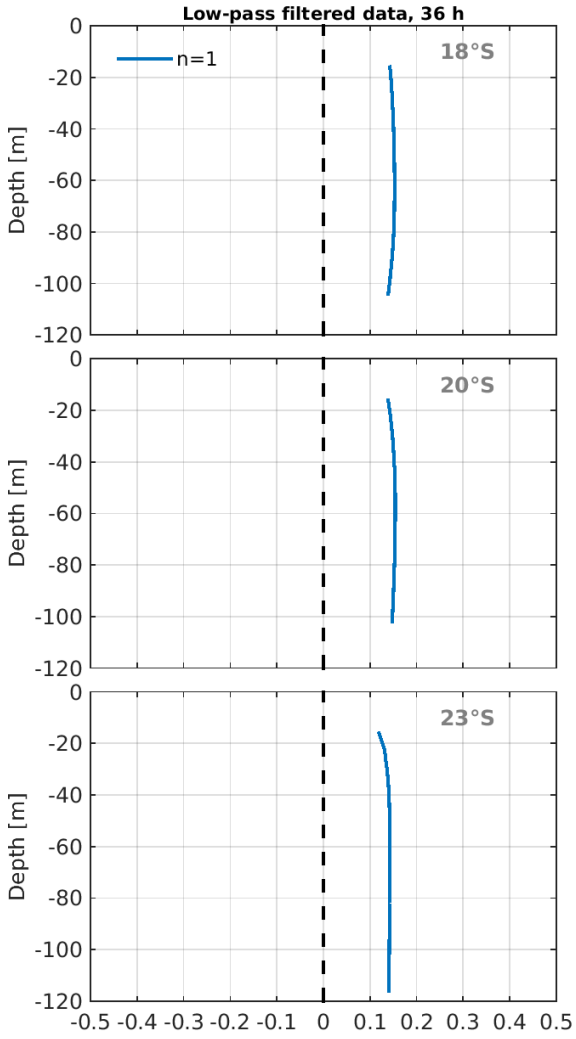
- Concurrent ADCP data from a mooring array along the Namibian shelf investigated
- Meridional current component dominated by a “barotropic” mode explaining more than 70 % of the total variance

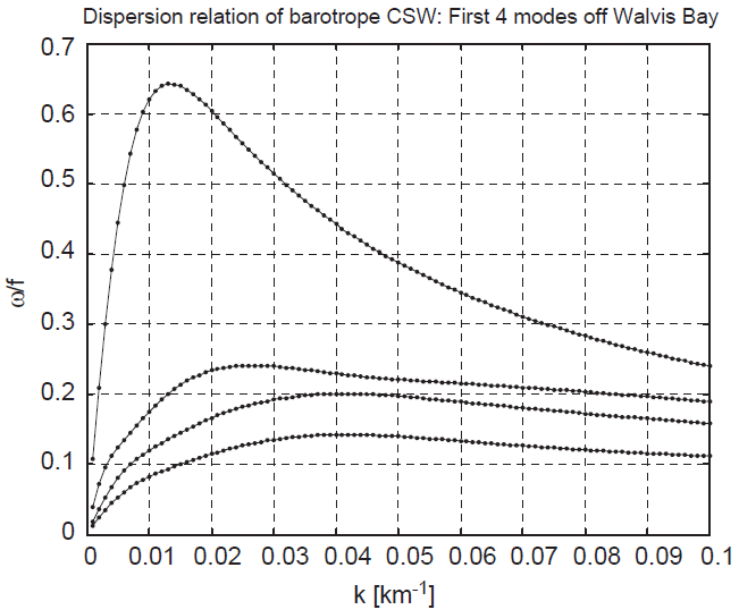
- Wave patterns with dominant periods of ~13 d and ~24 d, wave length ~1800 km and phase speed 0.5 - 4 m/s identified
- These signals correspond most likely to 1st and 2nd mode of CSW

Thank you for your attention !


Low-pass filtered data, 36 h
Explained variance
n=1
n=2
n=3
0
0.2
0.4
0.6
0.8
1
18°S
20°S
23°S


Low-pass filtered data, 36 h
PSD
Frequency [s-1]
25d
15d
48h
30h
M2
95%
18°S
20°S
23°S


Low-pass filtered data, 36 h
Depth [m]
n=1
18°S
20°S
23°S
0
-20
-40
-60
-80
-100
-120
-0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5



Lass_and_Mohrholz_2005

Tab. 3: Abschätzungen von charakteristischen Perioden (d), Wellenlängen (km) und Phasengeschwindigkeiten (km d^{-1}) freier CSW mit c_g = 0 bei exponentieller Approximation des Schelfprofils

	Peru (15,0° S)			Oregon (44,8° N)			NWA (21,5° N)			SWA (21,5° S)		
n	T^o	λ^o	c^o	T^o	λ^o	c^o	T^o	λ^o	c^o	T^o	λ^o	c^o
1	2,7	102	38	1,0	213	213	1,9	321	169	1,9	820	432
2	4,3	64	15	1,6	135	84	3,0	203.	68	3,0	519	173
3	6,1	46	8	2,2	95	43	4,3	143	33	4,3	367	85
4	7,9	35	4	2,9	73	25	5,6	110	20	5,6	281	50

Hagen_1979