VISIR routes in the Atlantic

Supplementary Material for manuscript:
https://doi.org/10.5194/gmd-2018-292

Authors: Gianandrea Mannarini & Lorenzo Carelli

Date: 2019-02-13

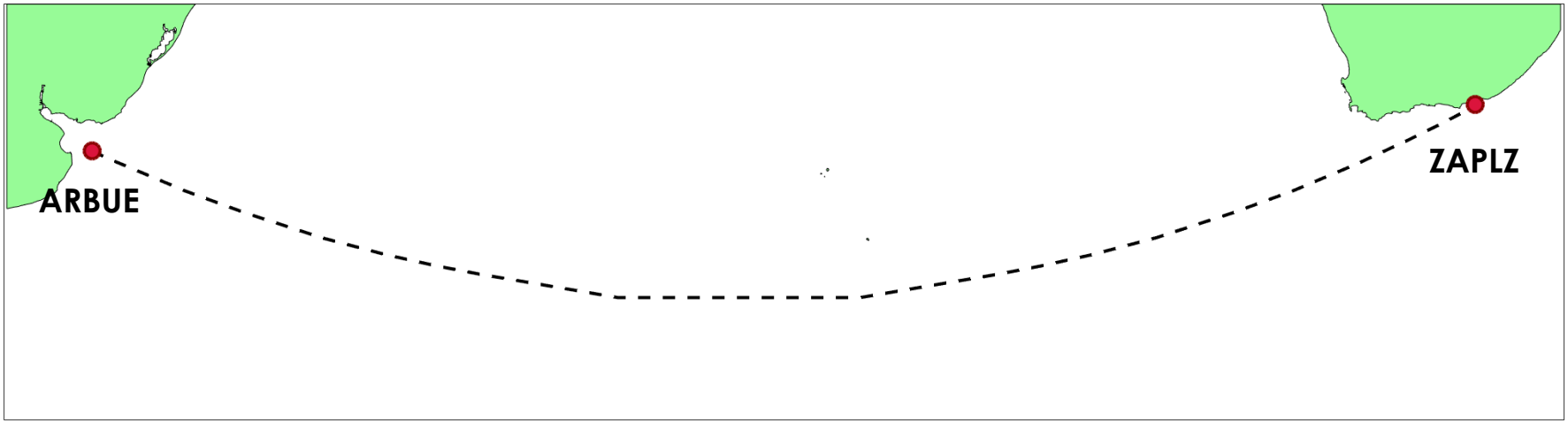
Version: 2.5

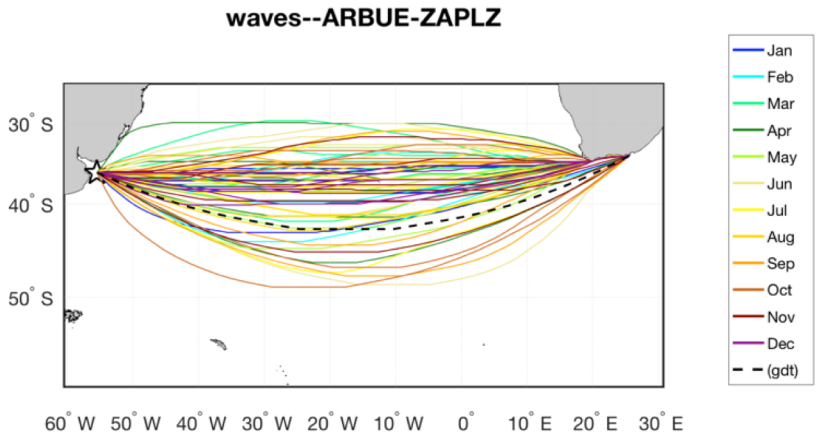
Contents

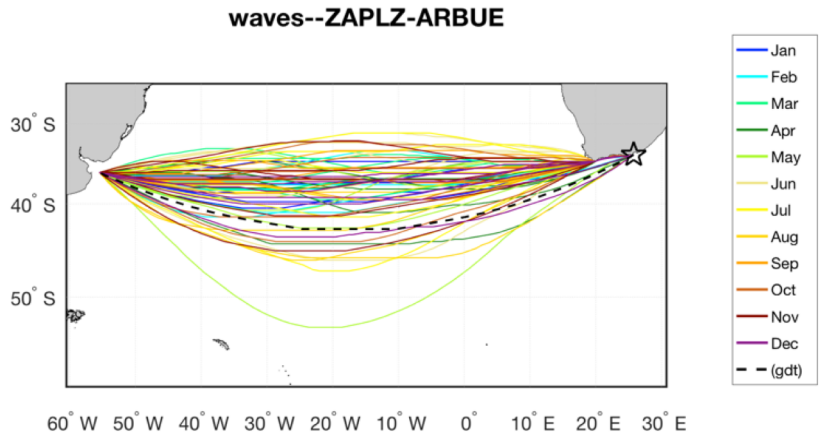
Route Id	Route name	Slide #
1	Buenos Aires - Port Elizabeth	3
2	Equator route	12
3	Norfolk - Algeciras	21
4	New York City – Le Havre	30
5	Santos - Mindelo	39
6	Mindelo - Genoa	48
7	Rotterdam - Algeciras	57
8	Miami - Panama	66
9	Boston - Miami	75

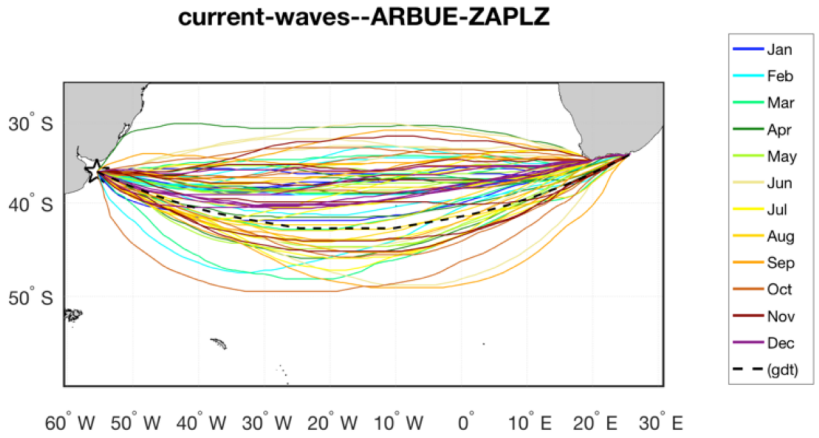
←Index

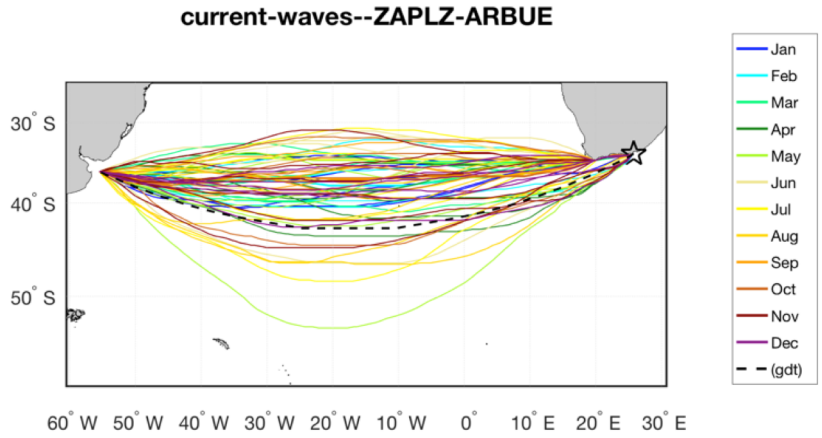
1. Buenos Aires - Port Elizabeth



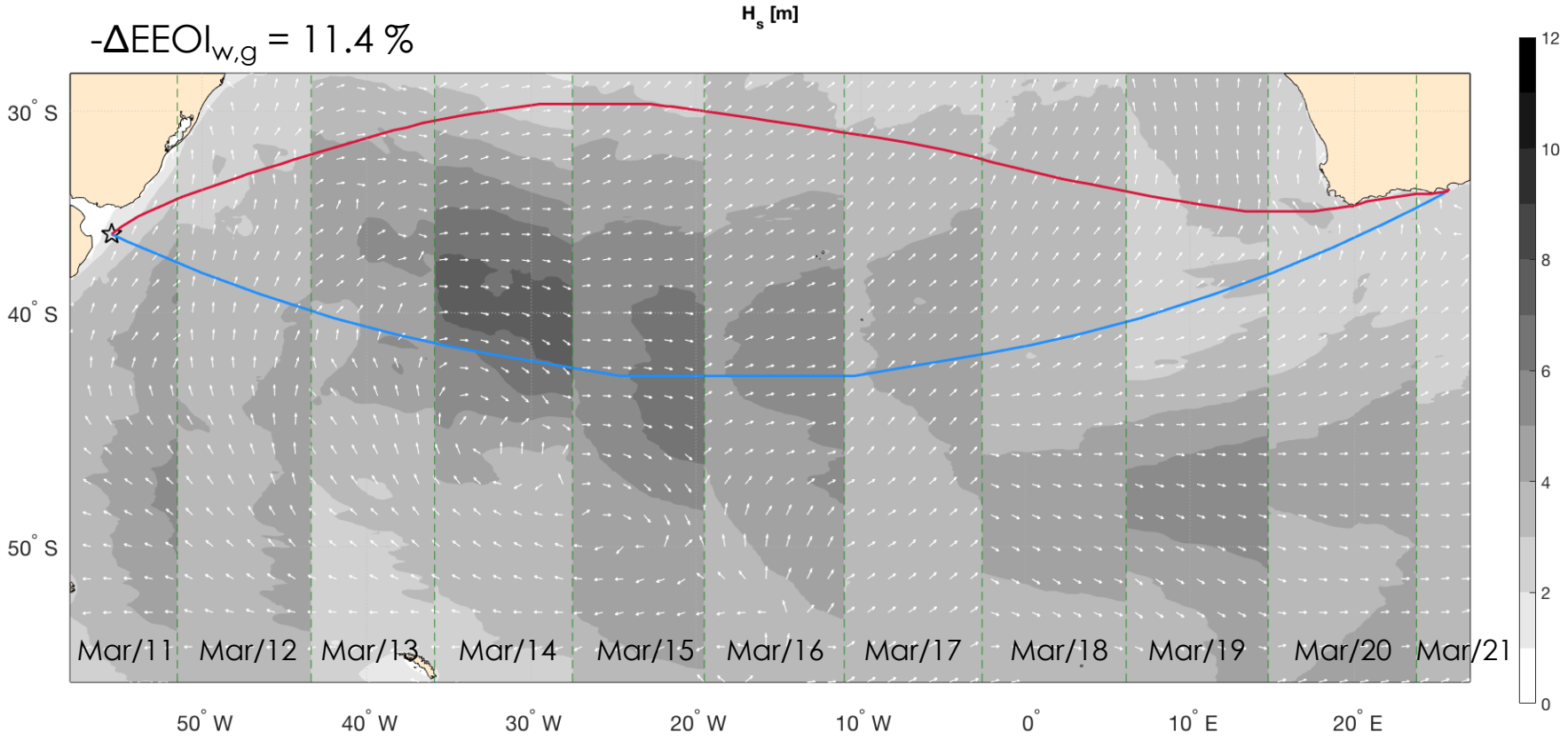

waves--ARBUE-ZAPLZ
30° S
40° S
50° S
60° W 50° W 40° W 30° W 20° W 10° W 0° 10° E 20° E 30° E
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)


waves--ZAPLZ-ARBUE
30° S
40° S
50° S
60° W 50° W 40° W 30° W 20° W 10° W 0° 10° E 20° E 30° E
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)


current-waves--ARBUE-ZAPLZ
30° S
40° S
50° S
60° W 50° W 40° W 30° W 20° W 10° W 0° 10° E 20° E 30° E
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

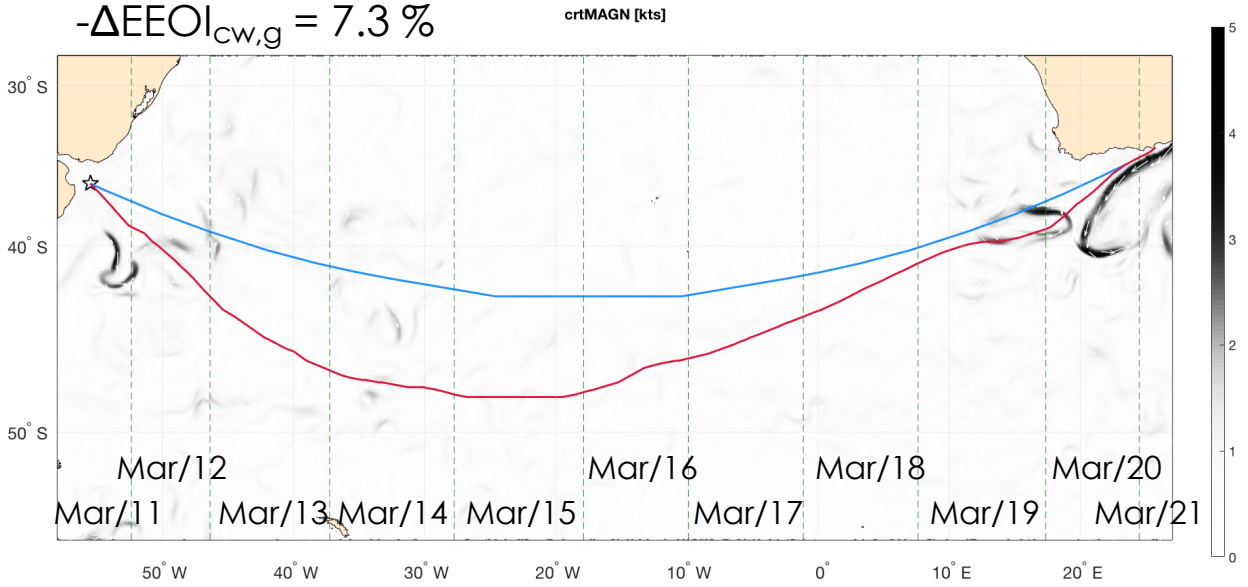

current-waves--ZAPLZ-ARBUE
30° S
40° S
50° S
60° W 50° W 40° W 30° W 20° W 10° W 0° 10° E 20° E 30° E
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

Buenos Aires - Port Elizabeth, waves, 11 Mar

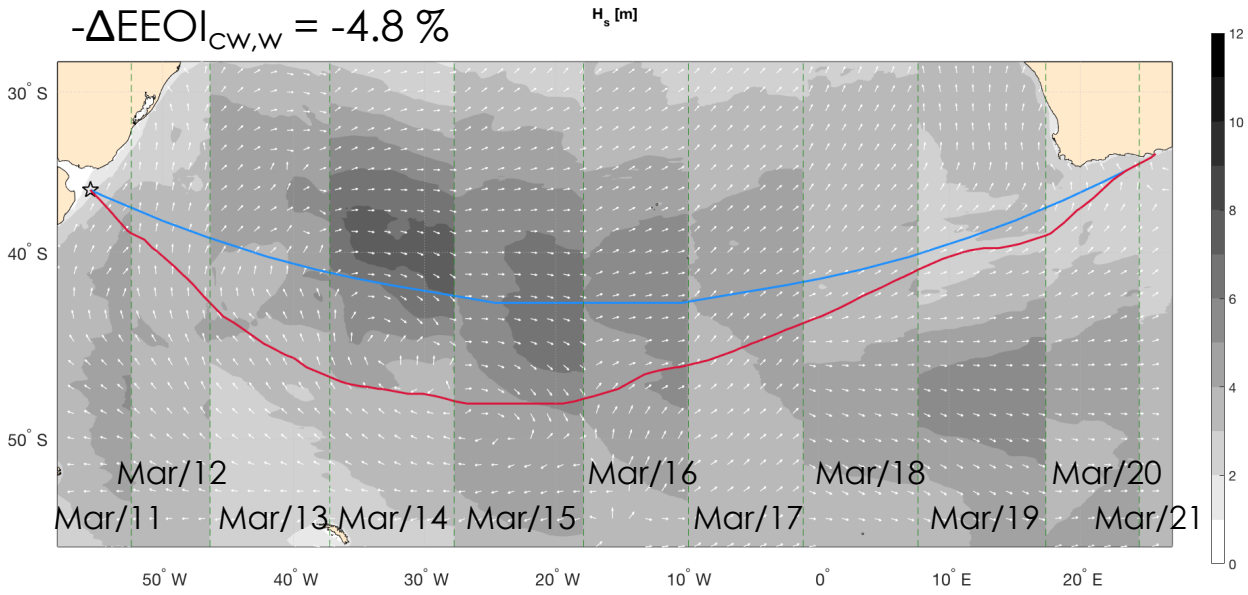


Buenos Aires - Port Elizabeth, currents and waves, 11 Mar

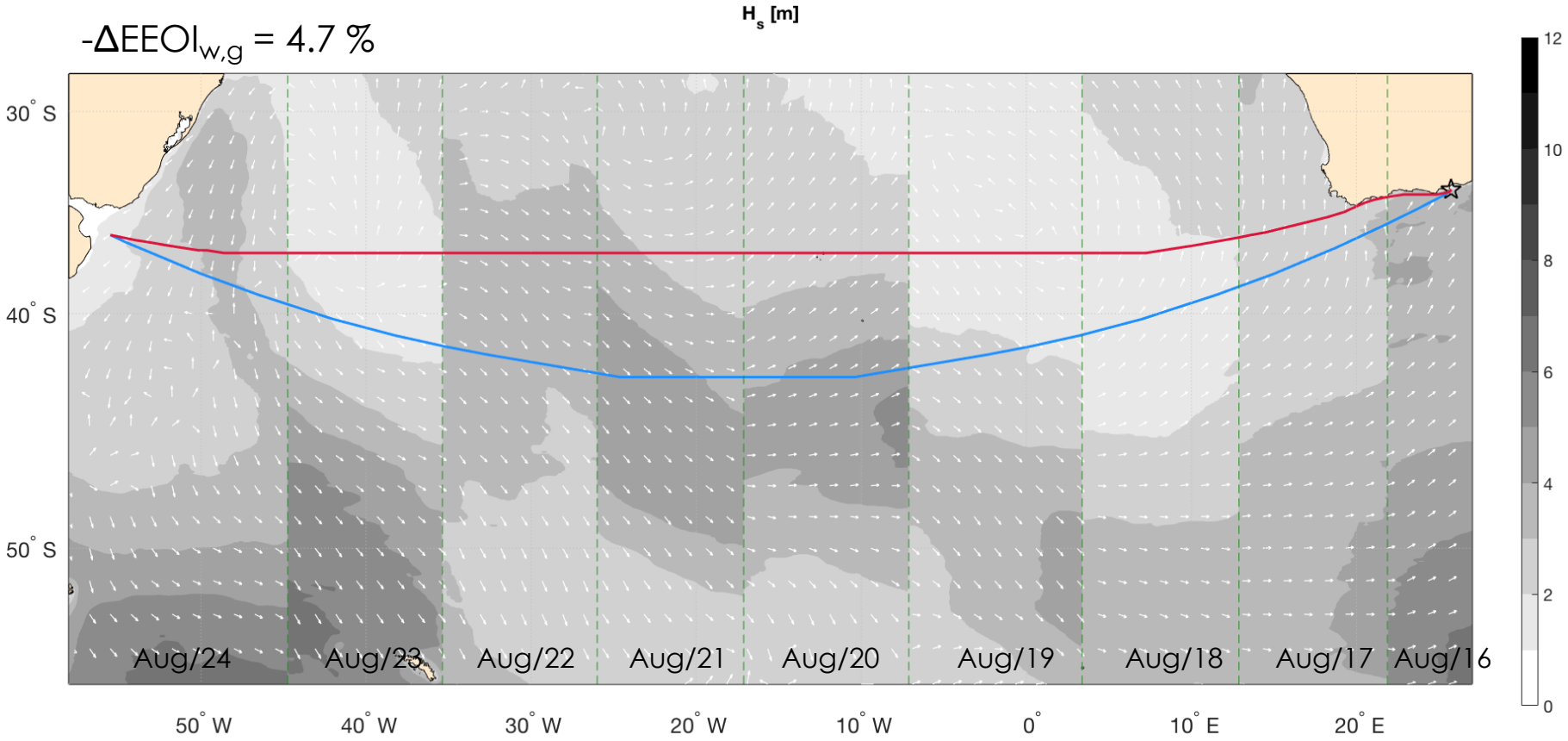
$-\Delta EEOI_{cw,g}$ = 7.3 %



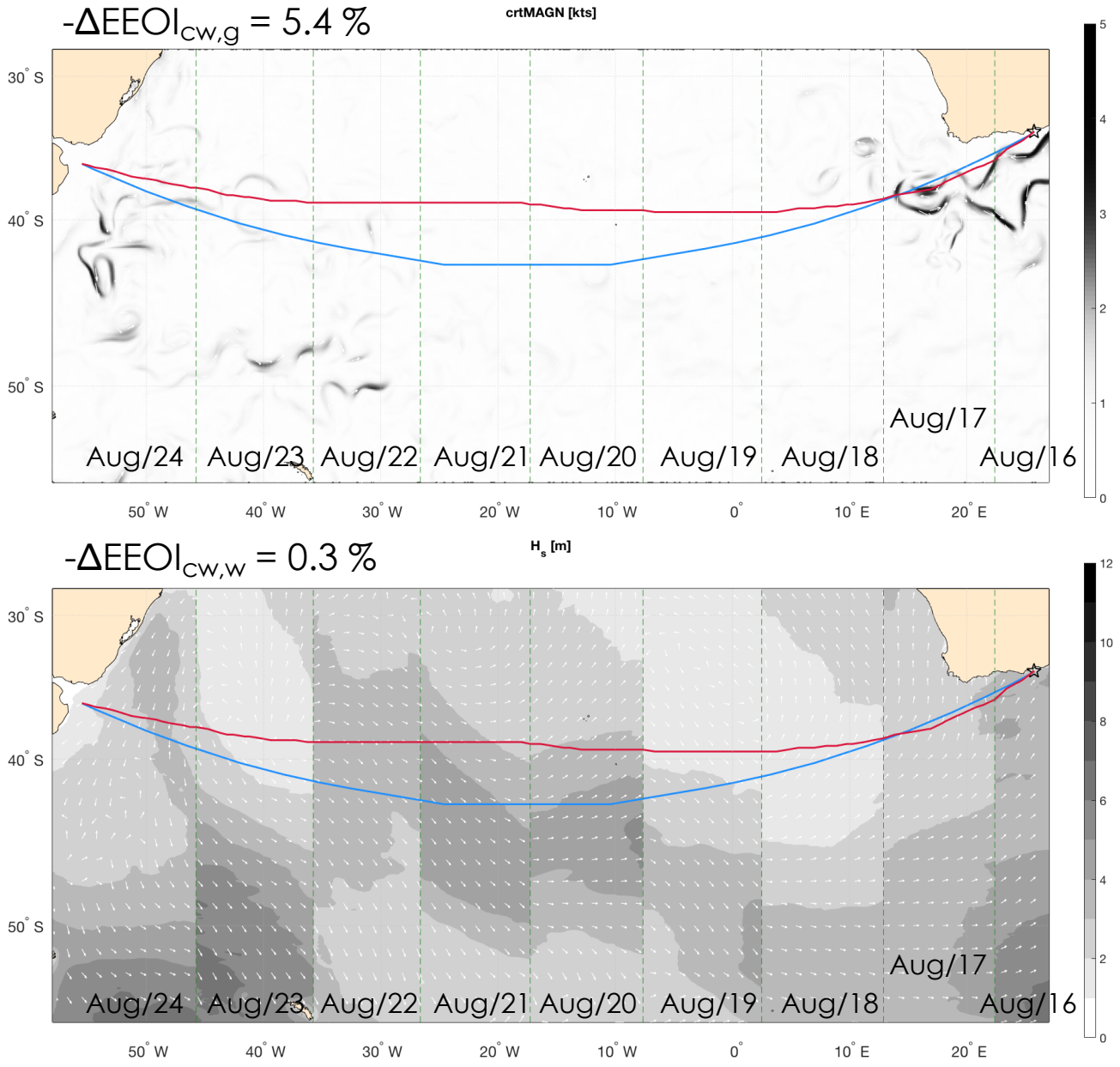
$-\Delta EEOI_{cw,w}$ = -4.8 %

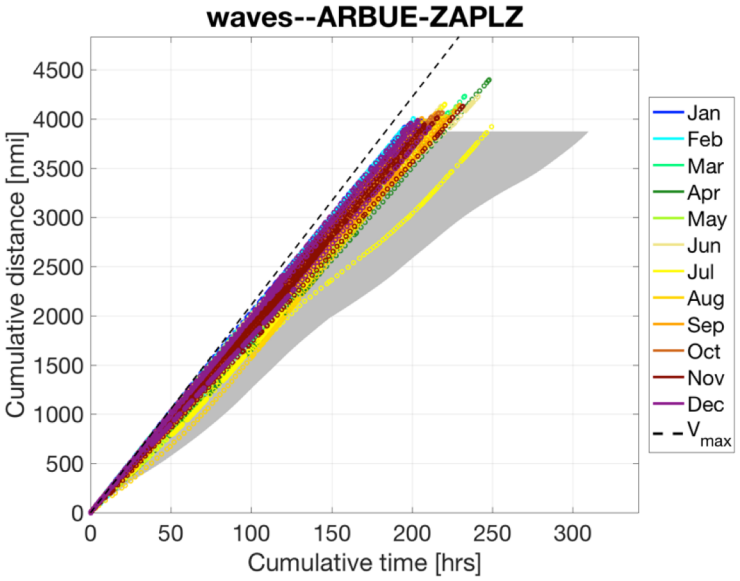


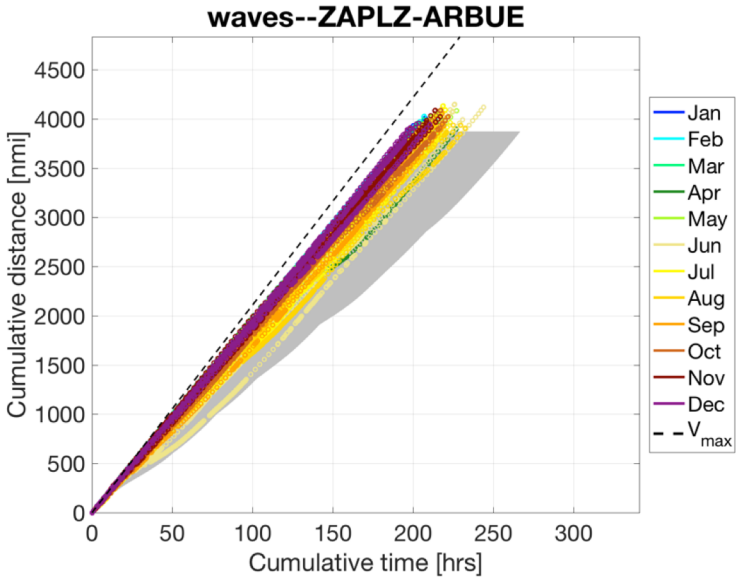
Port Elizabeth - Buenos Aires, waves, 16 Aug

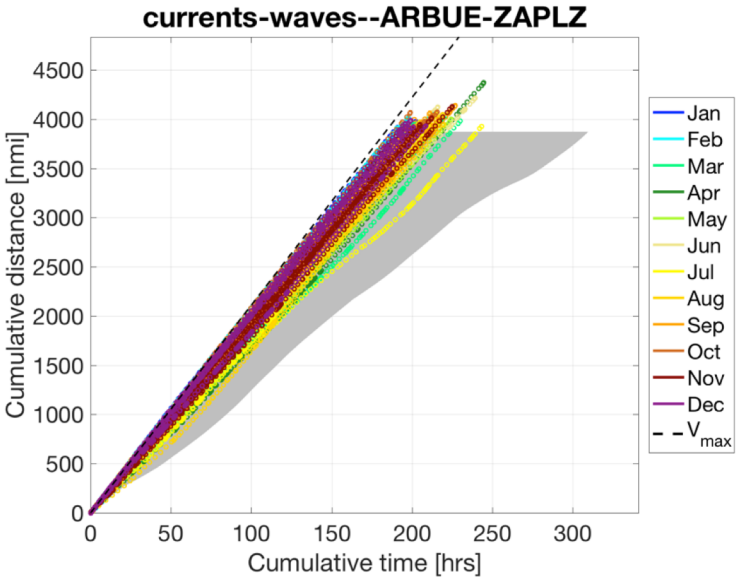


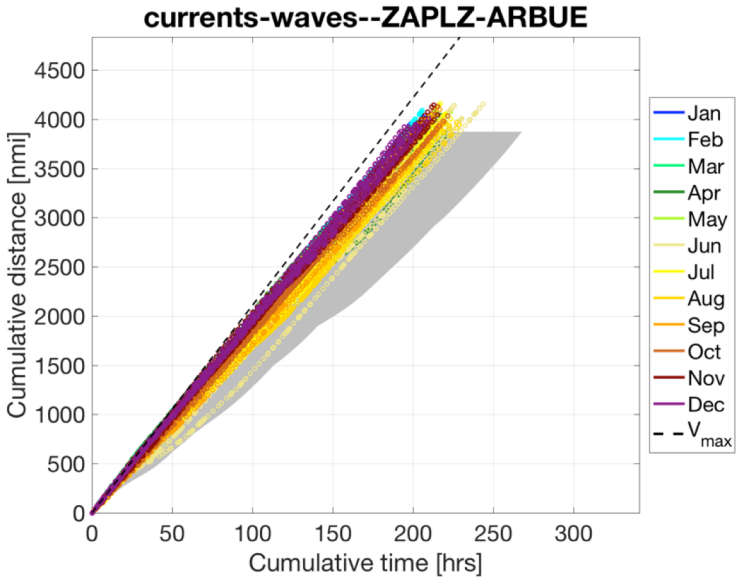
Port Elizabeth - Buenos Aires, currents and waves, 16 Aug

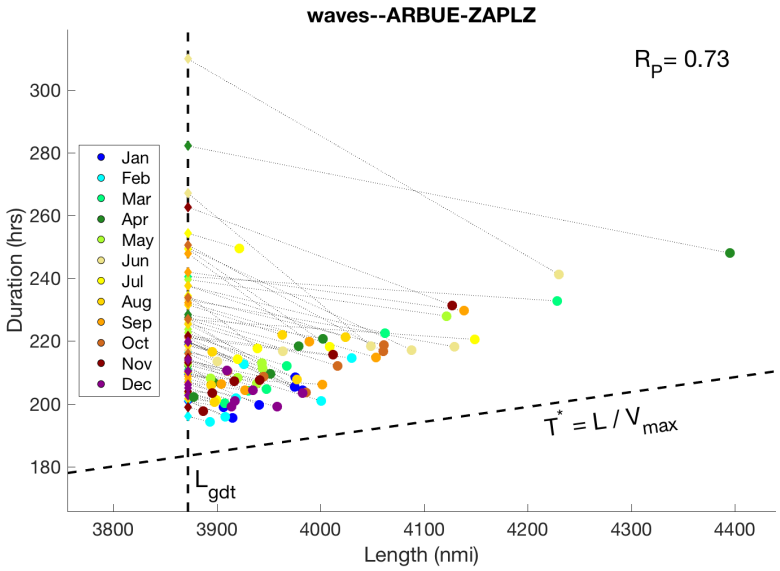


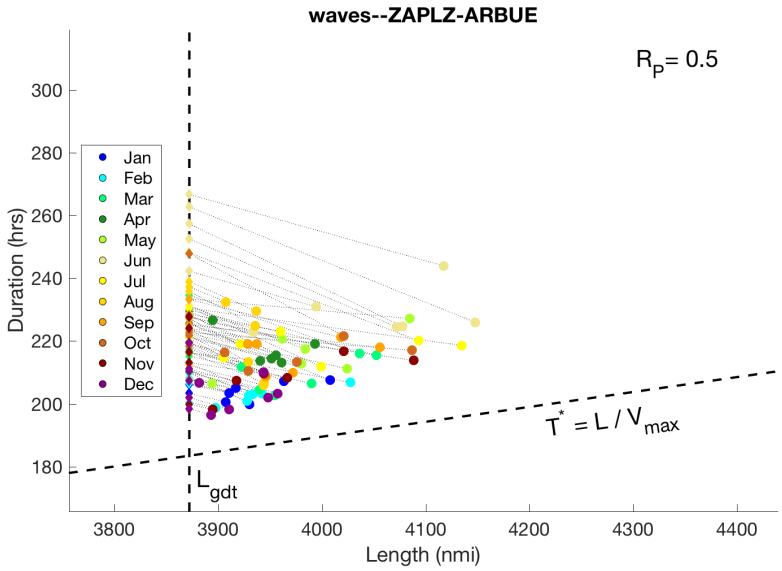

waves--ARBUE-ZAPLZ
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
4000
4500
0
50
100
150
200
250
300
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

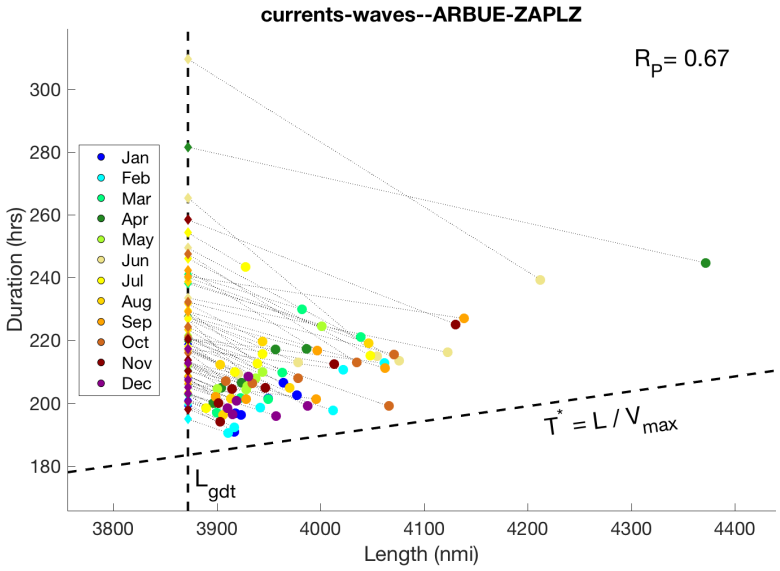

waves--ZAPLZ-ARBUE
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
4000
4500
0
50
100
150
200
250
300
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

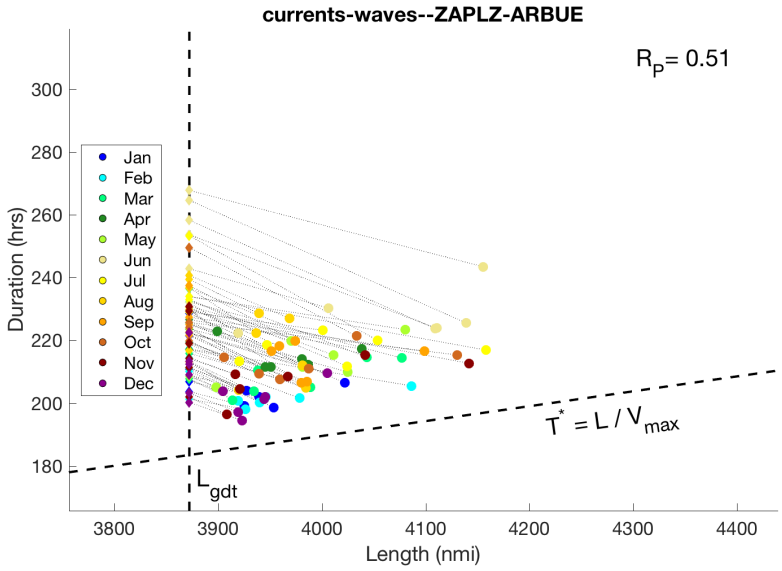

currents-waves--ARBUE-ZAPLZ
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
4000
4500
0
50
100
150
200
250
300
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

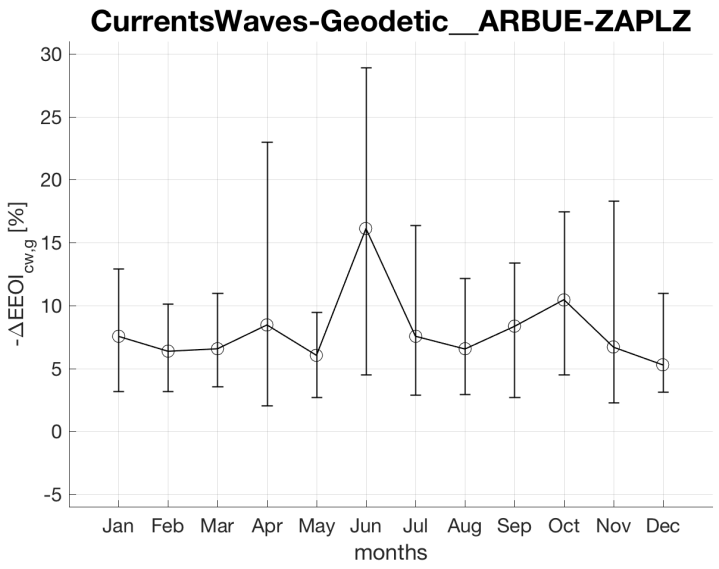

currents-waves--ZAPLZ-ARBUE
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
4000
4500
0
50
100
150
200
250
300
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

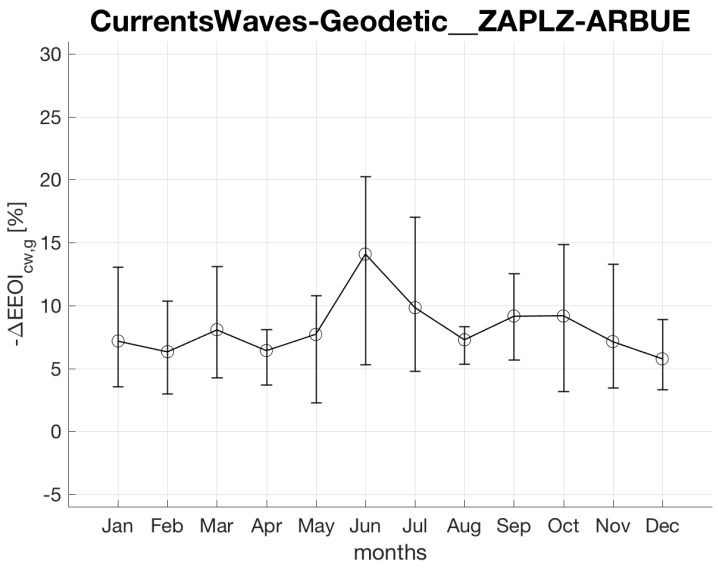

waves--ARBUE-ZAPLZ
R_P= 0.73
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}

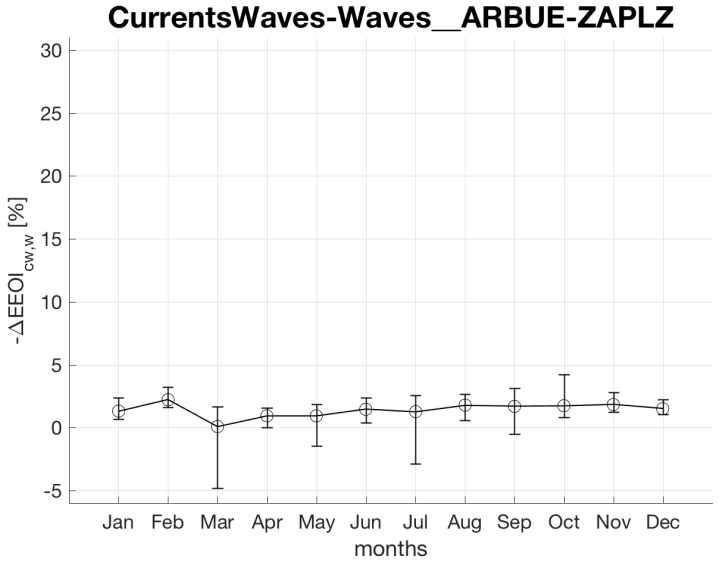

waves--ZAPLZ-ARBUE
R_P= 0.5
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}

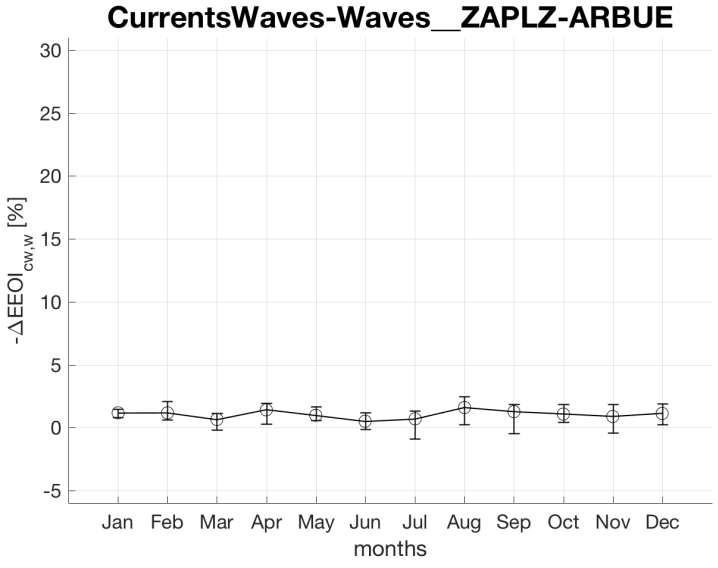

currents-waves--ARBUE-ZAPLZ
R_P= 0.67
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}


currents-waves--ZAPLZ-ARBUE
R_P= 0.51
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}


CurrentsWaves-Geodetic__ARBUE-ZAPLZ
-ΔEEOI cw,g [%]
30
25
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

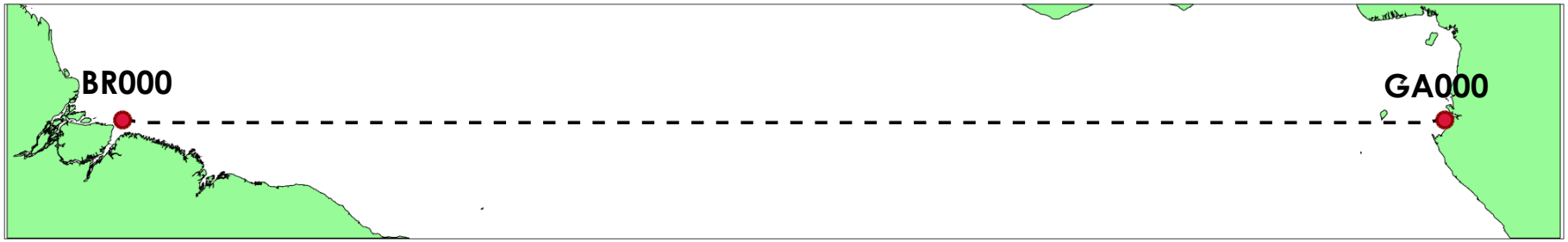

CurrentsWaves-Geodetic__ZAPLZ-ARBUE
-ΔEEOI cw,g [%]
30
25
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months


CurrentsWaves-Waves__ARBUE-ZAPLZ
-ΔEEOI cw,w [%]
30
25
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

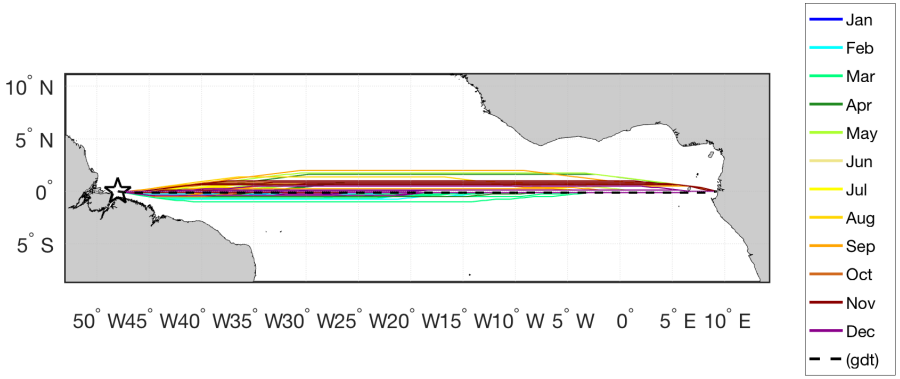

CurrentsWaves-Waves__ZAPLZ-ARBUE
-ΔEEOI cw,w [%]
30
25
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

←Index

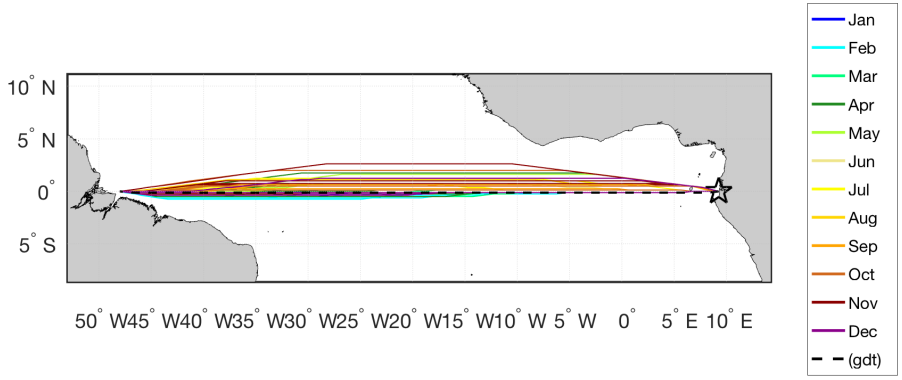
2. Equator route



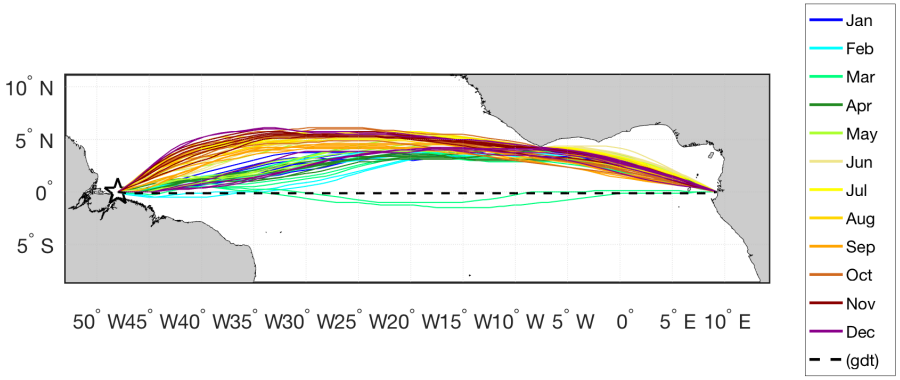
waves--BR000-GA000



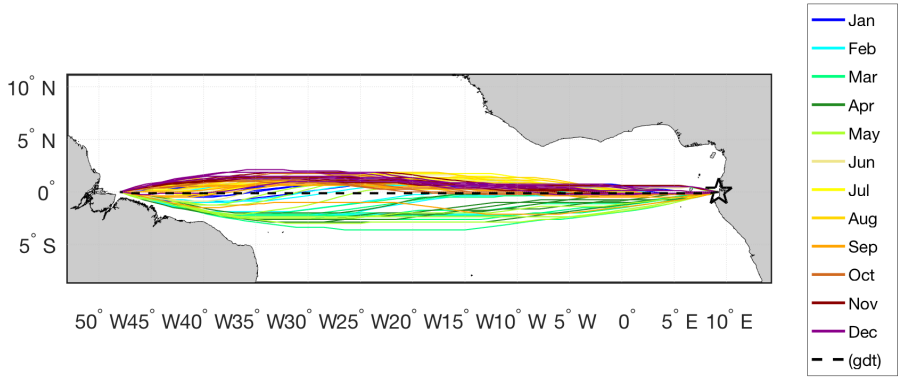
waves--GA000-BR000



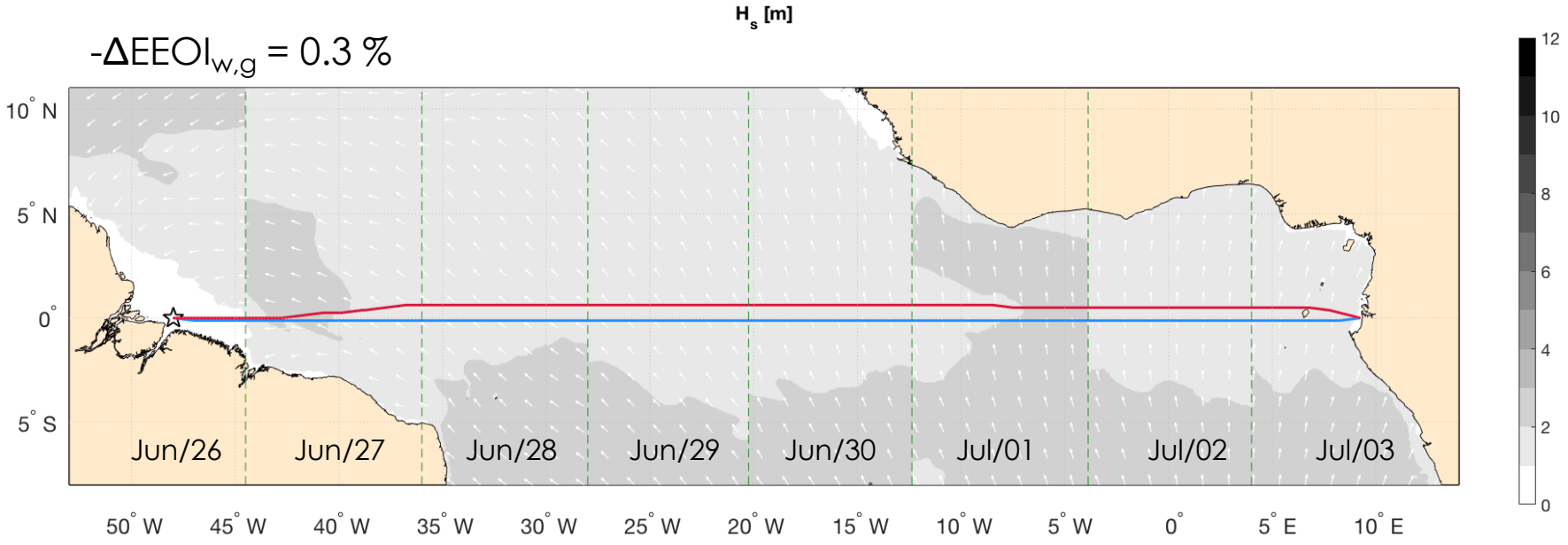
current-waves--BR000-GA000



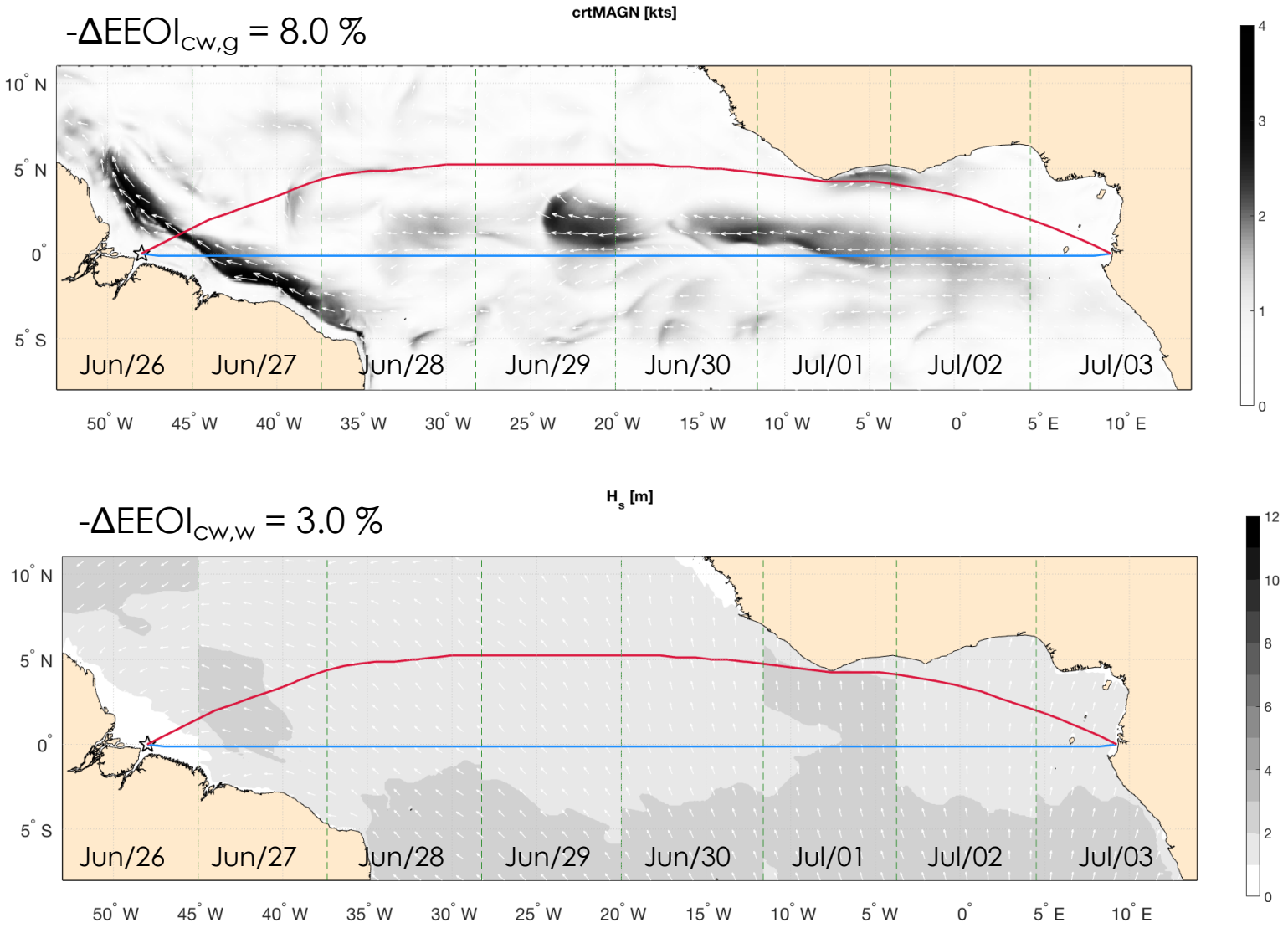
current-waves--GA000-BR000



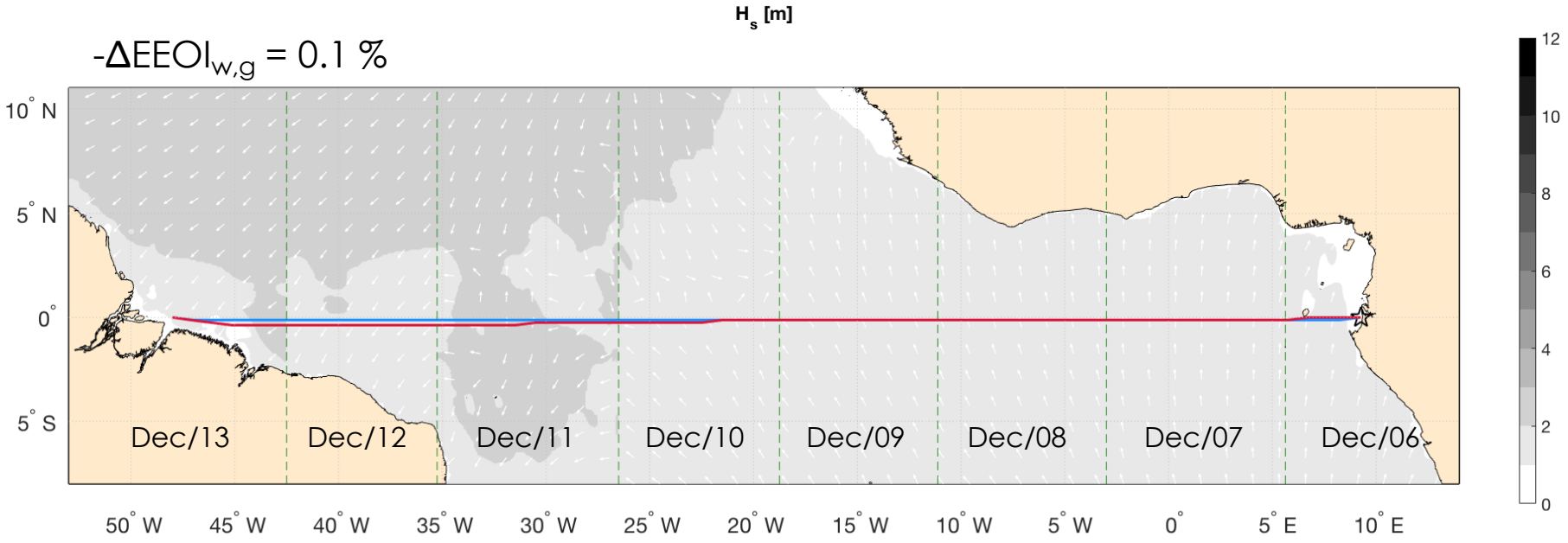
Brazil - Gabon, waves, 26 Jun



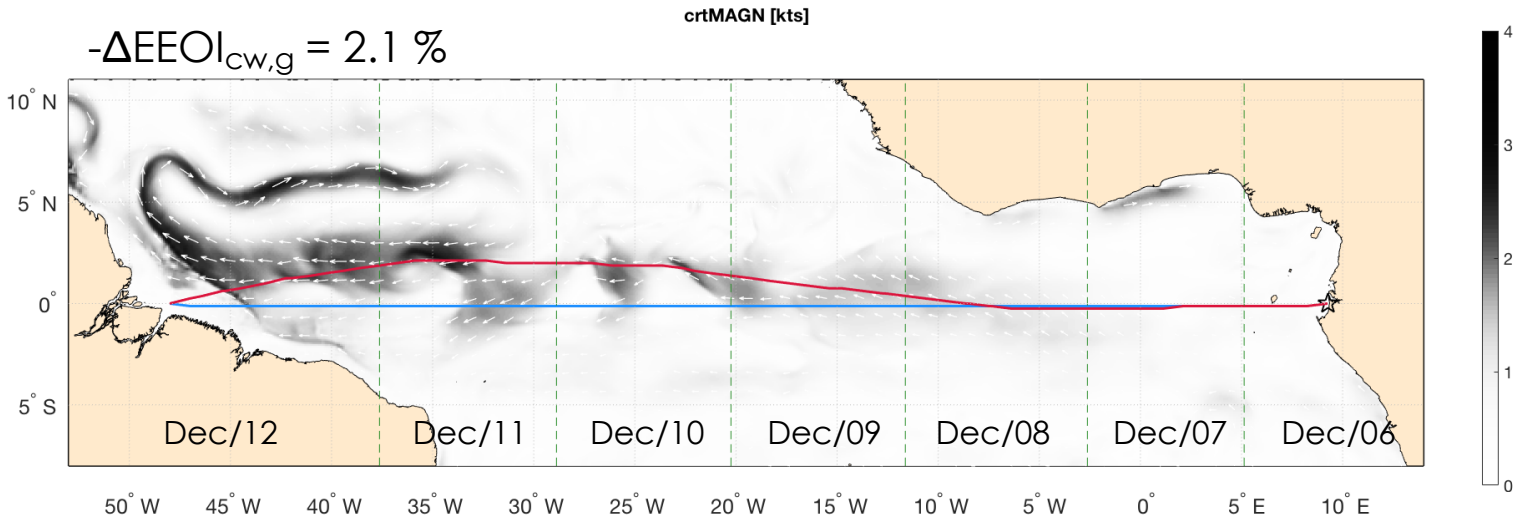
Brazil - Gabon, currents and waves, 26 Jun

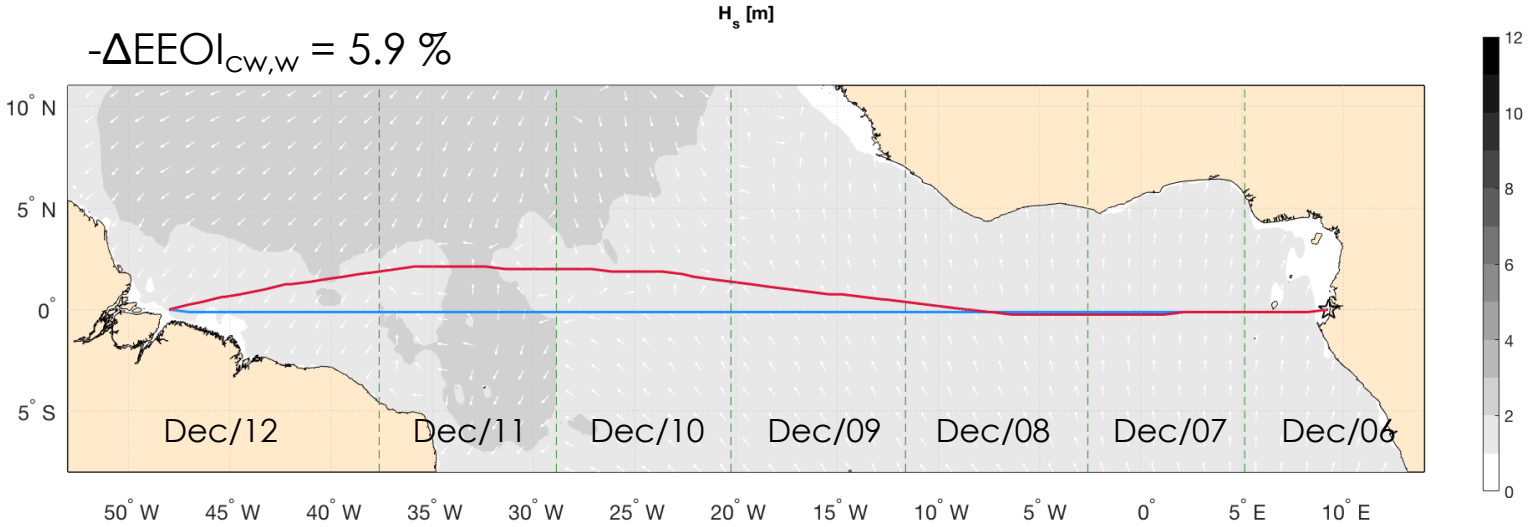


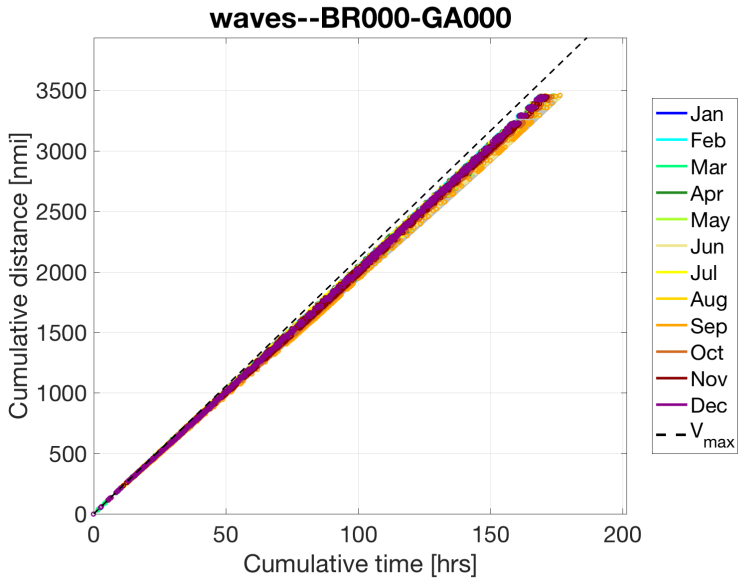
Gabon - Brazil, waves, 06 Dec

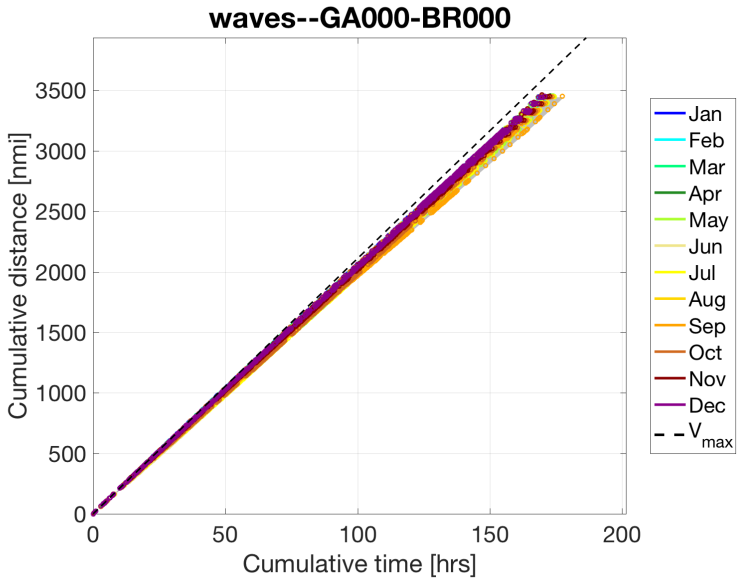


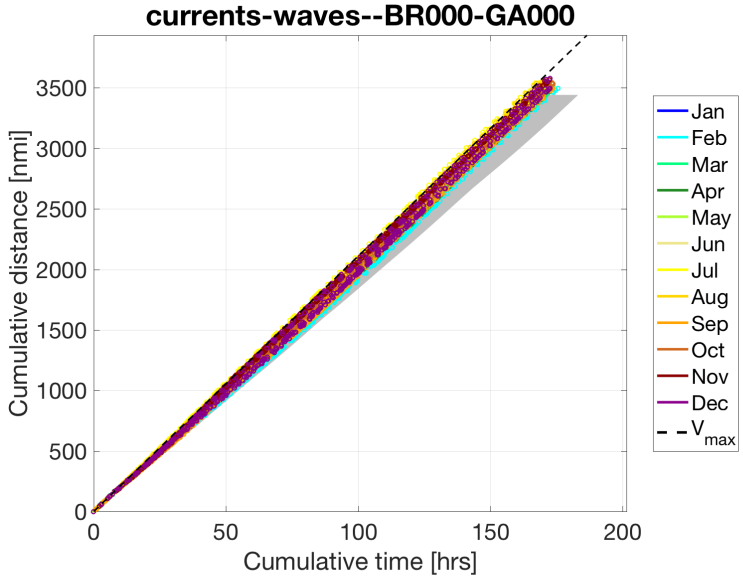
Gabon - Brazil, currents and waves, 06 Dec

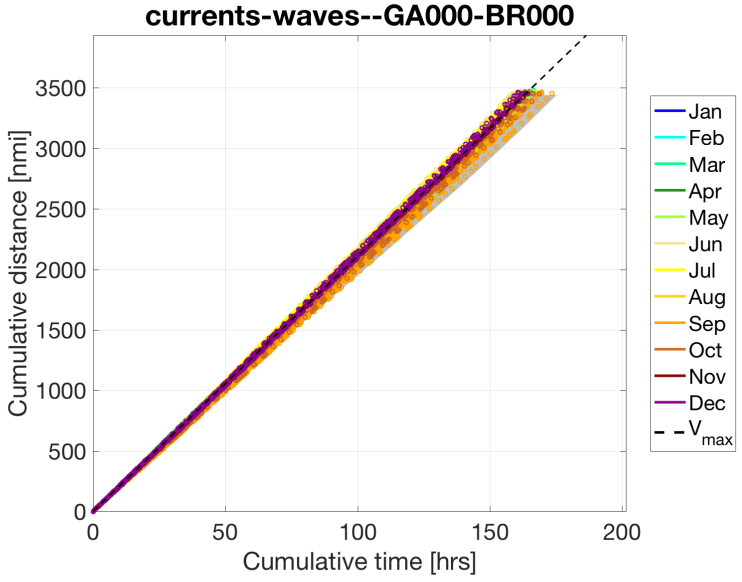


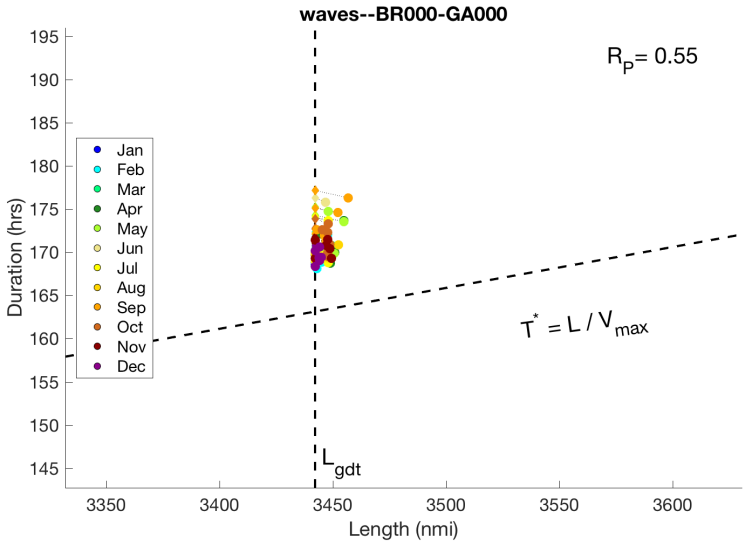


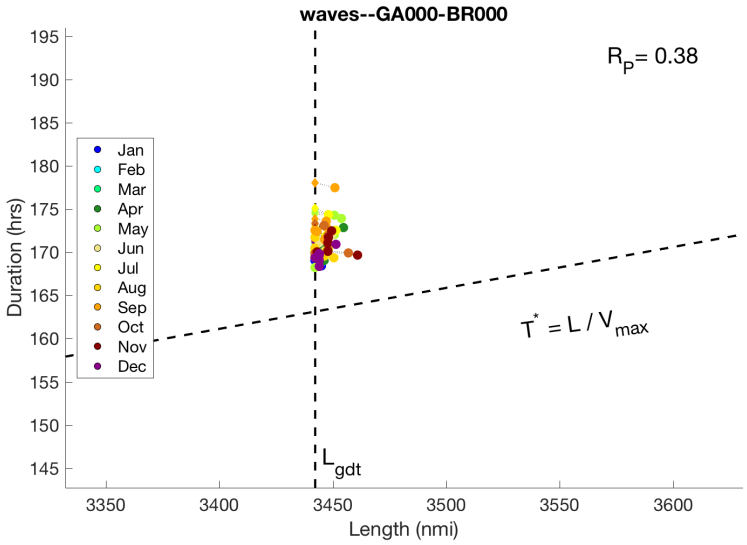

waves--BR000-GA000
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
0
50
100
150
200
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

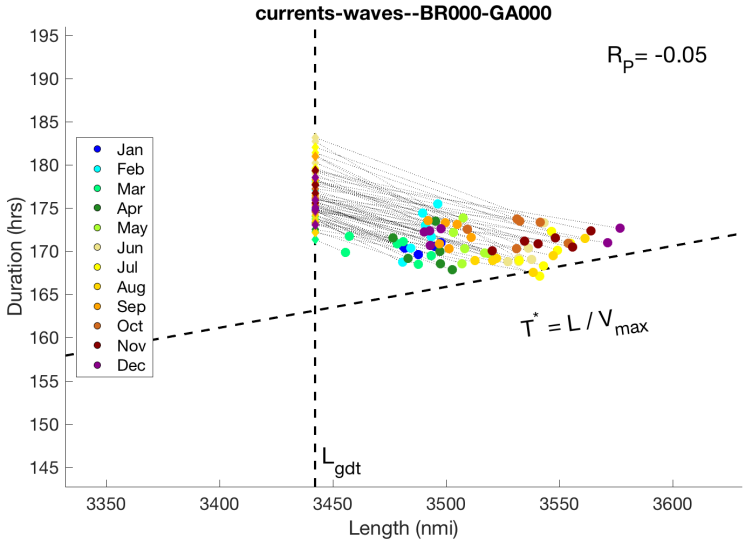

waves--GA000-BR000
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
0
50
100
150
200
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

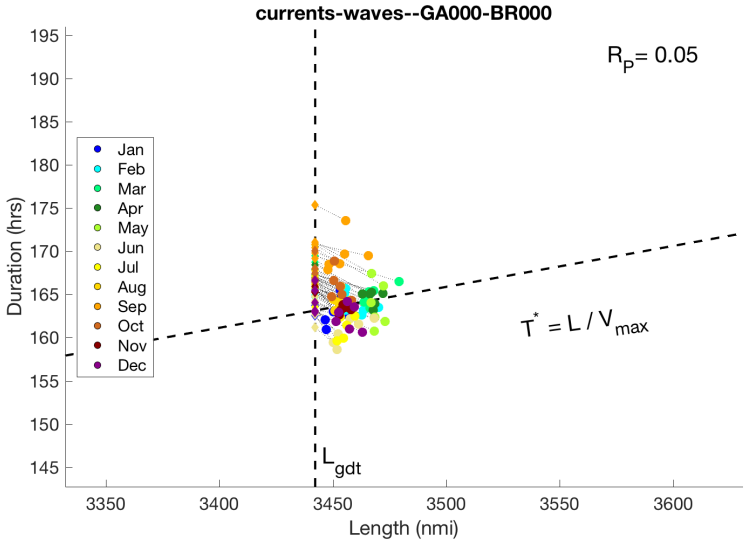

currents-waves--BR000-GA000
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
0
50
100
150
200
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

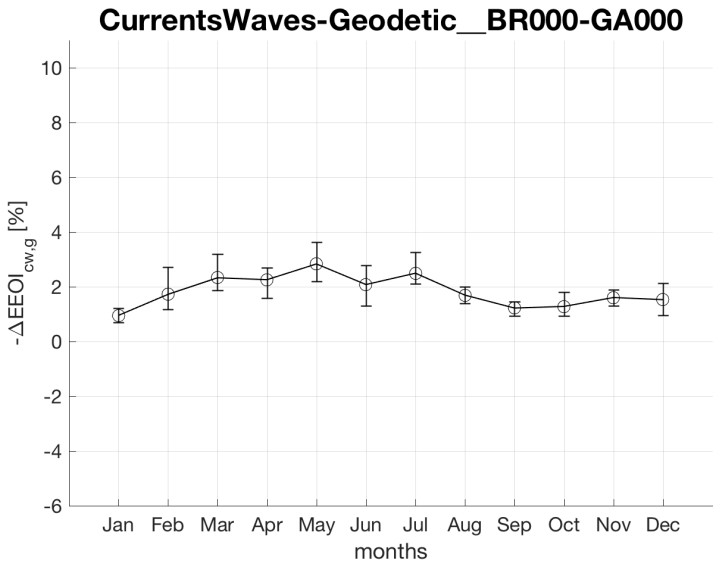

currents-waves--GA000-BR000
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
0
50
100
150
200
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

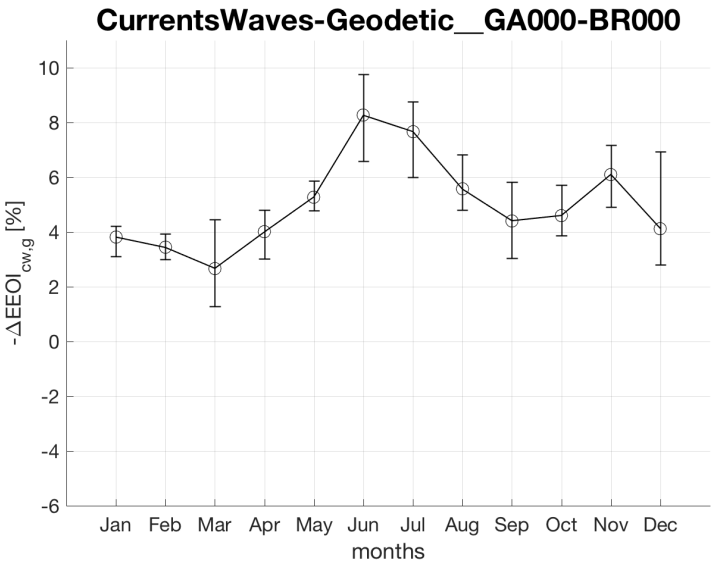

waves--BR000-GA000
R_P= 0.55
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

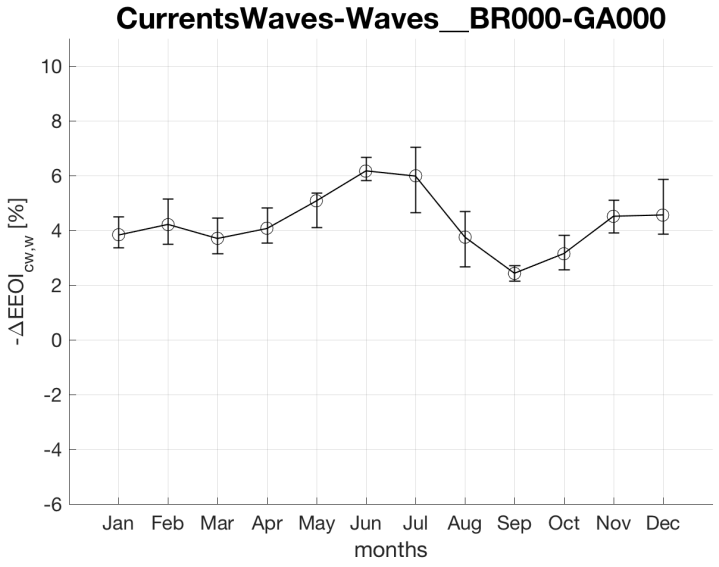

waves--GA000-BR000
R_P= 0.38
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

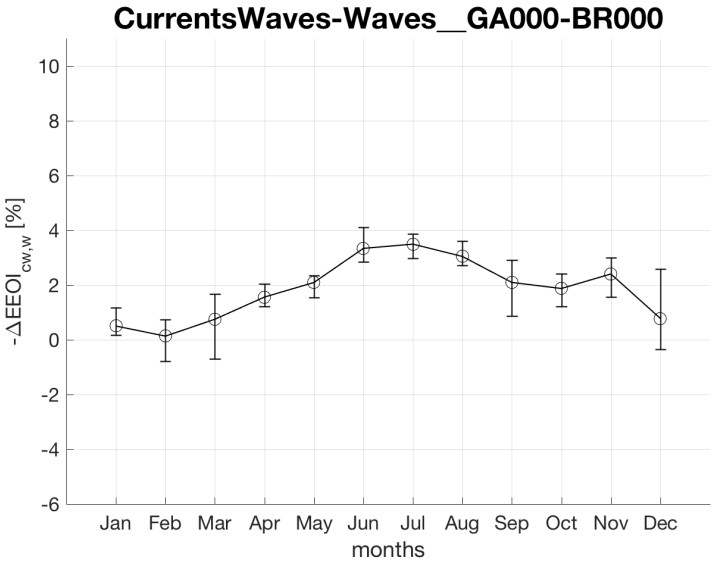

currents-waves--BR000-GA000
R_P= -0.05
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


currents-waves--GA000-BR000
R_P= 0.05
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


CurrentsWaves-Geodetic__BR000-GA000
-ΔEEOI cw,g [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

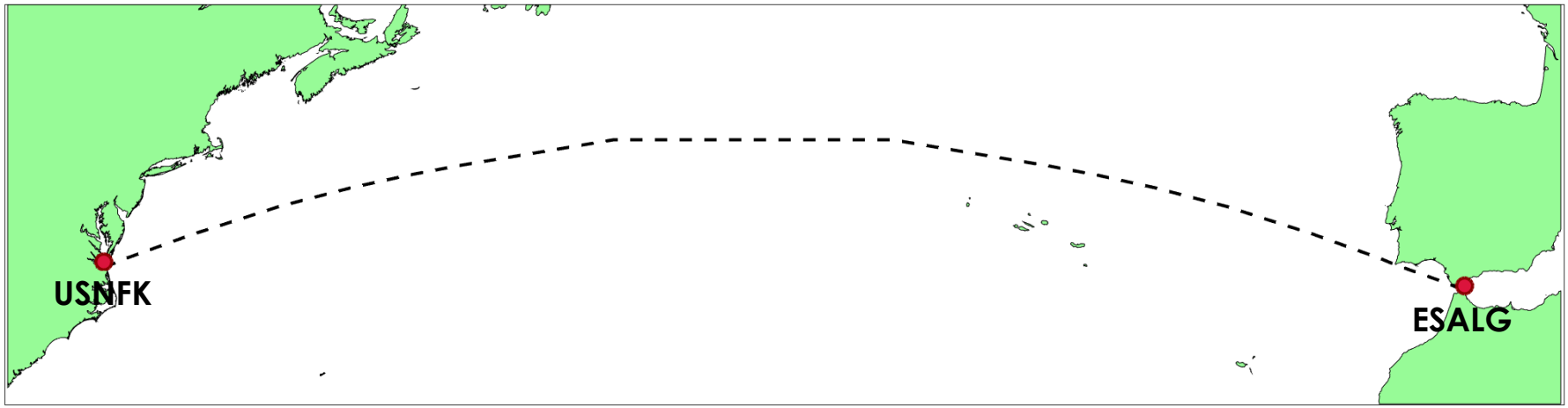

CurrentsWaves-Geodetic__GA000-BR000
-ΔEEOI cw,g [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

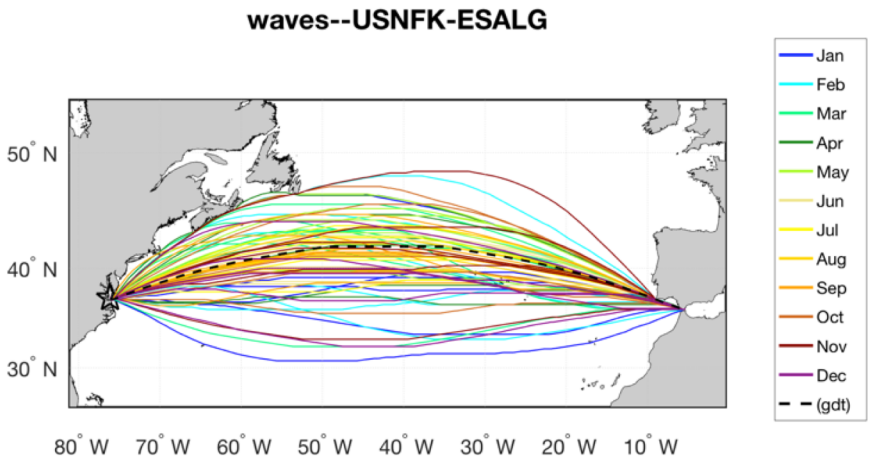

CurrentsWaves-Waves__BR000-GA000
-ΔEEOI cw,w [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

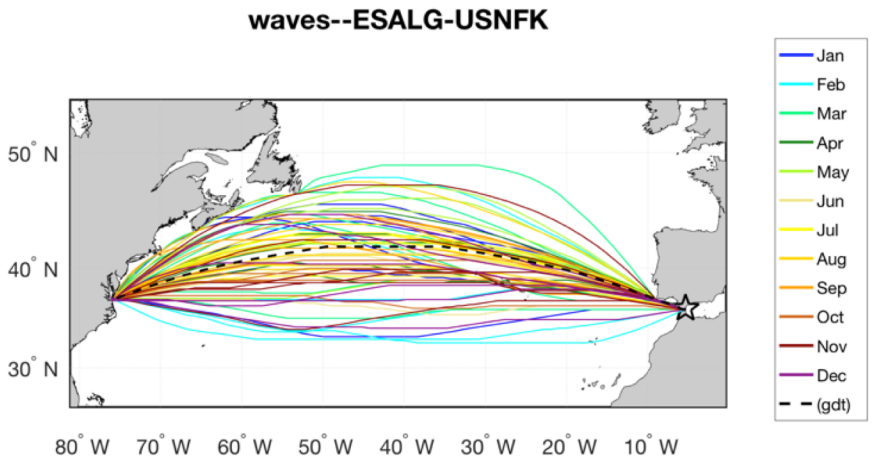

CurrentsWaves-Waves__GA000-BR000
-ΔEEOI cw,w [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

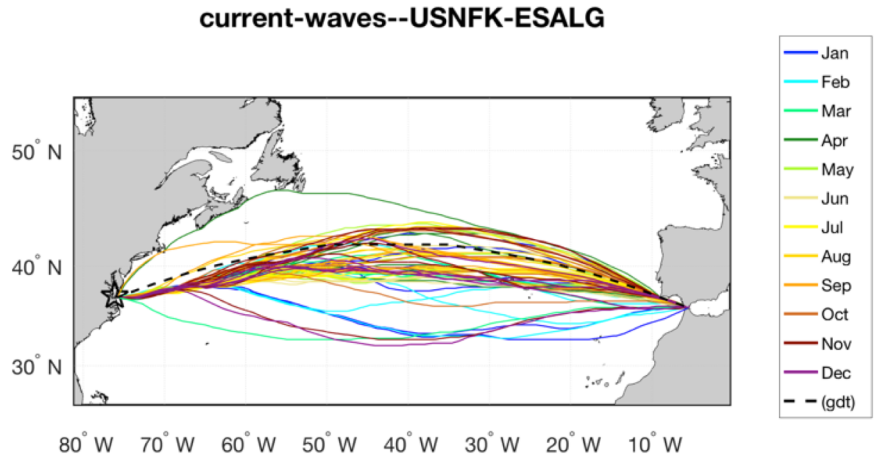
←Index

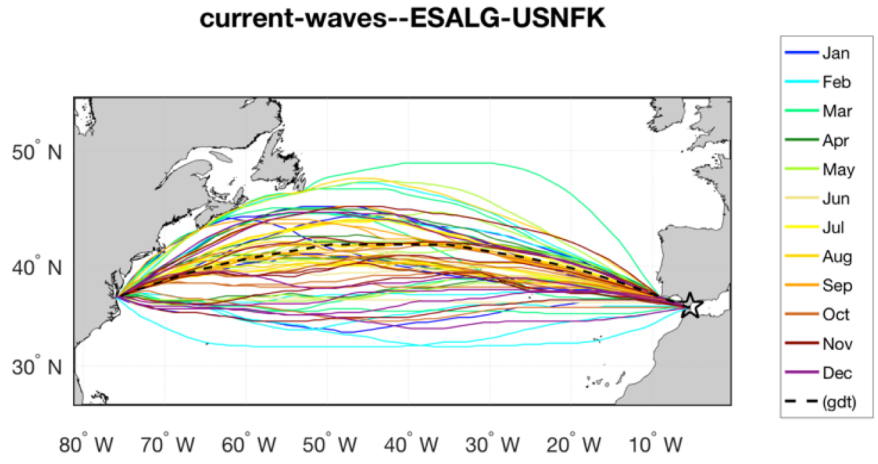
3. Norfolk - Algeciras



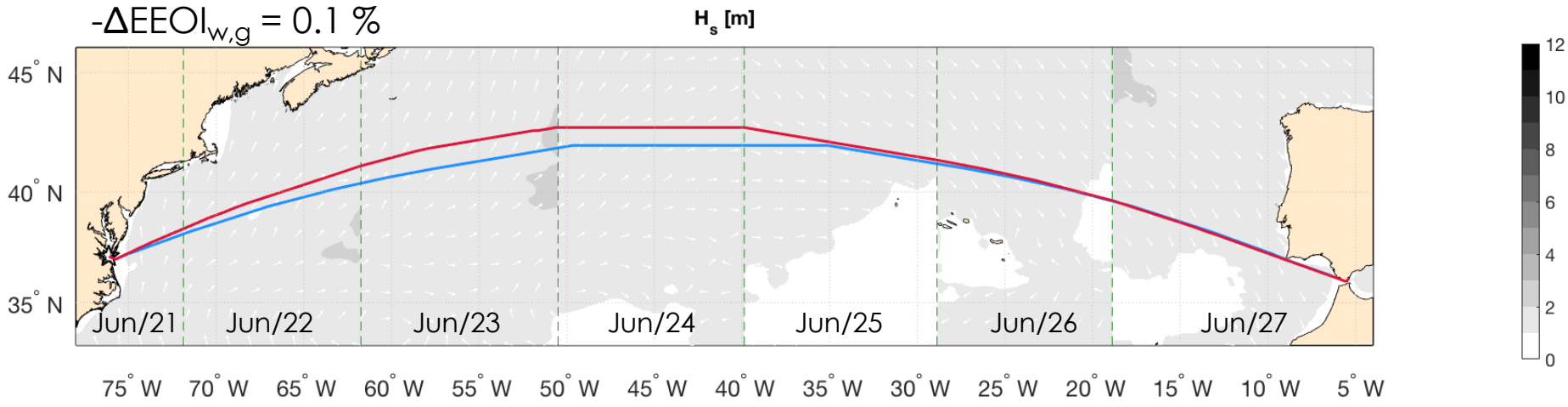

waves--USNFK-ESALG
50° N
40° N
30° N
80° W 70° W 60° W 50° W 40° W 30° W 20° W 10° W
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)


waves--ESALG-USNFK
50° N
40° N
30° N
80° W 70° W 60° W 50° W 40° W 30° W 20° W 10° W
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

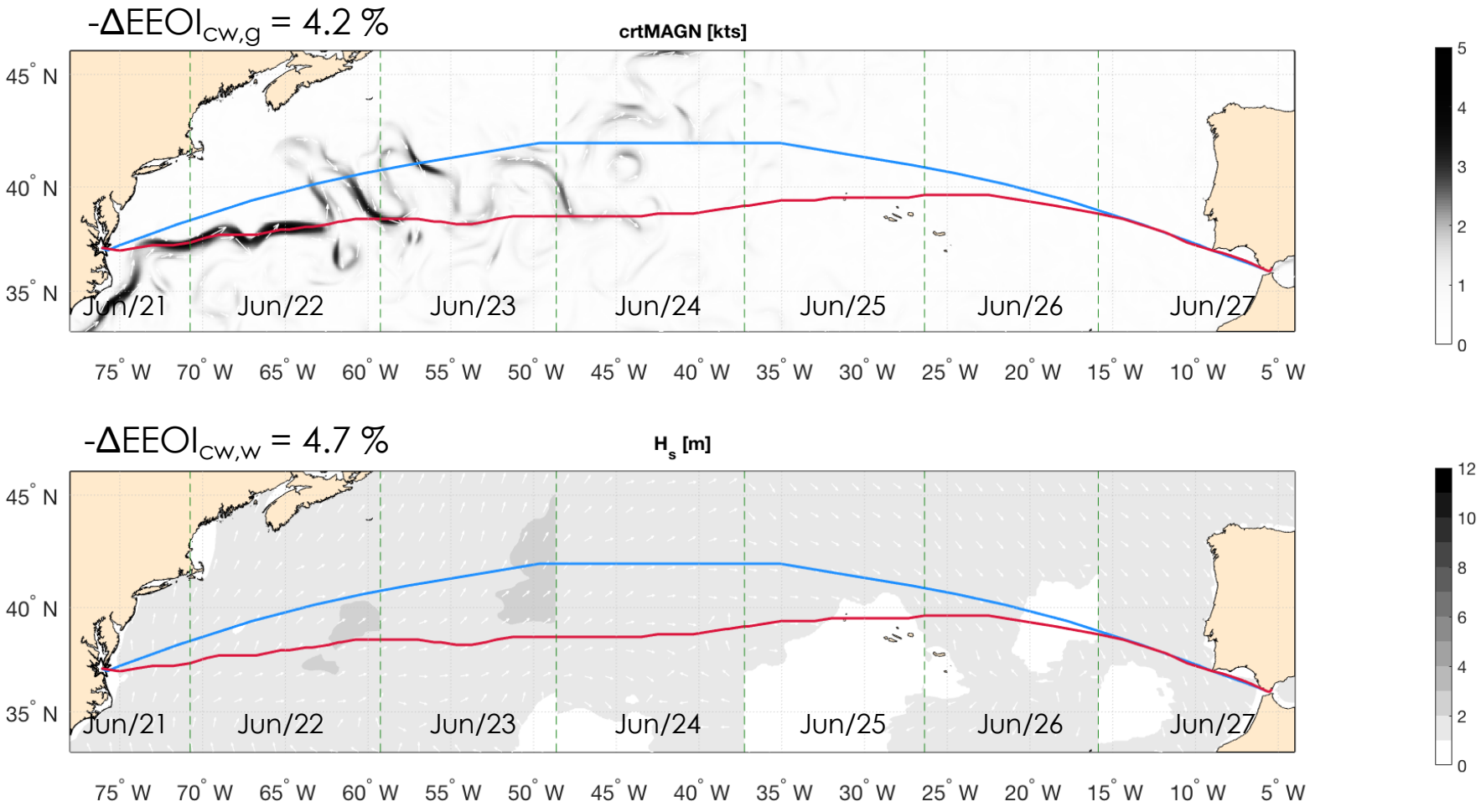

current-waves--USNFK-ESALG
50° N
40° N
30° N
80° W 70° W 60° W 50° W 40° W 30° W 20° W 10° W
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)


current-waves--ESALG-USNFK
50° N
40° N
30° N
80° W 70° W 60° W 50° W 40° W 30° W 20° W 10° W
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

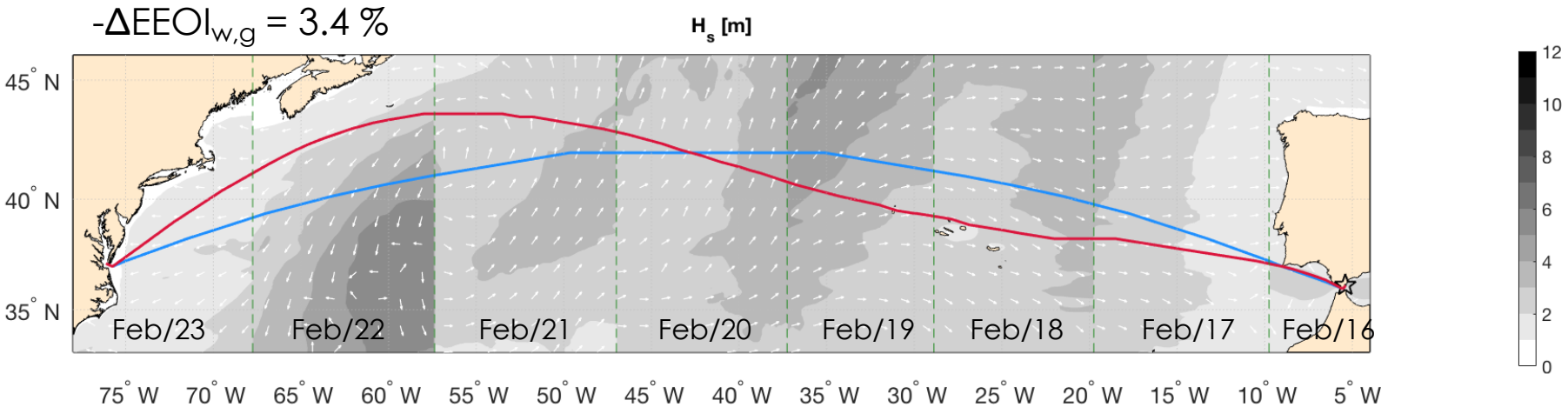
Norfolk - Algeciras, waves, 21 Jun



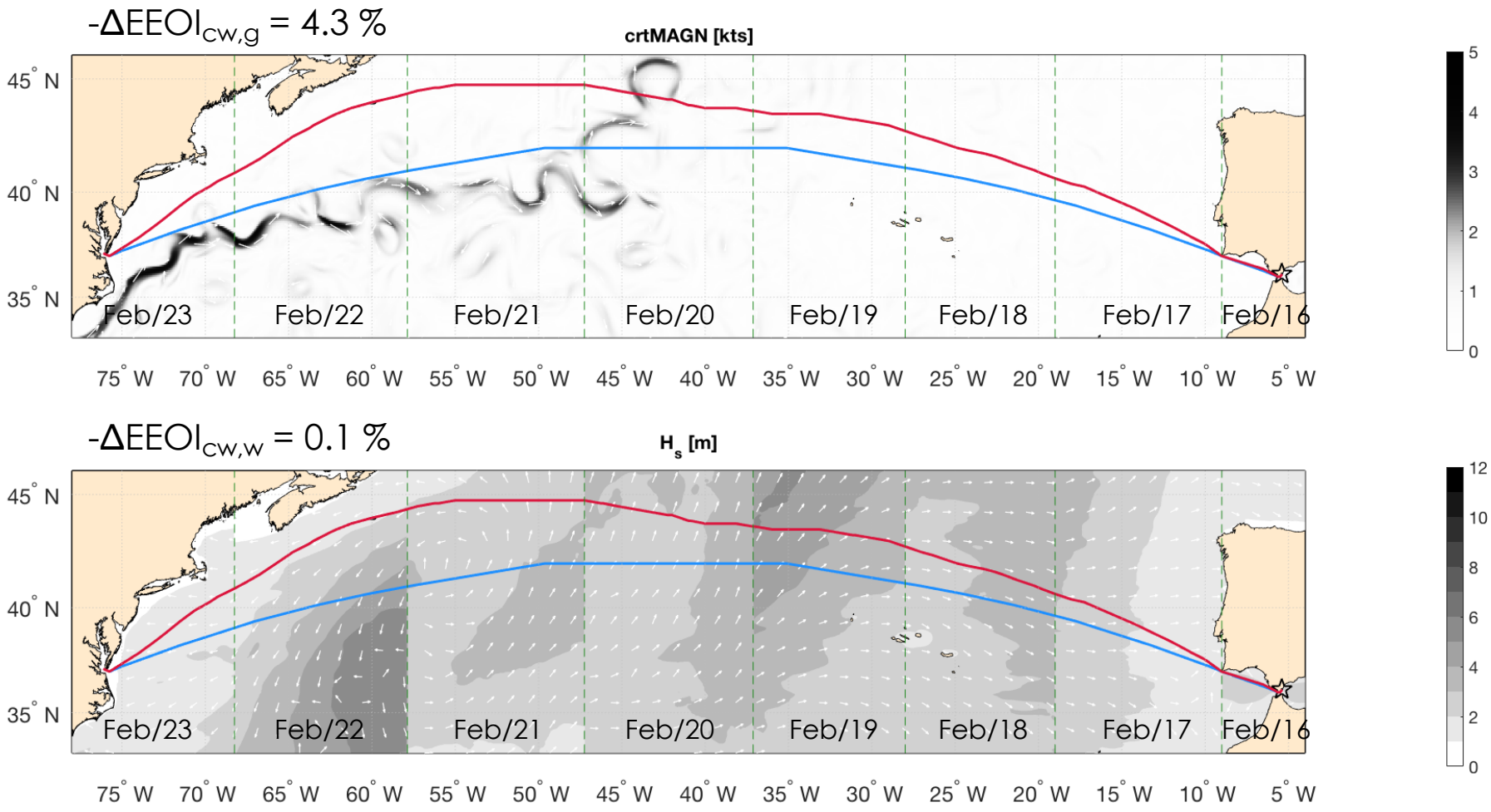
Norfolk - Algeciras, currents and waves, 21 Jun

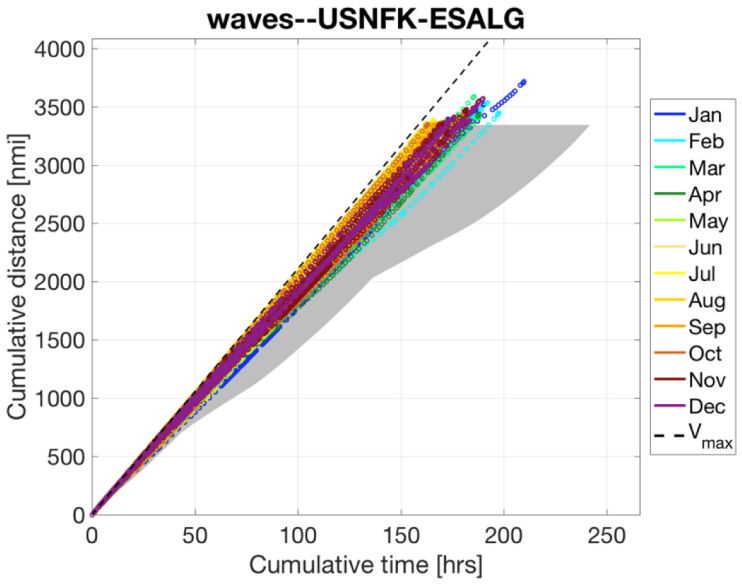


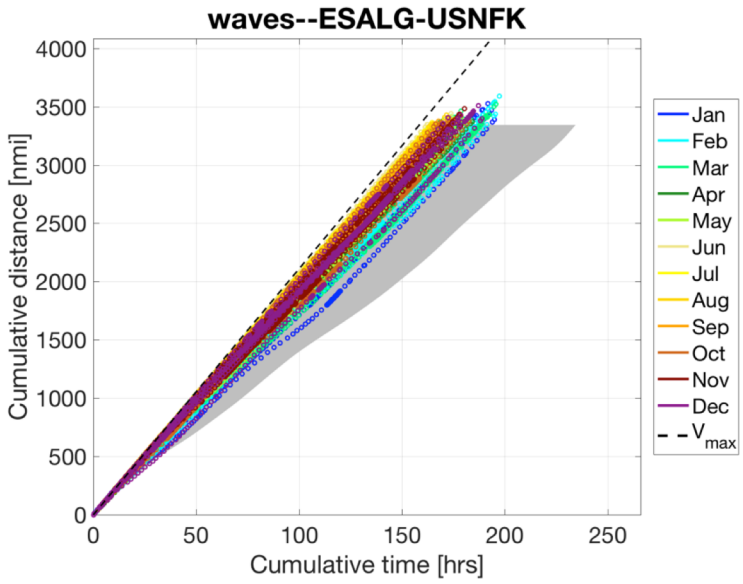
Algeciras - Norfolk, waves, 16 Feb

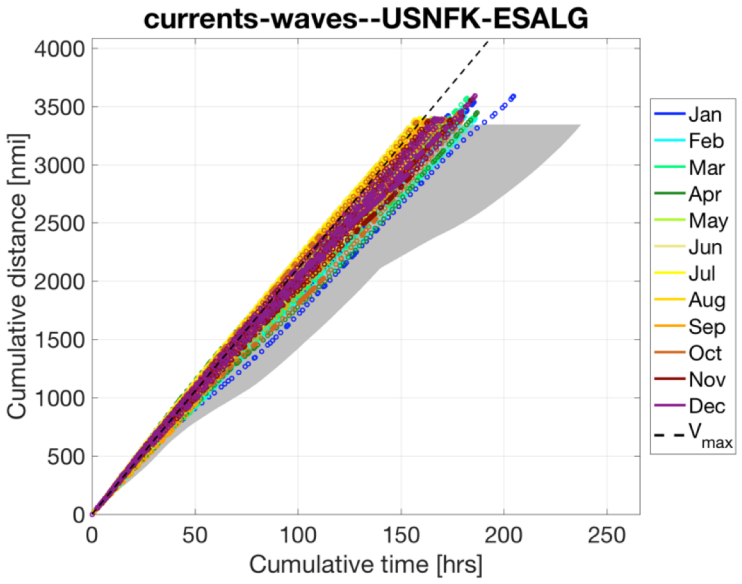


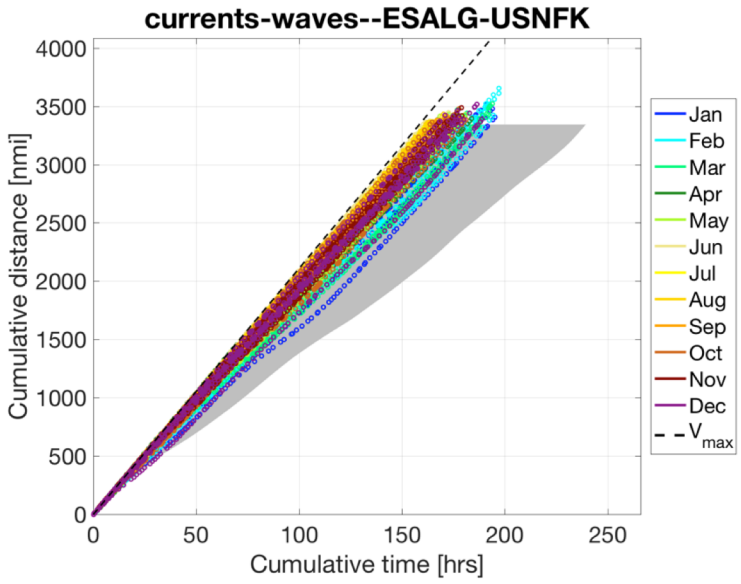
Algeciras - Norfolk, currents and waves, 16 Feb

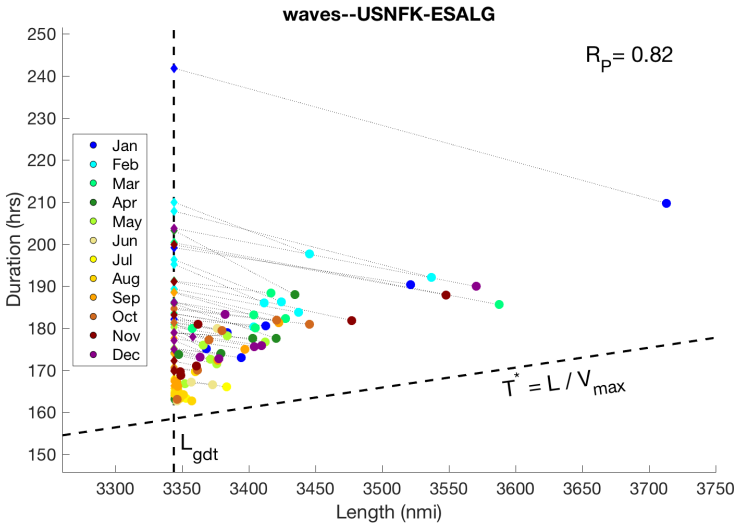


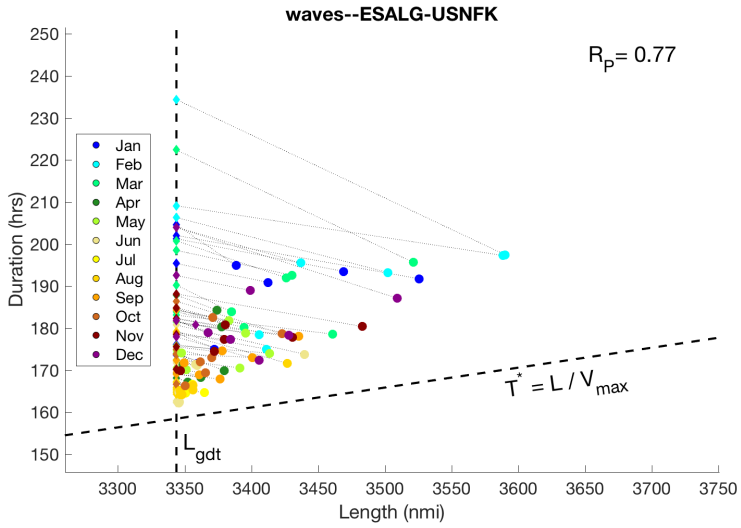

waves--USNFK-ESALG
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
4000
0
50
100
150
200
250
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

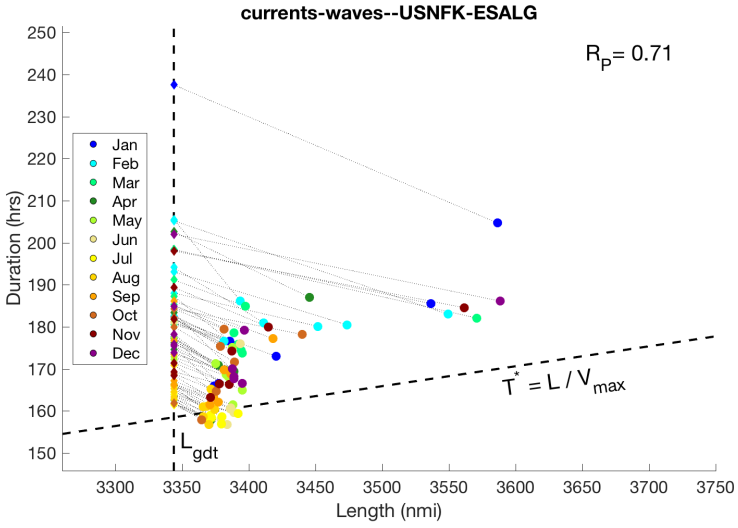

waves--ESALG-USNFK
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
4000
0
50
100
150
200
250
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

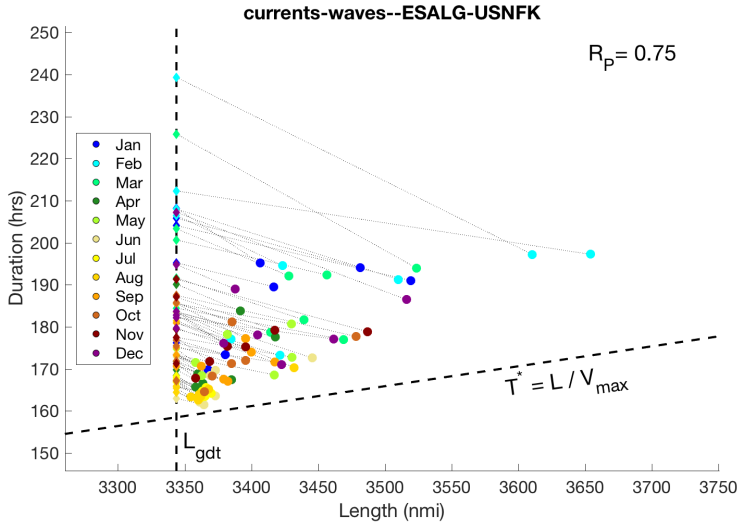

currents-waves--USNFK-ESALG
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
4000
0
50
100
150
200
250
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

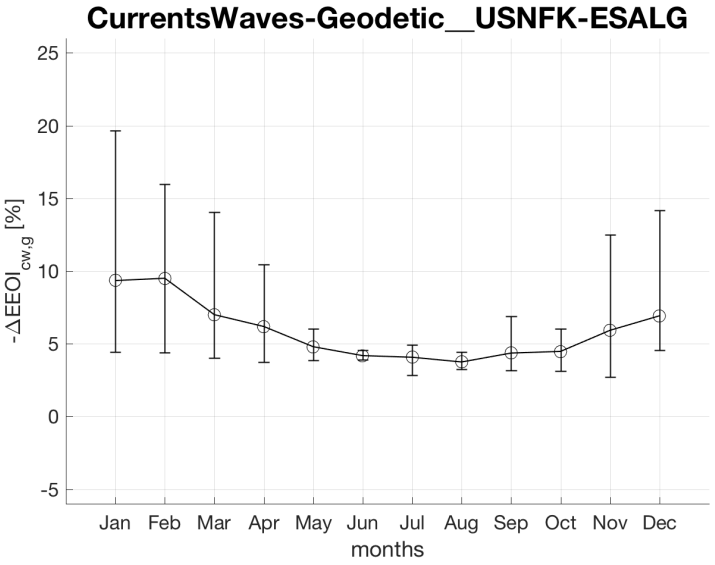

currents-waves--ESALG-USNFK
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
4000
0
50
100
150
200
250
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

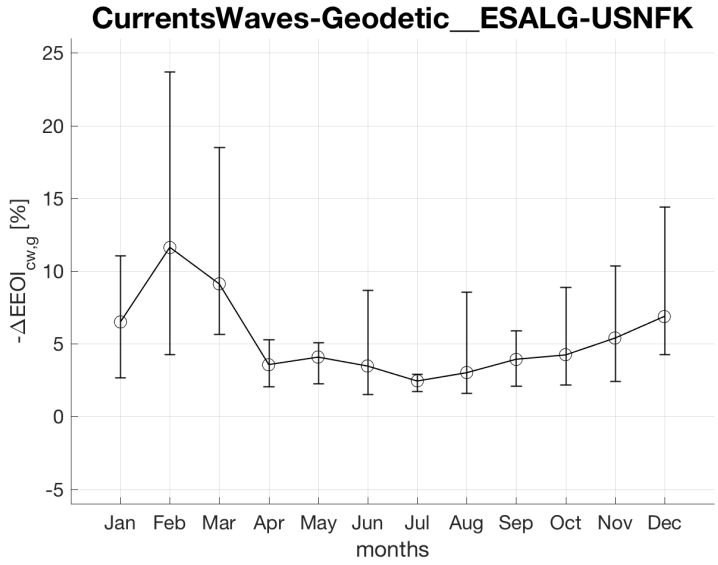

waves--USNFK-ESALG
R_P= 0.82
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

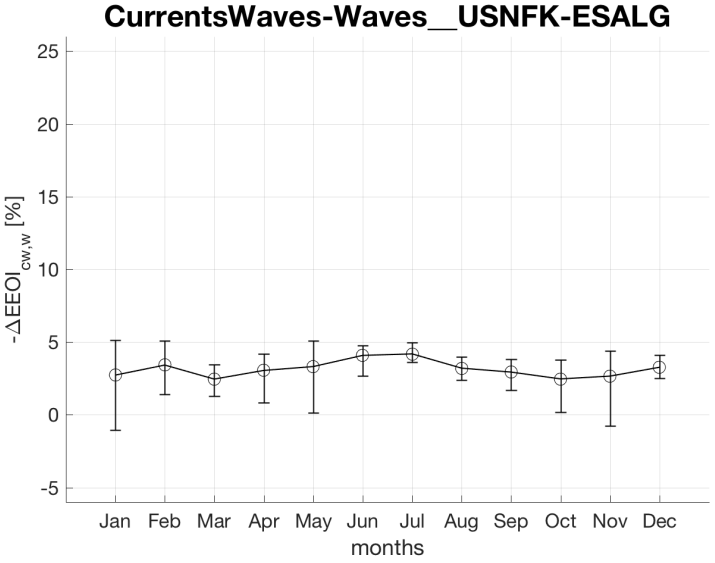

waves--ESALG-USNFK
R_P= 0.77
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

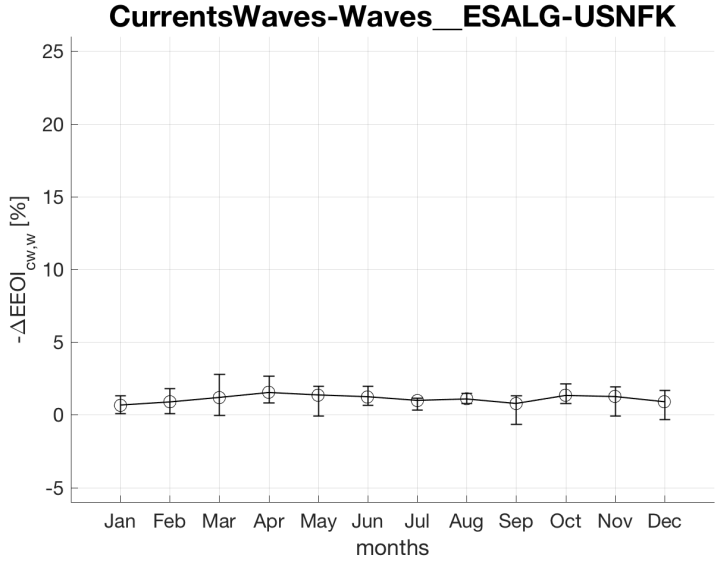

currents-waves--USNFK-ESALG
R_P= 0.71
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


currents-waves--ESALG-USNFK
R_P= 0.75
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


CurrentsWaves-Geodetic__USNFK-ESALG
-ΔEEOI cw,g [%]
25
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

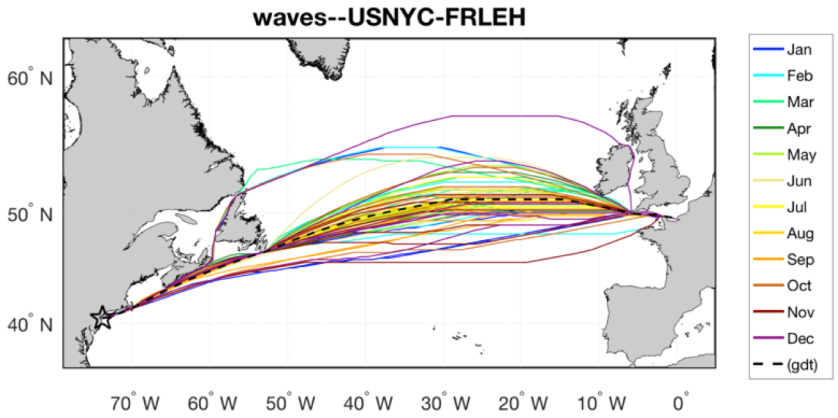

CurrentsWaves-Geodetic__ESALG-USNFK
-ΔEEOI cw,g [%]
25
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

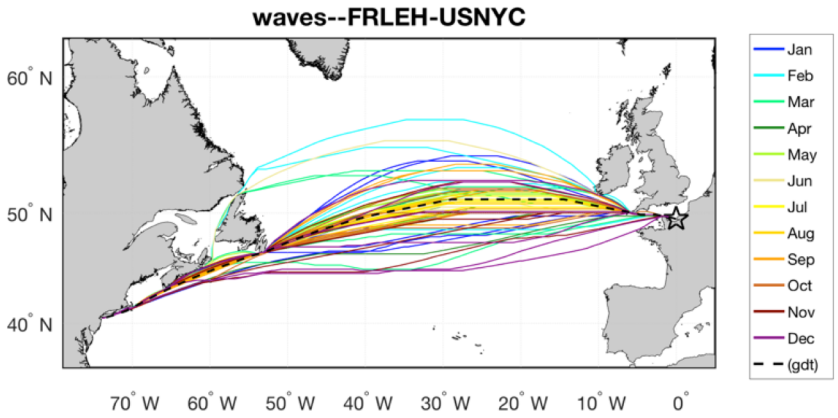

CurrentsWaves-Waves__USNFK-ESALG
-ΔEEOI cw,w [%]
25
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

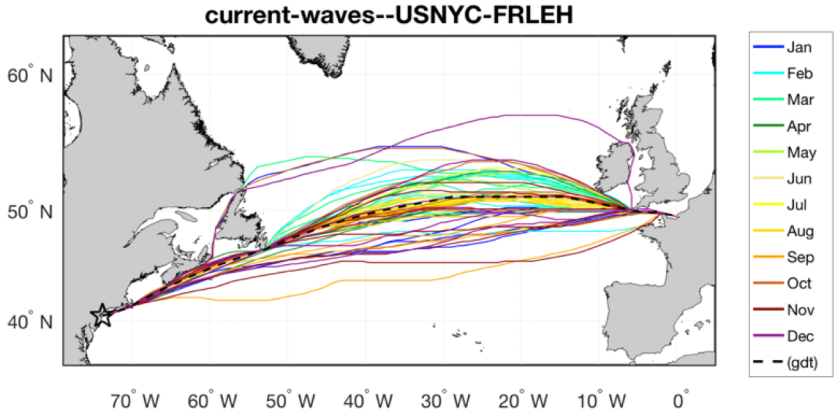

CurrentsWaves-Waves__ESALG-USNFK
-ΔEEOI cw,w [%]
25
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

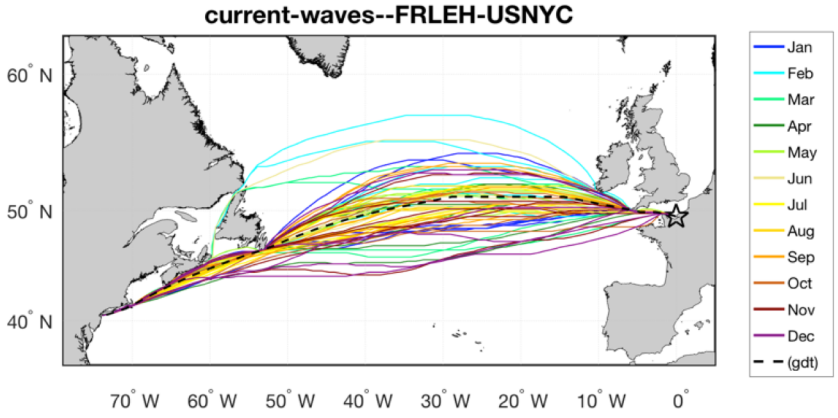
←Index

4. New York City - Le Havre

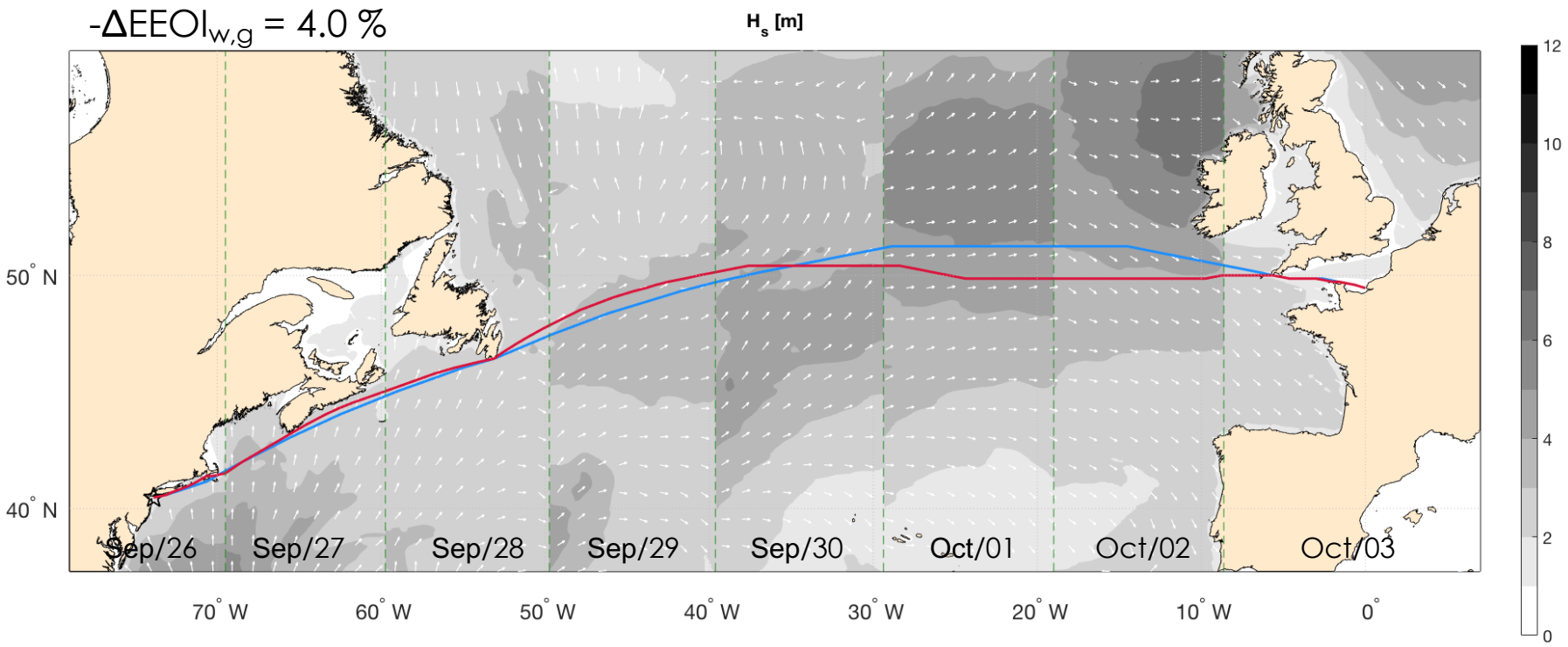

waves--USNYC-FRLEH
60° N
50° N
40° N
70° W
60° W
50° W
40° W
30° W
20° W
10° W
0°
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)


waves--FRLEH-USNYC
60° N
50° N
40° N
70° W
60° W
50° W
40° W
30° W
20° W
10° W
0°
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)


current-waves--USNYC-FRLEH
60° N
50° N
40° N
70° W
60° W
50° W
40° W
30° W
20° W
10° W
0°
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

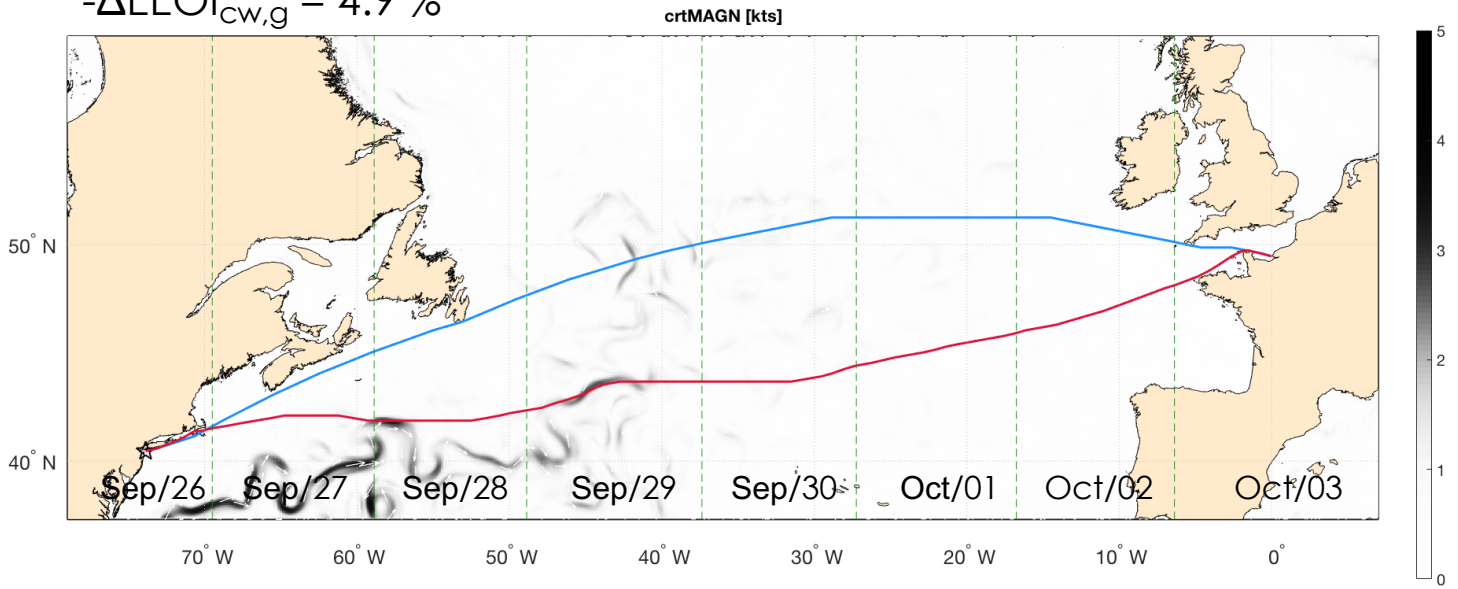

current-waves--FRLEH-USNYC
60° N
50° N
40° N
70° W
60° W
50° W
40° W
30° W
20° W
10° W
0°
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

New York City - Le Havre, waves, 26 Sep

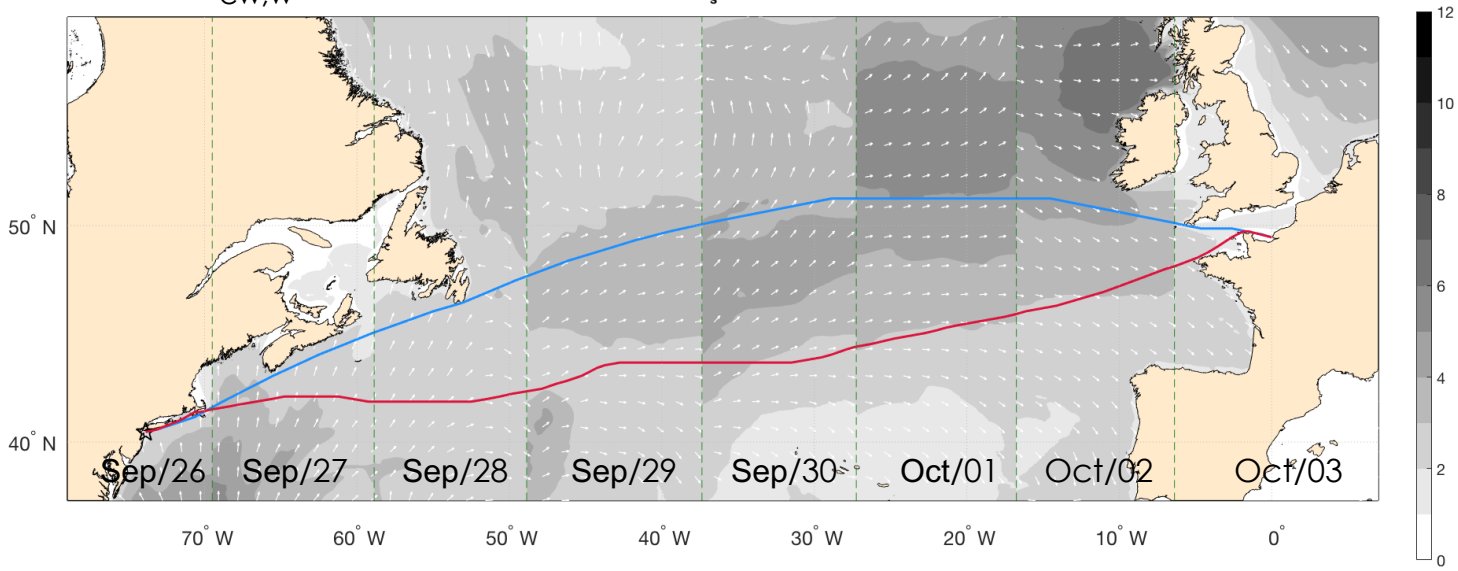


New York City - Le Havre, currents and waves, 26 Sep

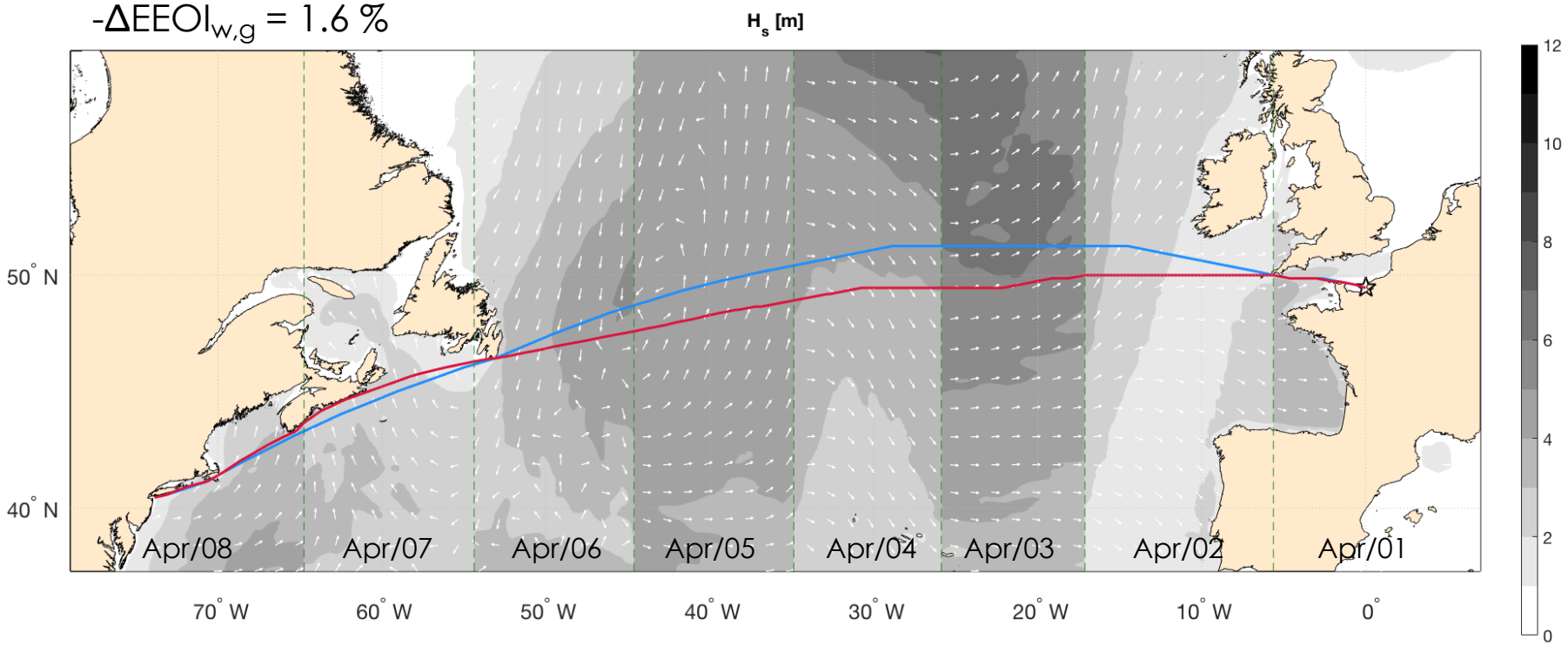
$-\Delta EEOI_{cw,g} = 4.9\ \%$



$-\Delta EEOI_{cw,w} = 0.4\ \%$

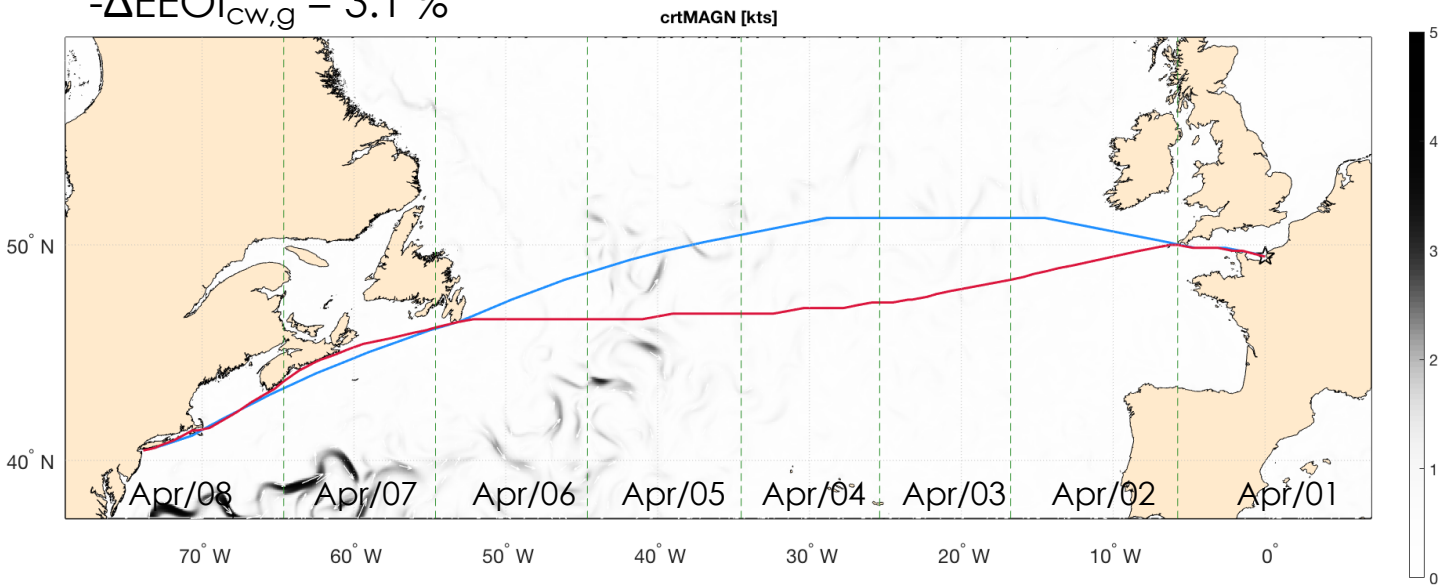


Le Havre - New York City, waves, 01 Apr

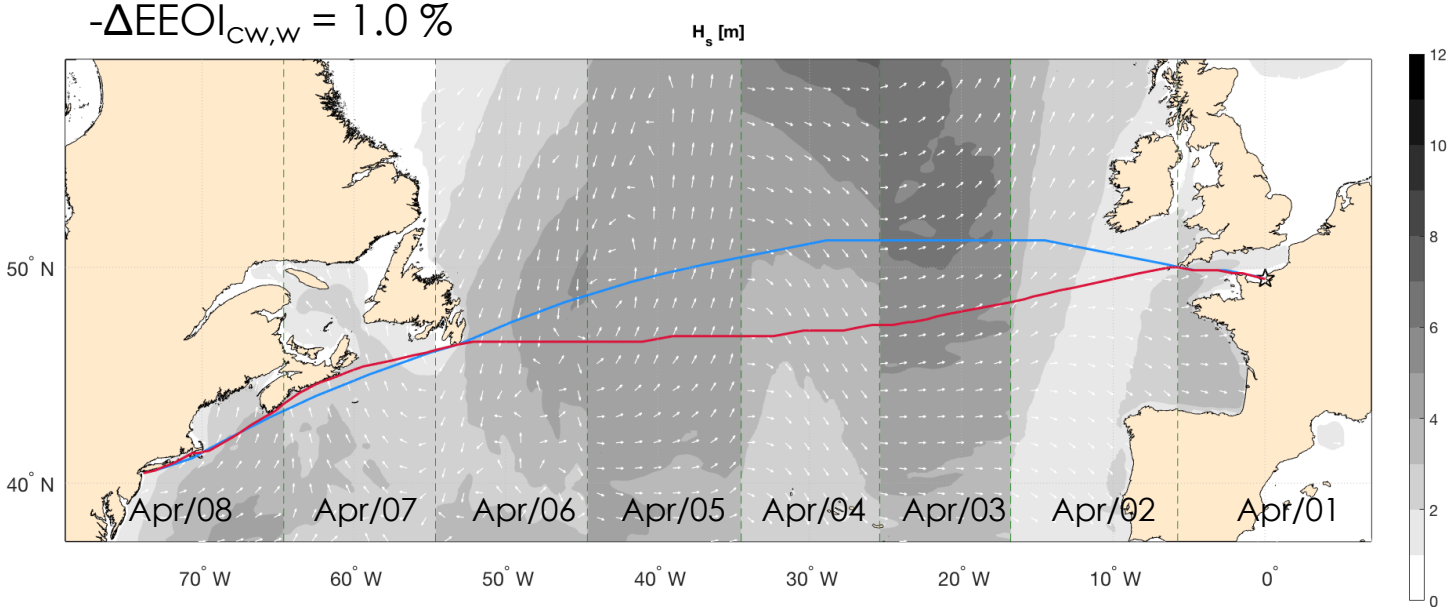


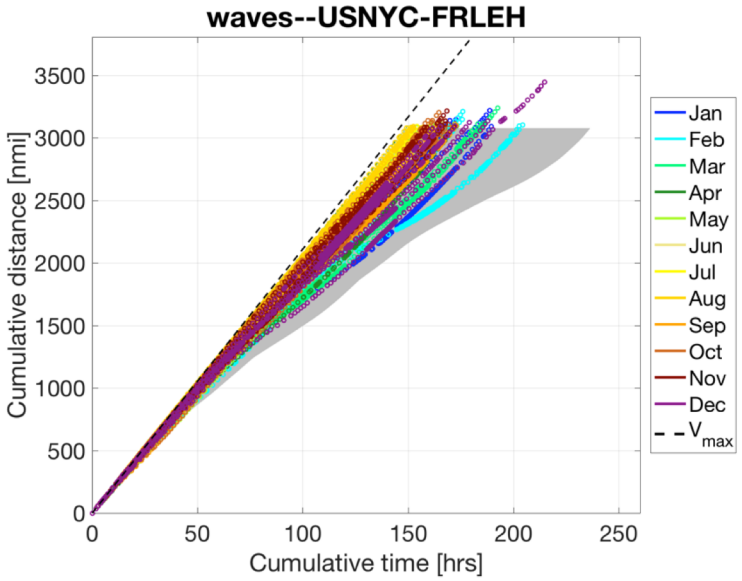
Le Havre - New York City, currents and waves, 01 Apr

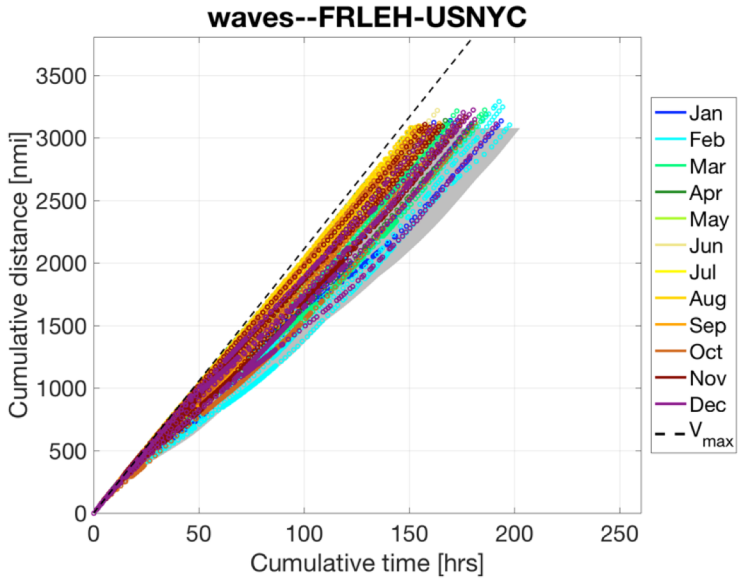
$-\Delta EEOI_{cw,g}$ = 3.1 %

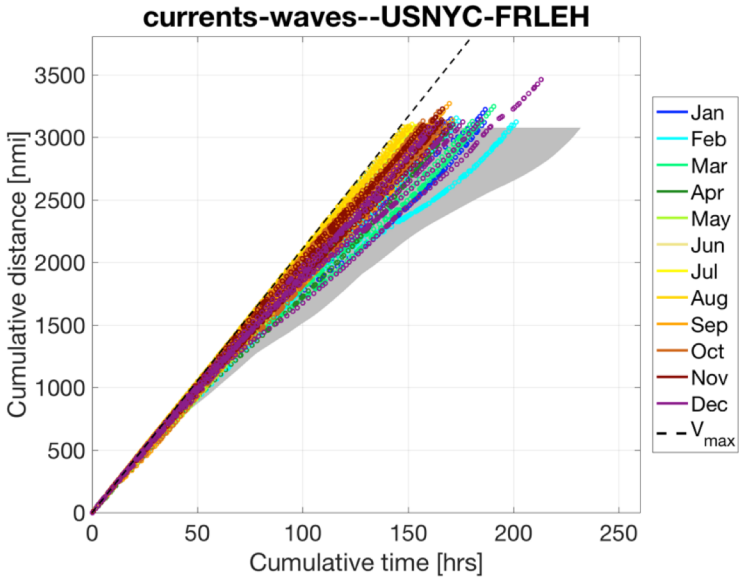


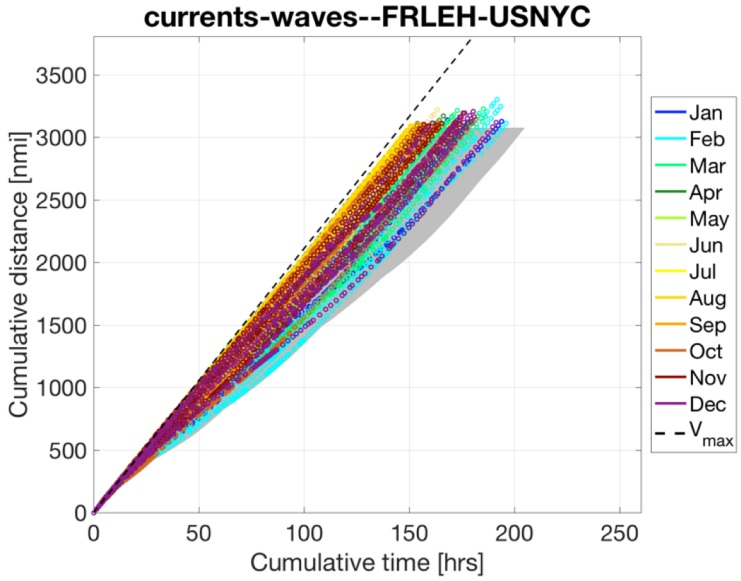
$-\Delta EEOI_{cw,w}$ = 1.0 %

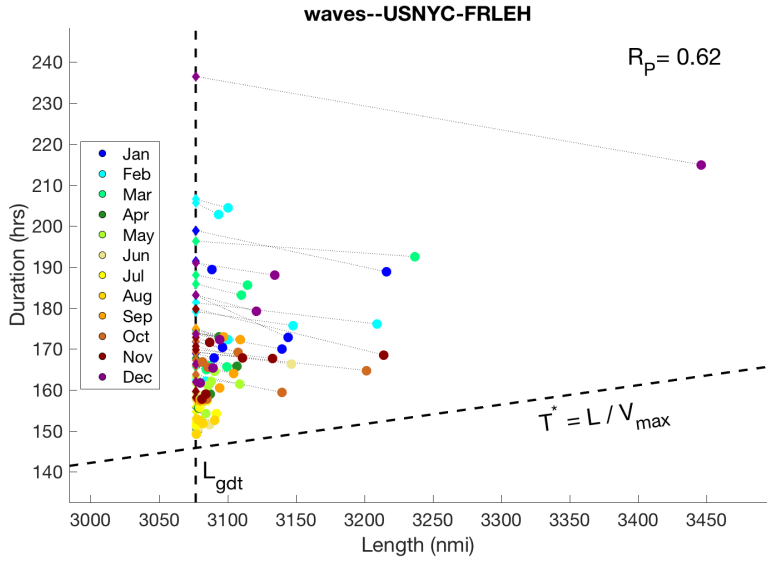


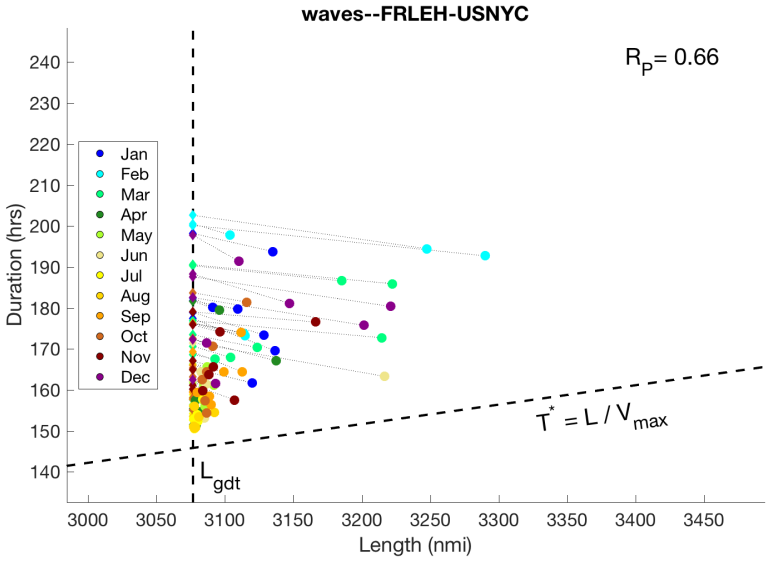

waves--USNYC-FRLEH
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
0
50
100
150
200
250
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

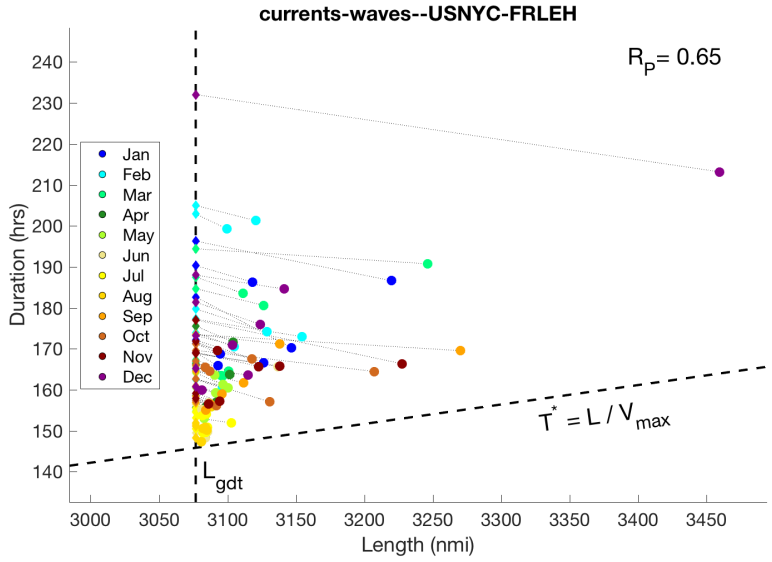

waves--FRLEH-USNYC
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
0
50
100
150
200
250
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

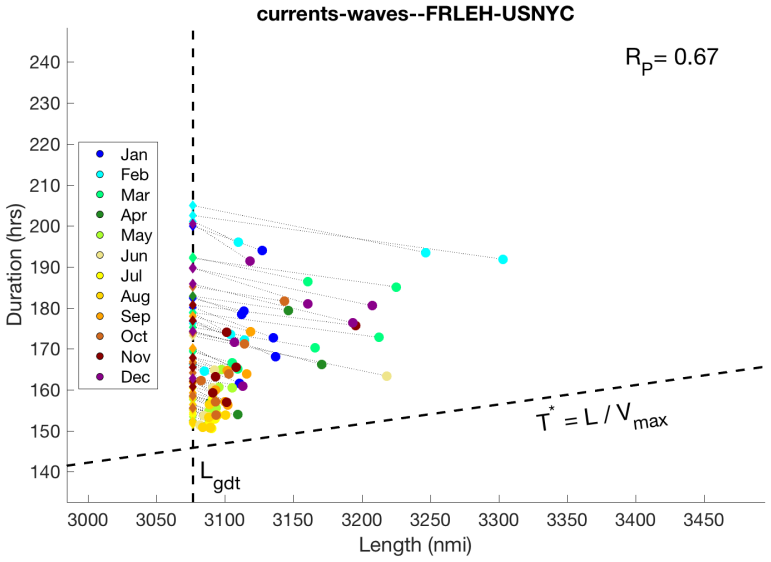

currents-waves--USNYC-FRLEH
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
0
50
100
150
200
250
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

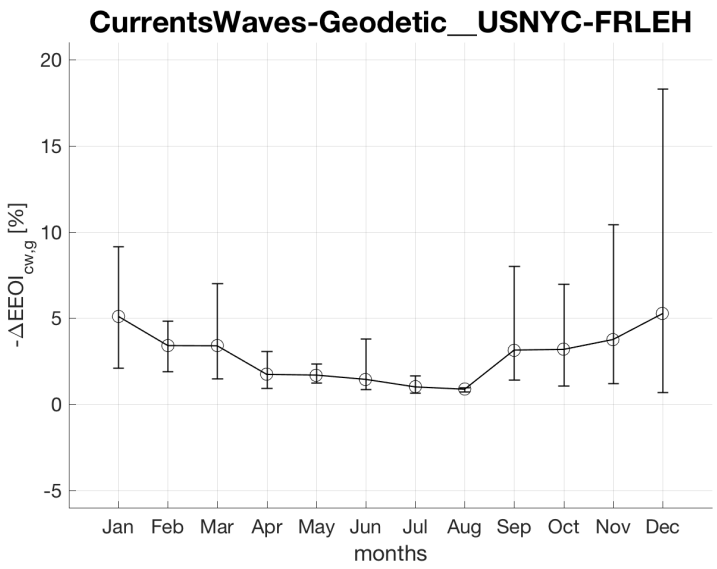

currents-waves--FRLEH-USNYC
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
3500
0
50
100
150
200
250
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

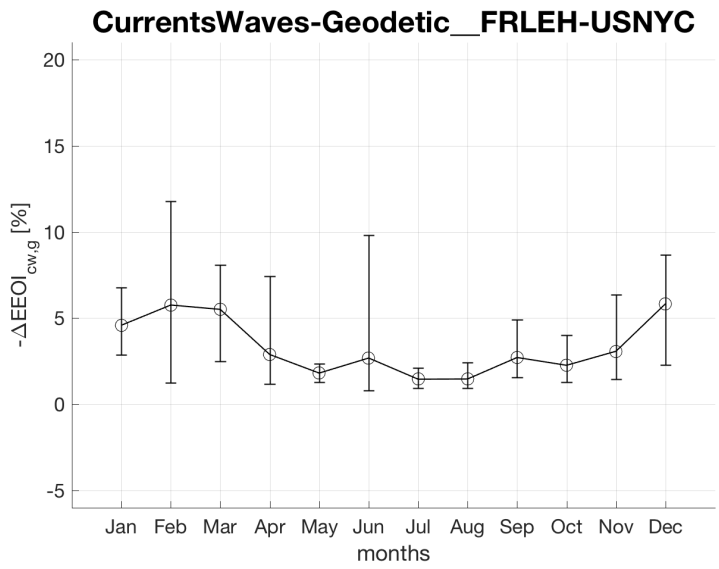

waves--USNYC-FRLEH
R_P= 0.62
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)

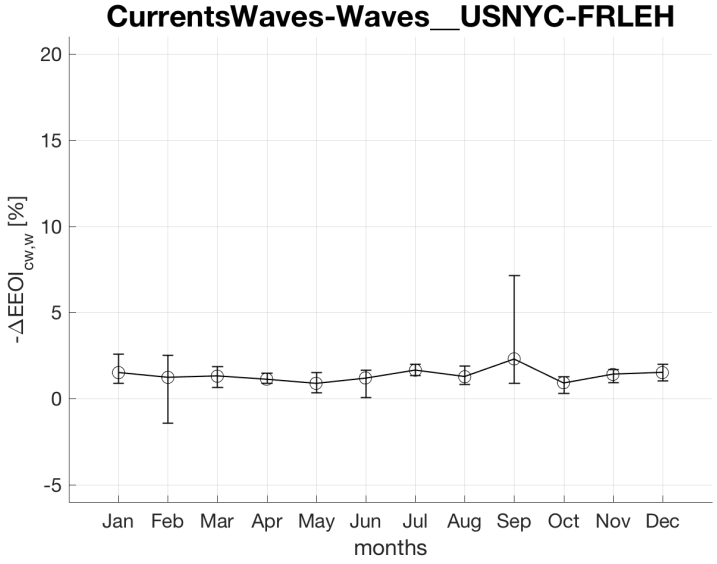

waves--FRLEH-USNYC
R_P= 0.66
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)

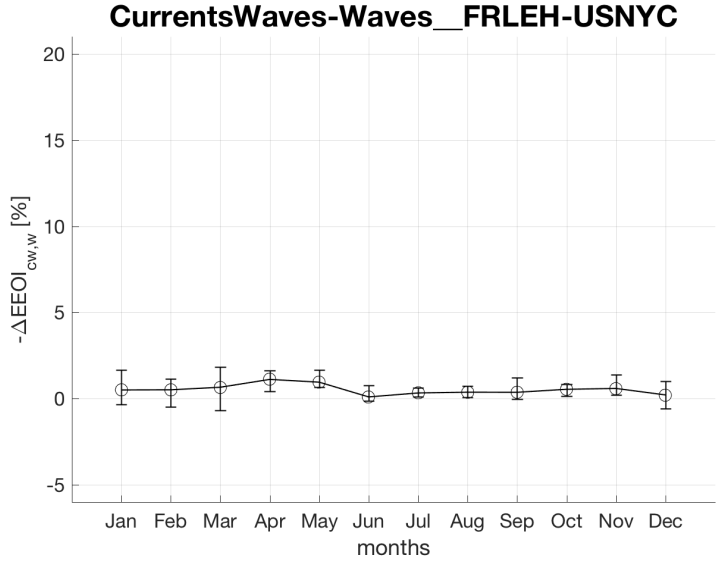

currents-waves--USNYC-FRLEH
R_P= 0.65
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)


currents-waves--FRLEH-USNYC
R_P= 0.67
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)


CurrentsWaves-Geodetic__USNYC-FRLEH
-ΔEEOI cw,g [%]
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

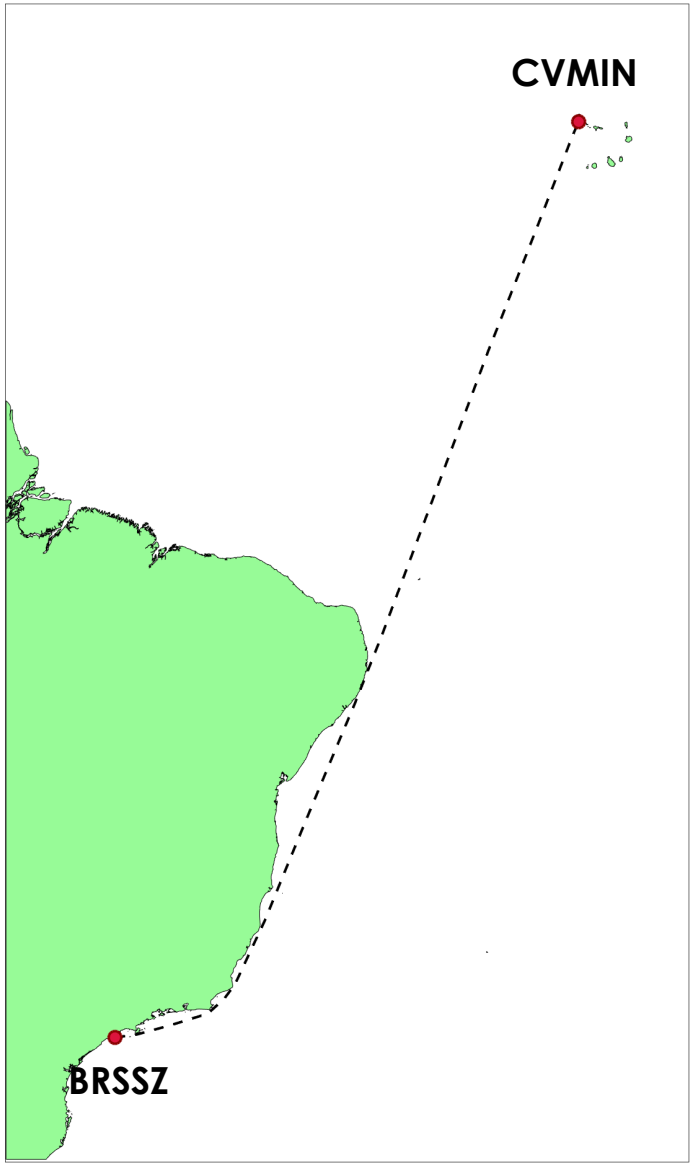

CurrentsWaves-Geodetic__FRLEH-USNYC
-ΔEEOI cw,g [%]
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

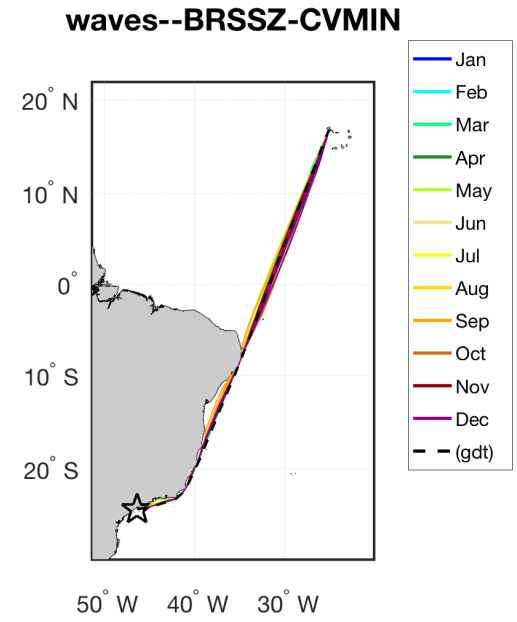

CurrentsWaves-Waves__USNYC-FRLEH
-ΔEEOI cw,w [%]
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

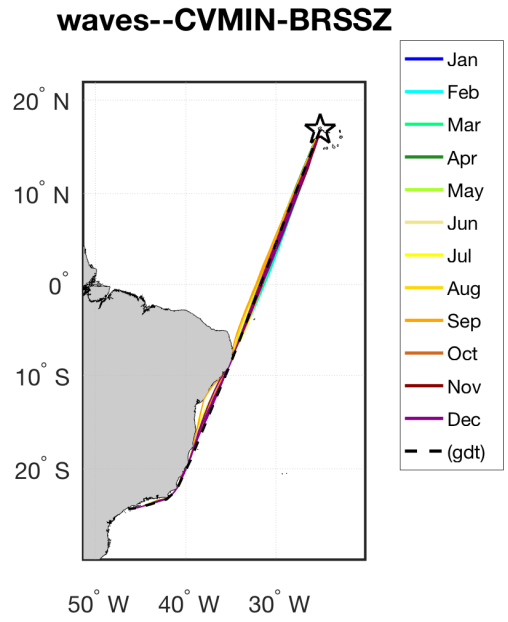

CurrentsWaves-Waves__FRLEH-USNYC
-ΔEEOI cw,w [%]
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

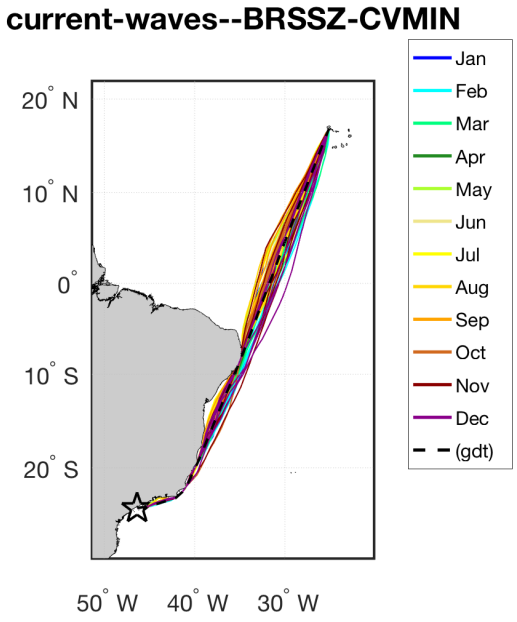
←Index

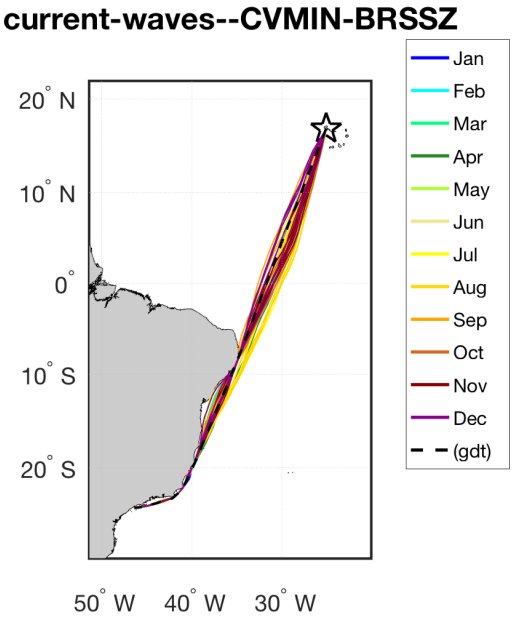
5. Santos - Mindelo



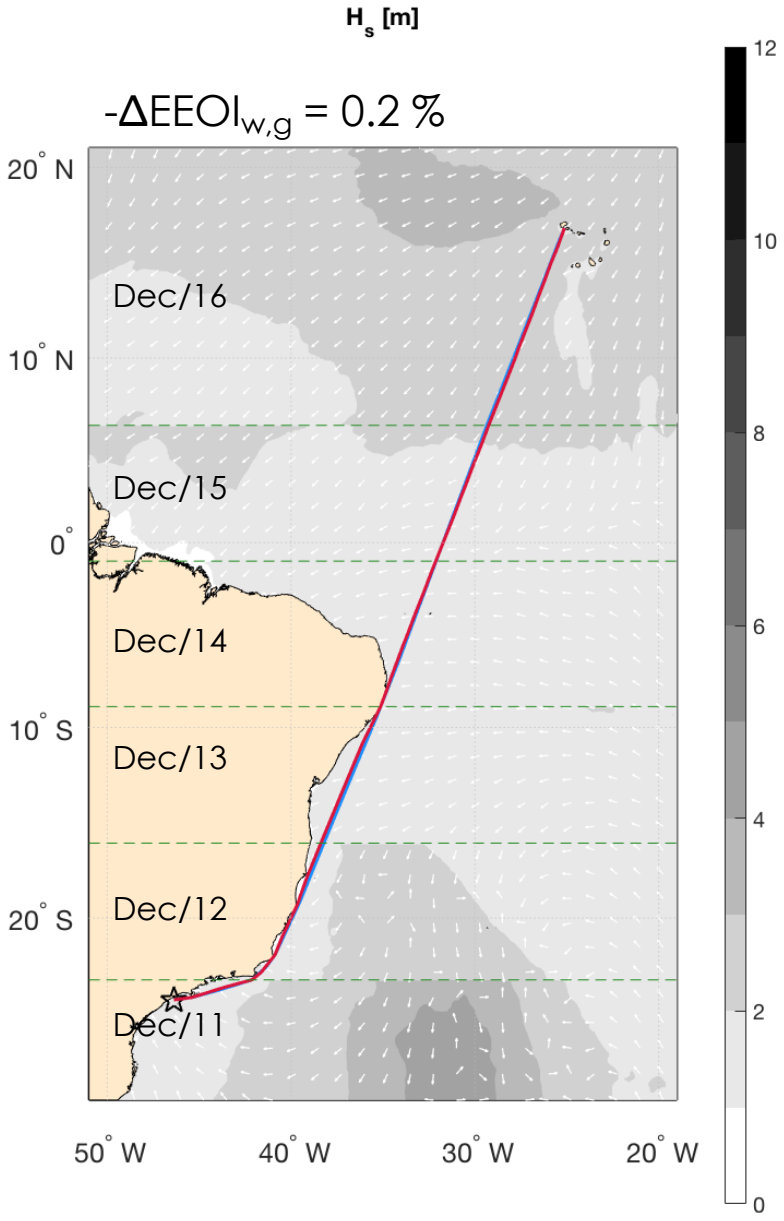

waves--BRSSZ-CVMIN
20° N
10° N
0°
10° S
20° S
50° W
40° W
30° W
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)


waves--CVMIN-BRSSZ
20° N
10° N
0°
10° S
20° S
50° W
40° W
30° W
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

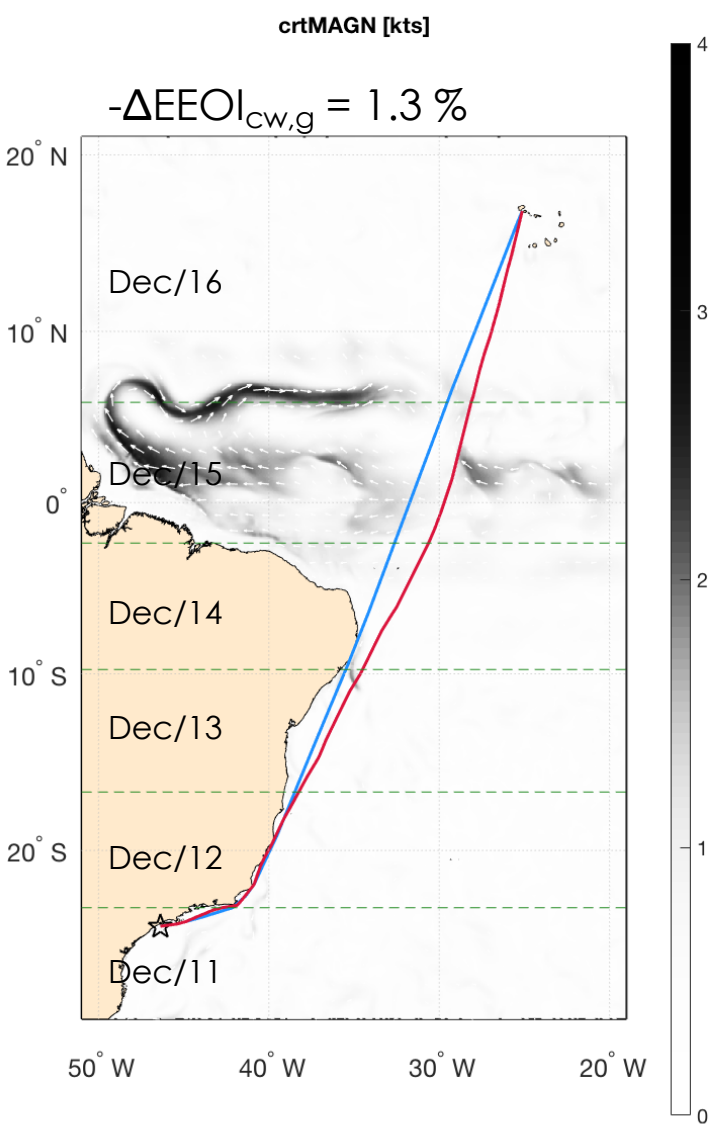

current-waves--BRSSZ-CVMIN
20° N
10° N
0°
10° S
20° S
50° W
40° W
30° W
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

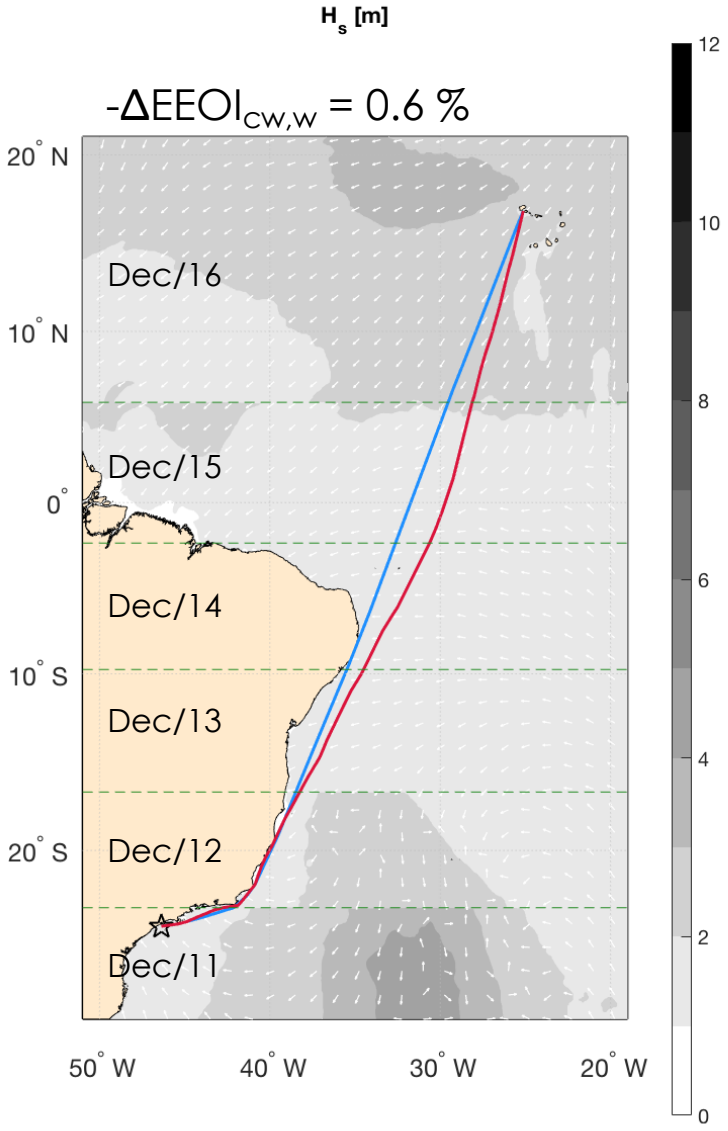

current-waves--CVMIN-BRSSZ
20° N
10° N
0°
10° S
20° S
50° W
40° W
30° W
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

Santos - Mindelo, waves, 11 Dec

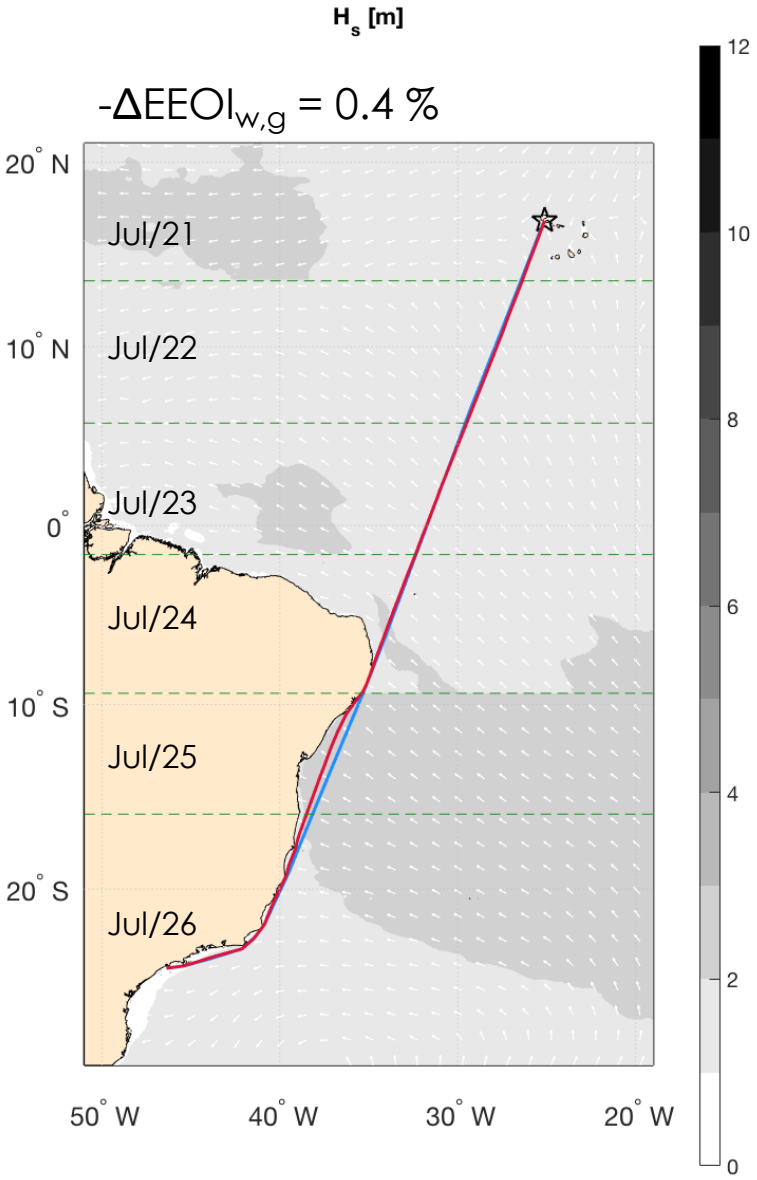


Santos - Mindelo, currents and waves, 11 Dec

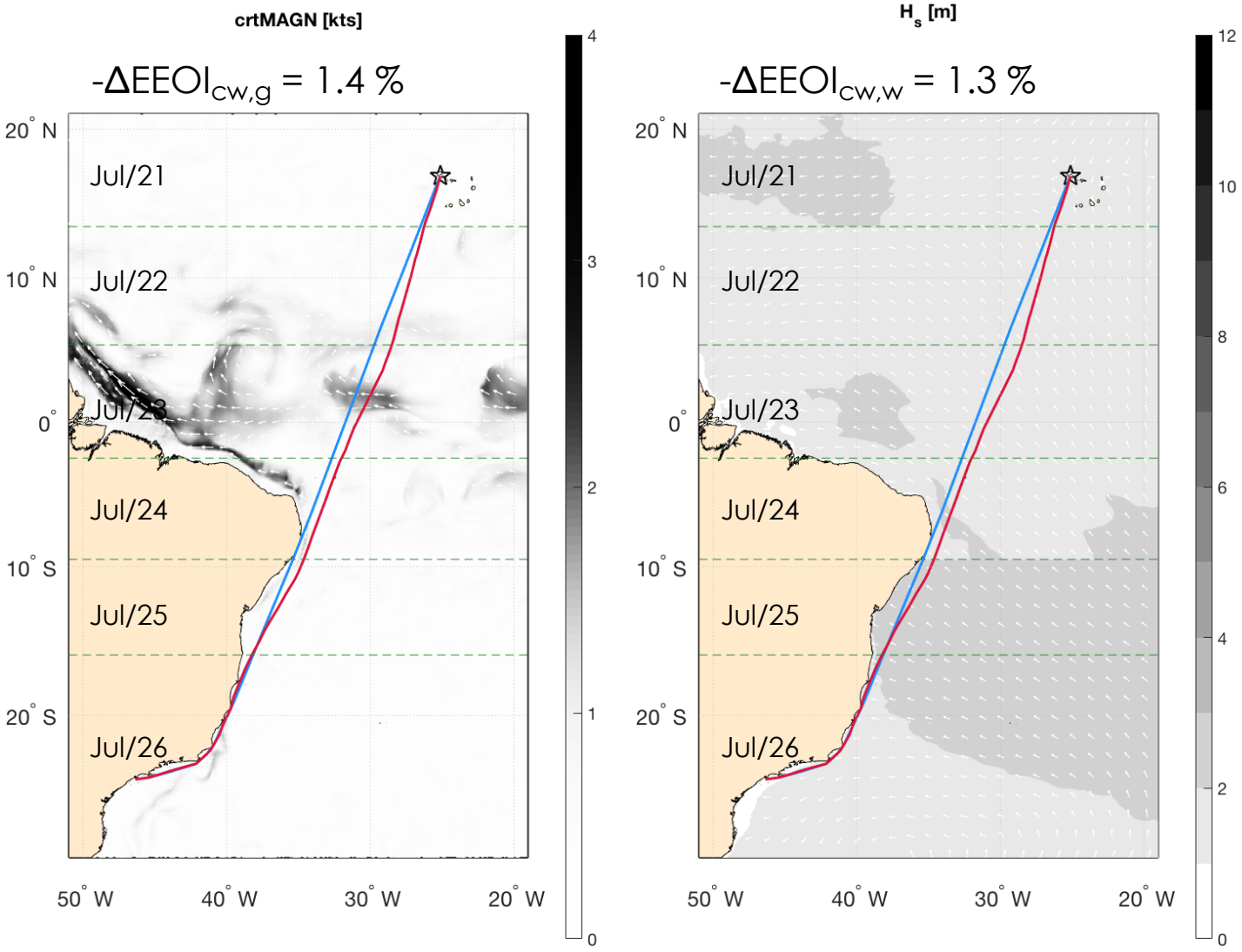


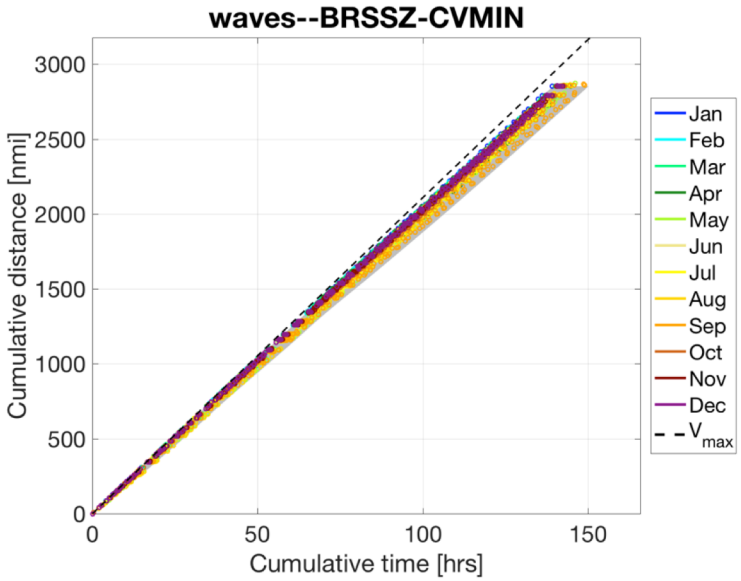


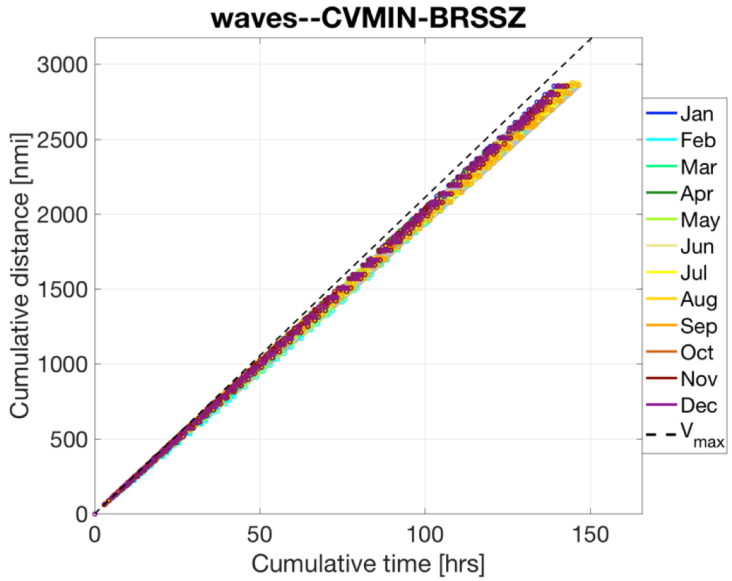
Mindelo - Santos, waves, 21 Jul

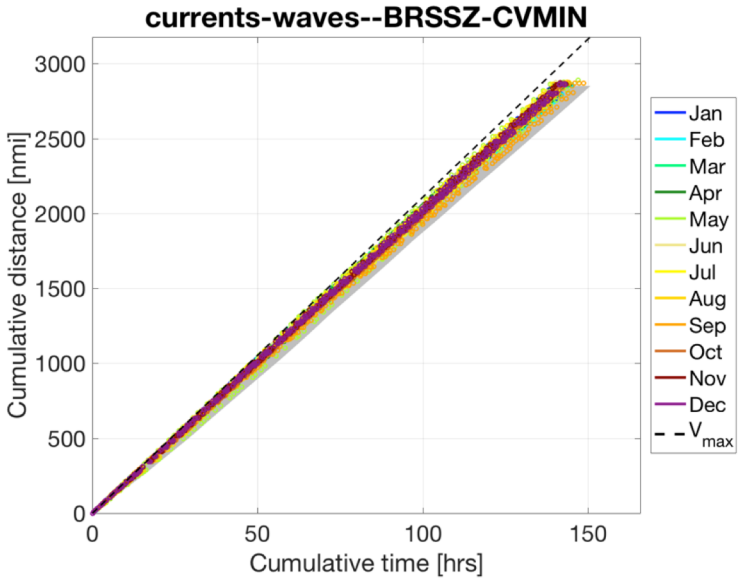


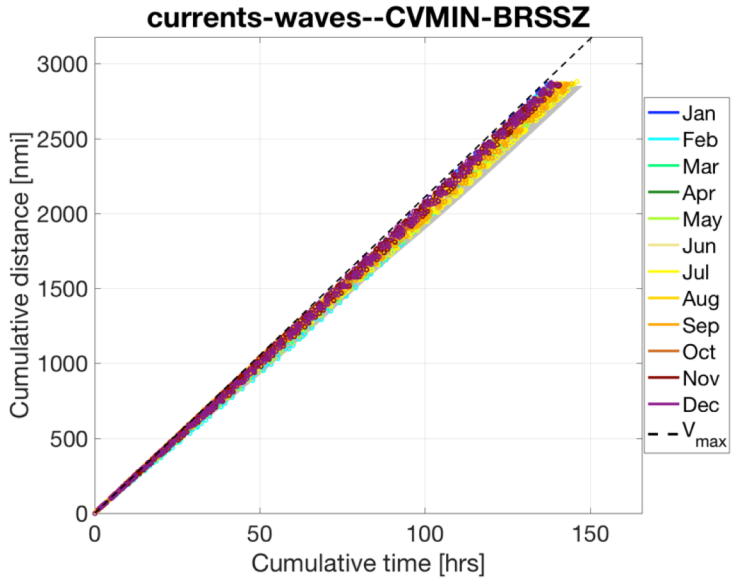
Mindelo - Santos, currents and waves, 21 Jul

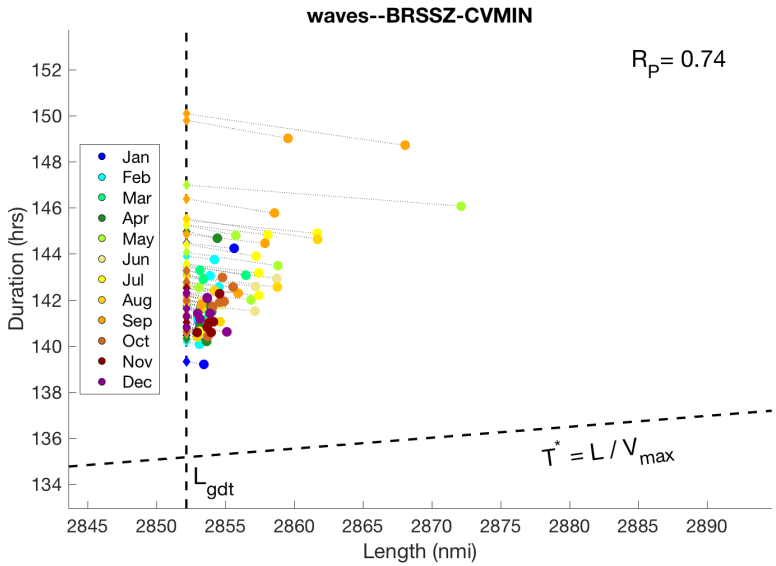


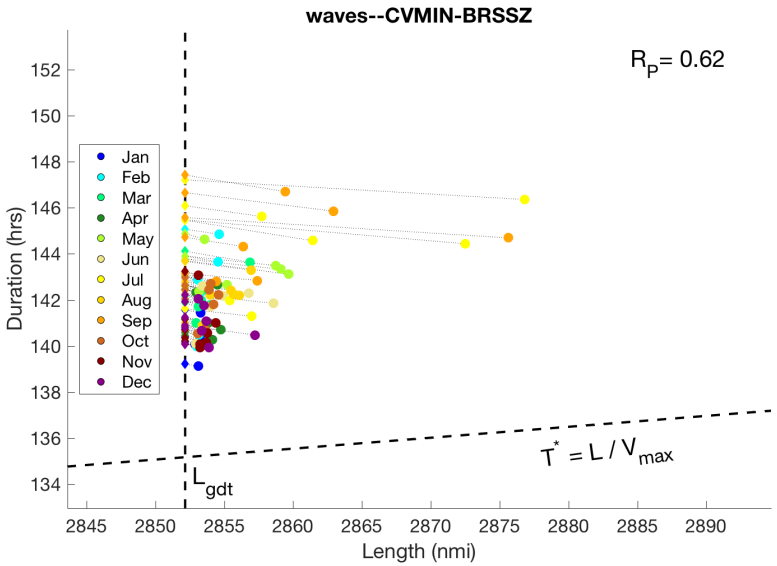

waves--BRSSZ-CVMIN
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
0
50
100
150
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

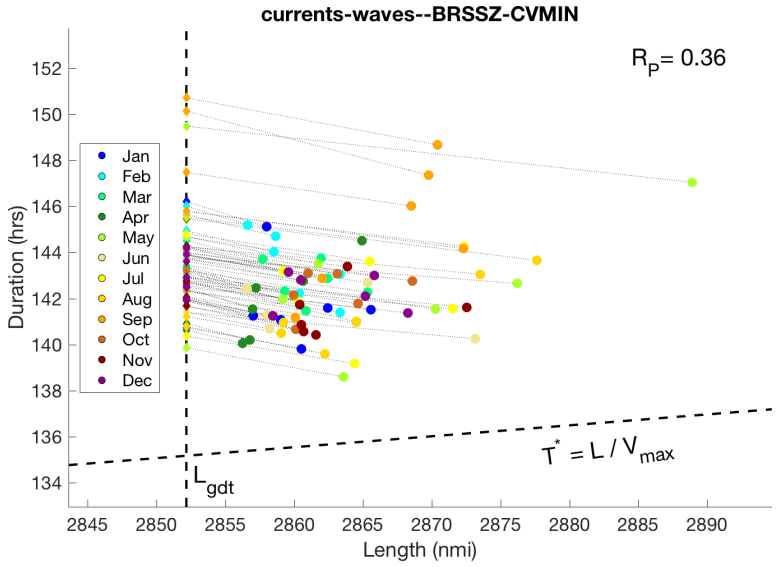

waves--CVMIN-BRSSZ
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
0
50
100
150
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

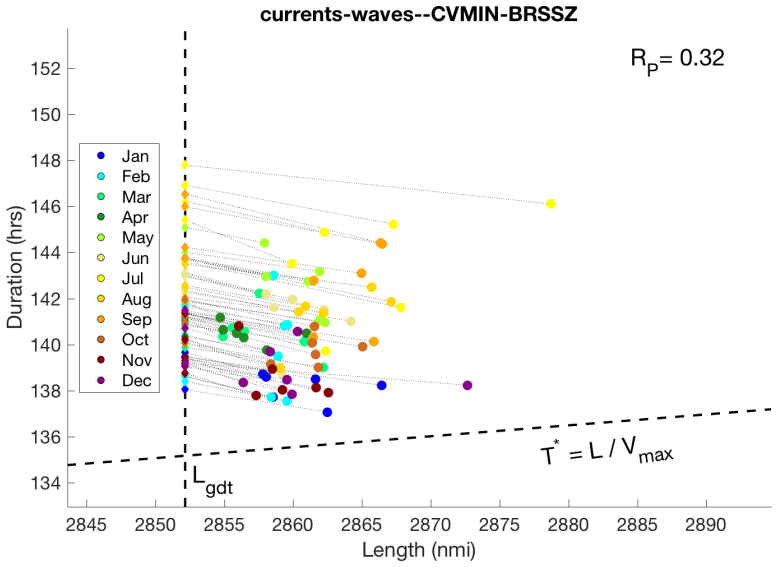

currents-waves--BRSSZ-CVMIN
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
0
50
100
150
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

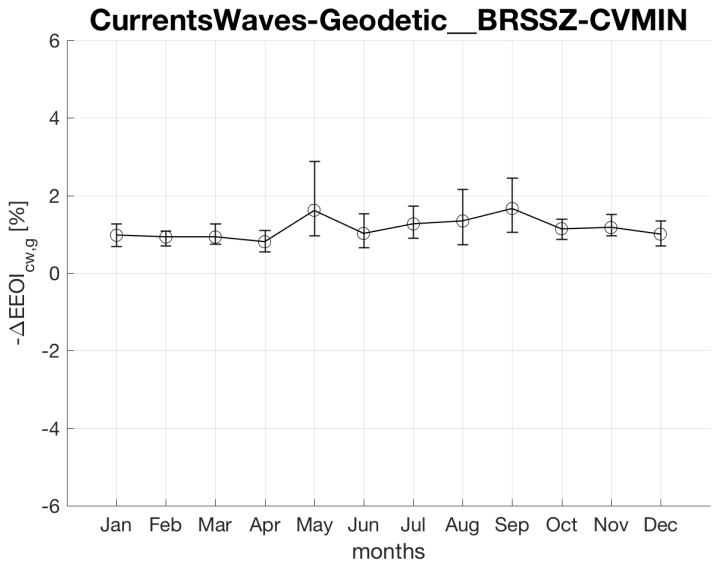

currents-waves--CVMIN-BRSSZ
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
3000
0
50
100
150
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

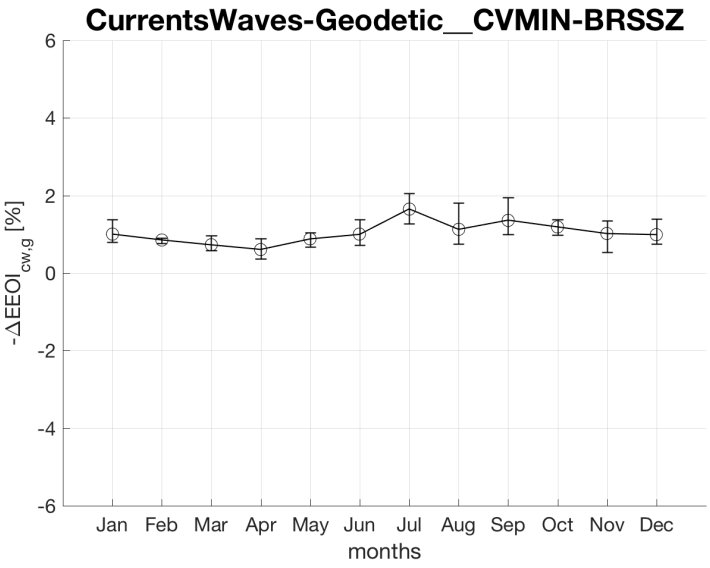

waves--BRSSZ-CVMIN
R_P= 0.74
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
L_{gdt}
$T^* = L / V_{max}$

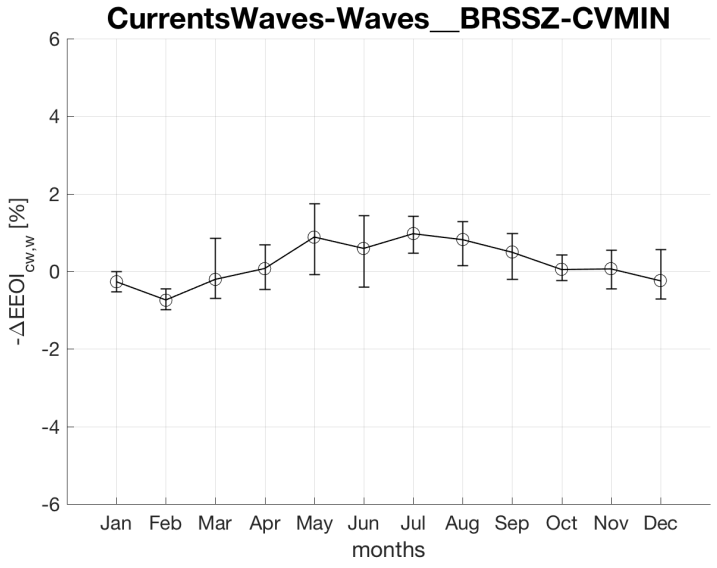

waves--CVMIN-BRSSZ
R_P= 0.62
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
L_{gdt}
$T^* = L / V_{max}$

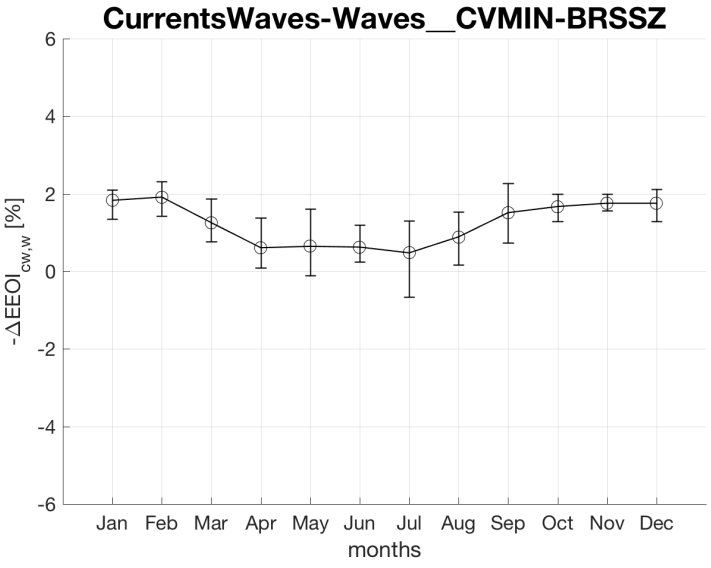

currents-waves--BRSSZ-CVMIN
R_P= 0.36
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
L_{gdt}
$T^* = L / V_{max}$


currents-waves--CVMIN-BRSSZ
R_P= 0.32
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
L_{gdt}
$T^* = L / V_{max}$


CurrentsWaves-Geodetic__BRSSZ-CVMIN
-ΔEEOI cw,g [%]
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

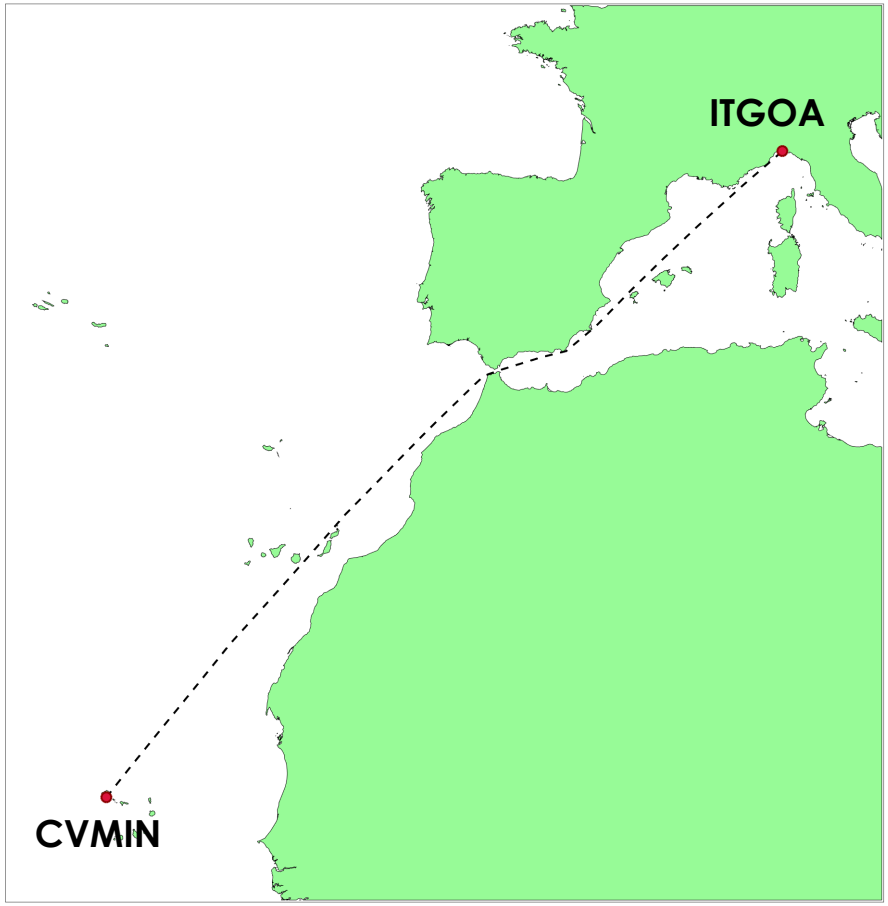

CurrentsWaves-Geodetic__CVMIN-BRSSZ
-ΔEEOI cw,g [%]
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

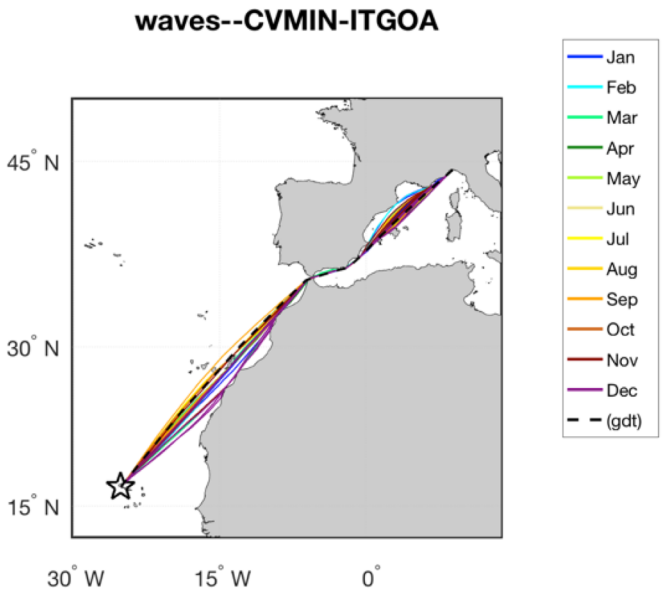

CurrentsWaves-Waves__BRSSZ-CVMIN
-ΔEEOI cw,w [%]
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

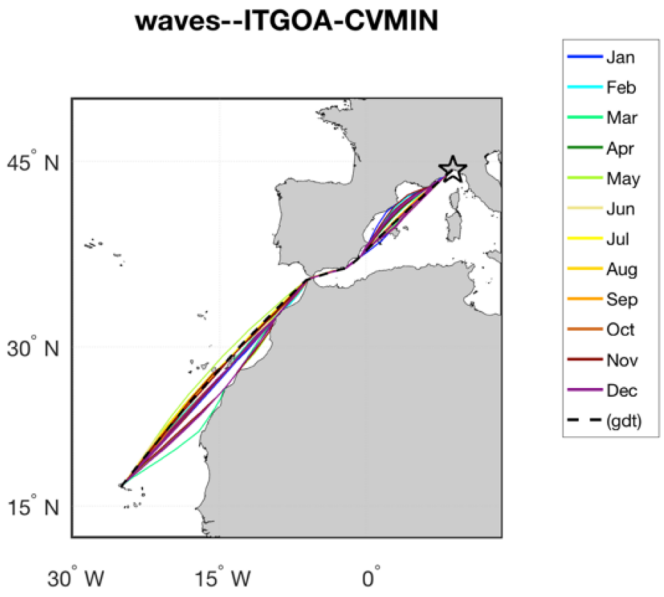

CurrentsWaves-Waves__CVMIN-BRSSZ
-ΔEEOI cw,w [%]
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

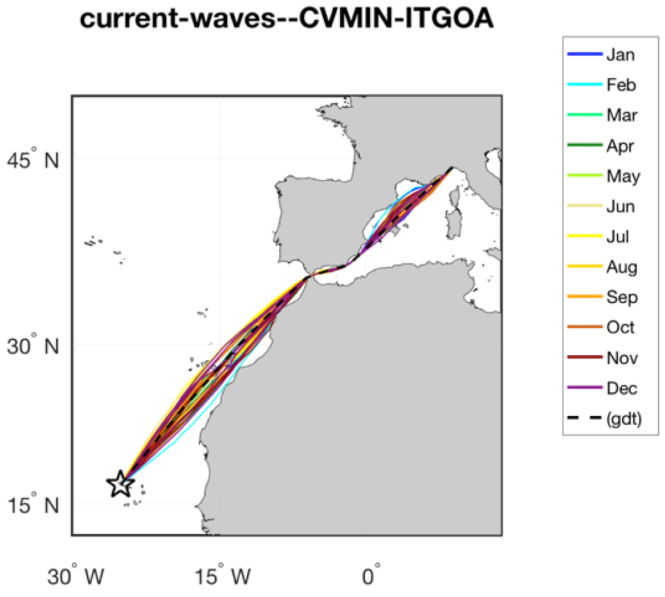
←Index

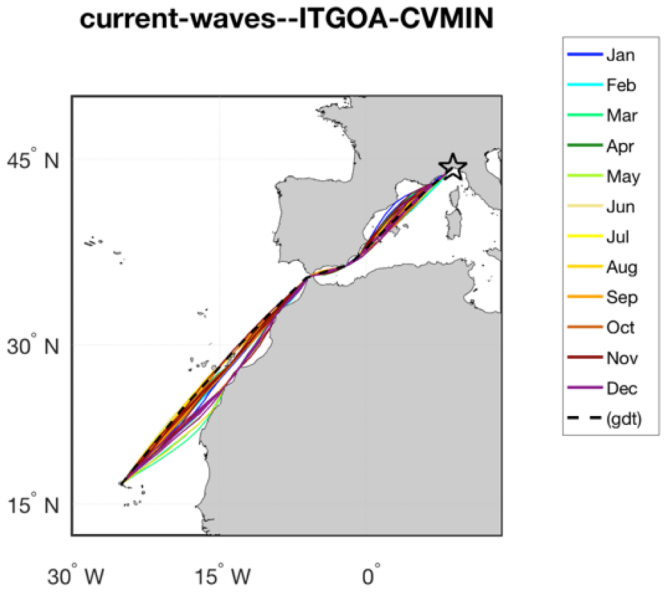
6. Mindelo - Genoa



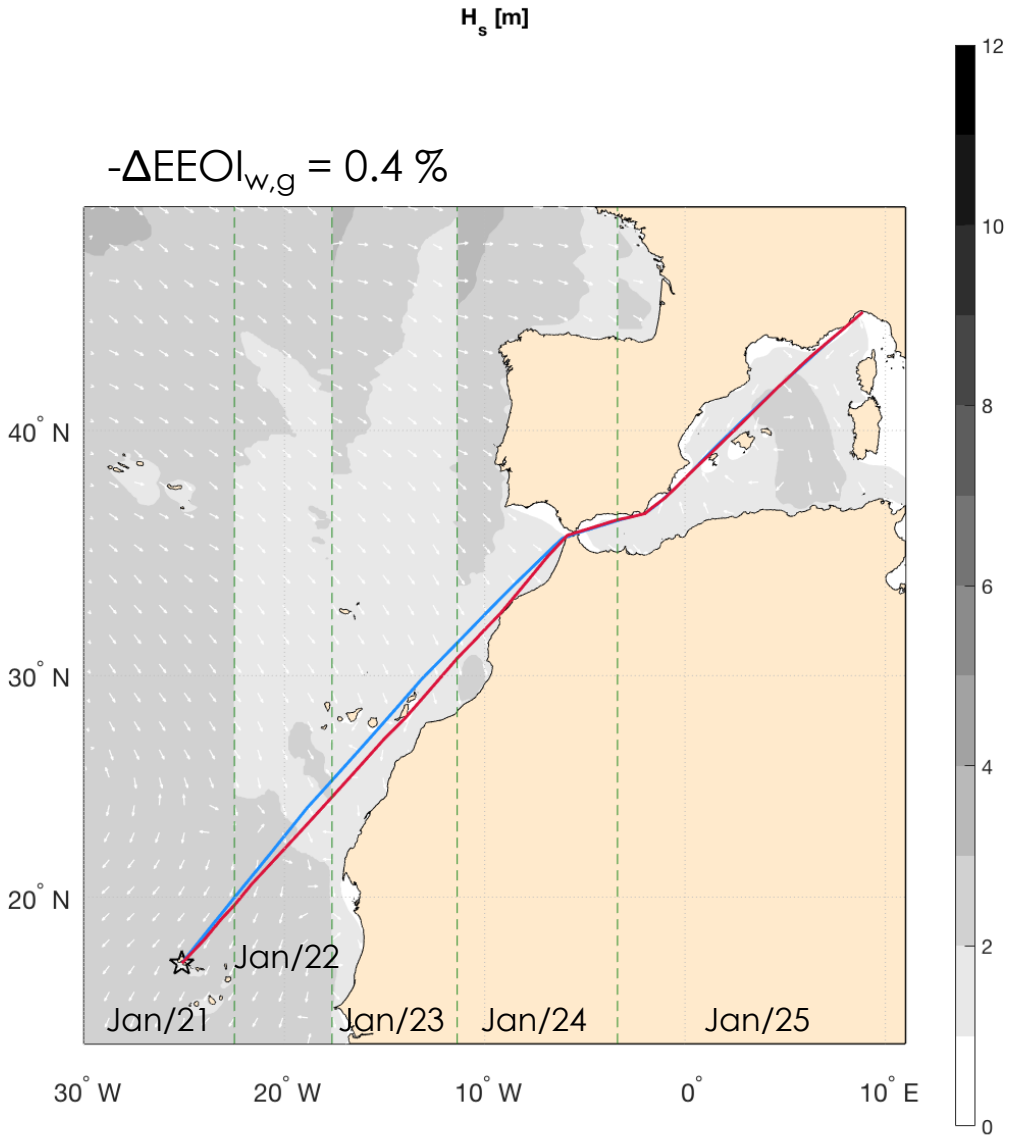

waves--CVMIN-ITGOA
45° N
30° N
15° N
30° W
15° W
0°
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)


waves--ITGOA-CVMIN
45° N
30° N
15° N
30° W
15° W
0°
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

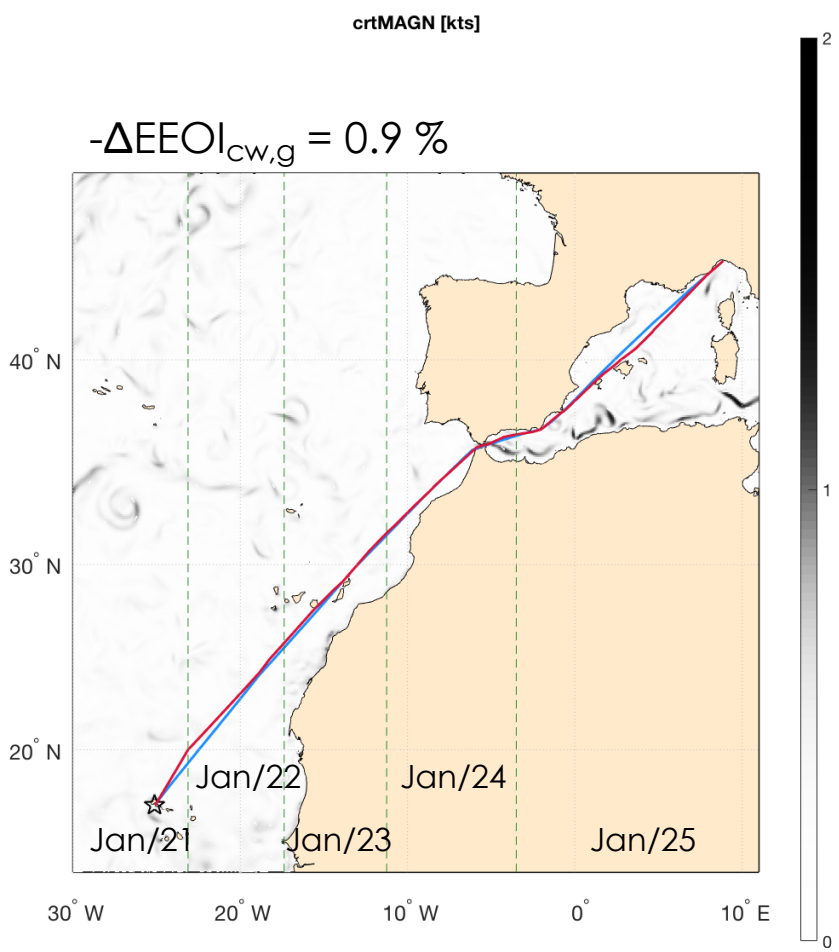

current-waves--CVMIN-ITGOA
45° N
30° N
15° N
30° W
15° W
0°
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

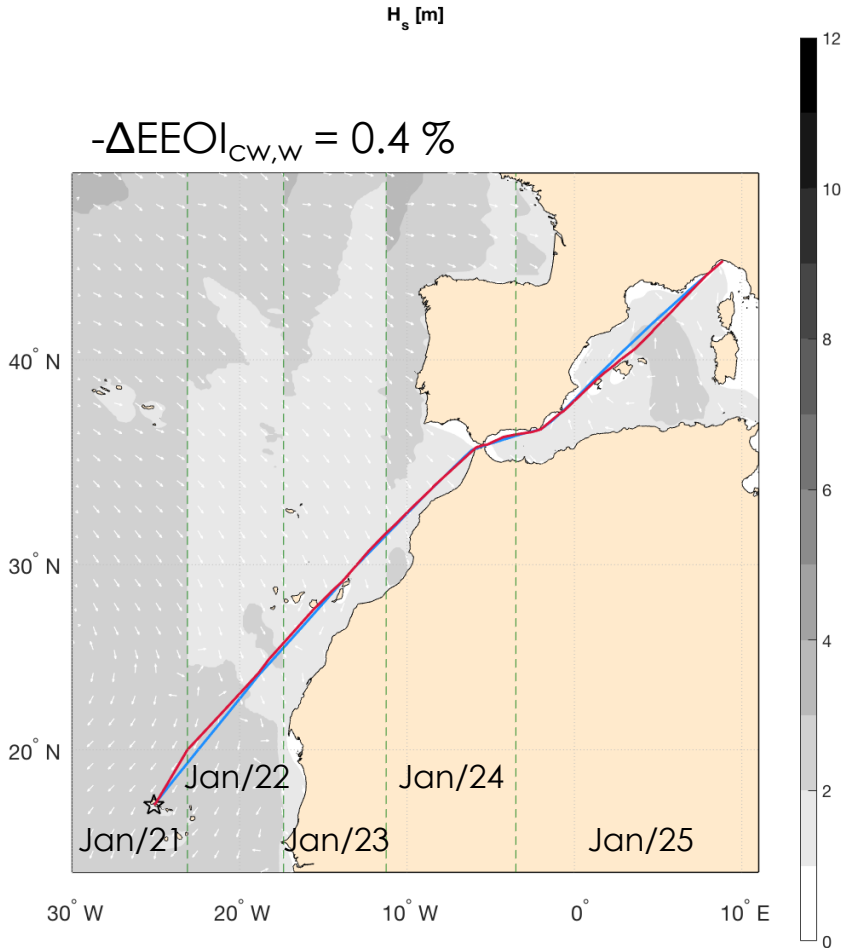

current-waves--ITGOA-CVMIN
45° N
30° N
15° N
30° W
15° W
0°
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

Mindelo - Genoa, waves, 21 Jan

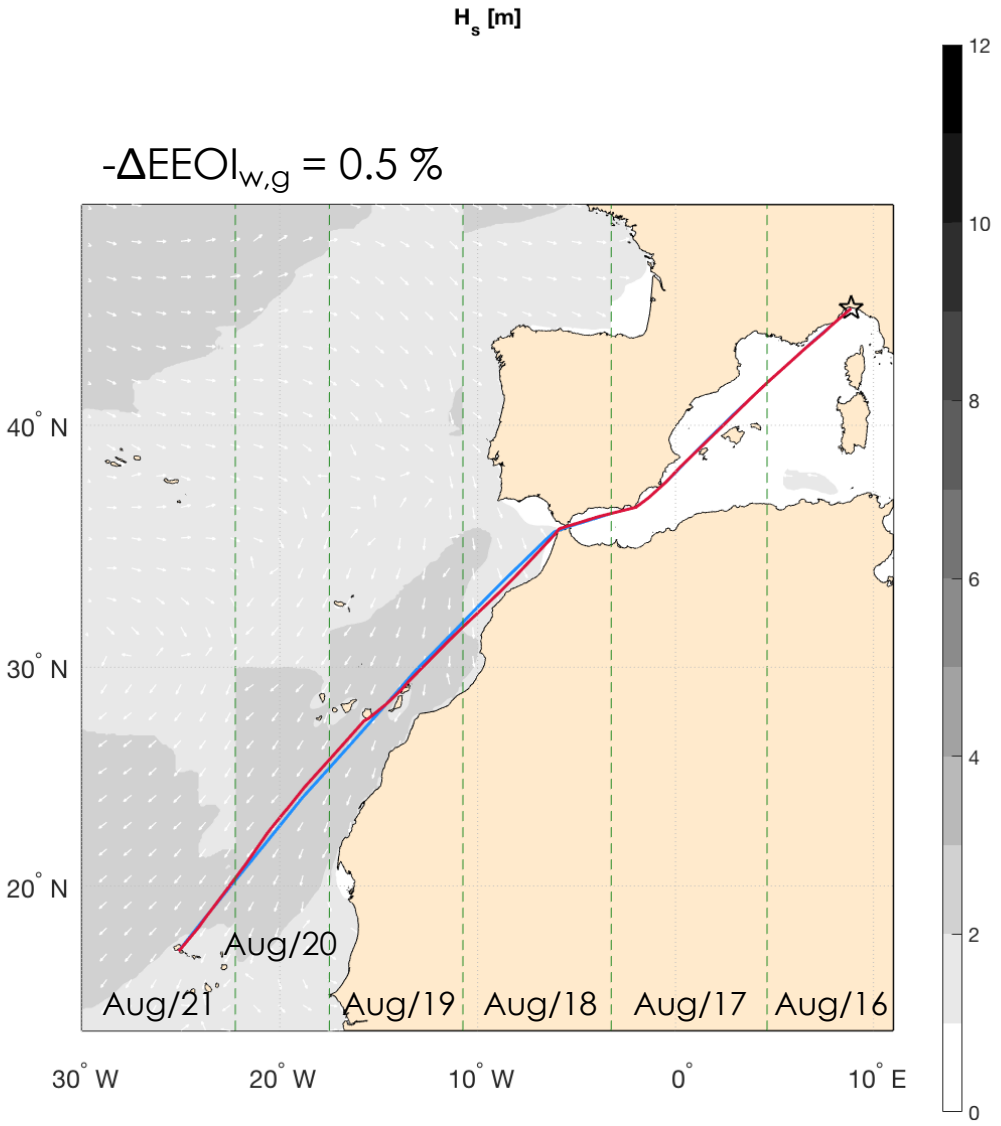


Mindelo - Genoa, currents and waves, 21 Jan

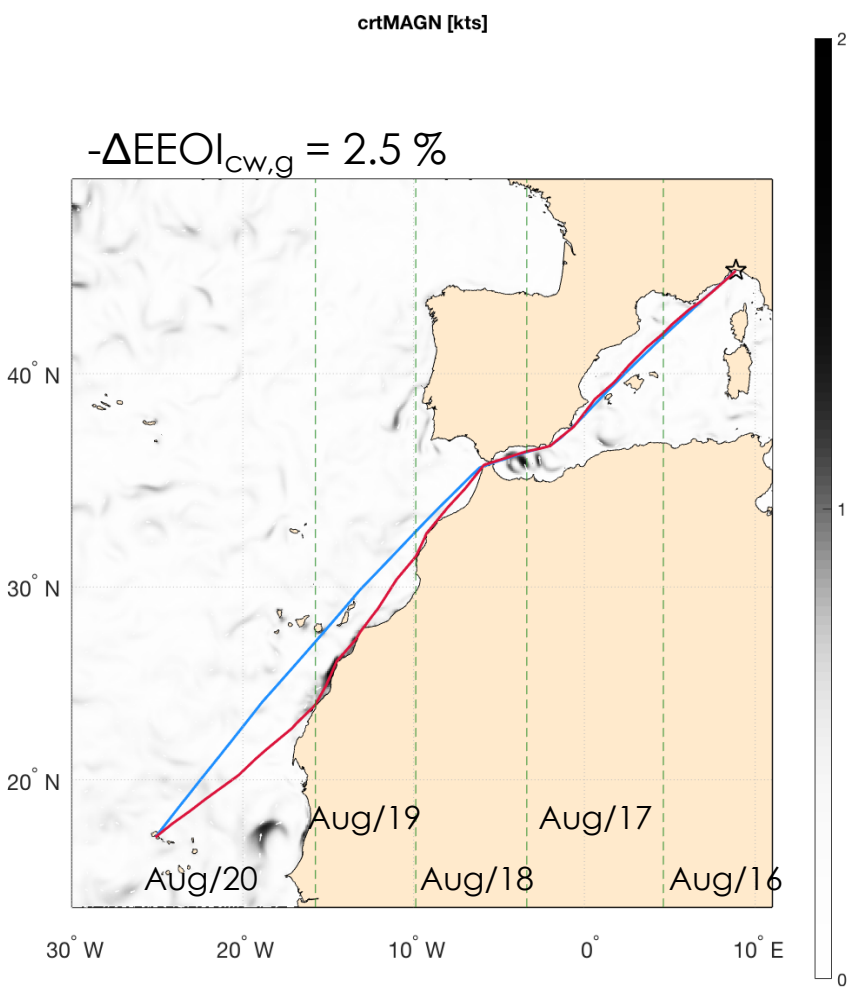


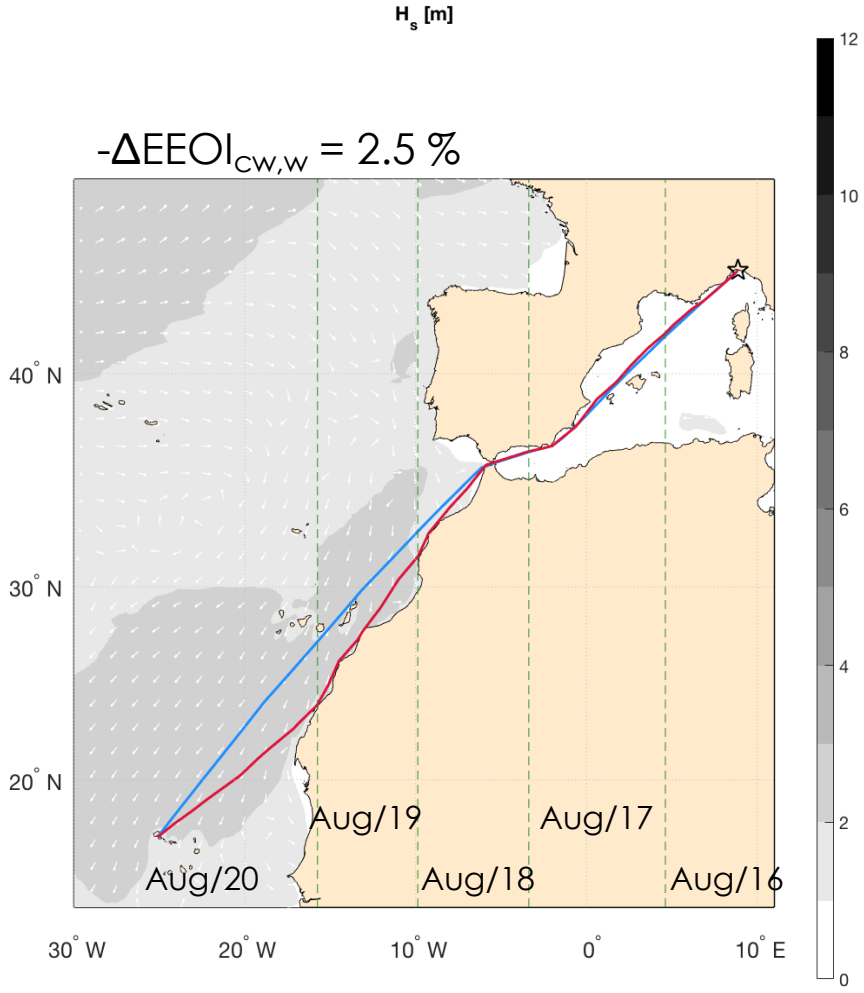


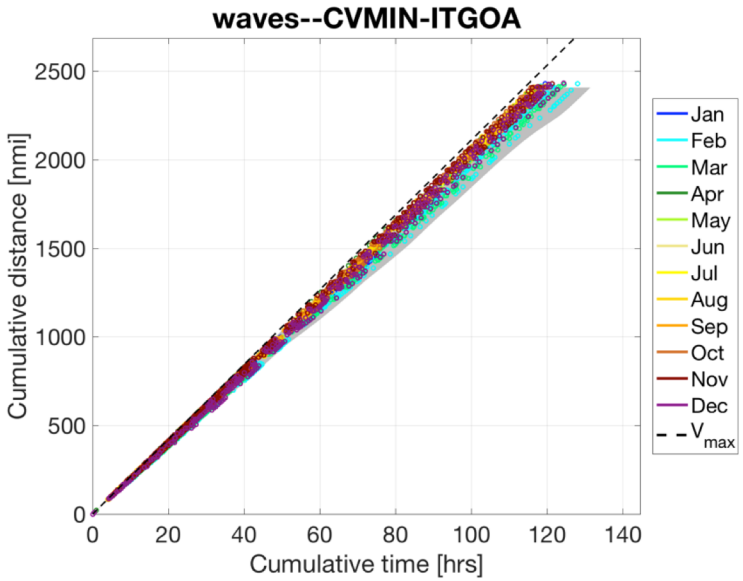
Genoa - Mindelo, waves, 16 Aug

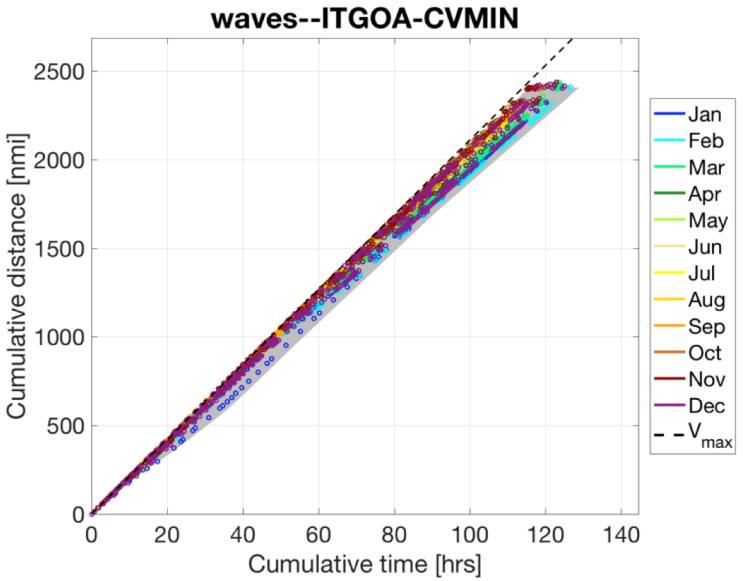


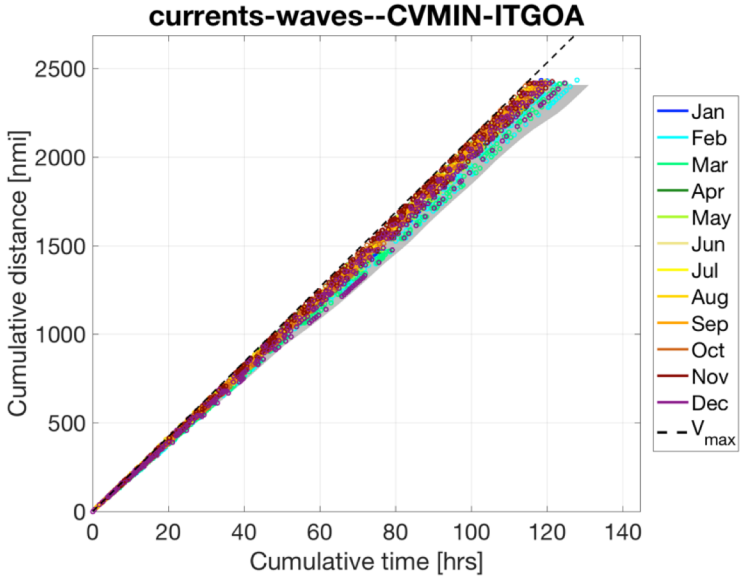
Genoa - Mindelo, currents and waves, 16 Aug

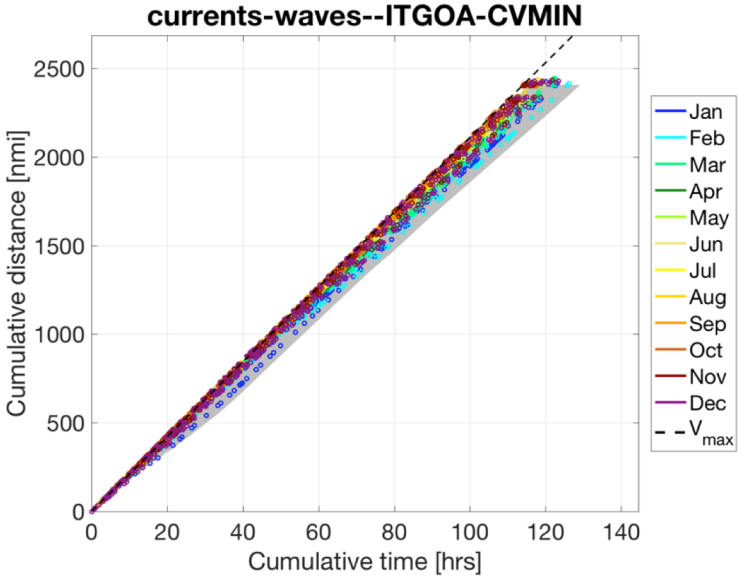


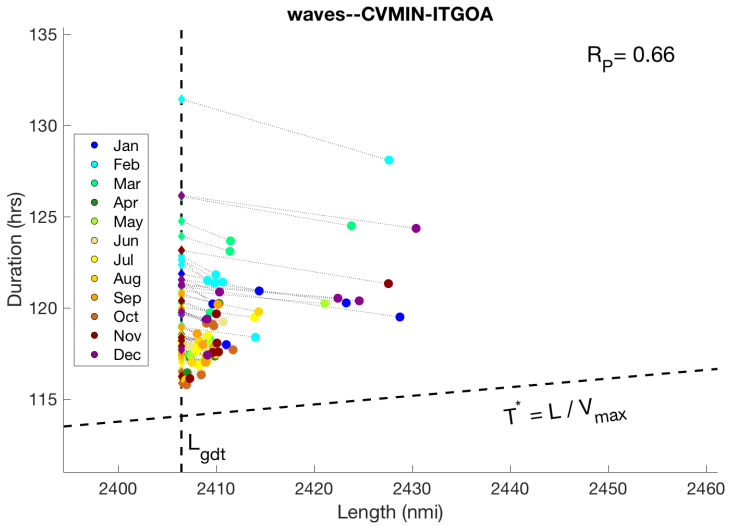


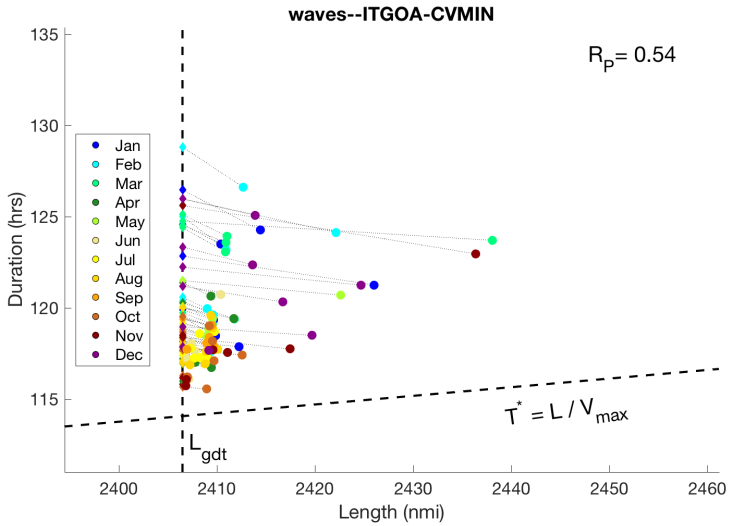

waves--CVMIN-ITGOA
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
0
20
40
60
80
100
120
140
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

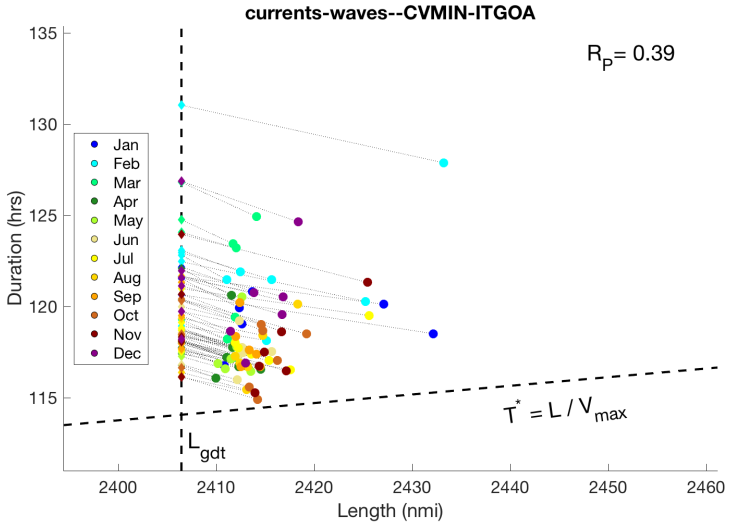

waves--ITGOA-CVMIN
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
0
20
40
60
80
100
120
140
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

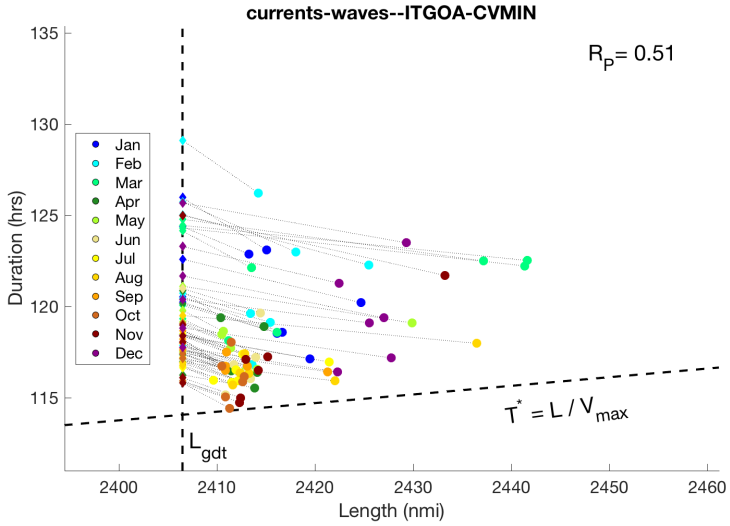

currents-waves--CVMIN-ITGOA
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
0
20
40
60
80
100
120
140
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

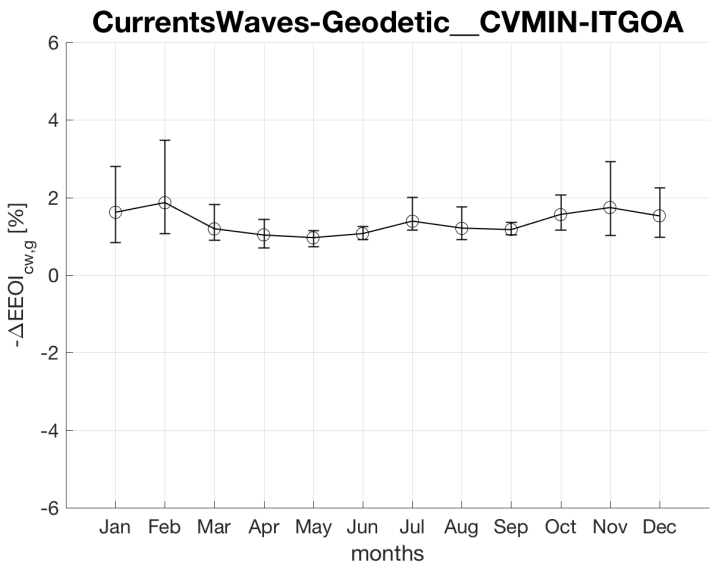

currents-waves--ITGOA-CVMIN
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
2000
2500
0
20
40
60
80
100
120
140
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

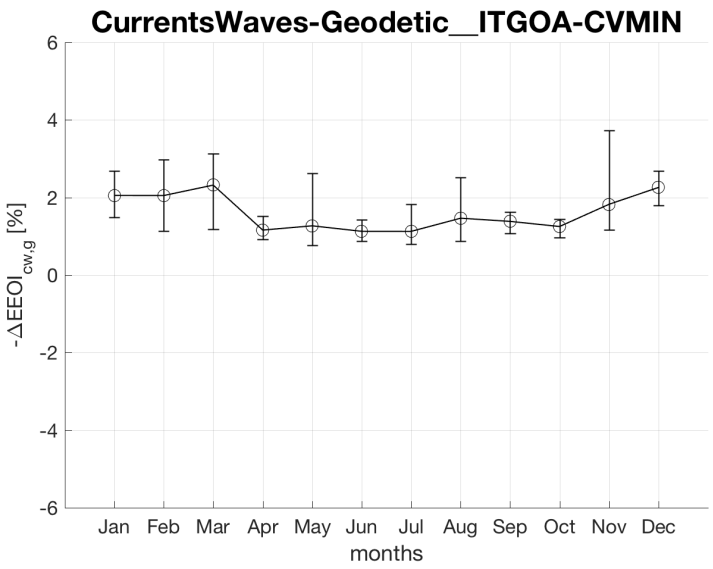

waves--CVMIN-ITGOA
R_P= 0.66
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}

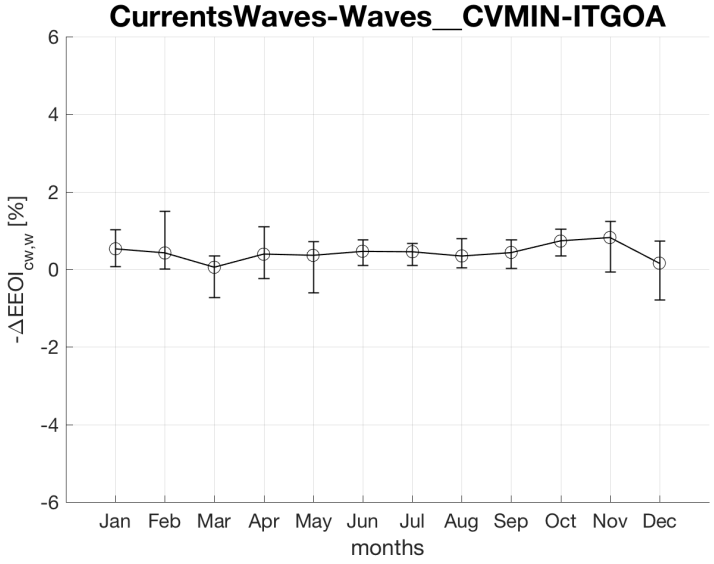

waves--ITGOA-CVMIN
R_P= 0.54
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}

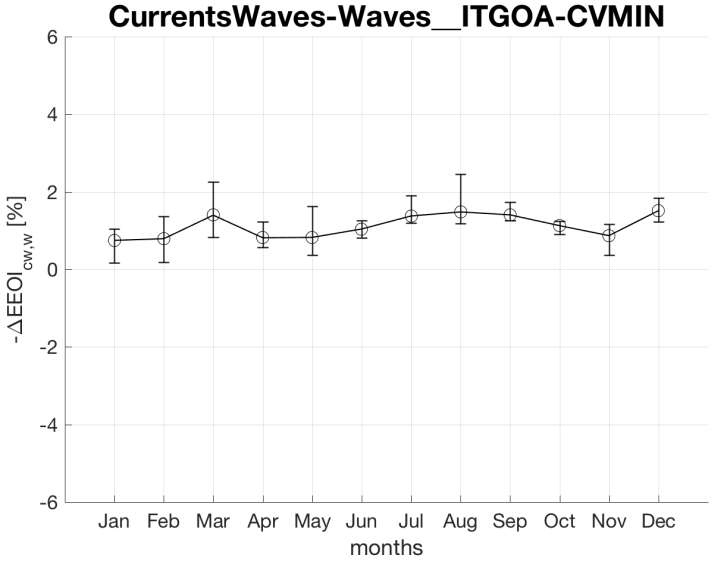

currents-waves--CVMIN-ITGOA
R_P= 0.39
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}


currents-waves--ITGOA-CVMIN
R_P= 0.51
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}


CurrentsWaves-Geodetic__CVMIN-ITGOA
-ΔEEOI cw,g [%]
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

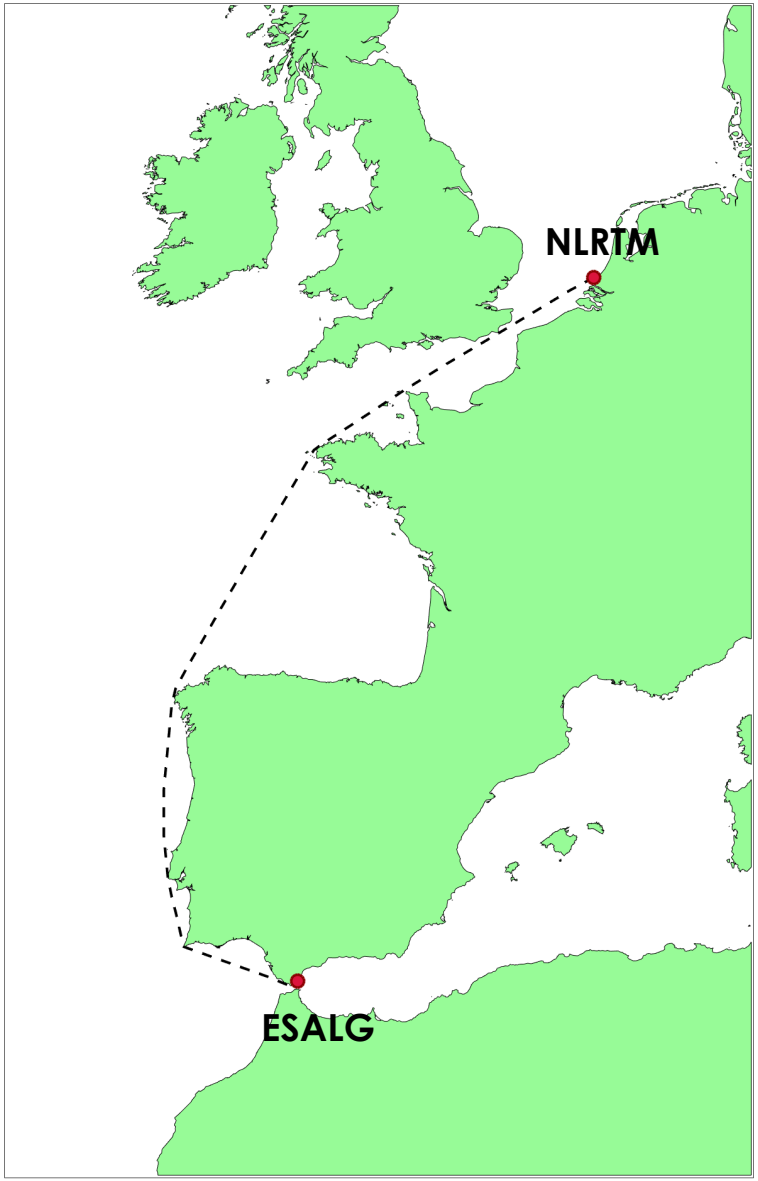

CurrentsWaves-Geodetic__ITGOA-CVMIN
-ΔEEOI cw,g [%]
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months


CurrentsWaves-Waves__CVMIN-ITGOA
-ΔEEOI cw,w [%]
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

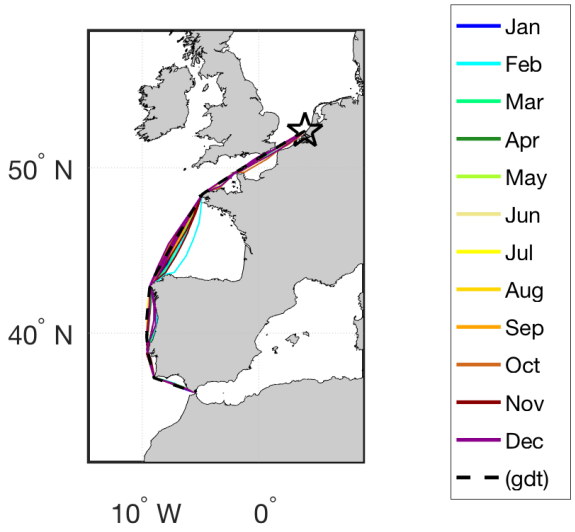

CurrentsWaves-Waves__ITGOA-CVMIN
-ΔEEOI cw,w [%]
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

←Index

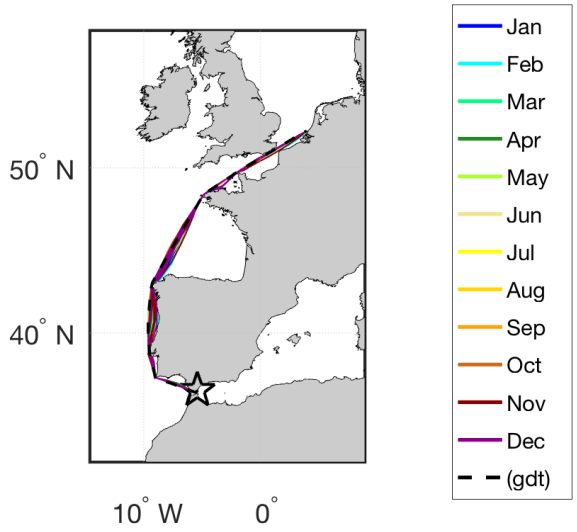
7. Rotterdam - Algeciras



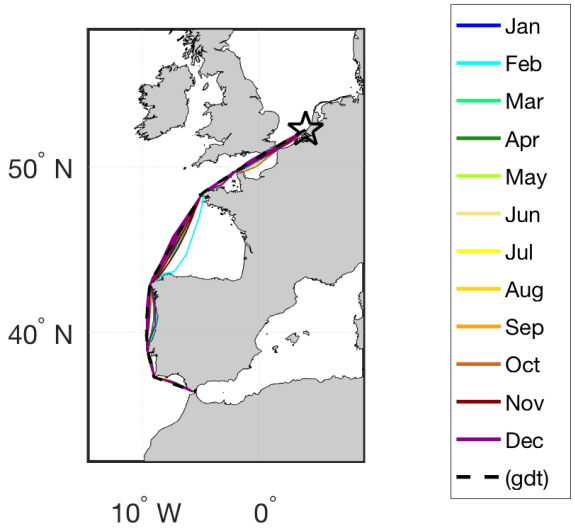
waves--NLRTM-ESALG



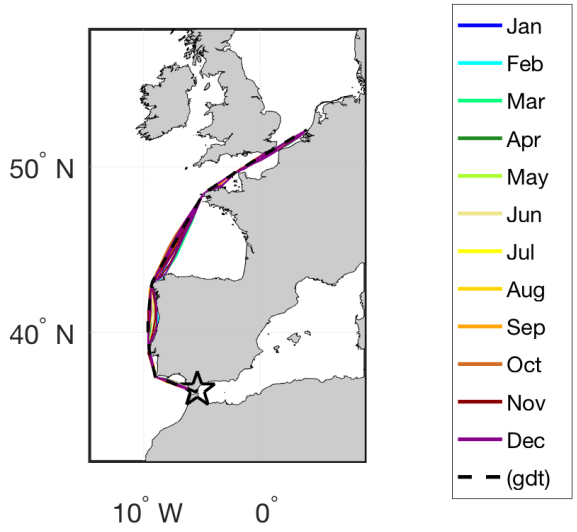
waves--ESALG-NLRTM



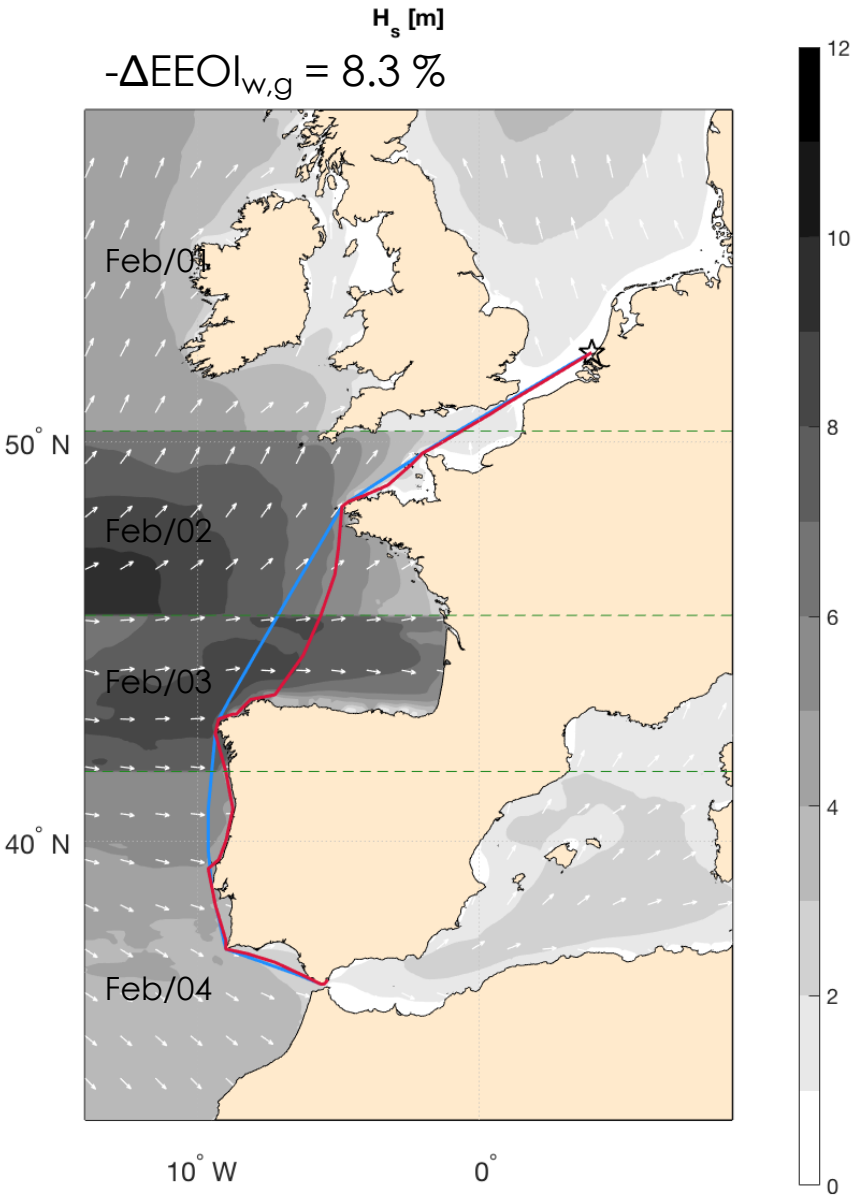
current-waves--NLRTM-ESALG



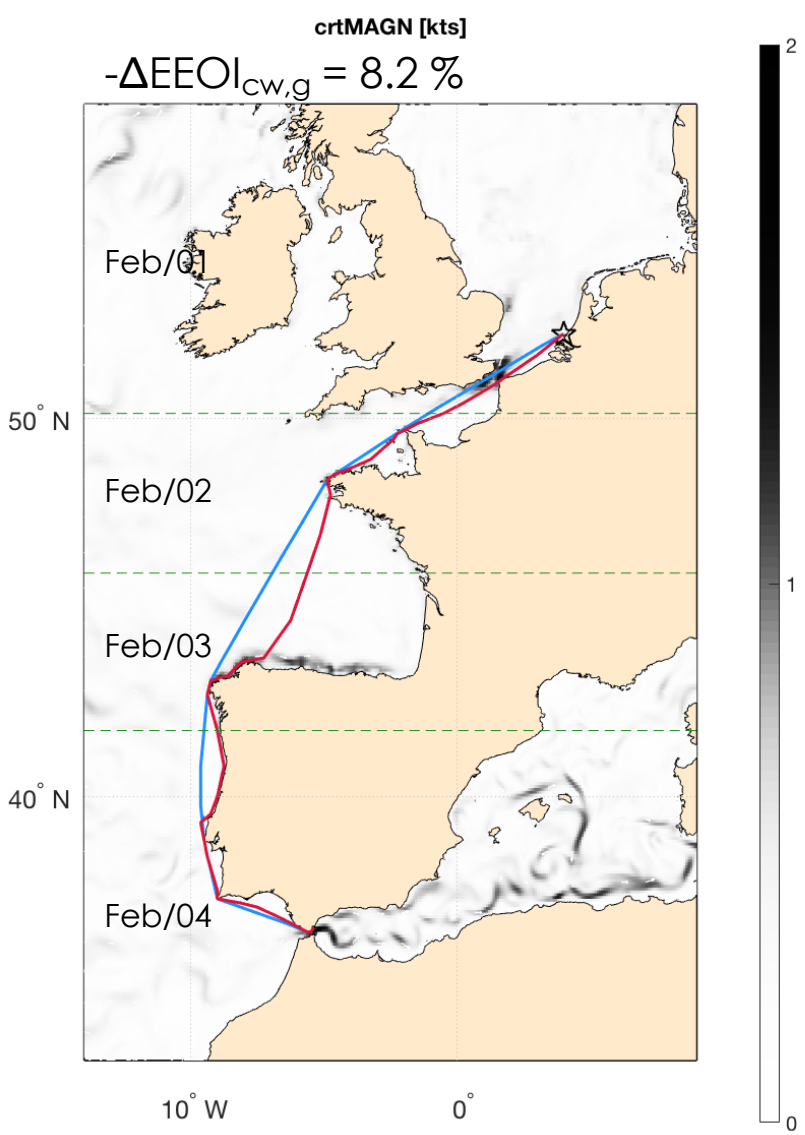
current-waves--ESALG-NLRTM

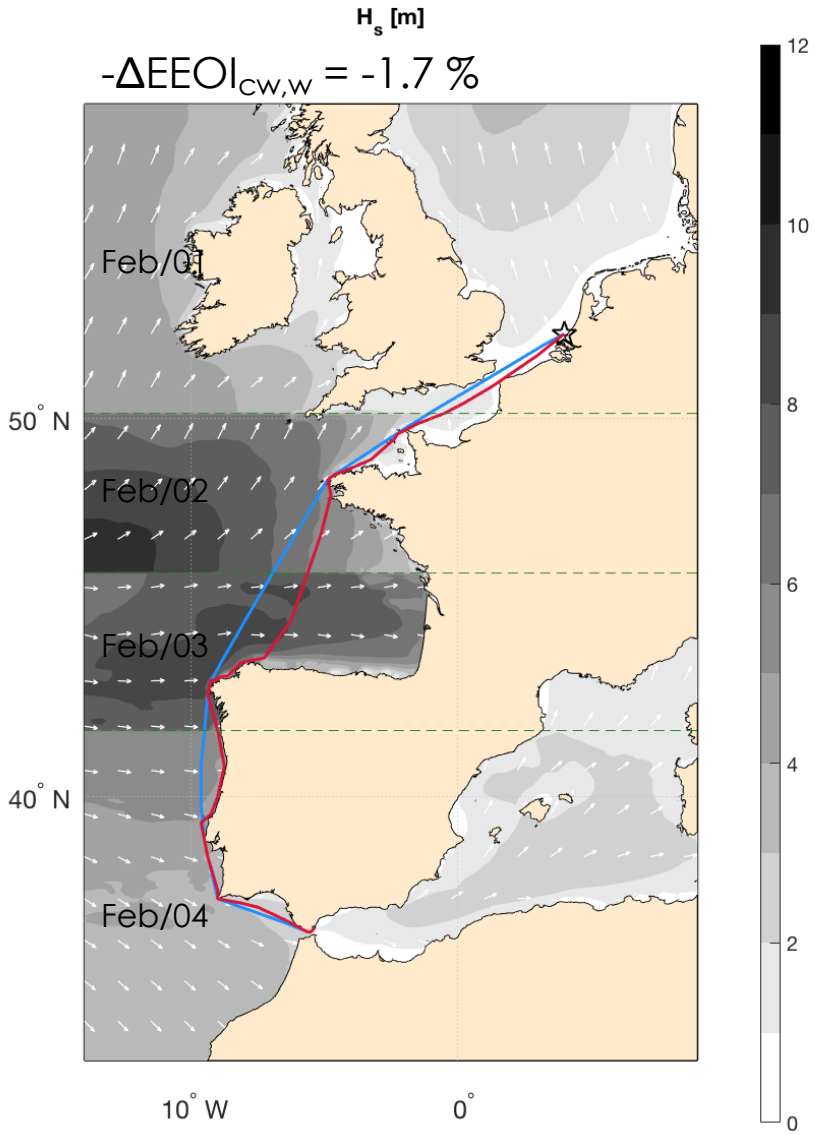


Rotterdam - Algeciras, waves, 01 Feb

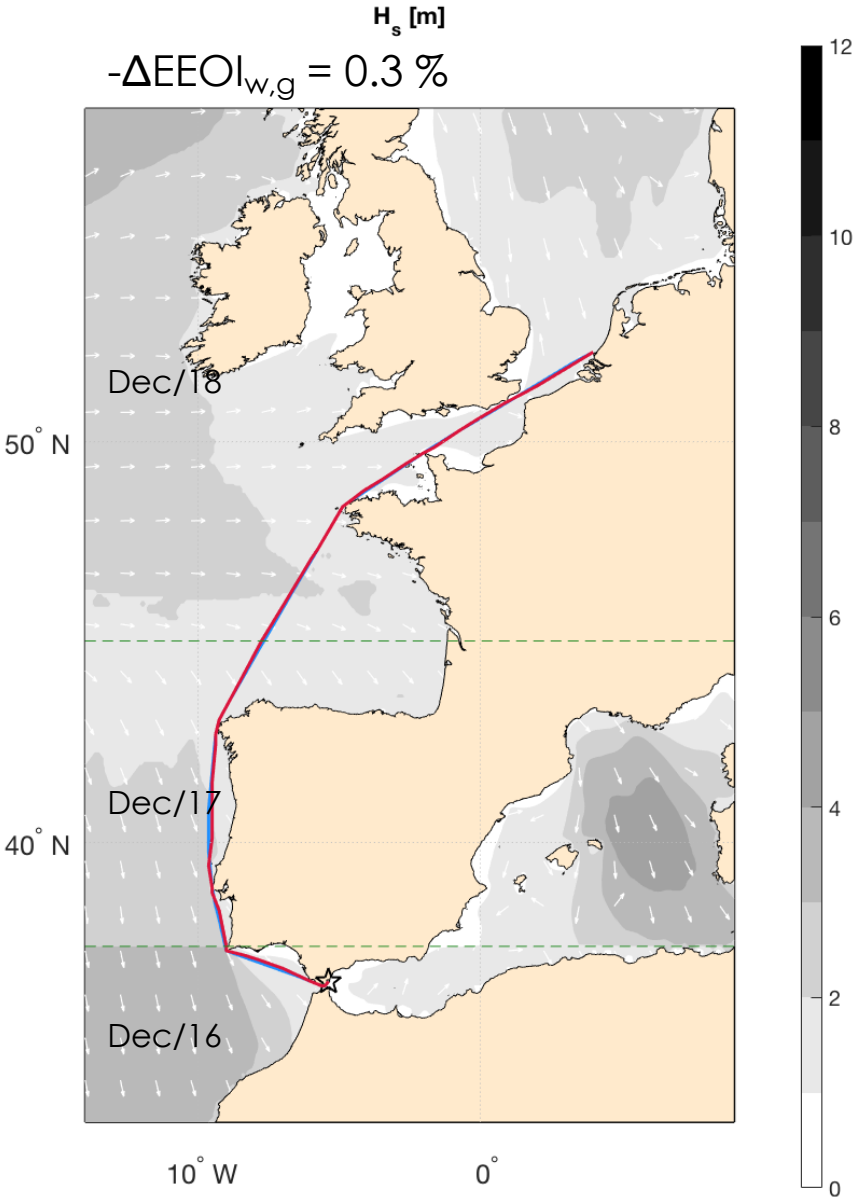


Rotterdam - Algeciras, currents and waves, 01 Feb

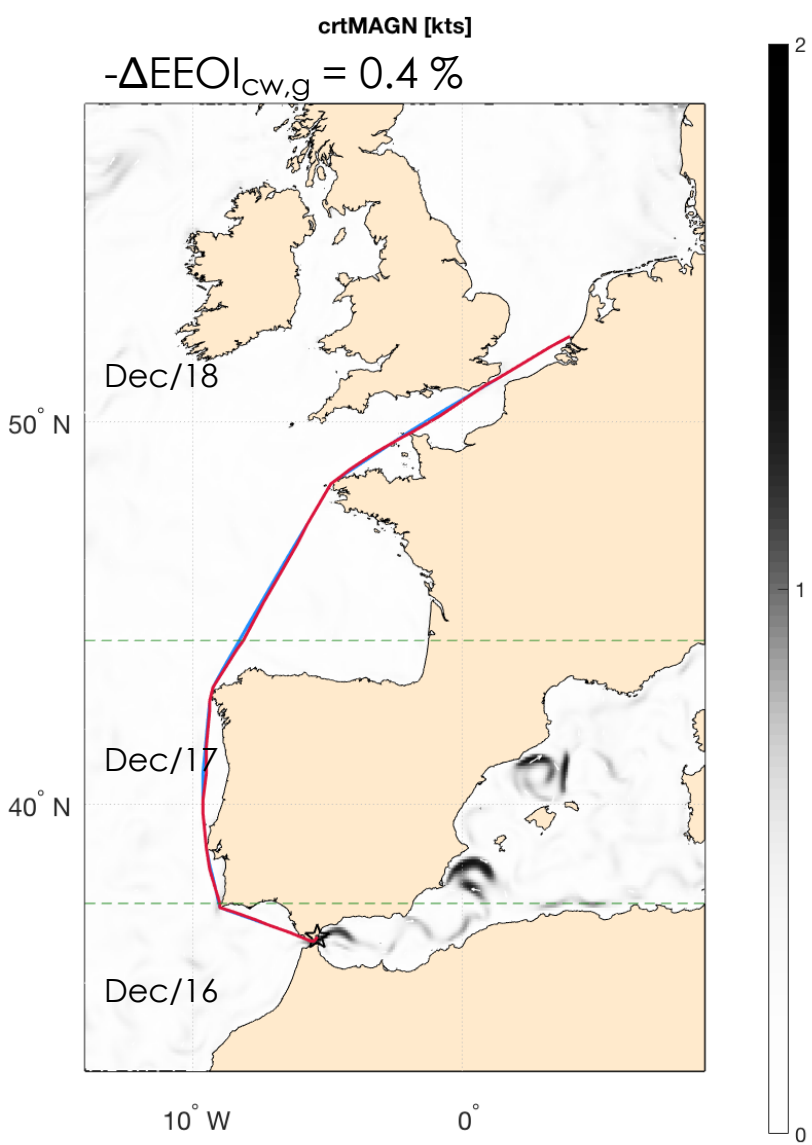


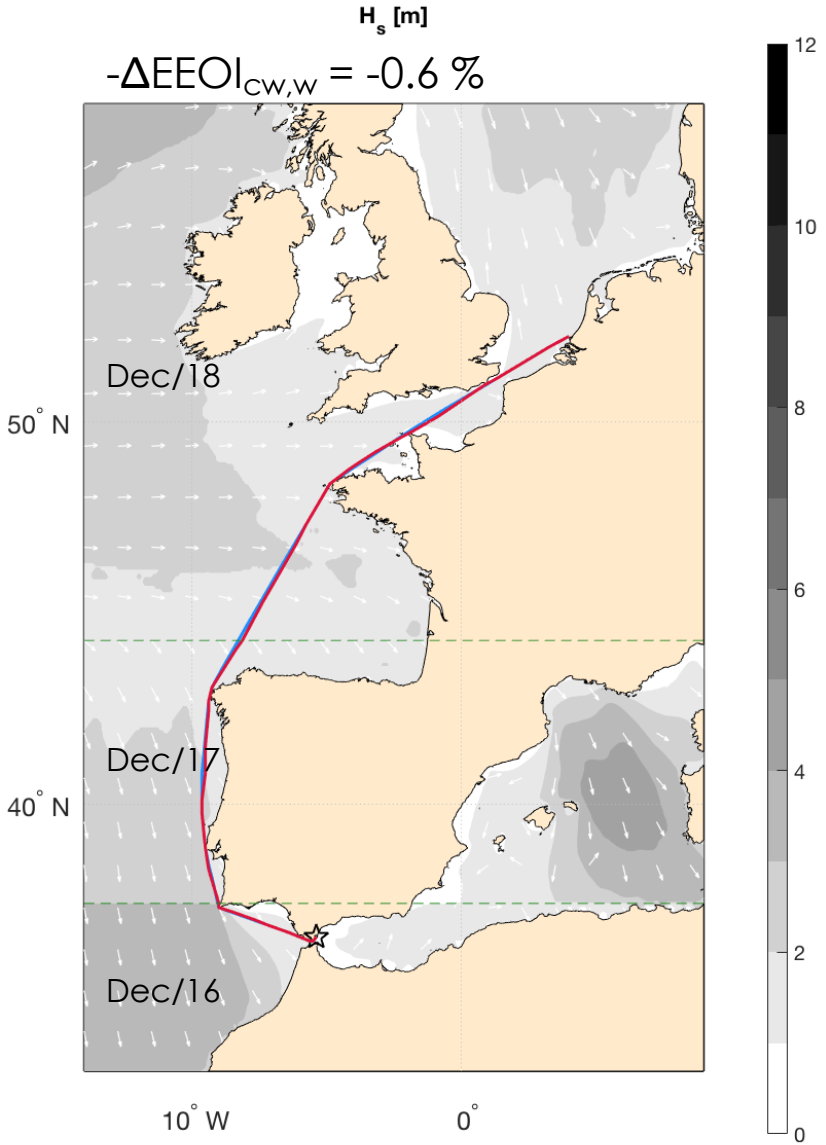


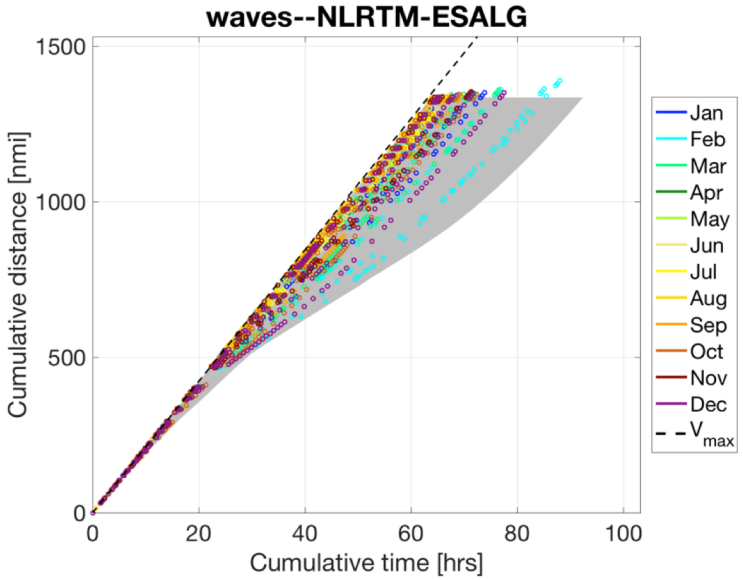
Algeciras - Rotterdam, waves, 16 Dec

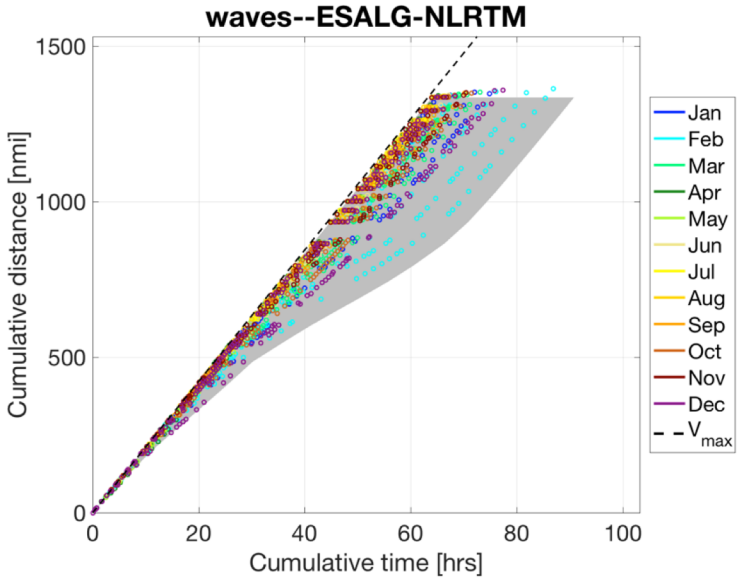


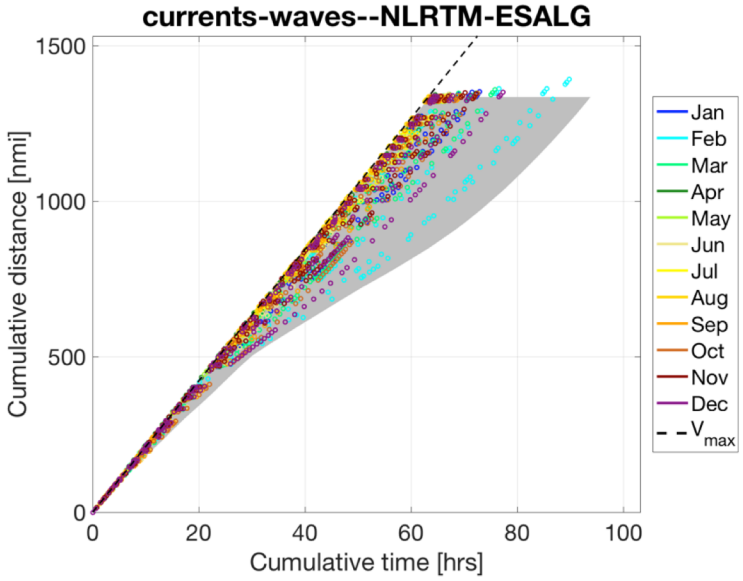
Algeciras - Rotterdam, currents and waves, 16 Dec

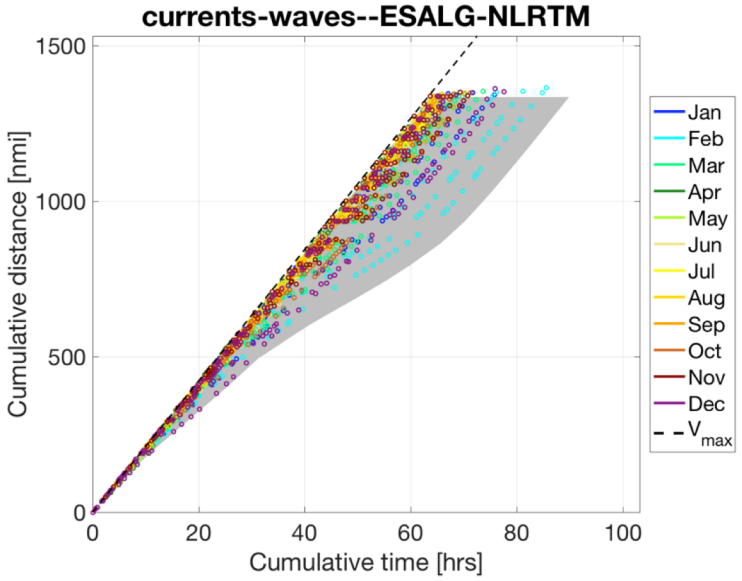


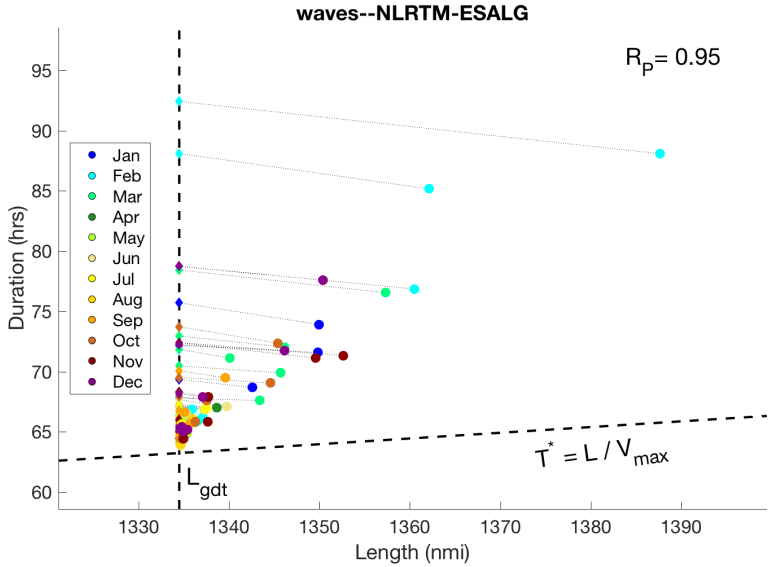


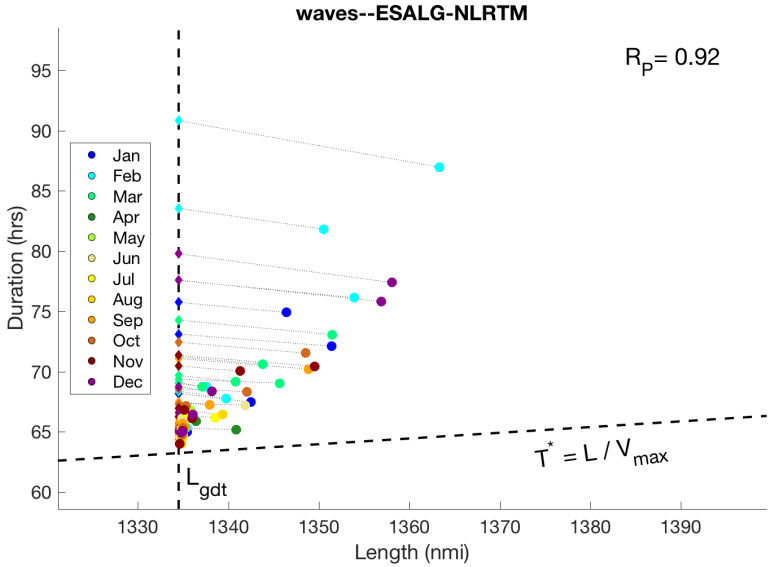

waves--NLRTM-ESALG
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
0
20
40
60
80
100
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

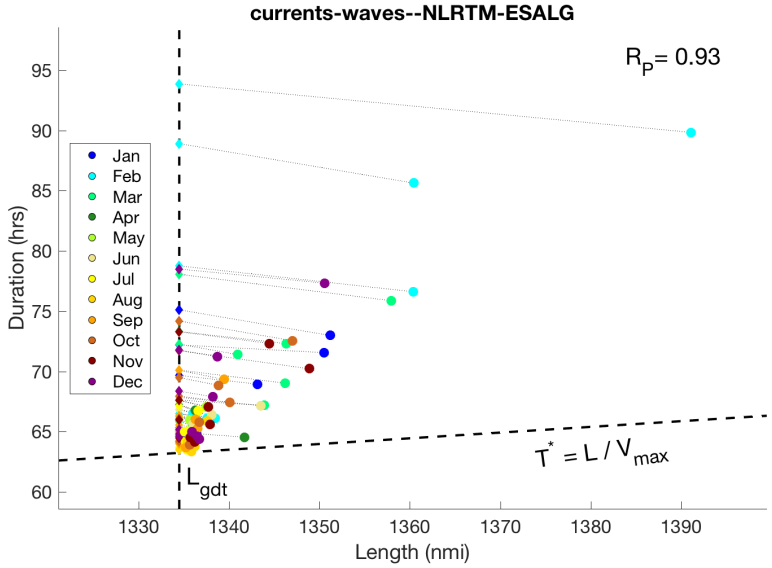

waves--ESALG-NLRTM
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
0
20
40
60
80
100
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

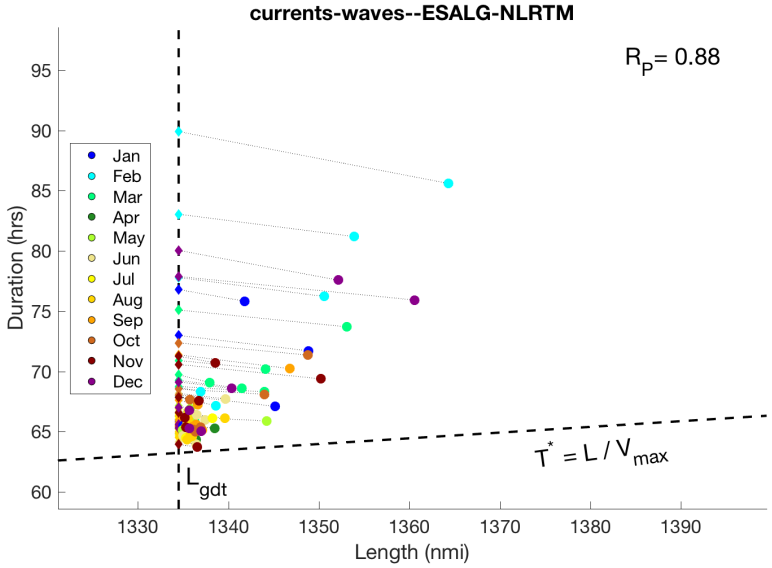

currents-waves--NLRTM-ESALG
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
0
20
40
60
80
100
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

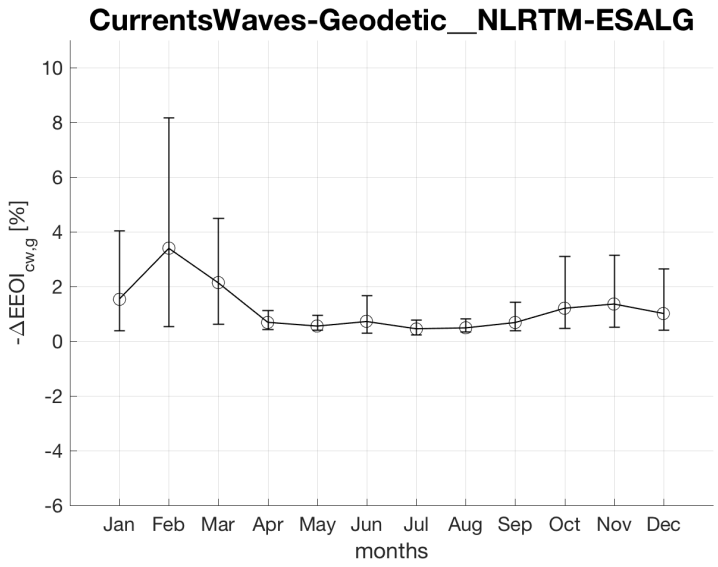

currents-waves--ESALG-NLRTM
Cumulative distance [nmi]
Cumulative time [hrs]
0
500
1000
1500
0
20
40
60
80
100
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

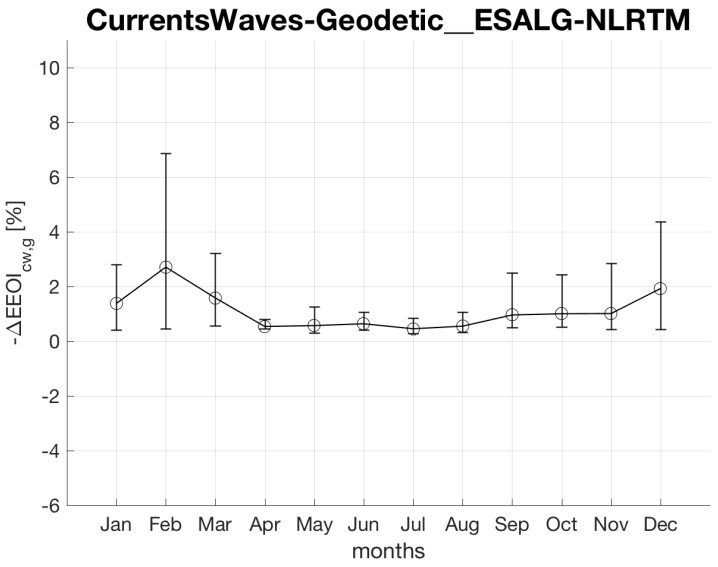

waves--NLRTM-ESALG
R_P= 0.95
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}

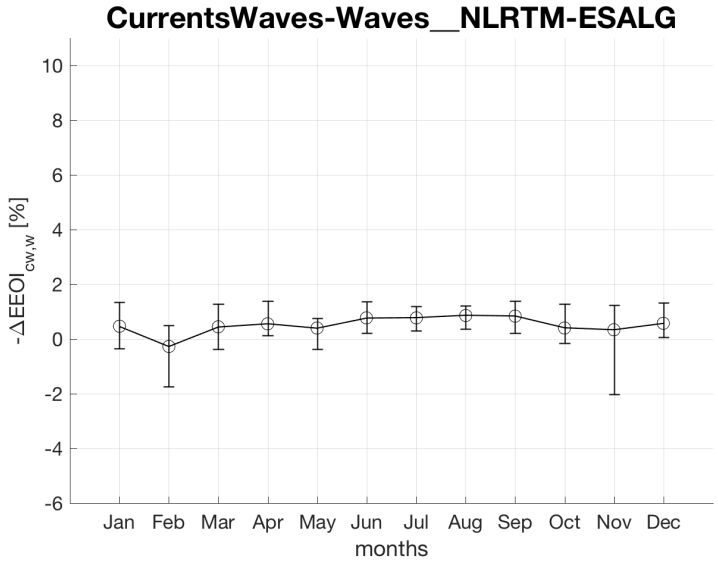

waves--ESALG-NLRTM
R_P= 0.92
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}

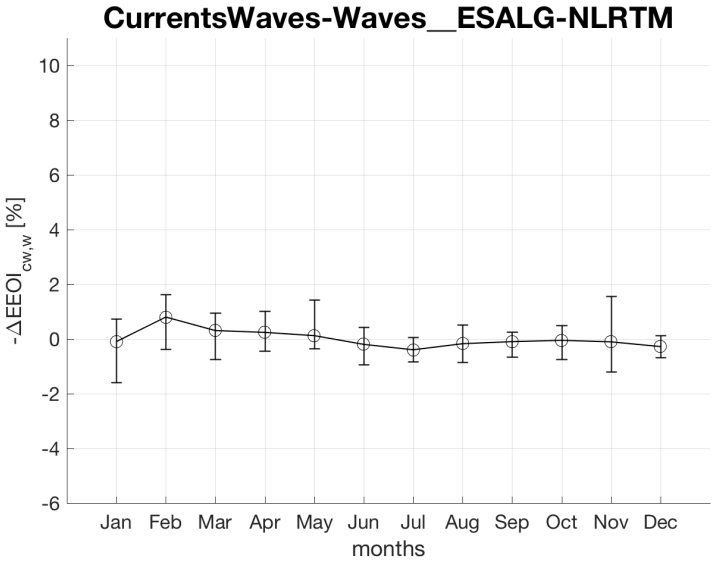

currents-waves--NLRTM-ESALG
R_P= 0.93
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}


currents-waves--ESALG-NLRTM
R_P= 0.88
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Duration (hrs)
Length (nmi)
$T^* = L / V_{max}$
L_{gdt}


CurrentsWaves-Geodetic__NLRTM-ESALG
-ΔEEOI cw,g [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

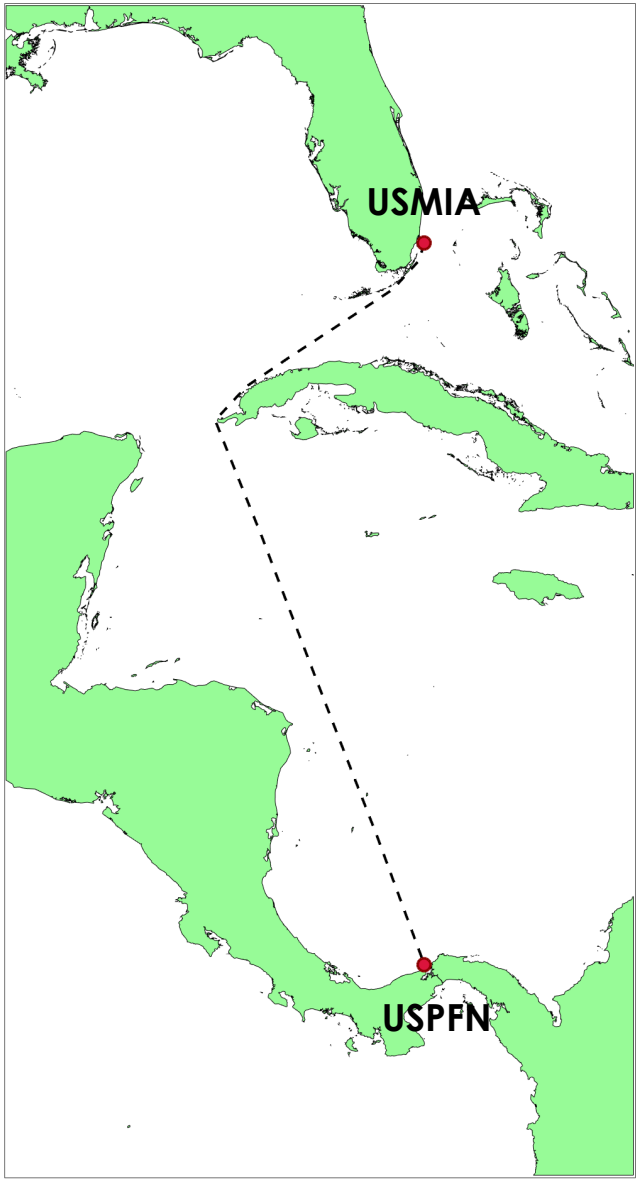

CurrentsWaves-Geodetic__ESALG-NLRTM
-ΔEEOI cw,g [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months


CurrentsWaves-Waves__NLRTM-ESALG
-ΔEEOI cw,w [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

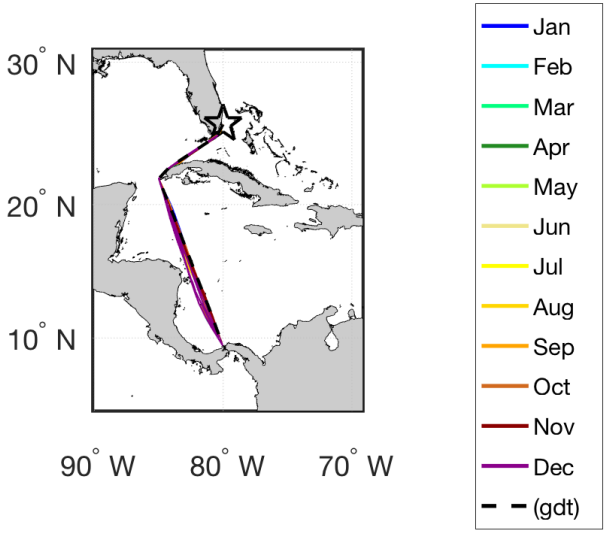

CurrentsWaves-Waves__ESALG-NLRTM
-ΔEEOI cw,w [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

←Index

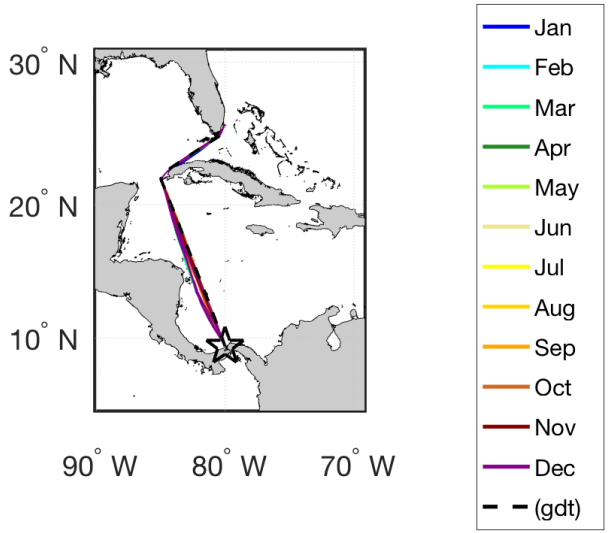
8. Miami - Panama



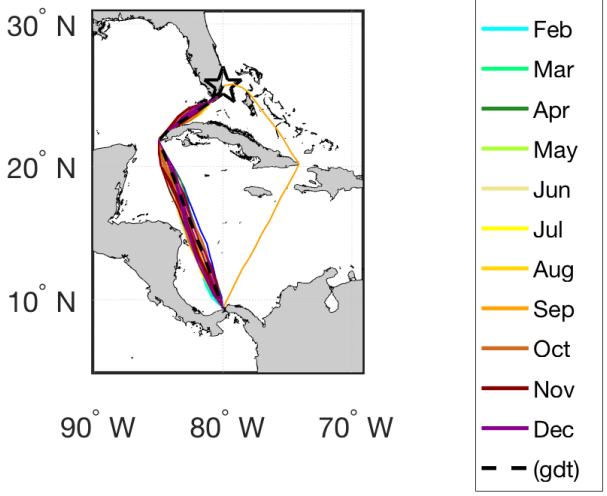
waves--USMIA-USPFN



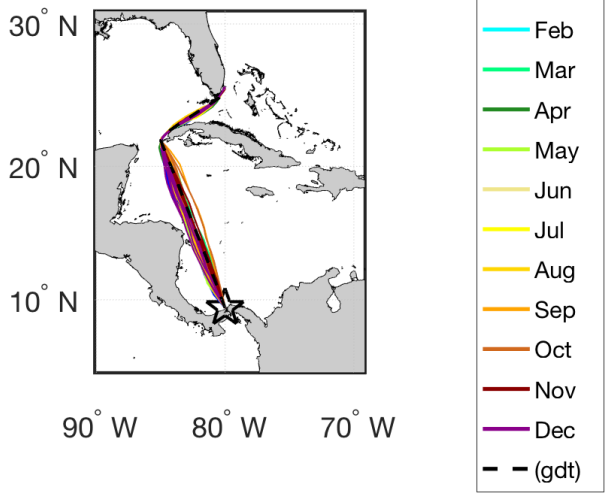
waves--USPFN-USMIA



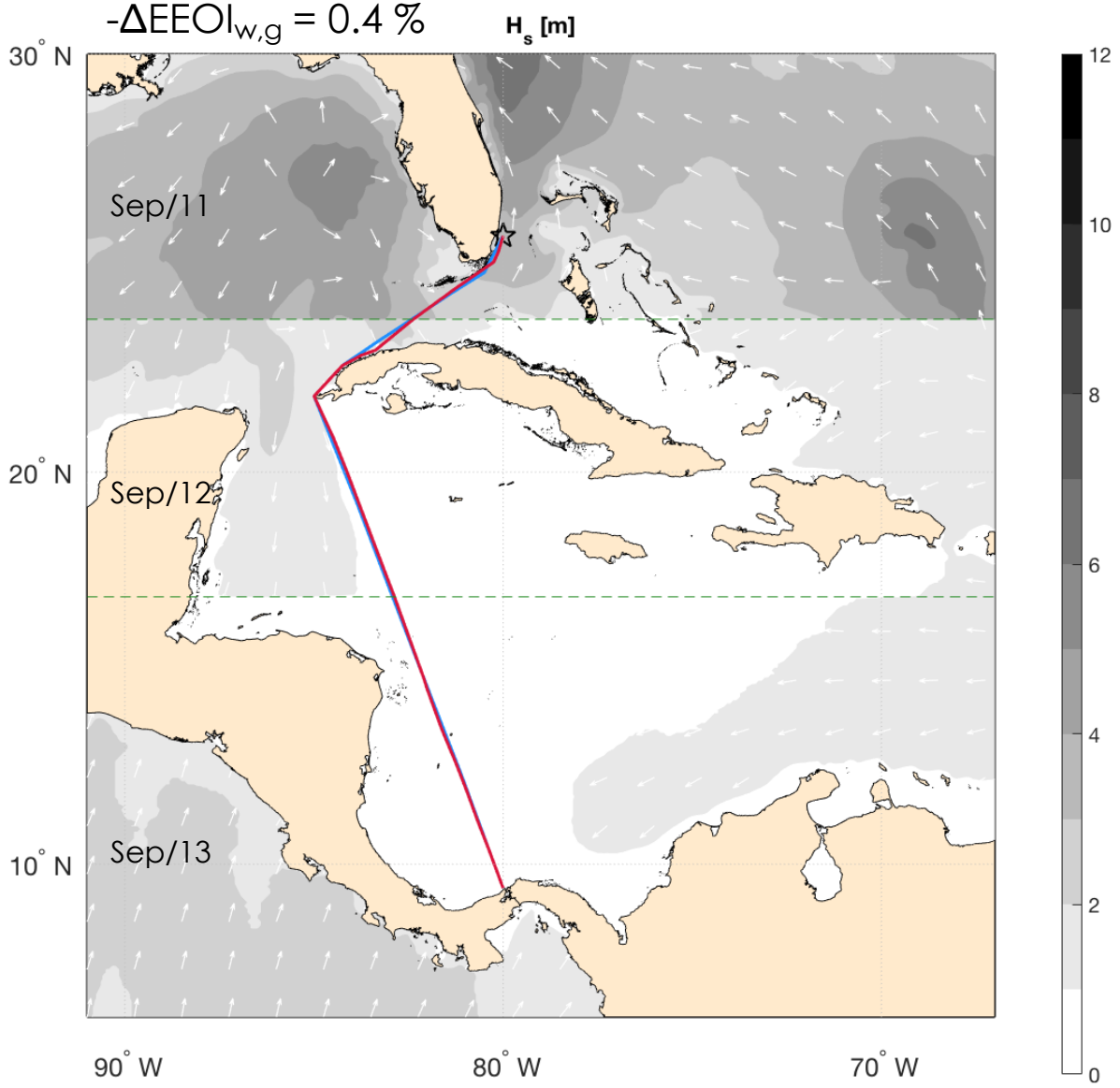
current-waves--USMIA-USPFN



current-waves--USPFN-USMIA

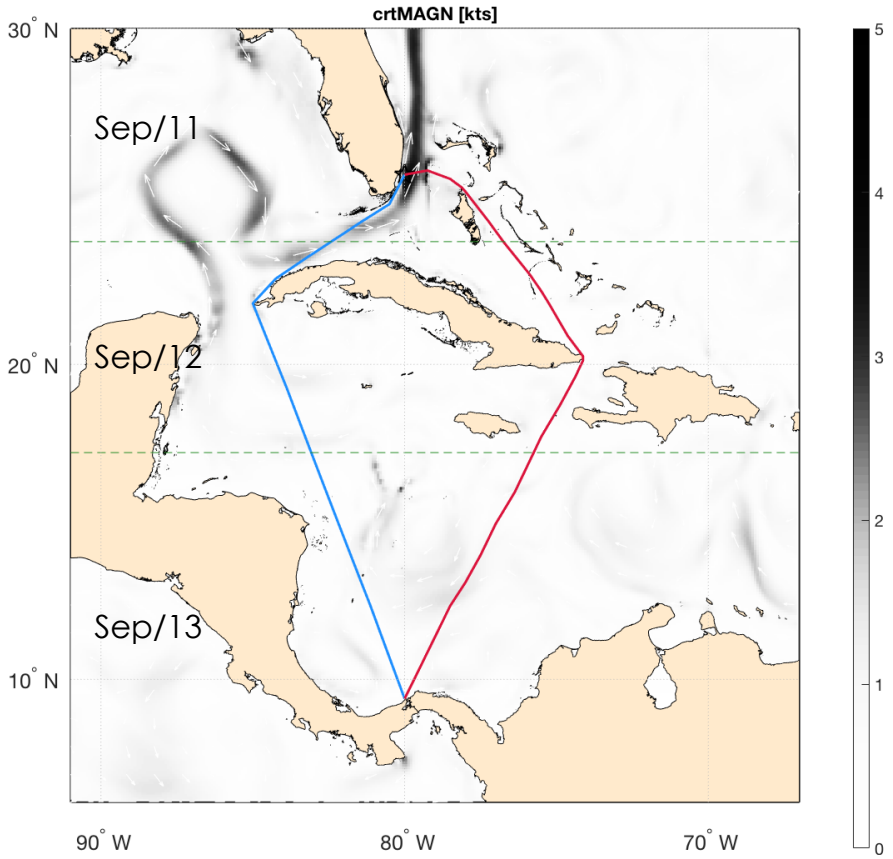


Miami - Panama, waves, 11 Sep

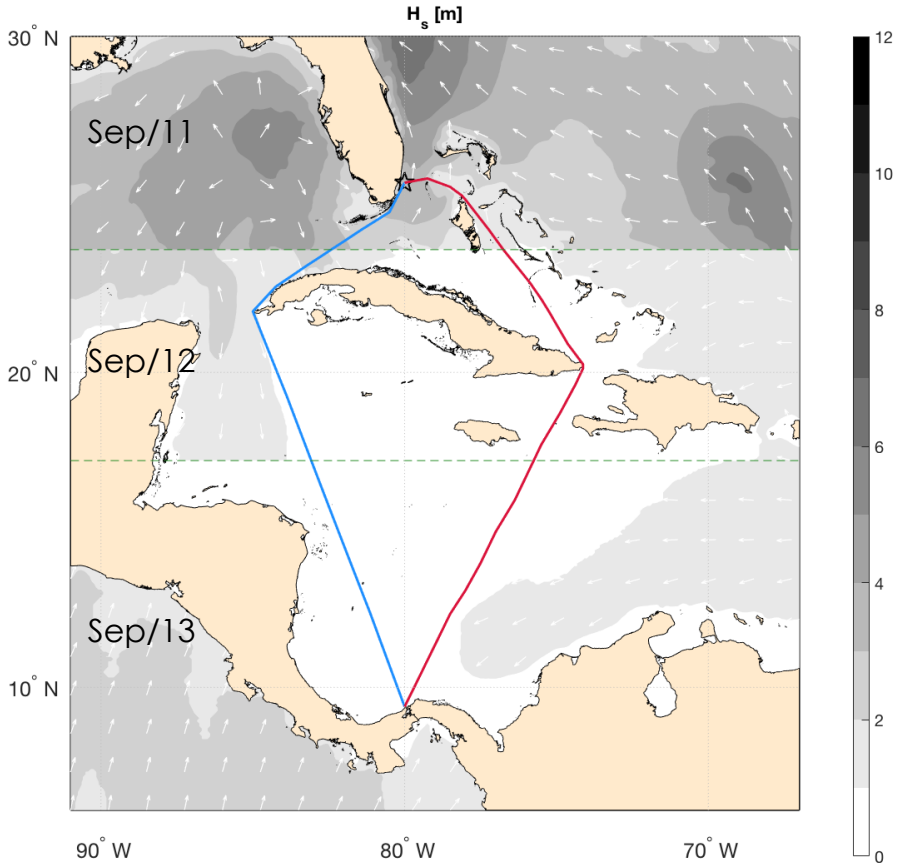


Miami - Panama, currents and waves, 11 Sep

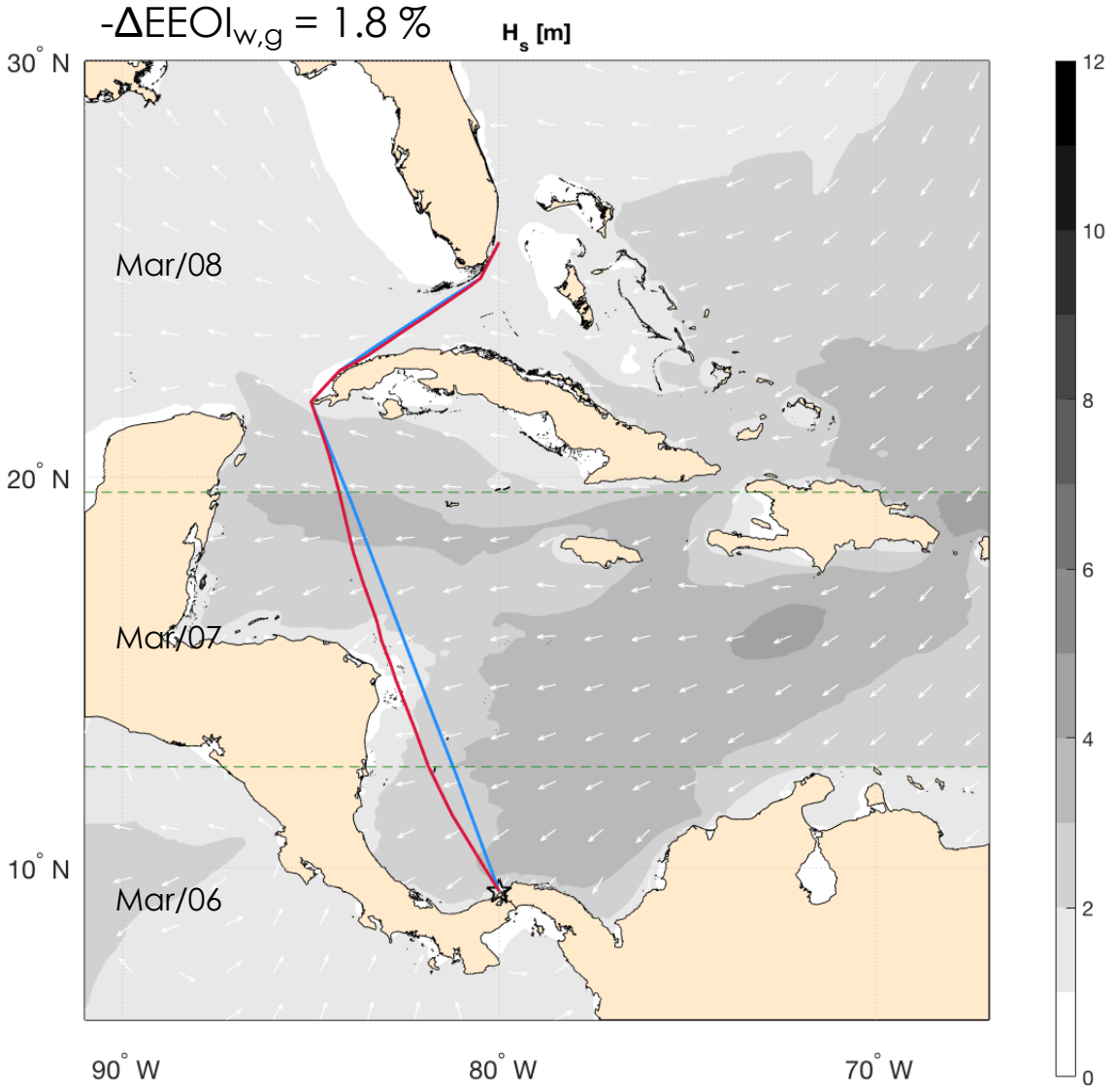
$-\Delta EEOI_{cw,g}$ = 6.5 %



$-\Delta EEOI_{cw,w}$ = 4.2 %

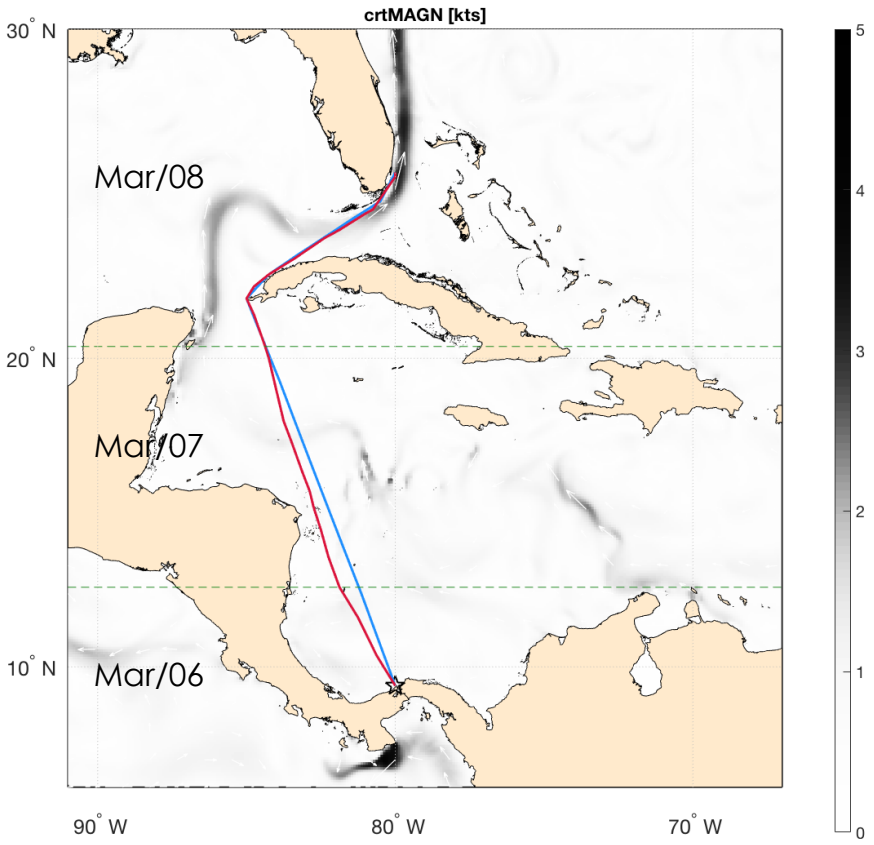


Panama - Miami, waves, 06 Mar

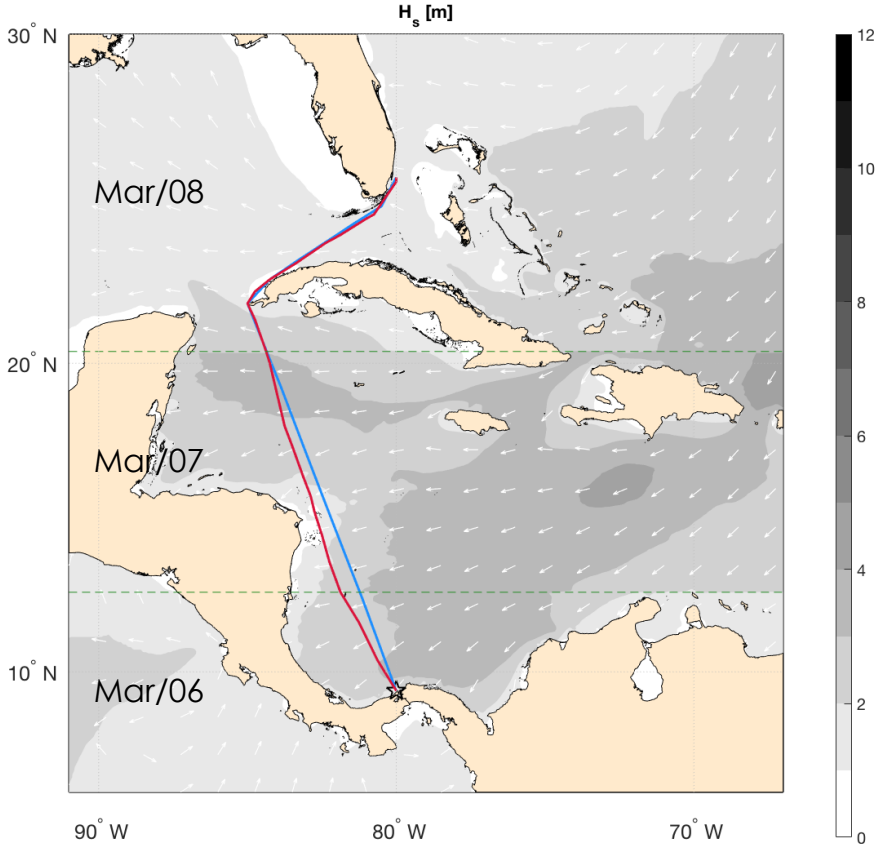


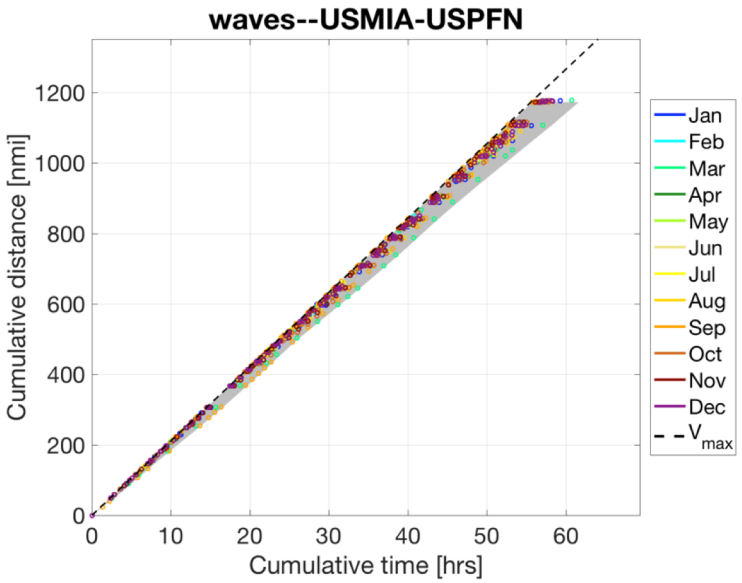
Panama - Miami, currents and waves, 06 Mar

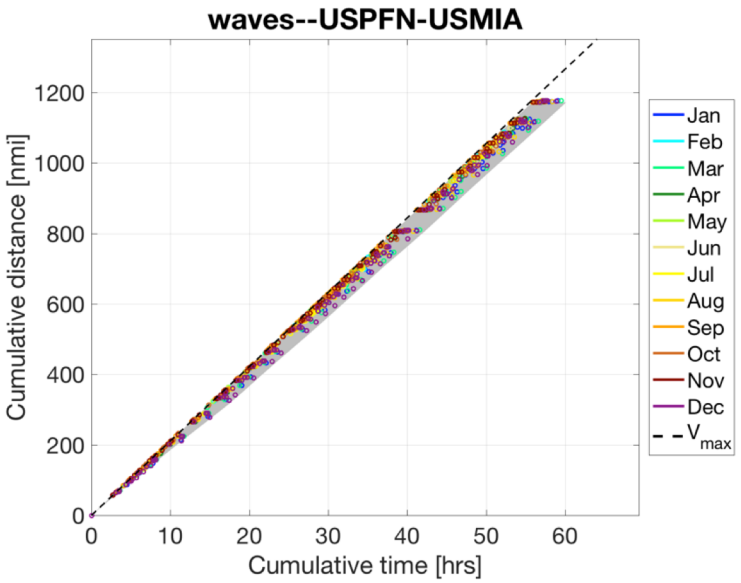
$-\Delta EEOI_{cw,g}$ = 2.3 %

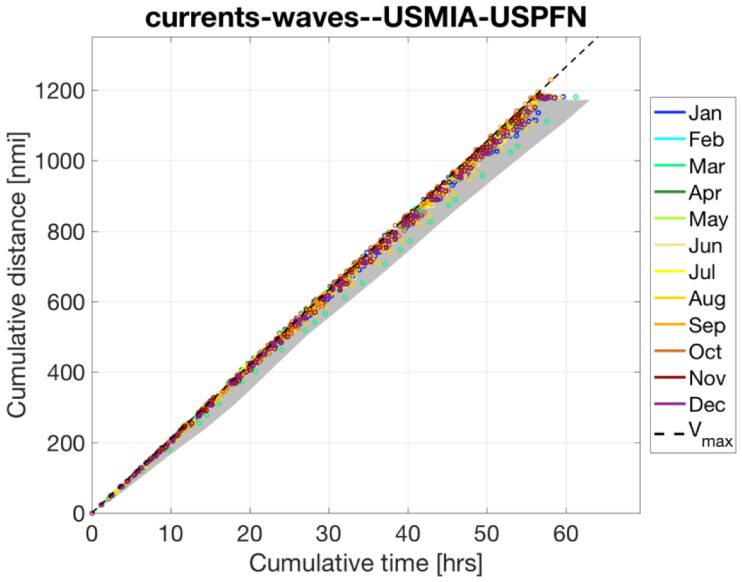


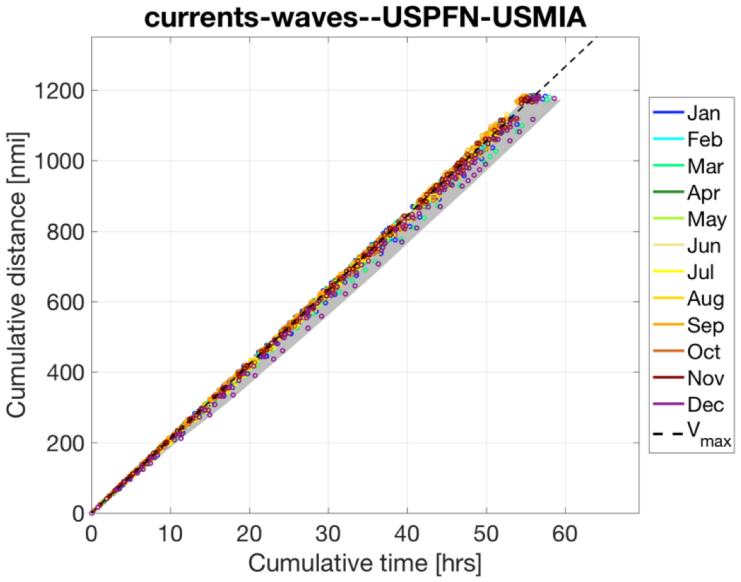
$-\Delta EEOI_{cw,w}$ = 2.7 %

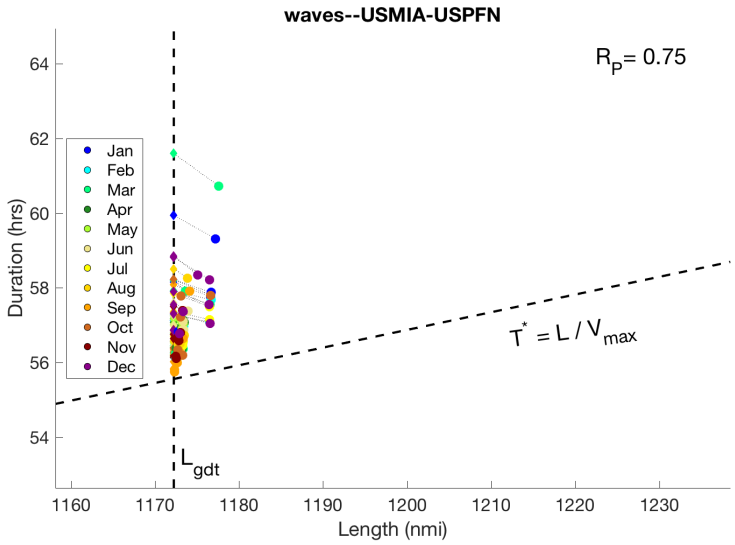


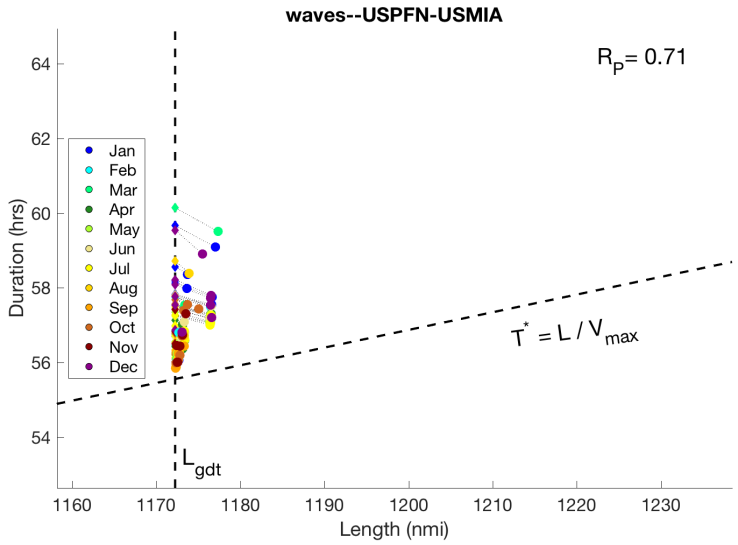

waves--USMIA-USPFN
Cumulative distance [nmi]
Cumulative time [hrs]
0
200
400
600
800
1000
1200
0
10
20
30
40
50
60
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

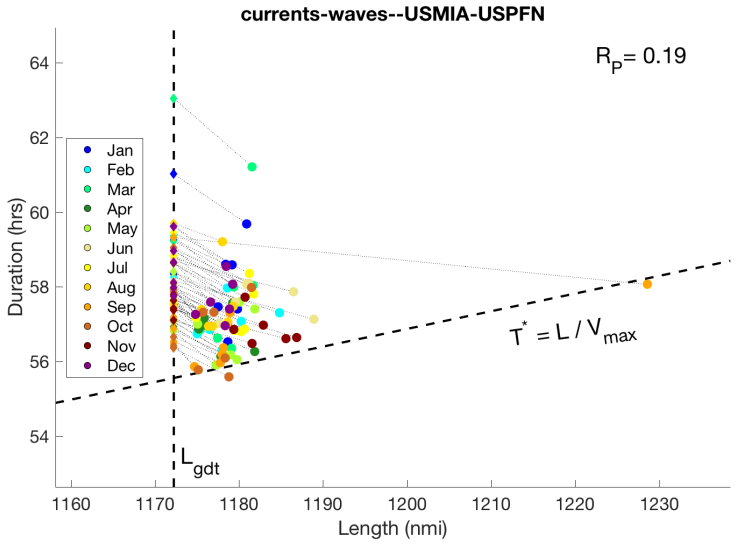

waves--USPFN-USMIA
Cumulative distance [nmi]
Cumulative time [hrs]
0
200
400
600
800
1000
1200
0
10
20
30
40
50
60
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

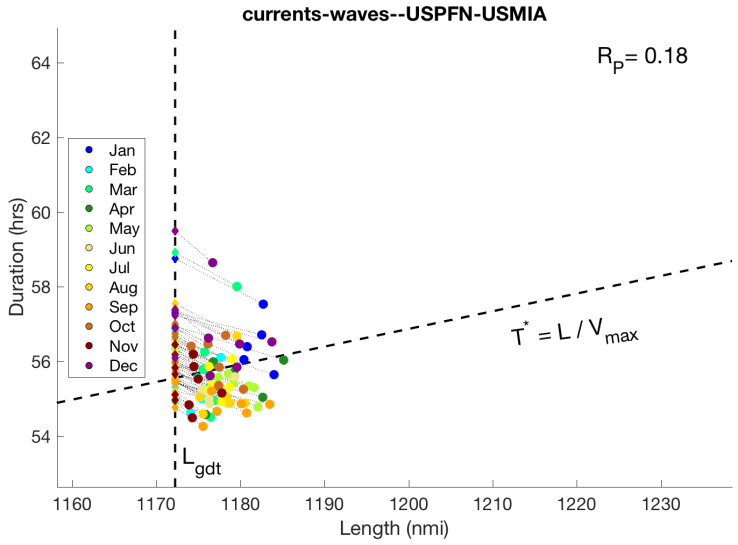

currents-waves--USMIA-USPFN
Cumulative distance [nmi]
Cumulative time [hrs]
0
200
400
600
800
1000
1200
0
10
20
30
40
50
60
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

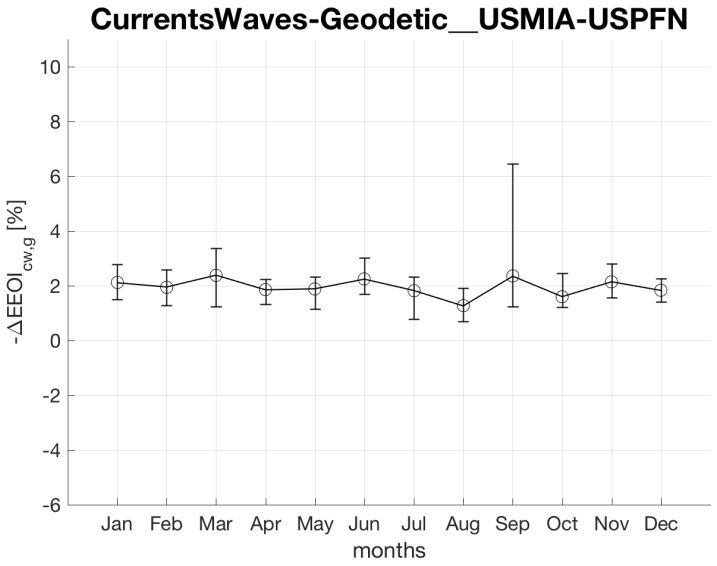

currents-waves--USPFN-USMIA
Cumulative distance [nmi]
Cumulative time [hrs]
0
200
400
600
800
1000
1200
0
10
20
30
40
50
60
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

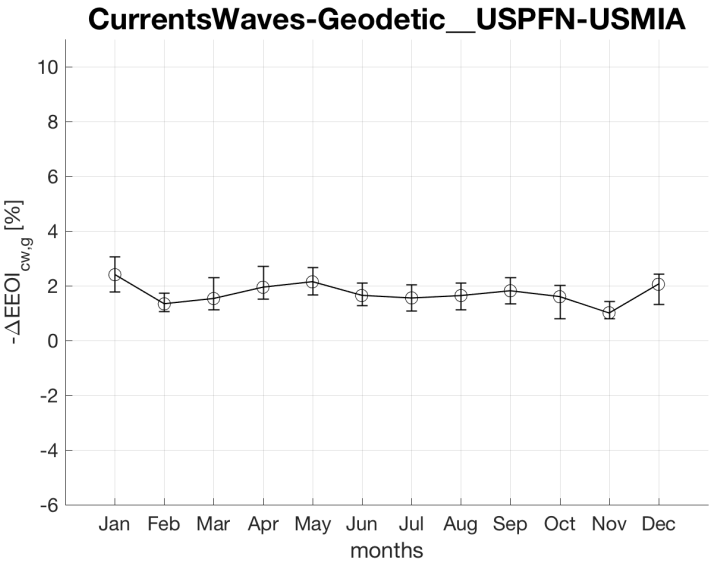

waves--USMIA-USPFN
R_P= 0.75
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

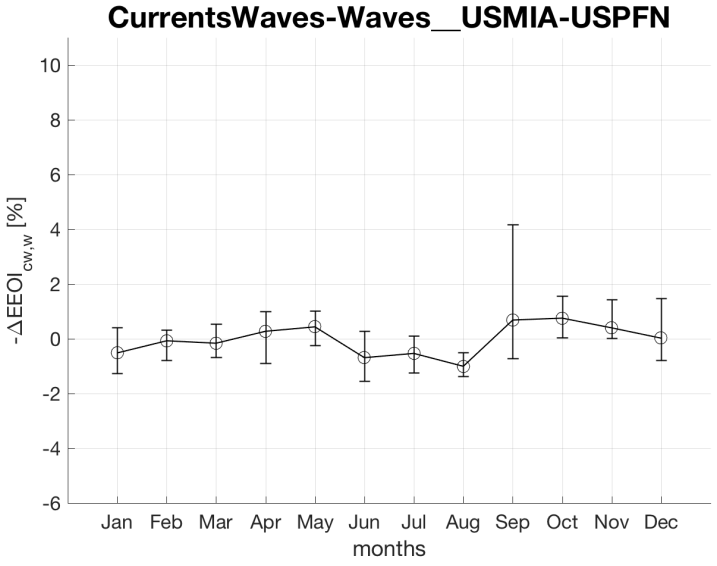

waves--USPFN-USMIA
R_P= 0.71
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

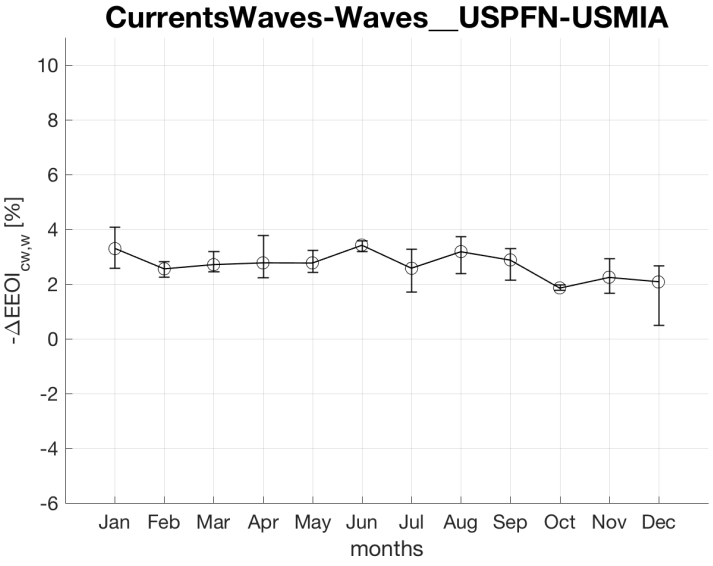

currents-waves--USMIA-USPFN
R_P= 0.19
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


currents-waves--USPFN-USMIA
R_P= 0.18
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


CurrentsWaves-Geodetic__USMIA-USPFN
-ΔEEOI cw,g [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

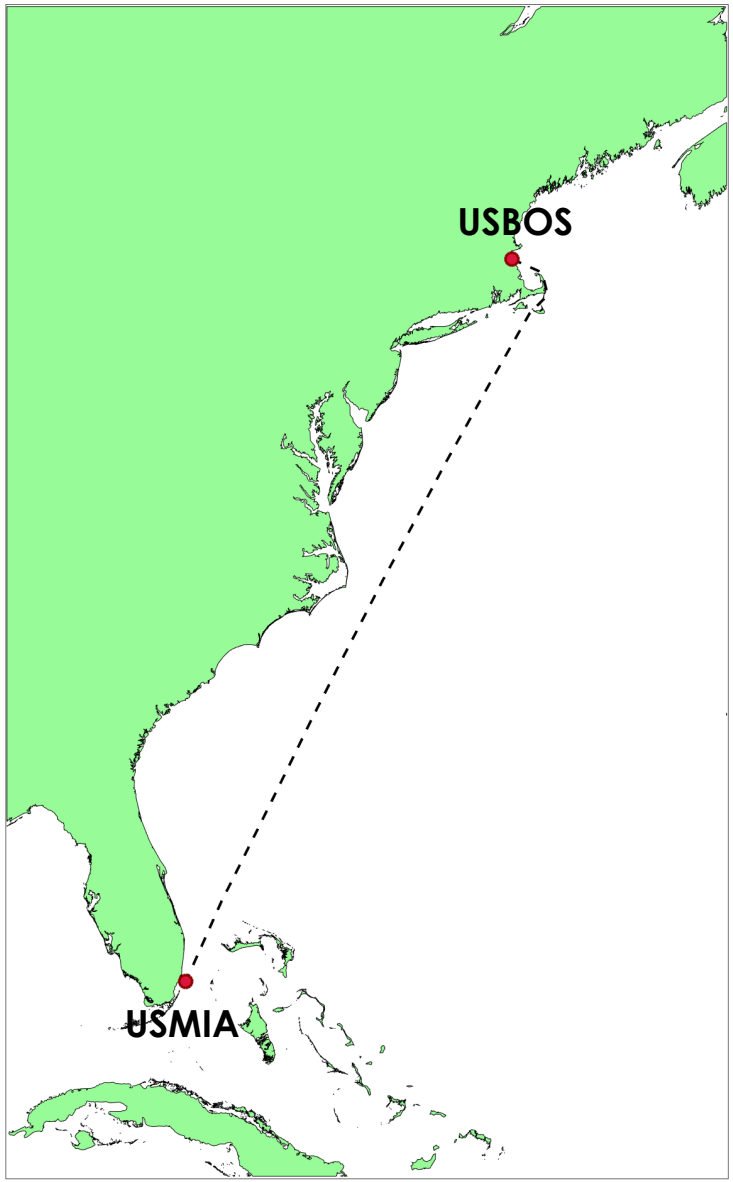

CurrentsWaves-Geodetic__USPFN-USMIA
-ΔEEOI cw,g [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

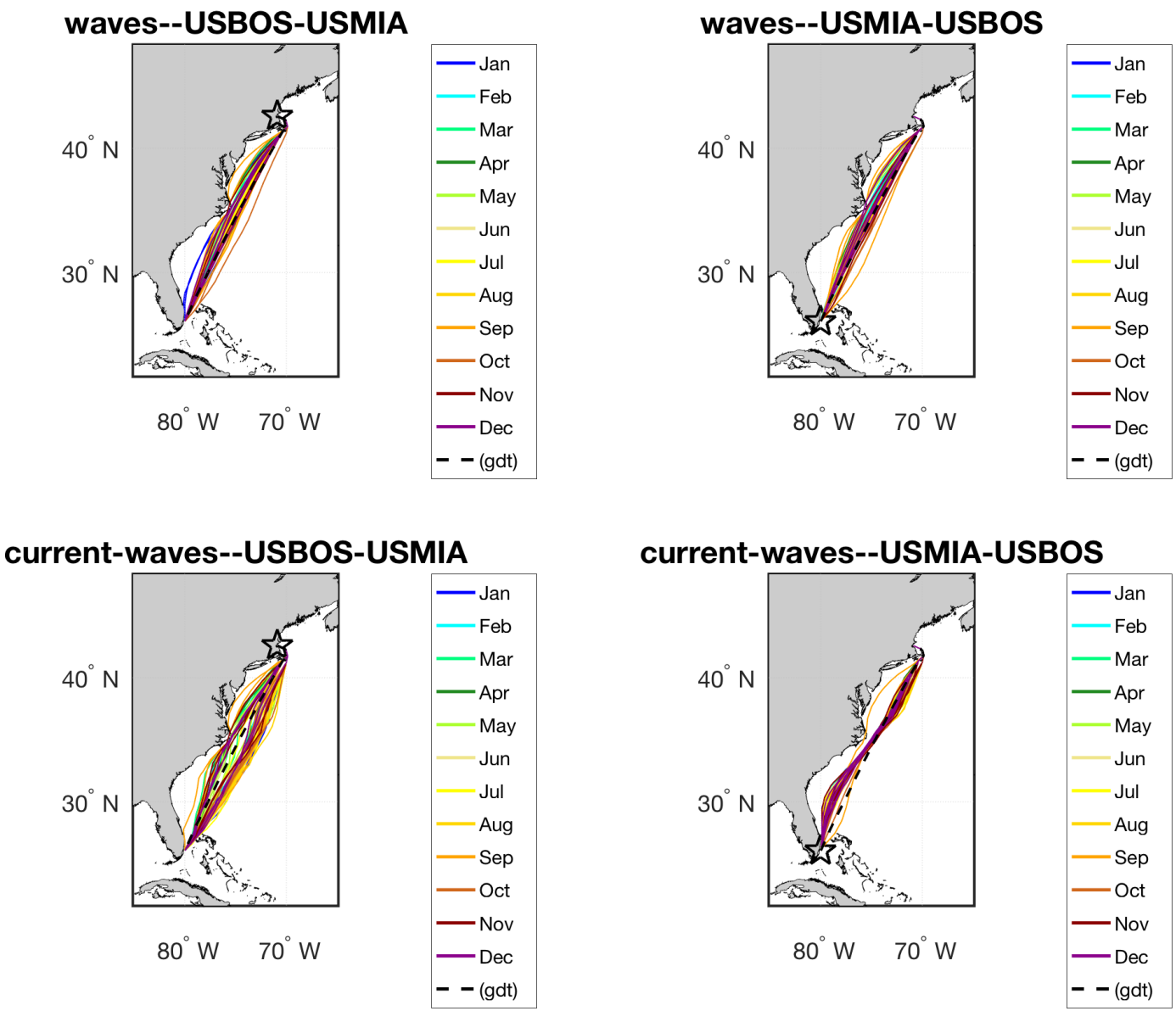

CurrentsWaves-Waves__USMIA-USPFN
-ΔEEOI cw,w [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months


CurrentsWaves-Waves__USPFN-USMIA
-ΔEEOI cw,w [%]
10
8
6
4
2
0
-2
-4
-6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

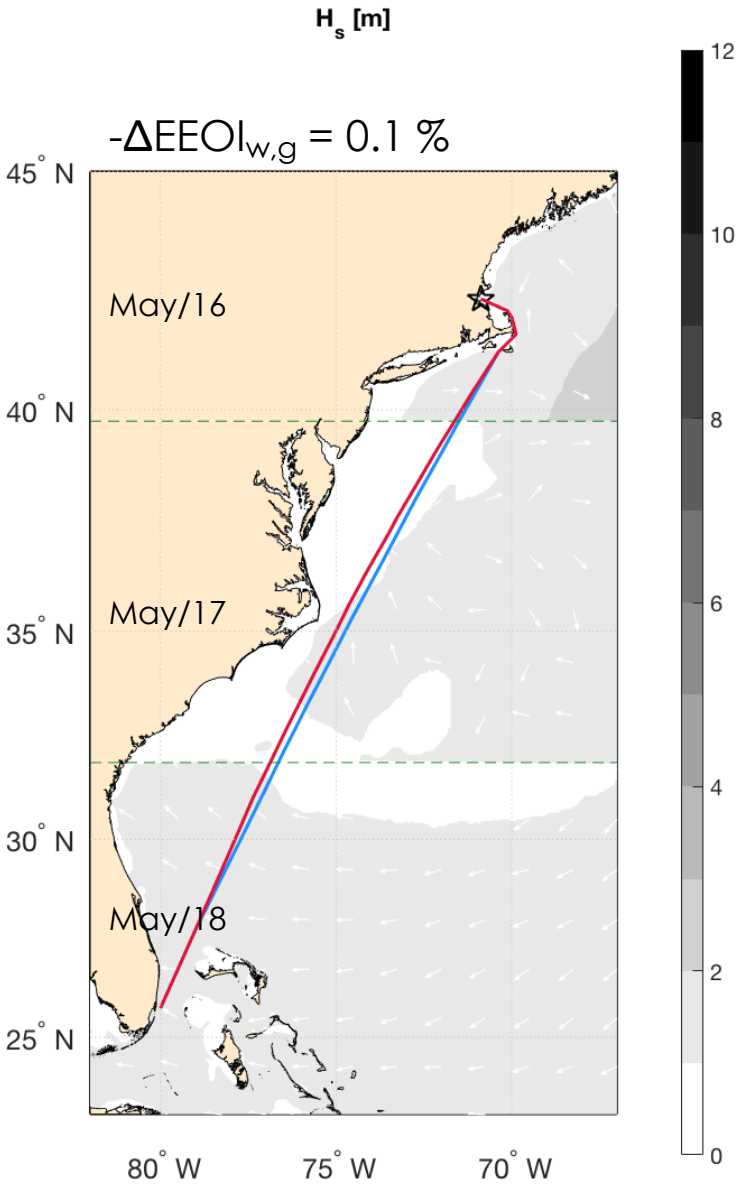
←Index

9. Boston - Miami

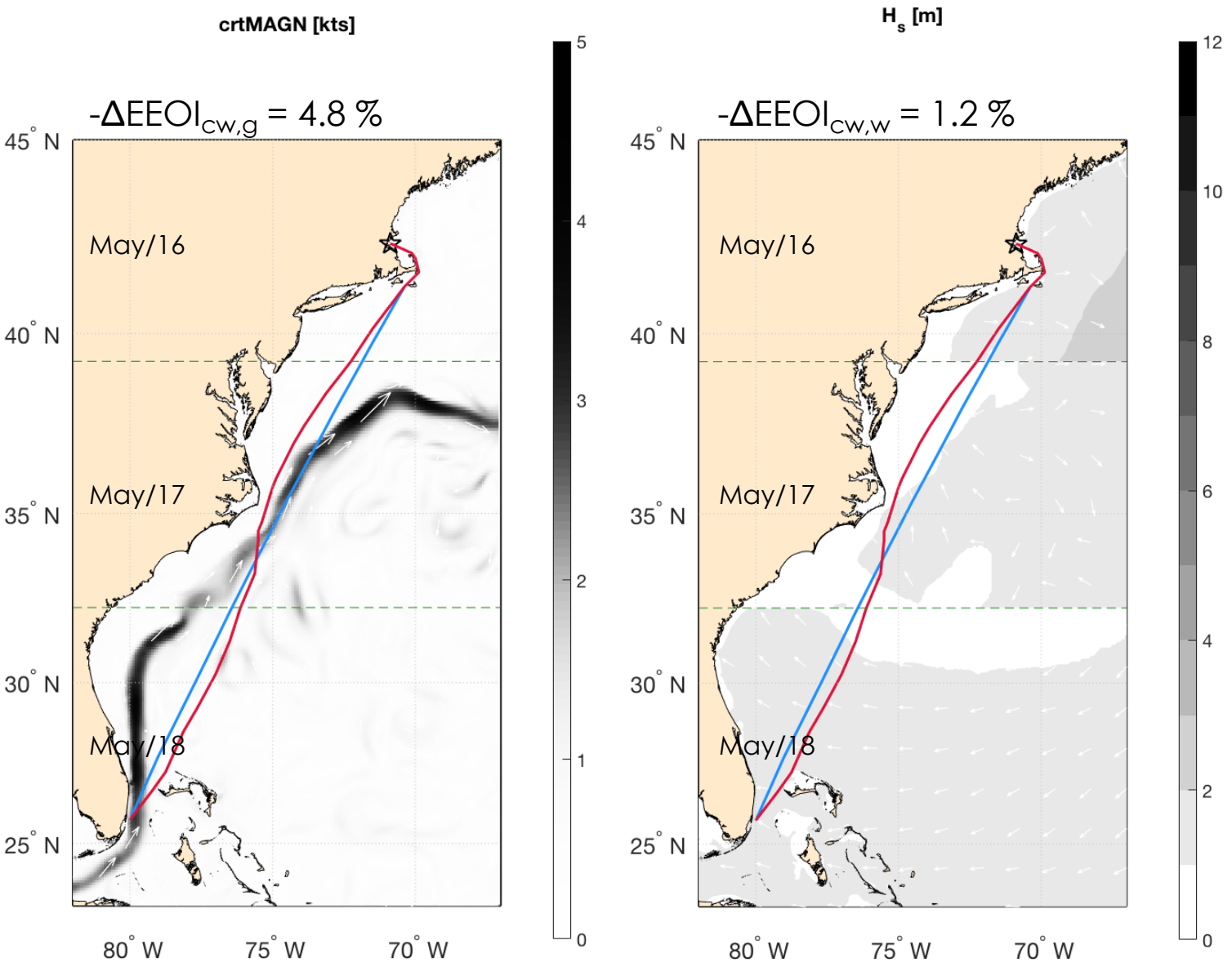



waves--USBOS-USMIA
waves--USMIA-USBOS
current-waves--USBOS-USMIA
current-waves--USMIA-USBOS
40° N
30° N
80° W
70° W
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
(gdt)

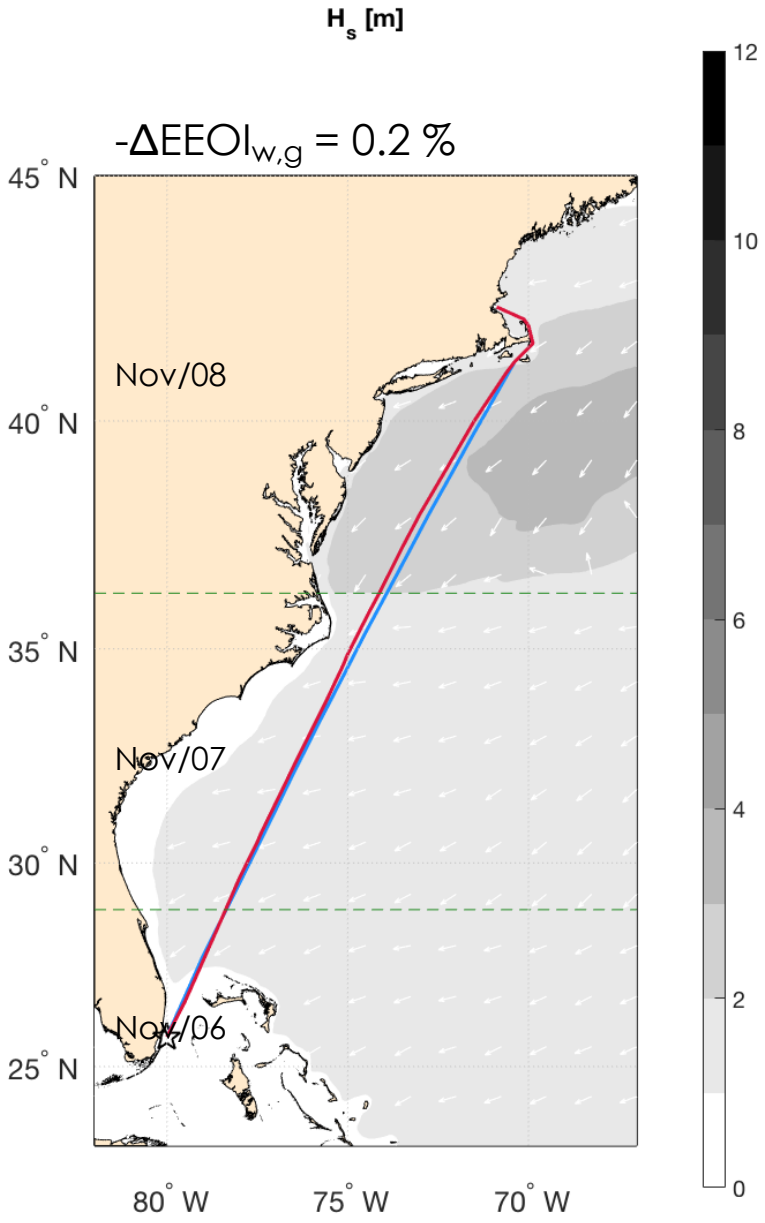
Boston - Miami, waves, 16 May



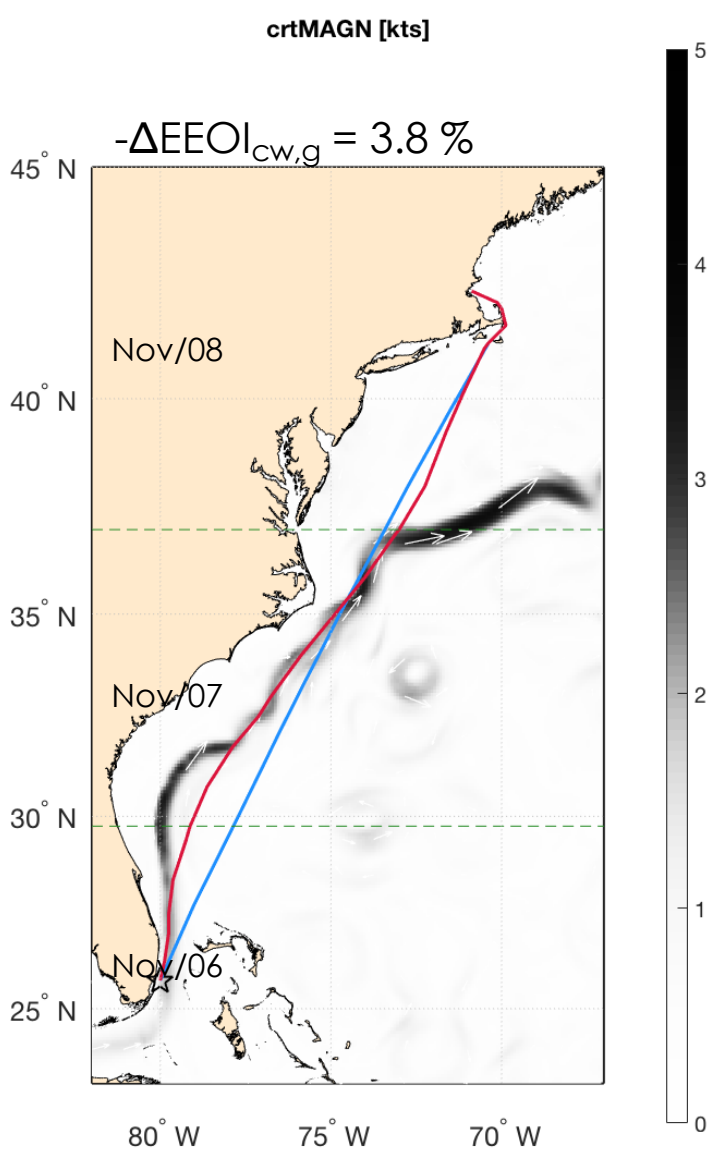
Boston - Miami, currents and waves, 16 May

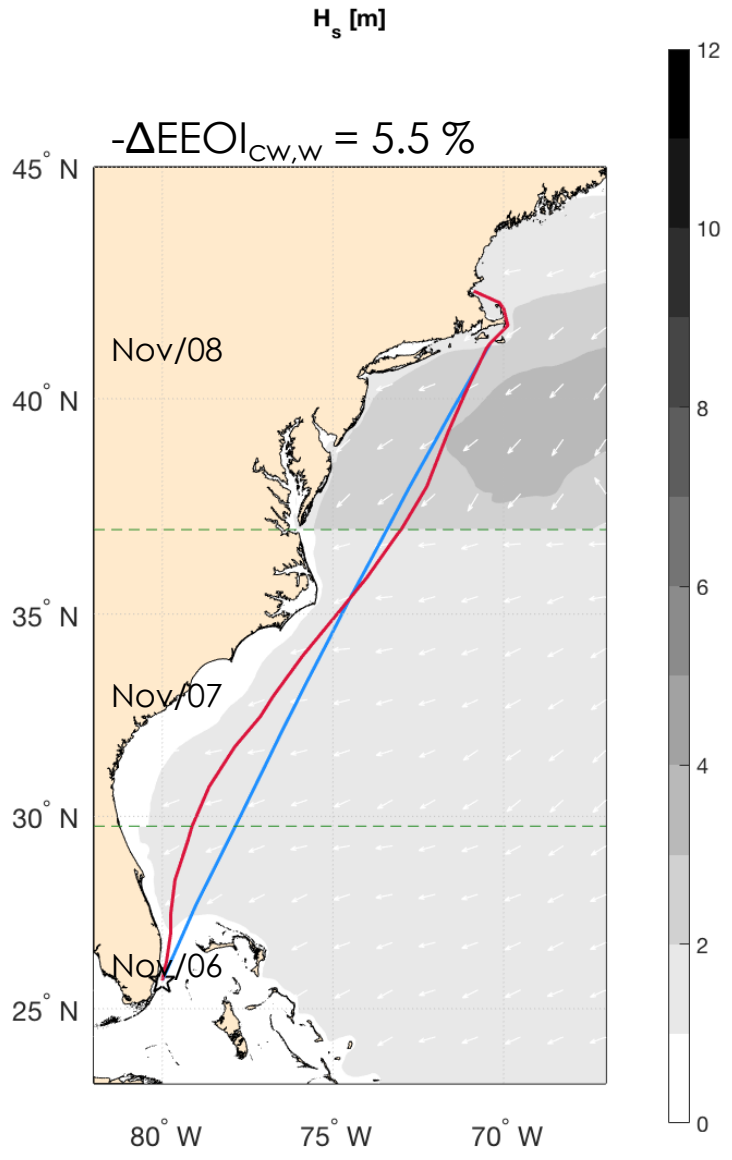


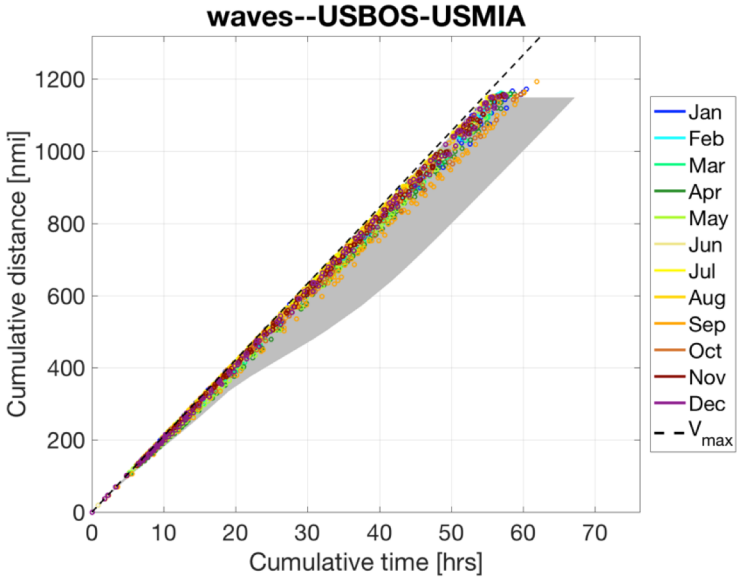
Miami - Boston, waves, 06 Nov

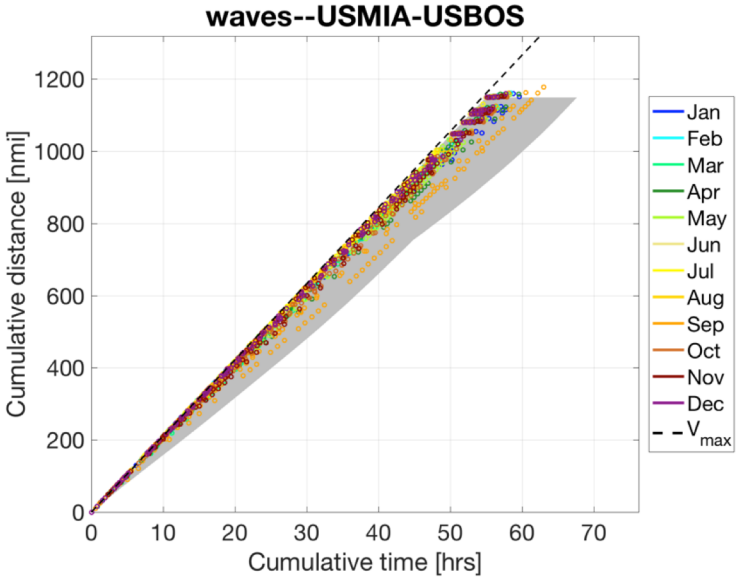


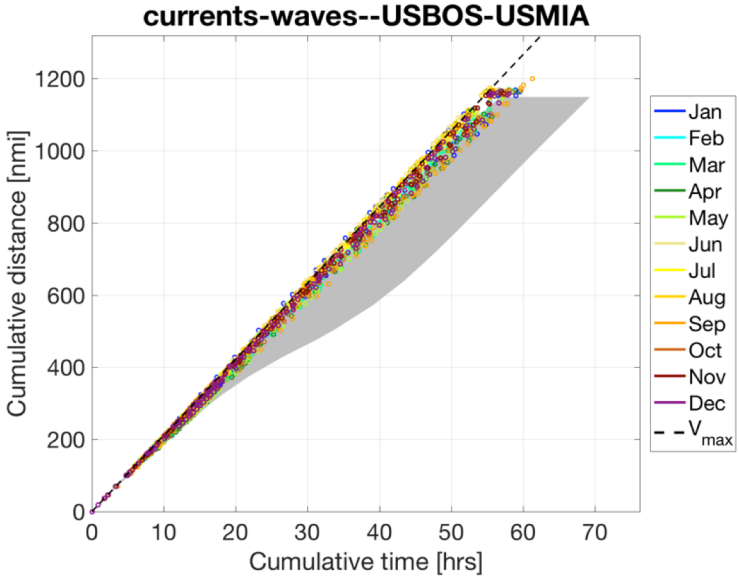
Miami - Boston, currents and waves, 06 Nov

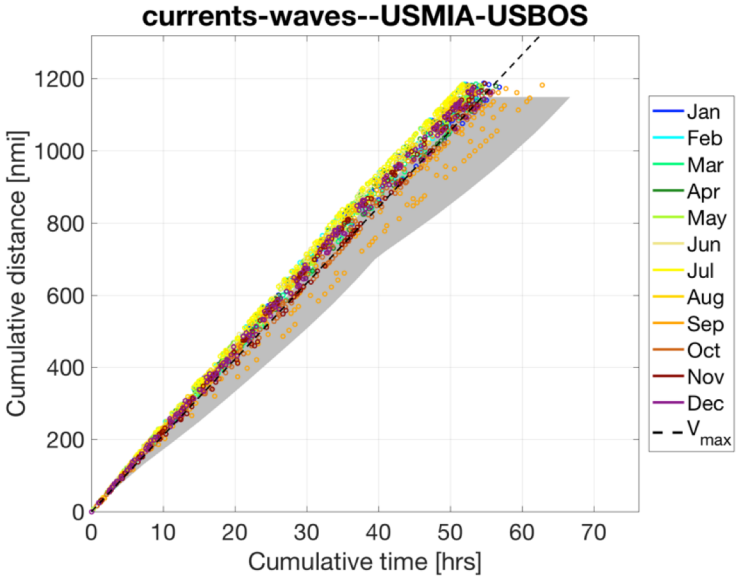


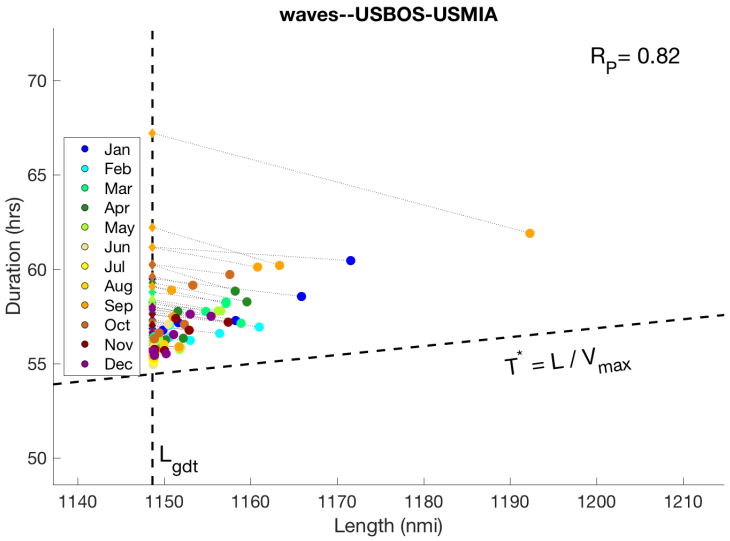


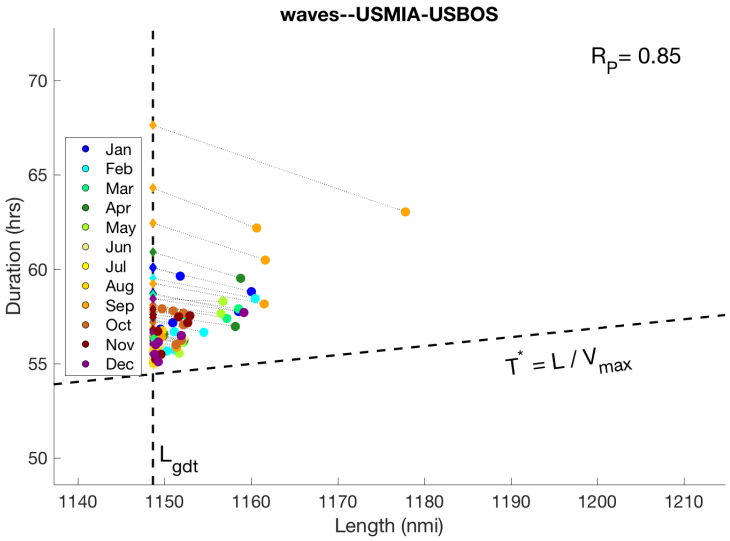

waves--USBOS-USMIA
Cumulative distance [nmi]
Cumulative time [hrs]
0
200
400
600
800
1000
1200
0
10
20
30
40
50
60
70
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

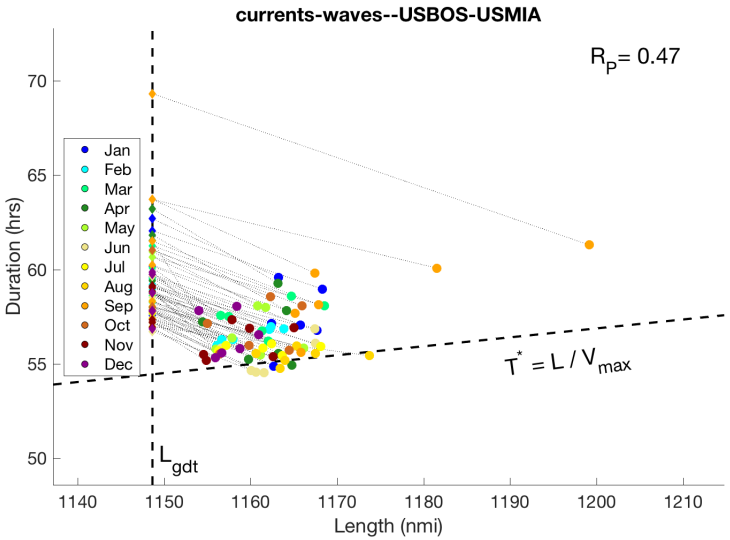

waves--USMIA-USBOS
Cumulative distance [nmi]
Cumulative time [hrs]
0
200
400
600
800
1000
1200
0
10
20
30
40
50
60
70
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

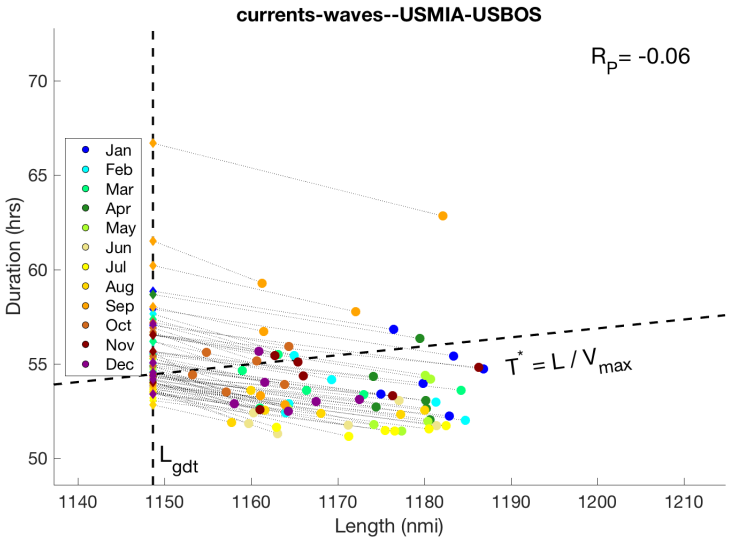

currents-waves--USBOS-USMIA
Cumulative distance [nmi]
Cumulative time [hrs]
0
200
400
600
800
1000
1200
0
10
20
30
40
50
60
70
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

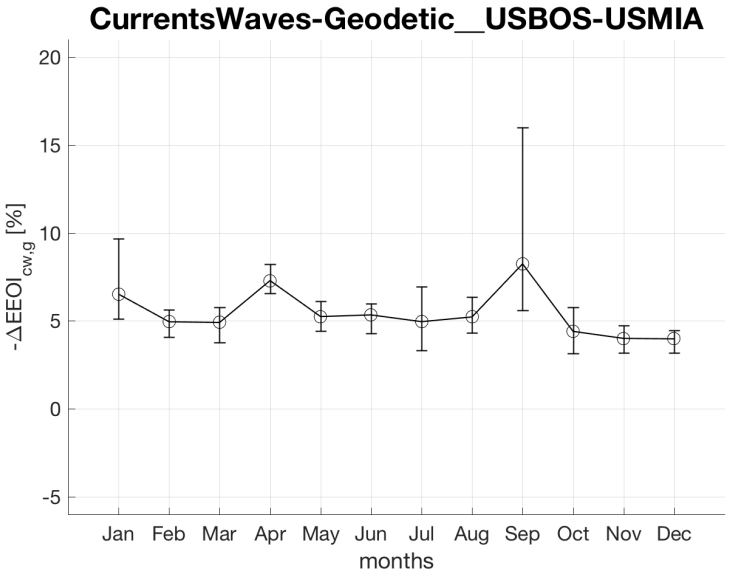

currents-waves--USMIA-USBOS
Cumulative distance [nmi]
Cumulative time [hrs]
0
200
400
600
800
1000
1200
0
10
20
30
40
50
60
70
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
V max

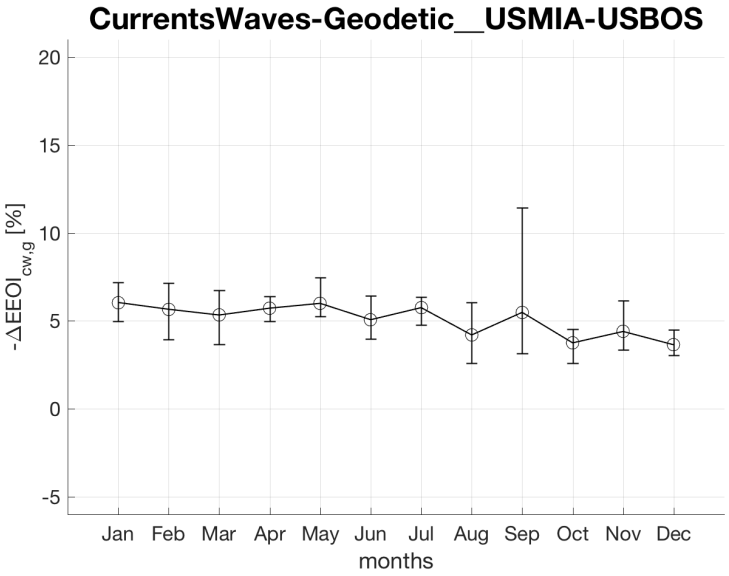

waves--USBOS-USMIA
R_P= 0.82
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
70
65
60
55
50
1140
1150
1160
1170
1180
1190
1200
1210

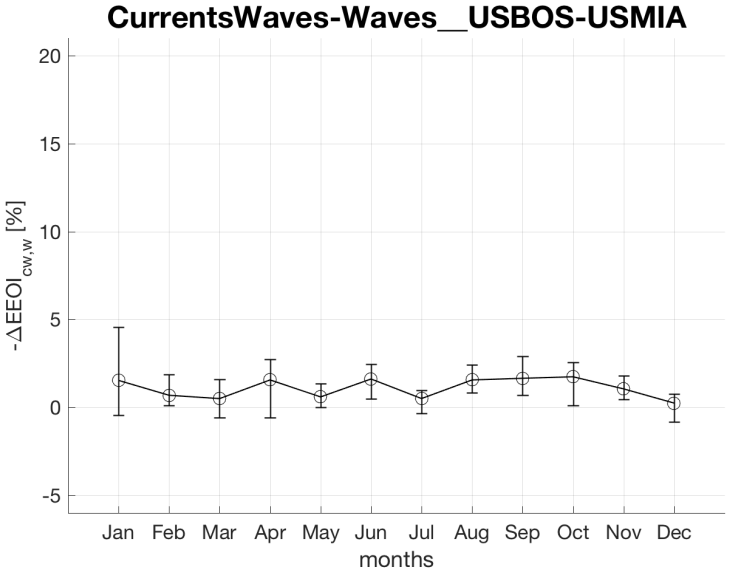

waves--USMIA-USBOS
R_P= 0.85
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
70
65
60
55
50
1140
1150
1160
1170
1180
1190
1200
1210

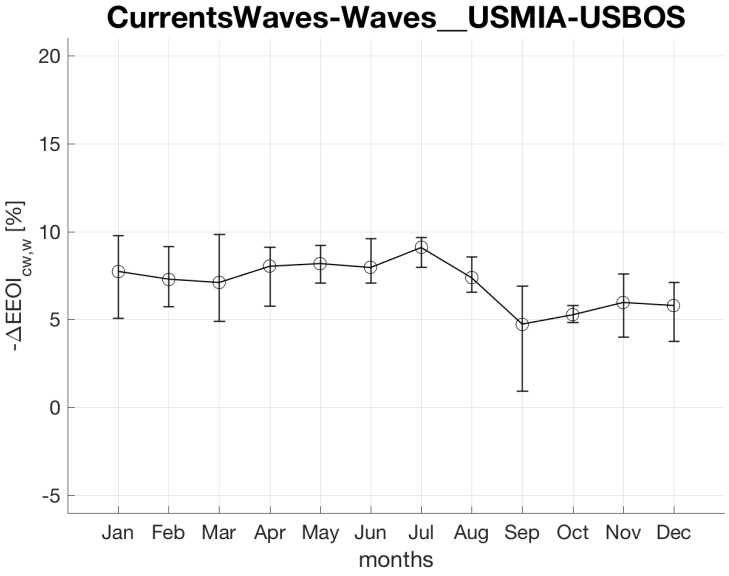

currents-waves--USBOS-USMIA
R_P= 0.47
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
70
65
60
55
50
1140
1150
1160
1170
1180
1190
1200
1210


currents-waves--USMIA-USBOS
R_P= -0.06
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
$T^* = L / V_{max}$
L_{gdt}
Duration (hrs)
Length (nmi)
70
65
60
55
50
1140
1150
1160
1170
1180
1190
1200
1210


CurrentsWaves-Geodetic__USBOS-USMIA
-ΔEEOI cw,g [%]
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months


CurrentsWaves-Geodetic__USMIA-USBOS
-ΔEEOI cw,g [%]
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months


CurrentsWaves-Waves__USBOS-USMIA
-ΔEEOI cw,w [%]
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months


CurrentsWaves-Waves__USMIA-USBOS
-ΔEEOI cw,w [%]
20
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
months

←Index

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 633211.