Test Version

2020-04-21

Load and transform shapefile

```
###1.Load seabed habitats shapefile


sb2019 <-readOGR(paste0(Data_location,"Template_Ecosystem/data/MSFD"),"MSFD_BBHT_Ireland2019")
```

```
## OGR data source with driver: ESRI Shapefile
## Source: "C:\Template_Ecosystem\data\MSFD", layer: "MSFD_BBHT_Ireland2019"
## with 100401 features
## It has 7 fields
```

```
##############################################################################
####"Mercator" Coordinate Reference Systems used in the habitat shapefile######
##############################################################################

###2. Transform to "WGS84" Coordinate Reference Systems

#########################################################################################################
#### spTransform() function from sp package used to transform from "Mercator" to "WGS84" CRS##
#########################################################################################################

 sb2019 <-
 spTransform(sb2019,
 "+proj=longlat +datum=WGS84 +no_defs +ellps=WGS84 +towgs84=0,0,0")
```

Seabed Habitats Mapping around Ireland

Summary

Biozone	area_km2	perc
Atlantic upper bathyal	0	0%
Atlanto-Mediterranean mid bathyal	0	0%
Deep circalittoral	23256	97.9%
Infralittoral	0	0%
Shallow circalittoral	167	0.7%
Unclassified	343	1.4%

Substrate	area_km2	perc
Coarse sediment	474	2%
Coarse substrate	1227	5.2%
Fine mud	56	0.2%
Muddy sand	4650	19.6%
Rock	75	0.3%
Rock or other hard substrata	881	3.7%
Sand	15929	67%
Sandy mud	48	0.2%
sandy Mud/muddy Sand	83	0.3%
Seabed	0	0%
Unclassified substrate	0	0%
Unclassiifed substrate	343	1.4%

Folk_5	area_km2	perc
Coarse sediment	1701	7.2%
Mud to muddy Sand	4837	20.4%
Rock	956	4%
Sand	15929	67%
Unclassified	343	1.4%

EUNIS	area_km2	perc
A3: Infralittoral rock and other hard substrata	0	0%
A4: Circalittoral rock and other hard substrata	956	4%
A5.13: Infralittoral coarse sediment	0	0%
A5.14: Circalittoral coarse sediment	1	0%
A5.15: Deep circalittoral coarse sediment	1700	7.2%
A5.25 or A5.26: Circalittoral fine sand or Circalittoral muddy sand	4	0%
A5.27: Deep circalittoral sand	15925	67%
A5.35: Circalittoral sandy mud	25	0.1%
A5.37: Deep circalittoral mud	4812	20.2%
A6.5: Deep-sea mud	0	0%
A6: Deep-sea bed	0	0%
Unclassified	343	1.4%

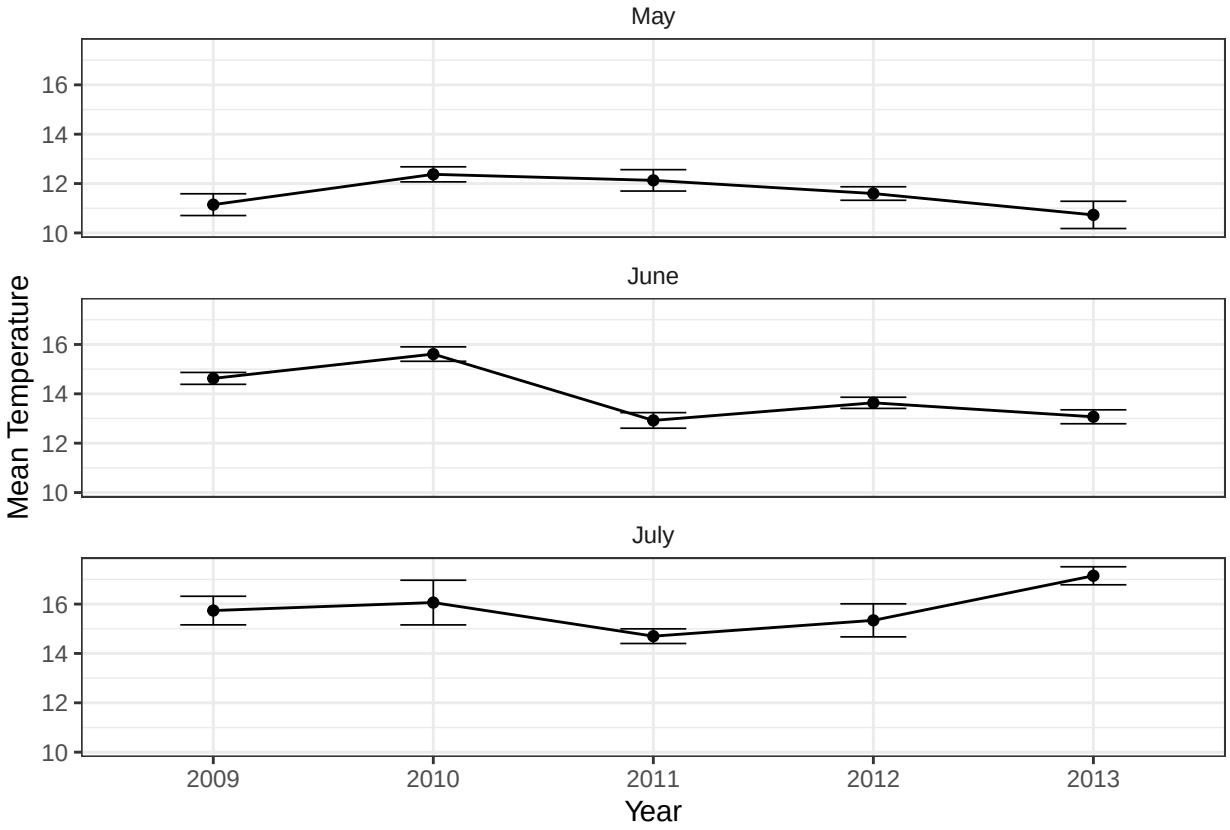
MSFD_BBHT	area_km2	perc
Circalittoral coarse sediment	1	0%
Circalittoral mud	25	0.1%
Circalittoral rock and biogenic reef	137	0.6%
Circalittoral sand	4	0%
Infralittoral coarse sediment	0	0%
Infralittoral rock and biogenic reef	0	0%
Offshore circalittoral coarse sediment	1700	7.2%
Offshore circalittoral mud	4812	20.2%
Offshore circalittoral rock and biogenic reef	819	3.4%
Offshore circalittoral sand	15925	67%
Unclassified	343	1.4%
Upper bathyal sediment	0	0%

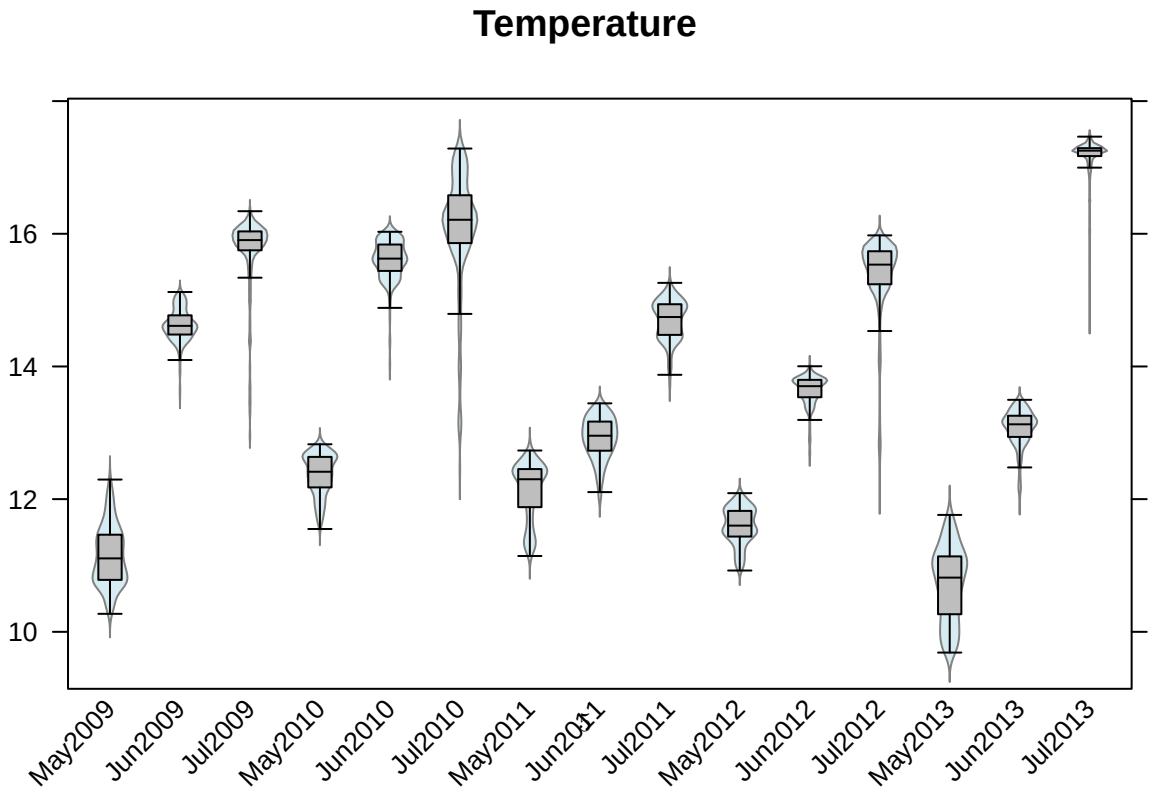
MSFD_BBHT	area_km2	perc
Upper bathyal sediment or Upper bathyal rock and biogenic reef	0	0%

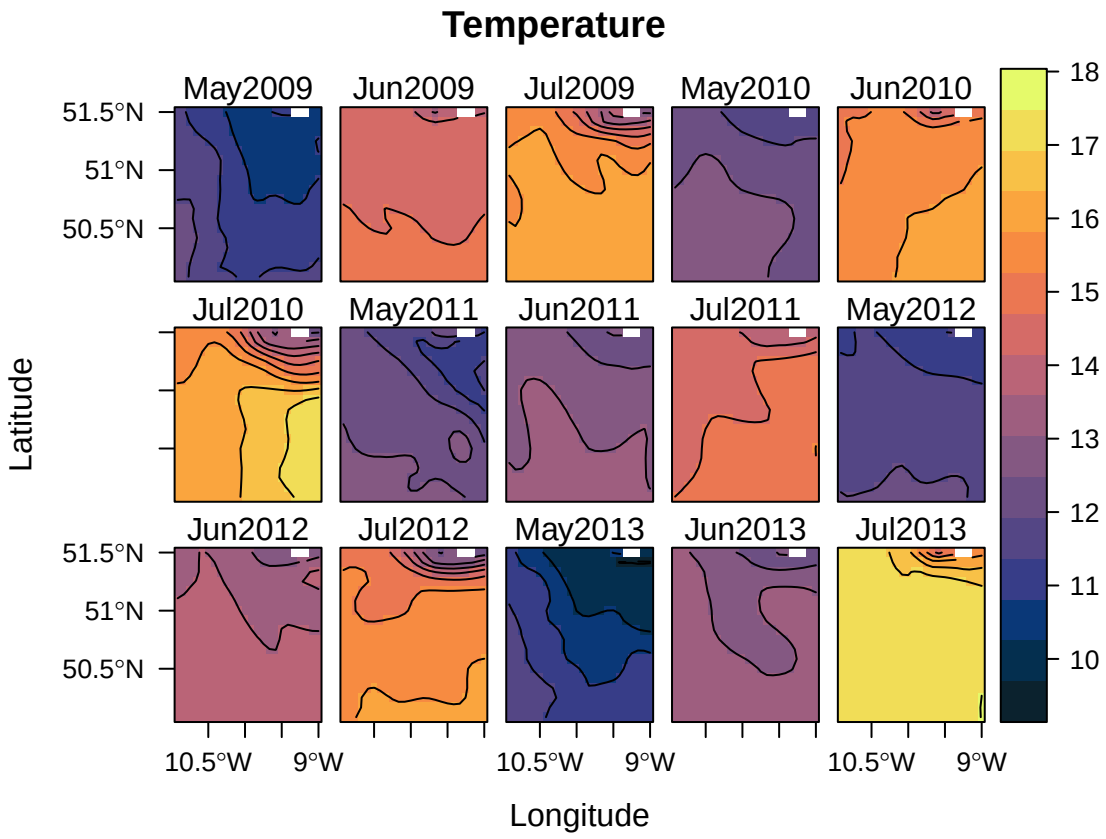
Copernicus Marine Service Data

Ocean Physics Realanalysis

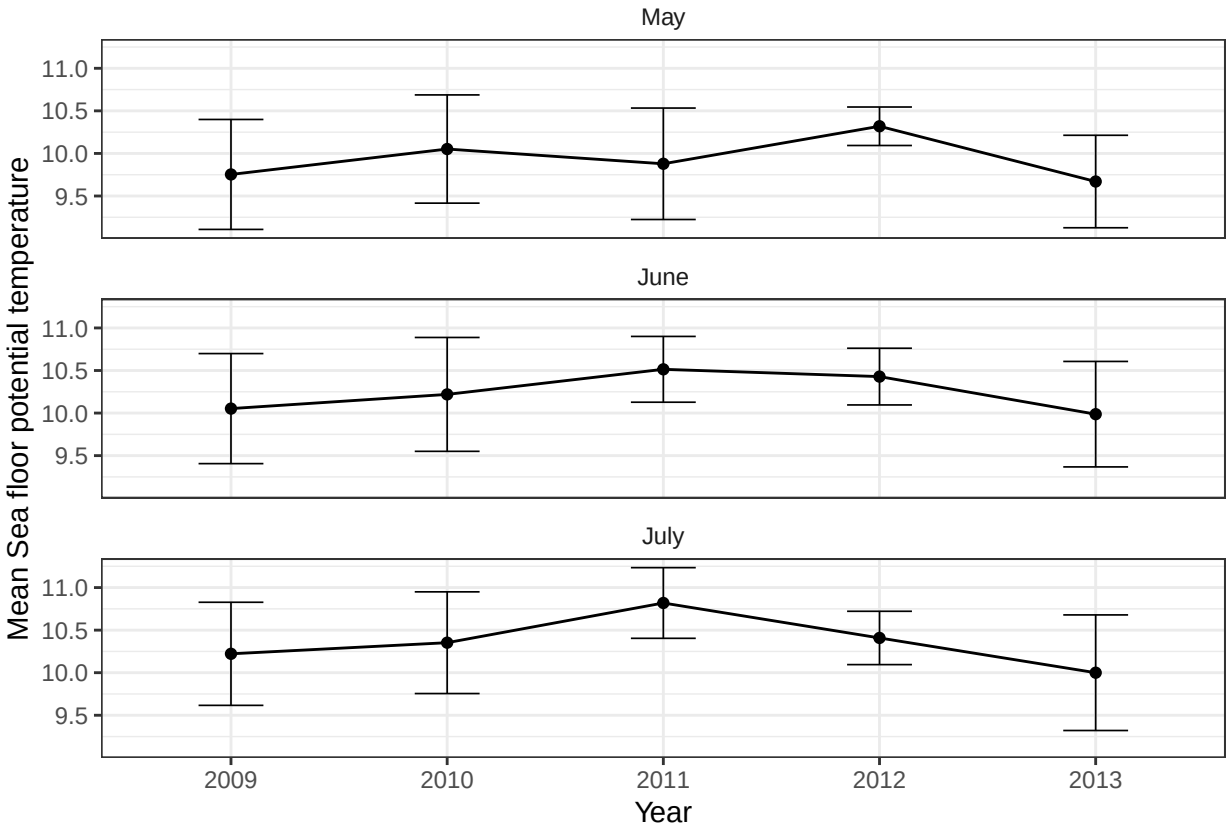
Temperature

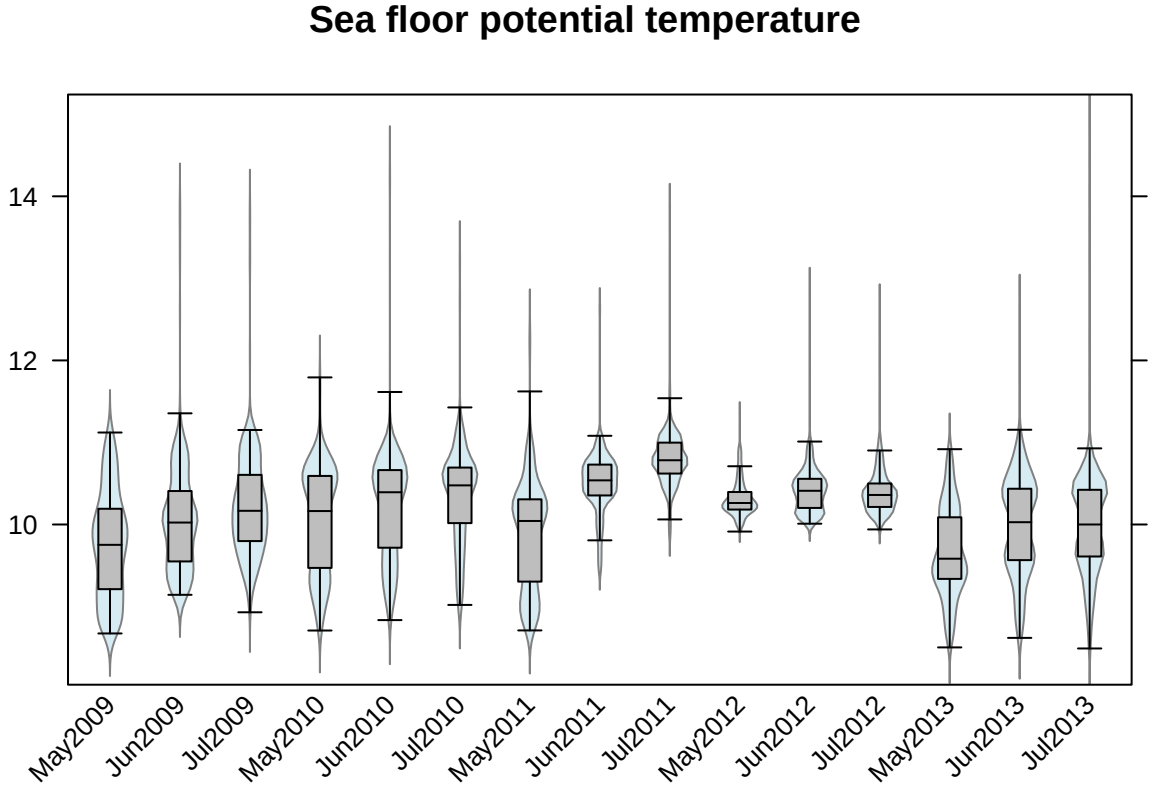


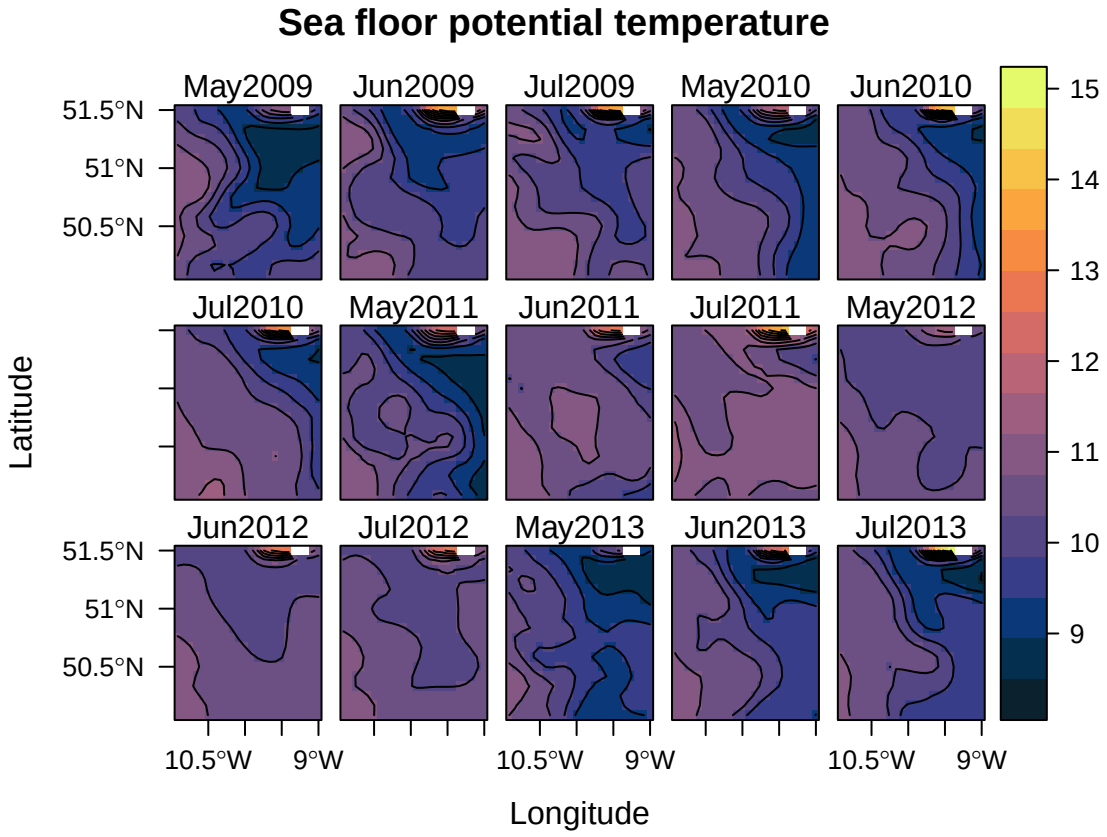



Temperature
May2009
Jun2009
Jul2009
May2010
Jun2010
Jul2010
May2011
Jun2011
Jul2011
May2012
Jun2012
Jul2012
May2013
Jun2013
Jul2013
51.5°N
51°N
50.5°N
10.5°W
9°W
Latitude
Longitude
18
17
16
15
14
13
12
11
10

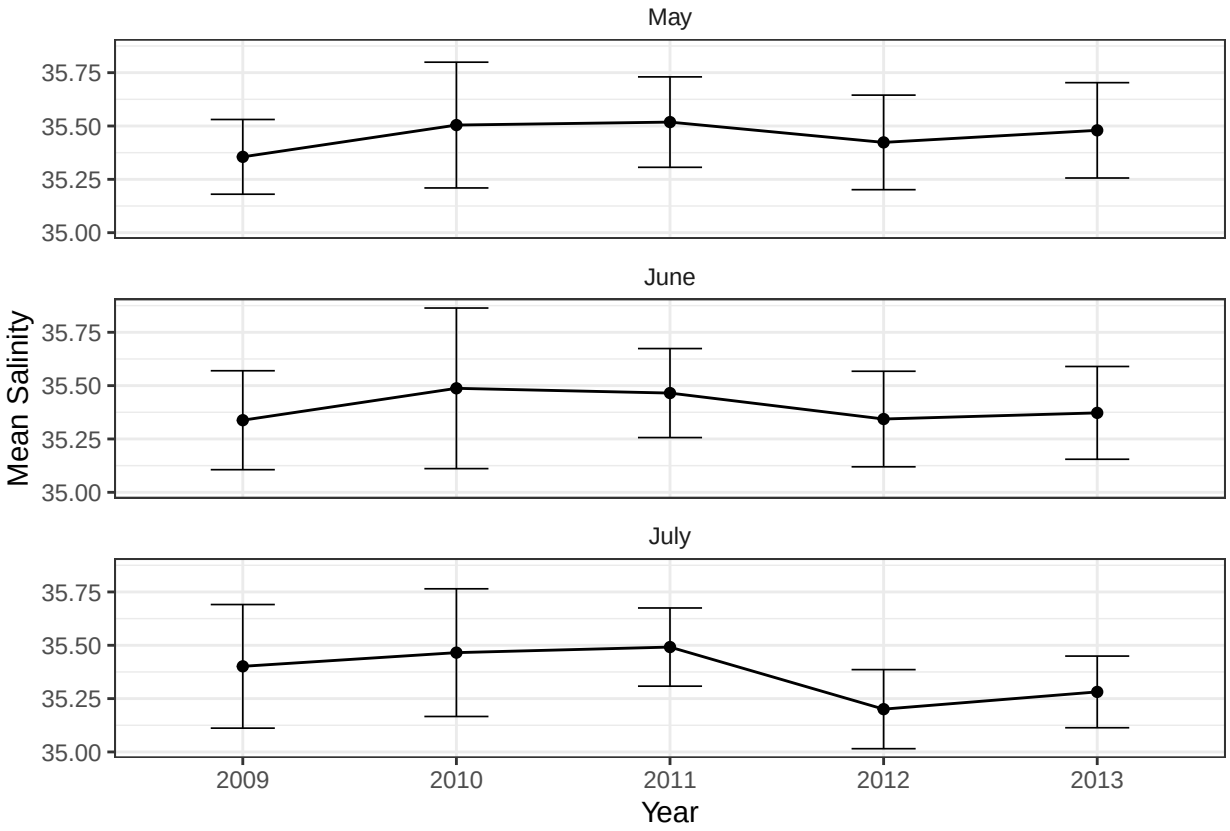
Sea floor potential temperature

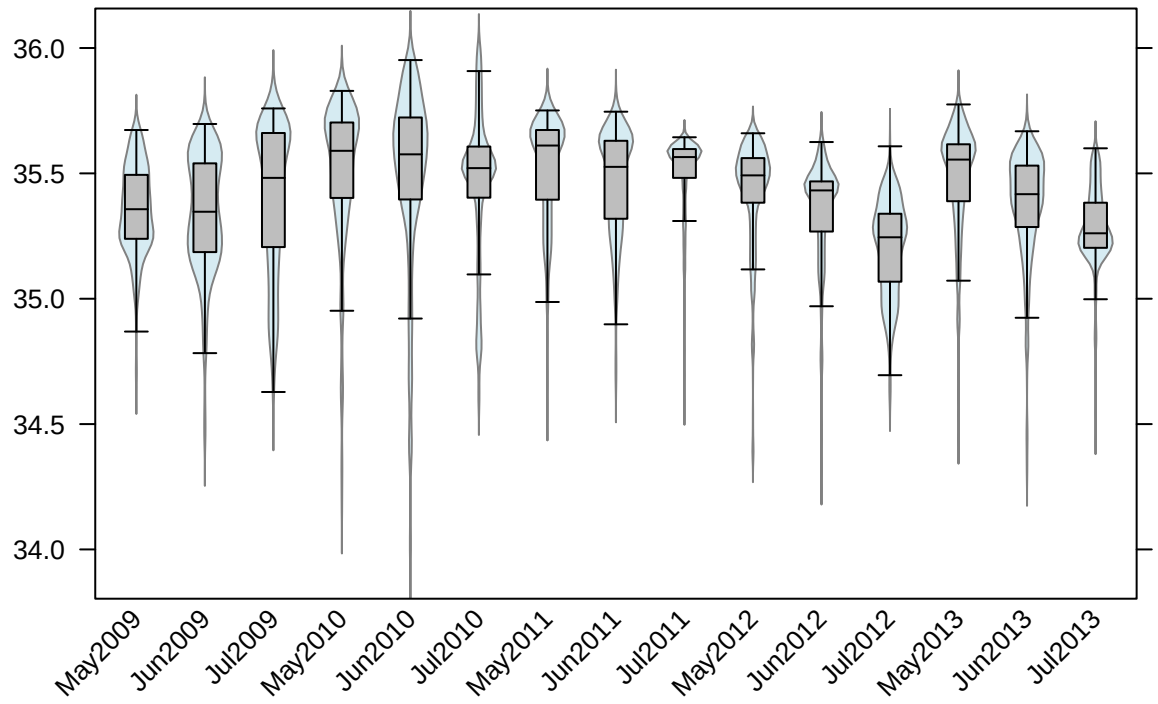


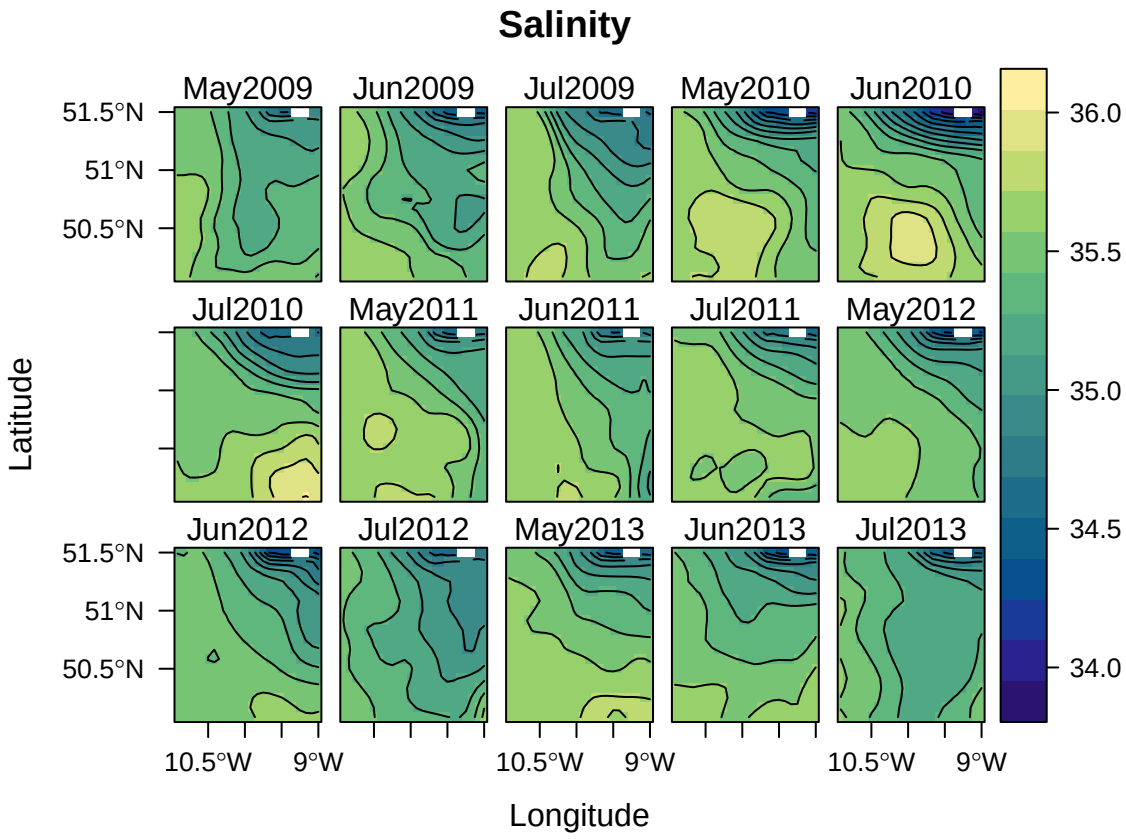



Sea floor potential temperature
May2009
Jun2009
Jul2009
May2010
Jun2010
Jul2010
May2011
Jun2011
Jul2011
May2012
Jun2012
Jul2012
May2013
Jun2013
Jul2013
51.5°N
51°N
50.5°N
10.5°W
9°W
Latitude
Longitude
15
14
13
12
11
10
9

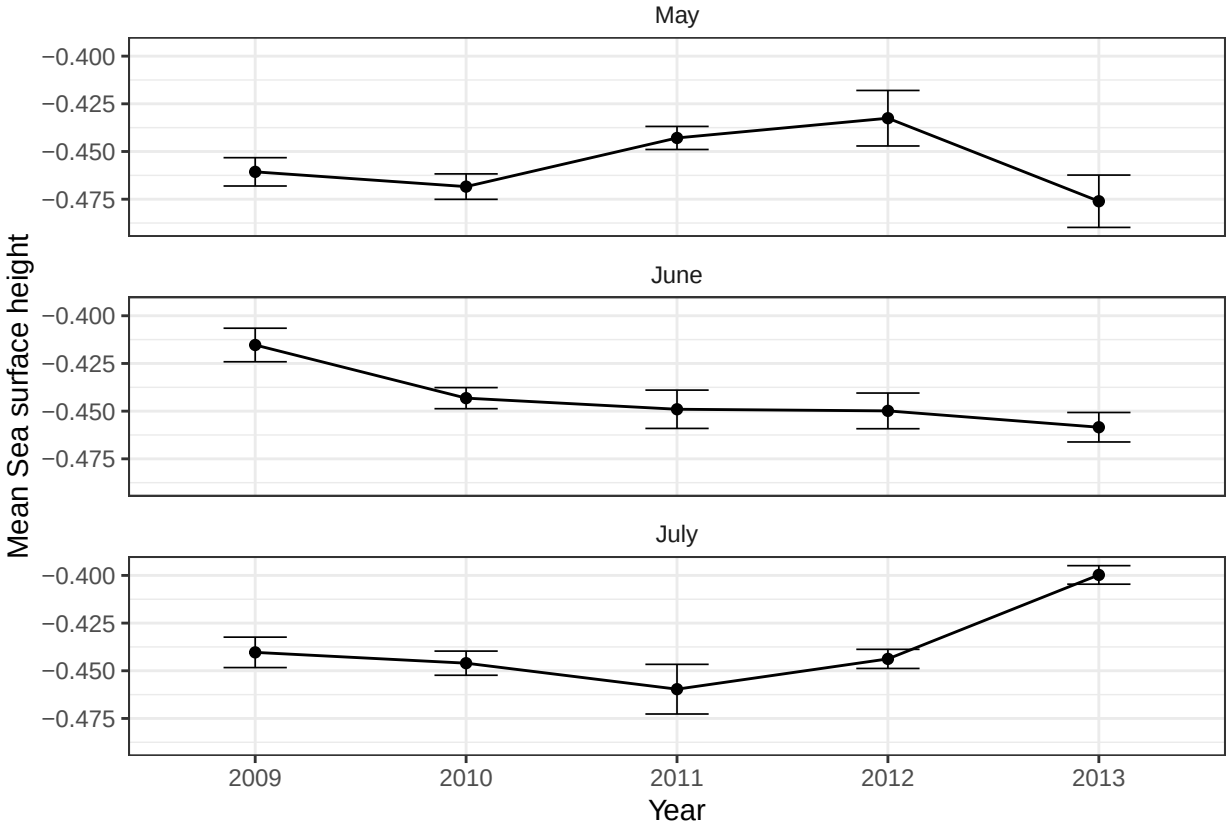
Salinity

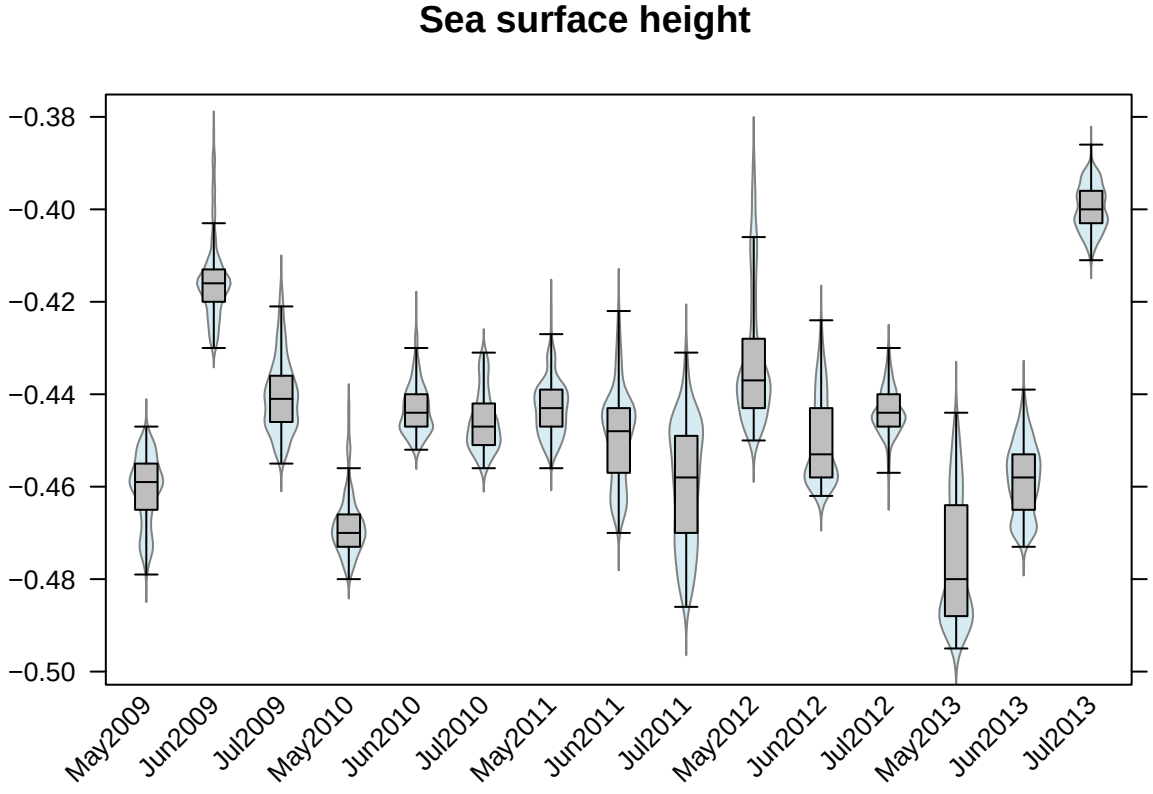

May
June
July
35.75
35.50
35.25
35.00
Mean Salinity
2009
2010
2011
2012
2013
Year

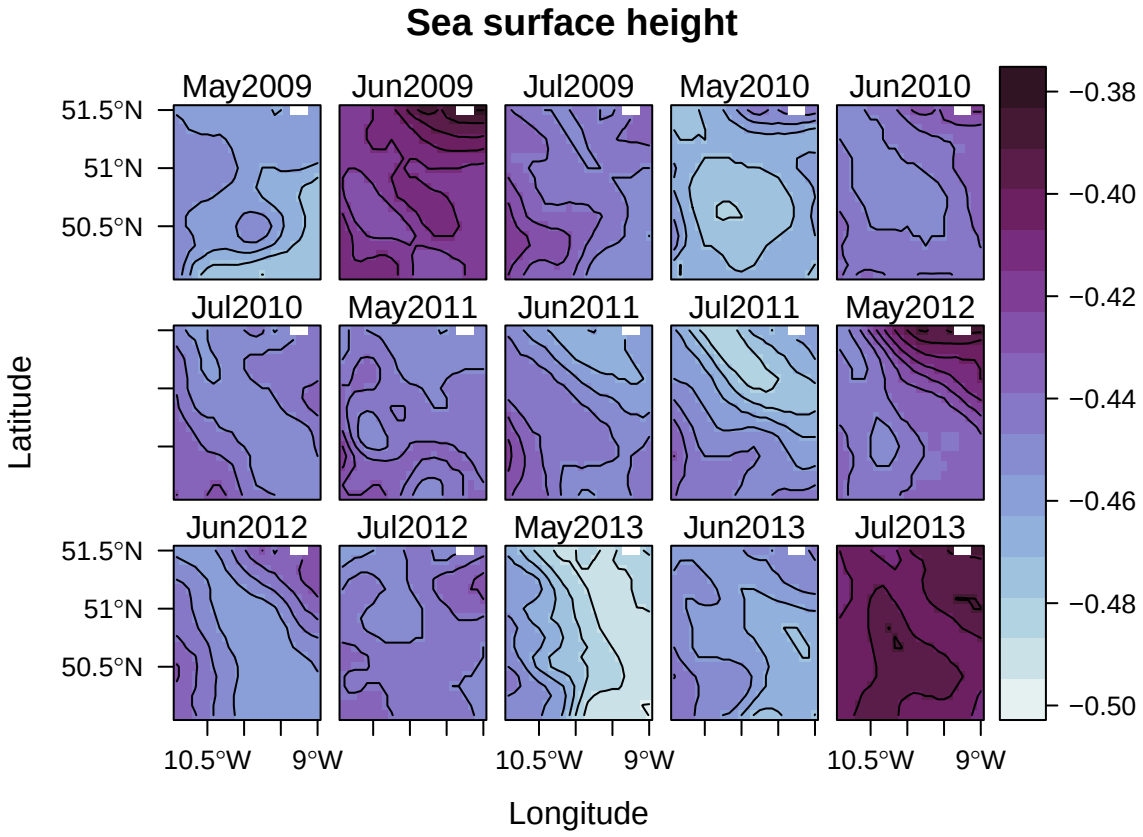

Salinity
36.0
35.5
35.0
34.5
34.0
May2009
Jun2009
Jul2009
May2010
Jun2010
Jul2010
May2011
Jun2011
Jul2011
May2012
Jun2012
Jul2012
May2013
Jun2013
Jul2013


Salinity
May2009
Jun2009
Jul2009
May2010
Jun2010
Jul2010
May2011
Jun2011
Jul2011
May2012
Jun2012
Jul2012
May2013
Jun2013
Jul2013
51.5°N
51°N
50.5°N
10.5°W
9°W
Latitude
Longitude
36.0
35.5
35.0
34.5
34.0

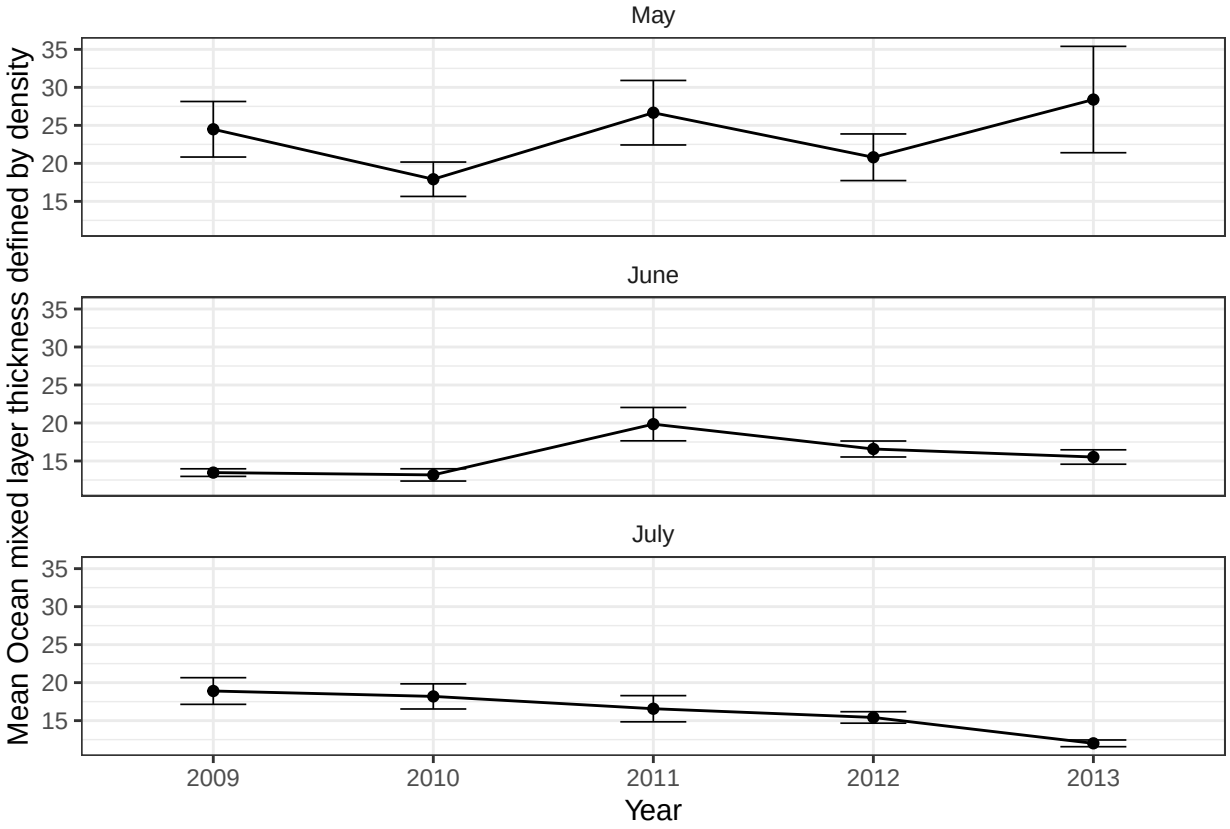
Sea surface height

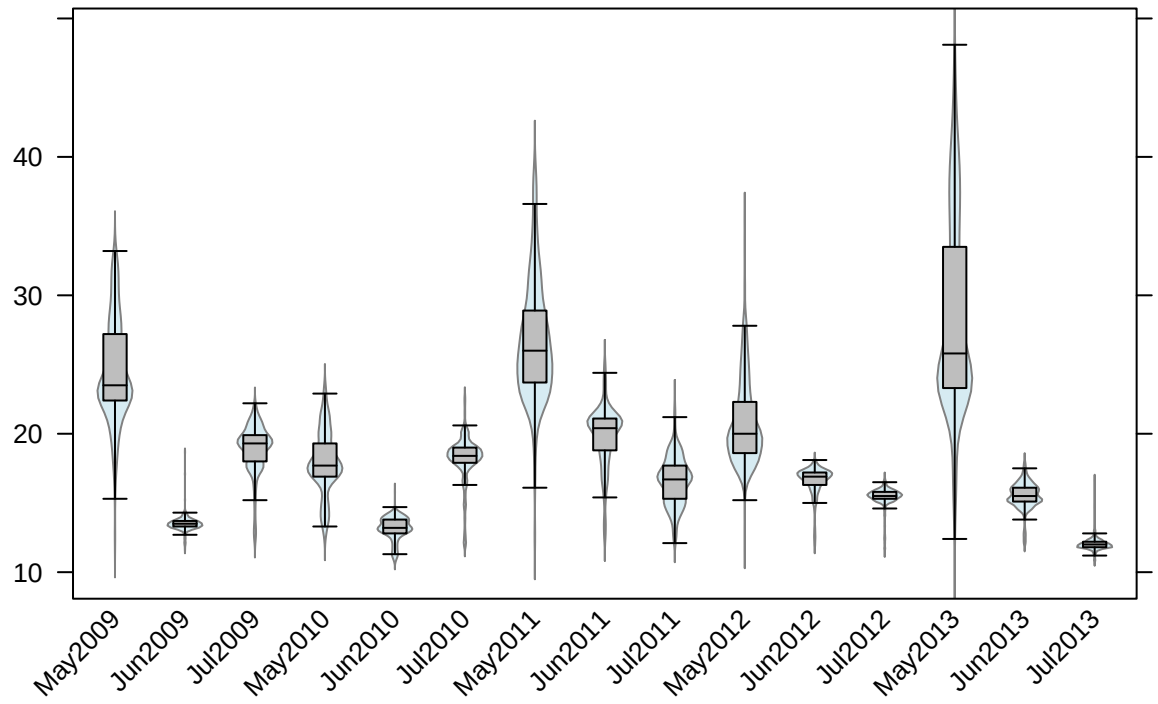


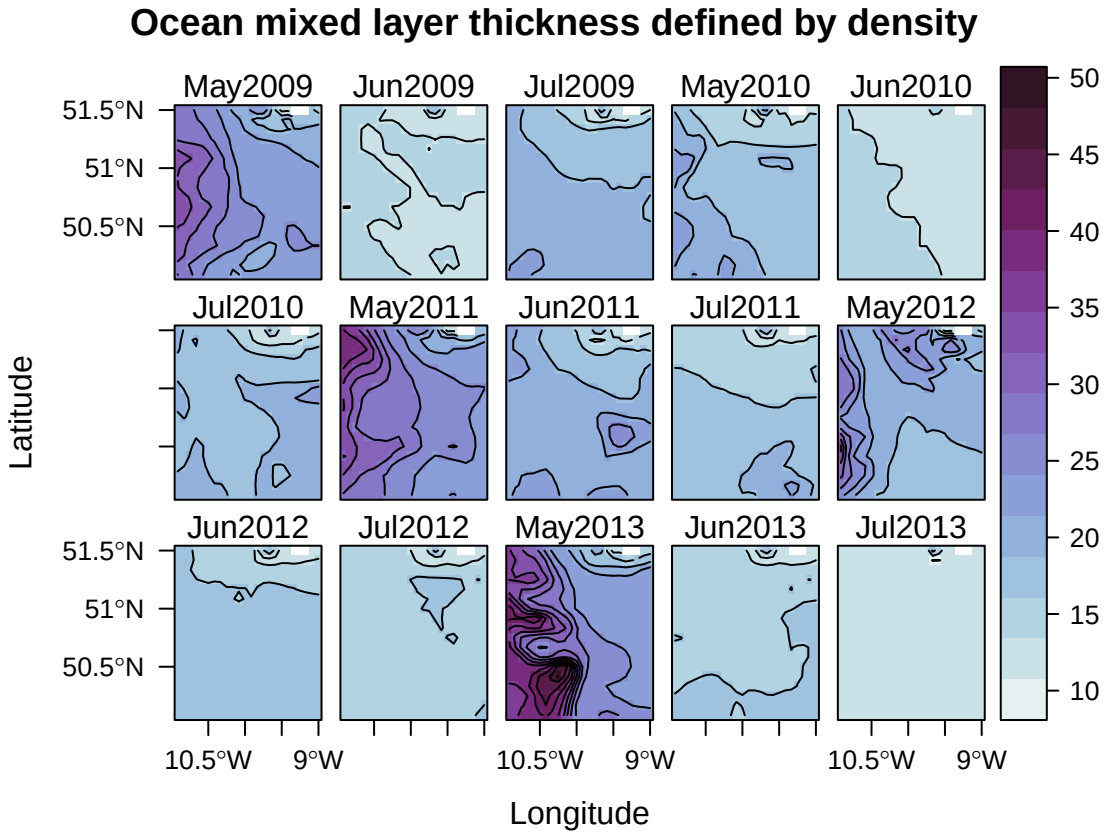



Sea surface height
May2009
Jun2009
Jul2009
May2010
Jun2010
Jul2010
May2011
Jun2011
Jul2011
May2012
Jun2012
Jul2012
May2013
Jun2013
Jul2013
51.5°N
51°N
50.5°N
10.5°W
9°W
Latitude
Longitude
−0.38
−0.40
−0.42
−0.44
−0.46
−0.48
−0.50

Ocean mixed layer thickness defined by density

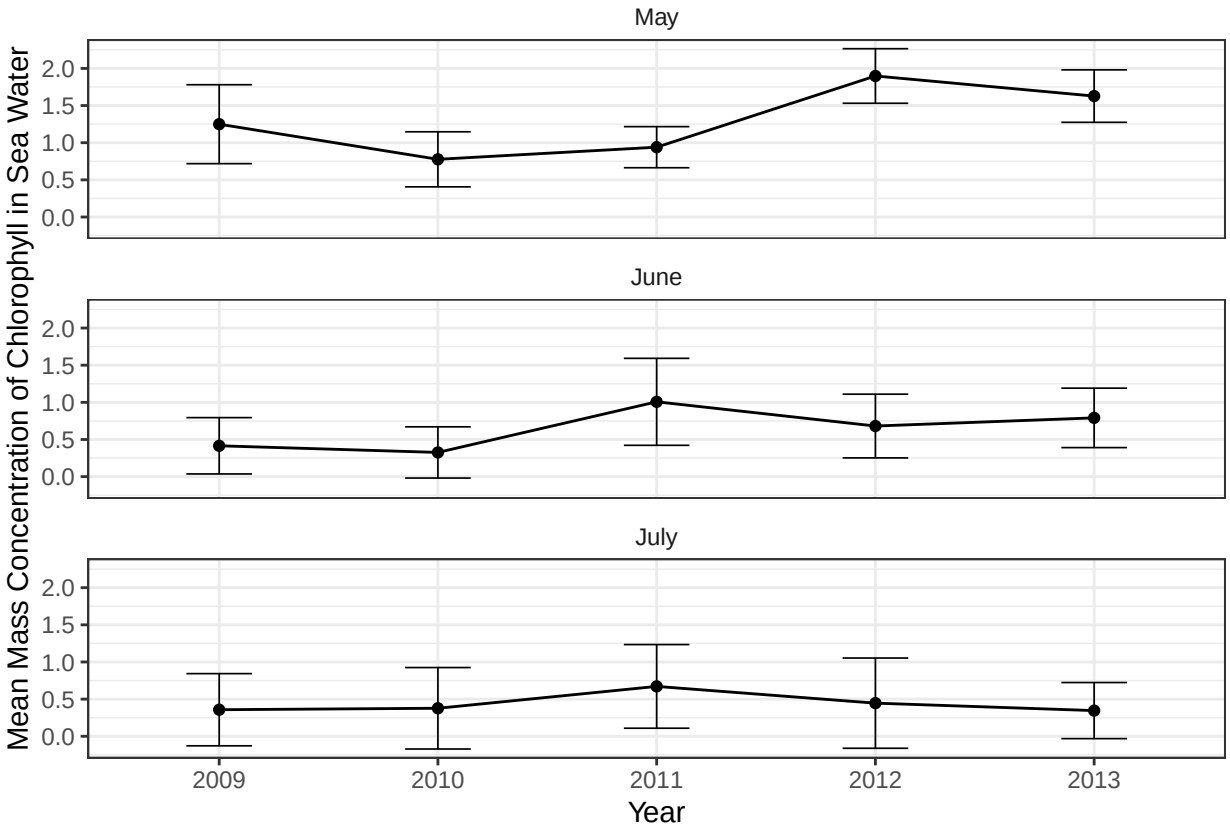


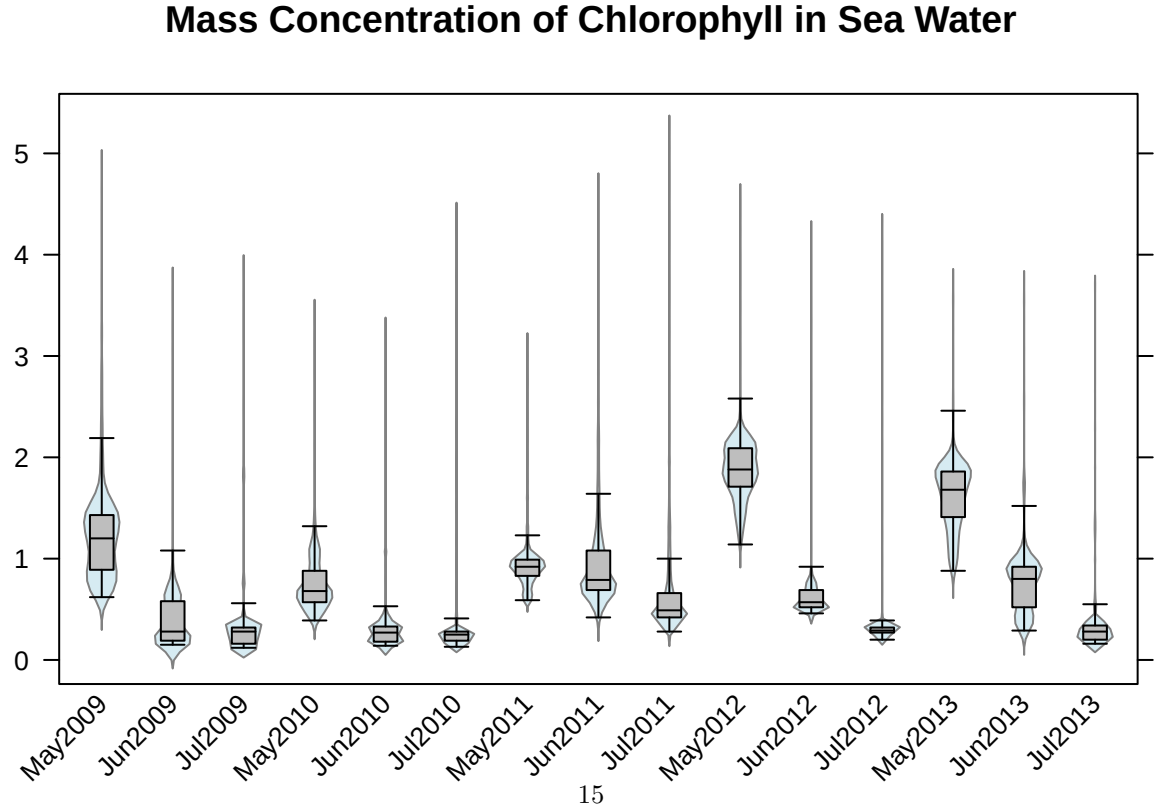


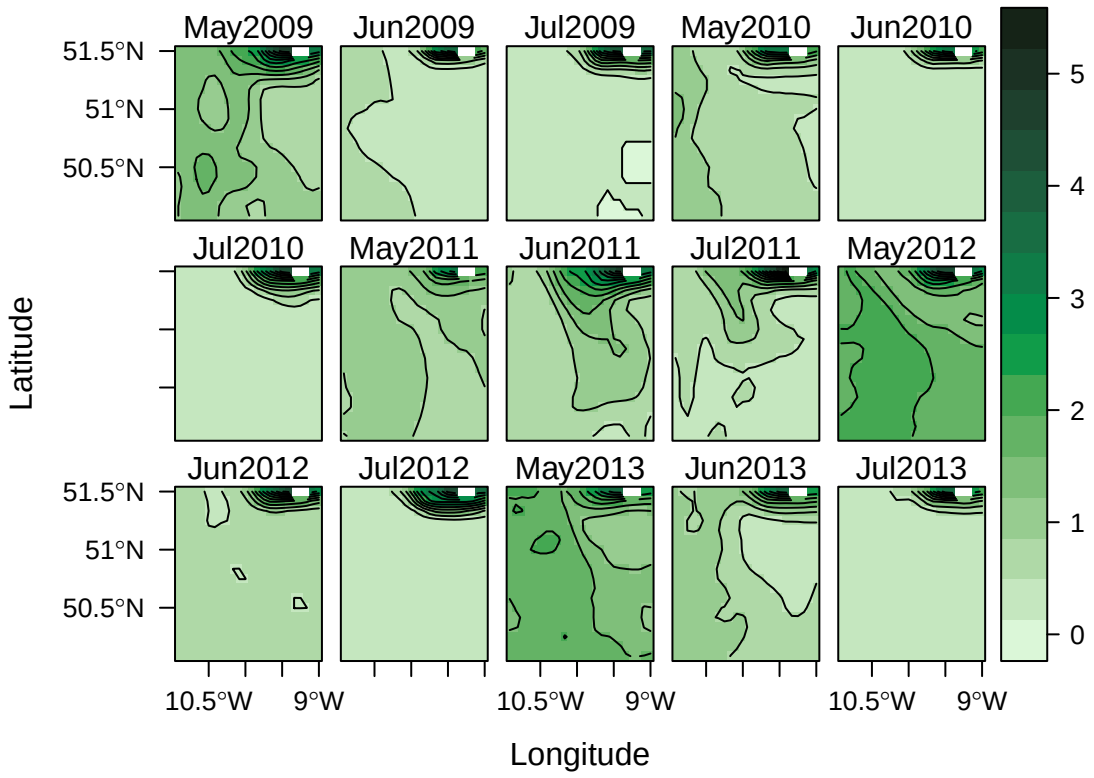

Ocean mixed layer thickness defined by density
May2009
Jun2009
Jul2009
May2010
Jun2010
Jul2010
May2011
Jun2011
Jul2011
May2012
Jun2012
Jul2012
May2013
Jun2013
Jul2013
51.5°N
51°N
50.5°N
10.5°W
9°W
Latitude
Longitude
50
45
40
35
30
25
20
15
10

Ocean BioGeoChemistry NON ASSIMILATIVE Hindcast

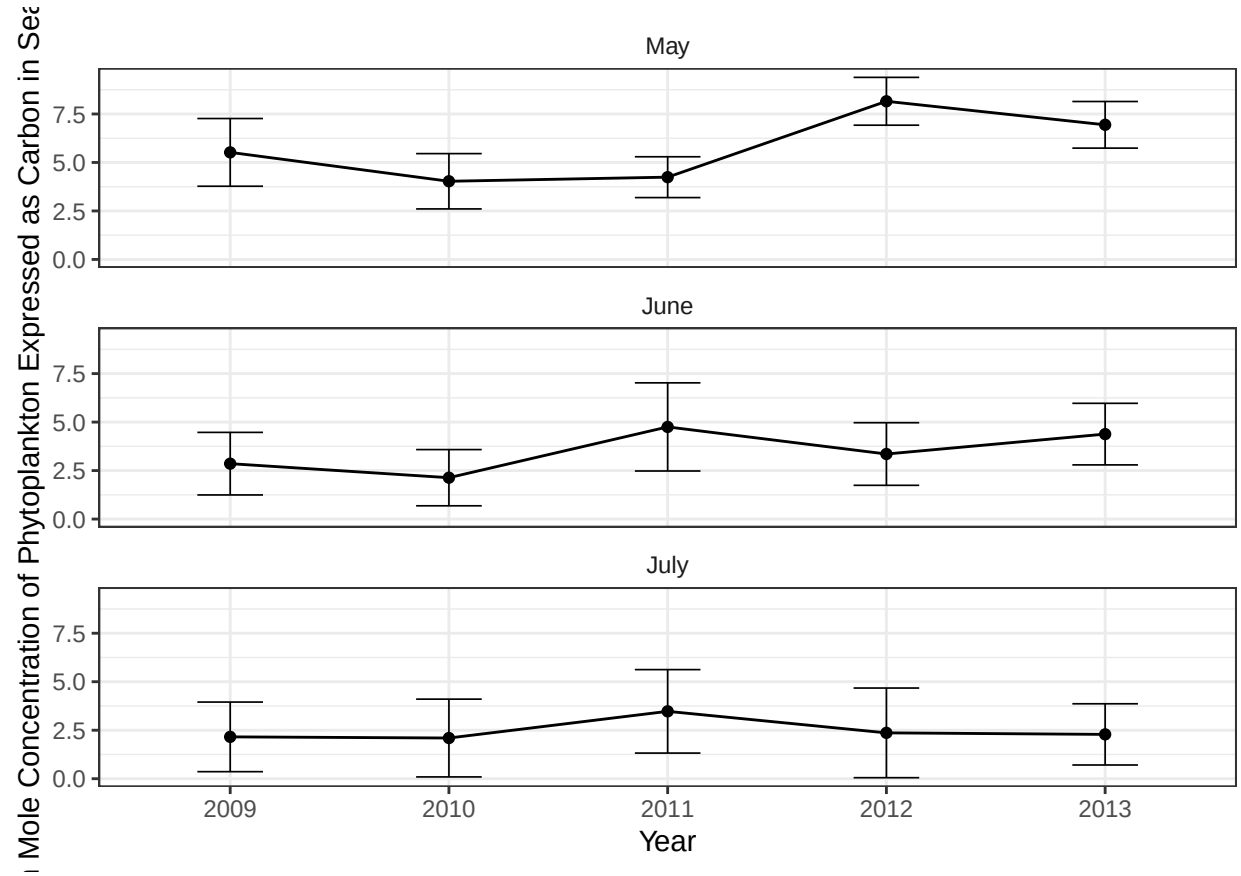
Mass Concentration of Chlorophyll in Sea Water



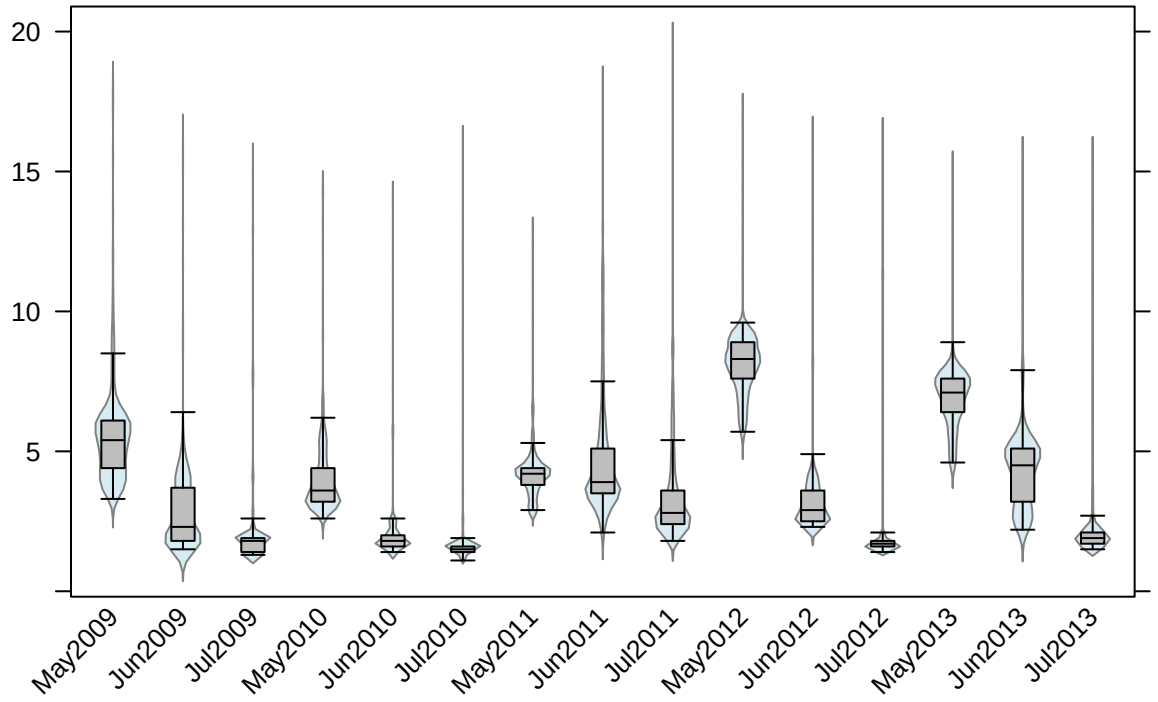


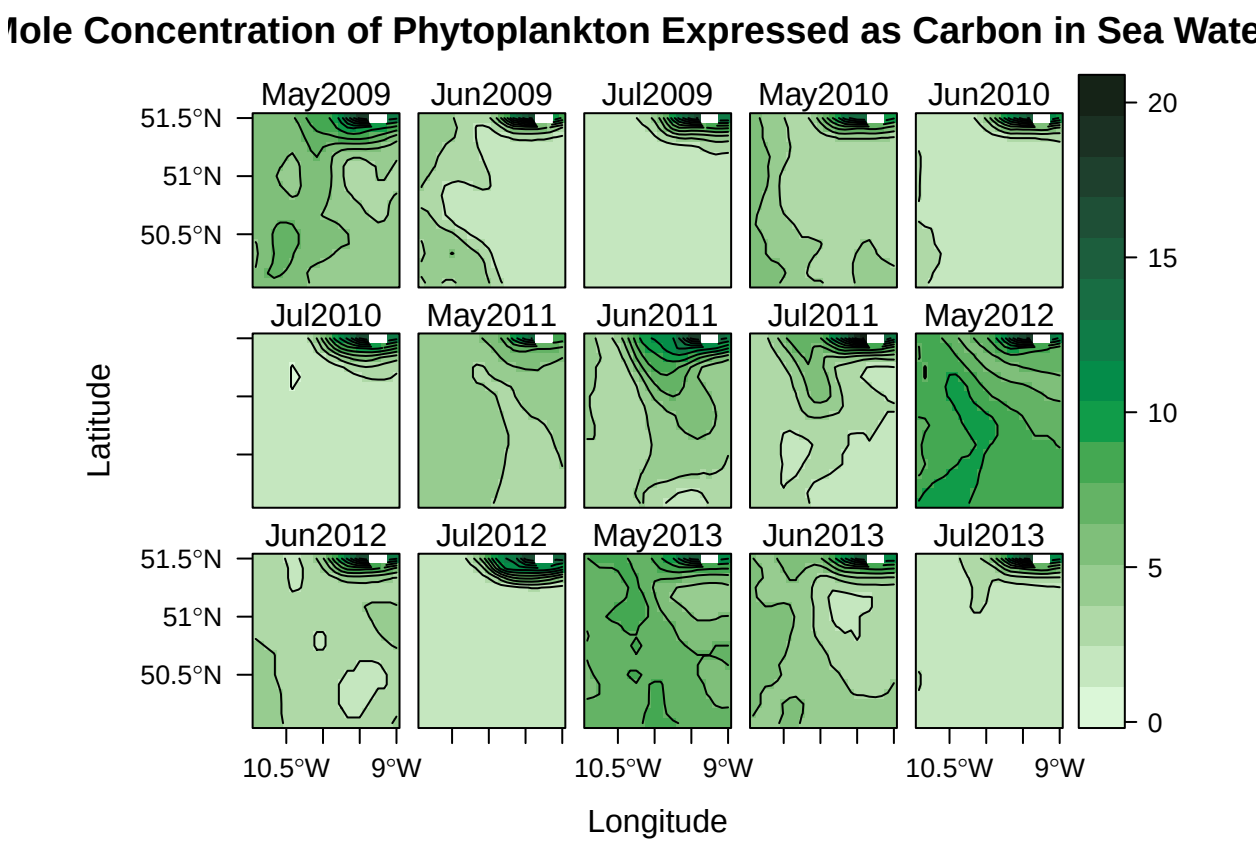

Mass Concentration of Chlorophyll in Sea Water
May2009
Jun2009
Jul2009
May2010
Jun2010
Jul2010
May2011
Jun2011
Jul2011
May2012
Jun2012
Jul2012
May2013
Jun2013
Jul2013
51.5°N
51°N
50.5°N
10.5°W
9°W
Latitude
Longitude
0
1
2
3
4
5

Mole Concentration of Phytoplankton Expressed as Carbon in Sea Water

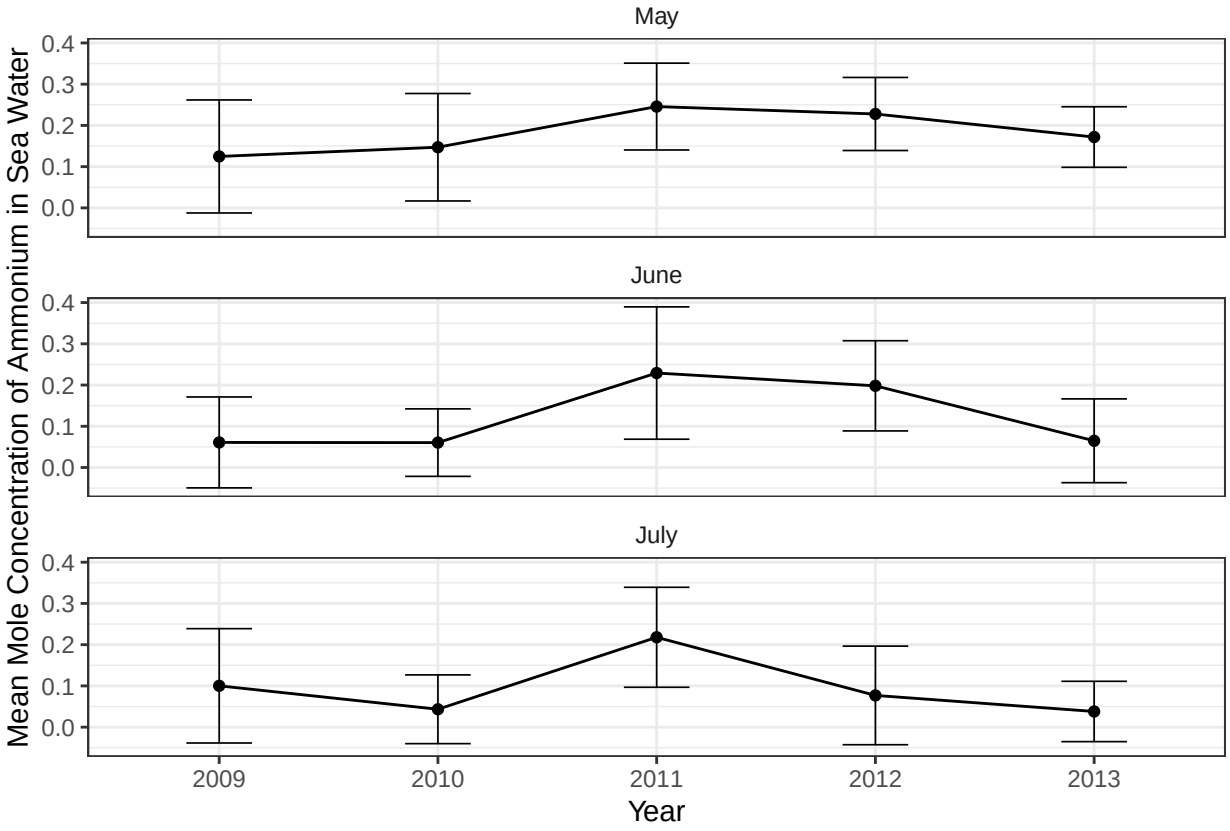


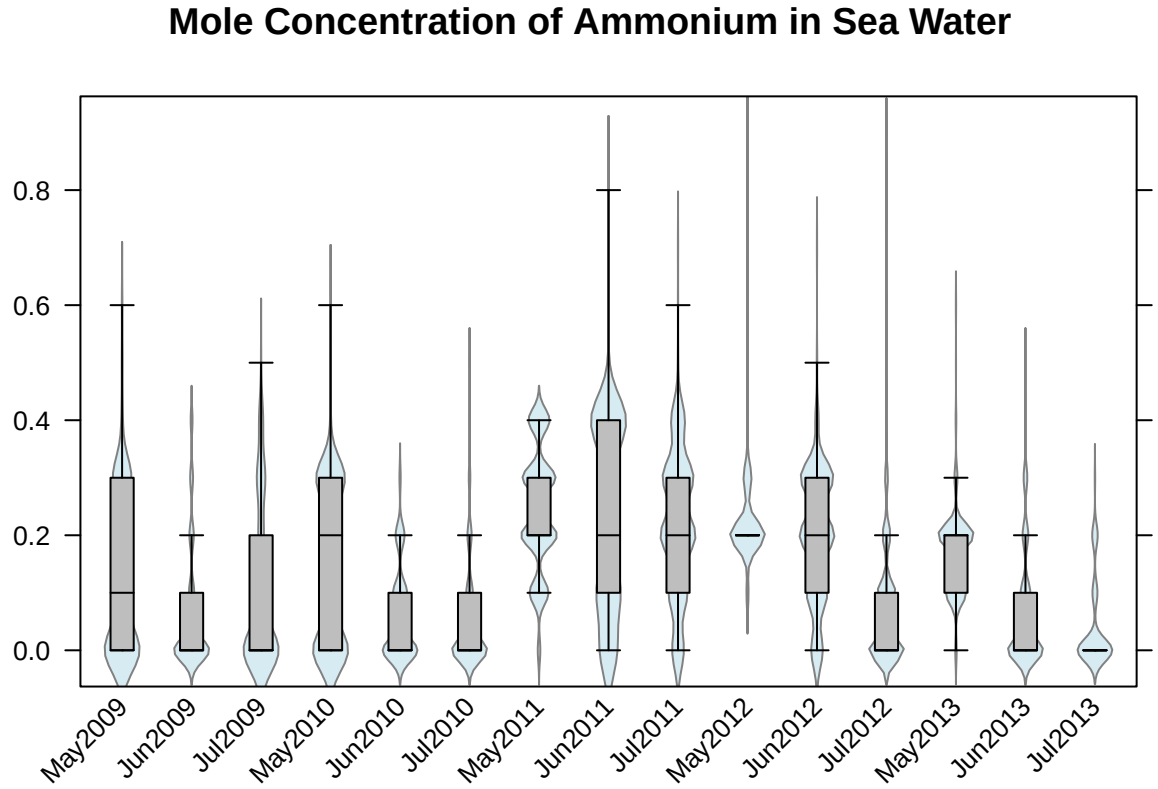
Mole Concentration of Phytoplankton Expressed as Carbon in Sea Wate

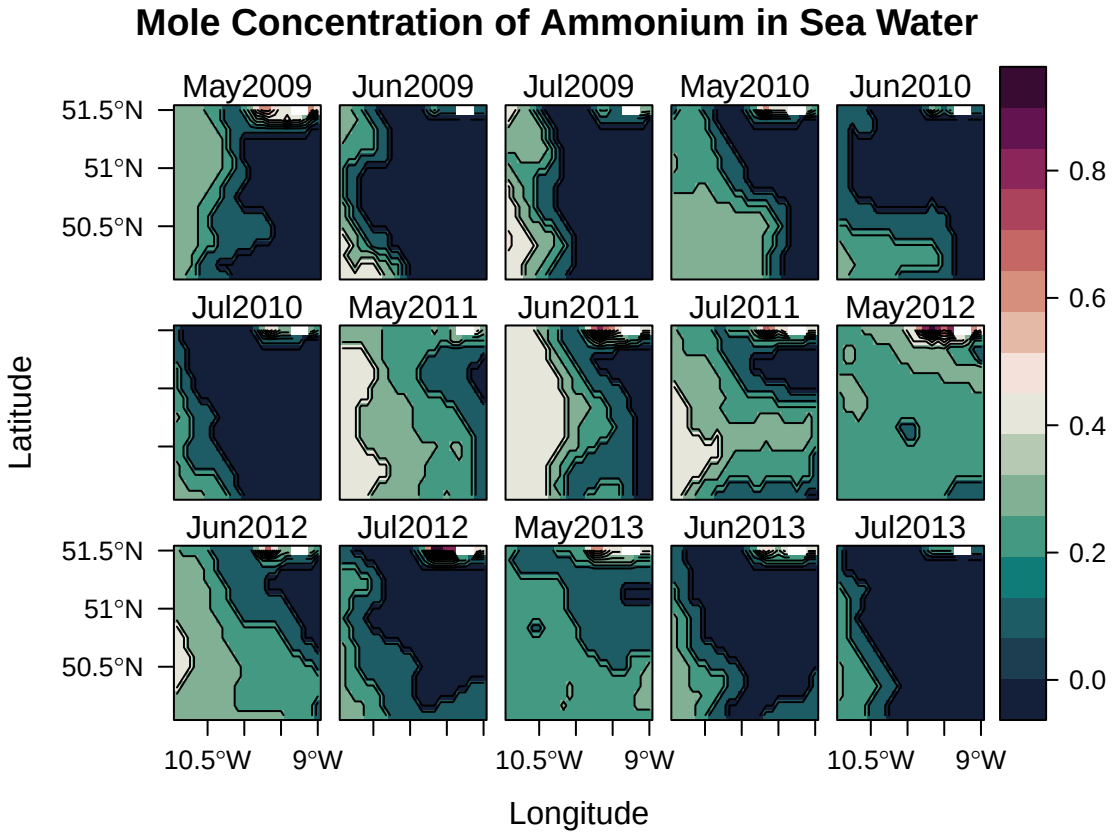



Mole Concentration of Phytoplankton Expressed as Carbon in Sea Wate
May2009
Jun2009
Jul2009
May2010
Jun2010
Jul2010
May2011
Jun2011
Jul2011
May2012
Jun2012
Jul2012
May2013
Jun2013
Jul2013
51.5°N
51°N
50.5°N
10.5°W
9°W
Latitude
Longitude
20
15
10
5
0

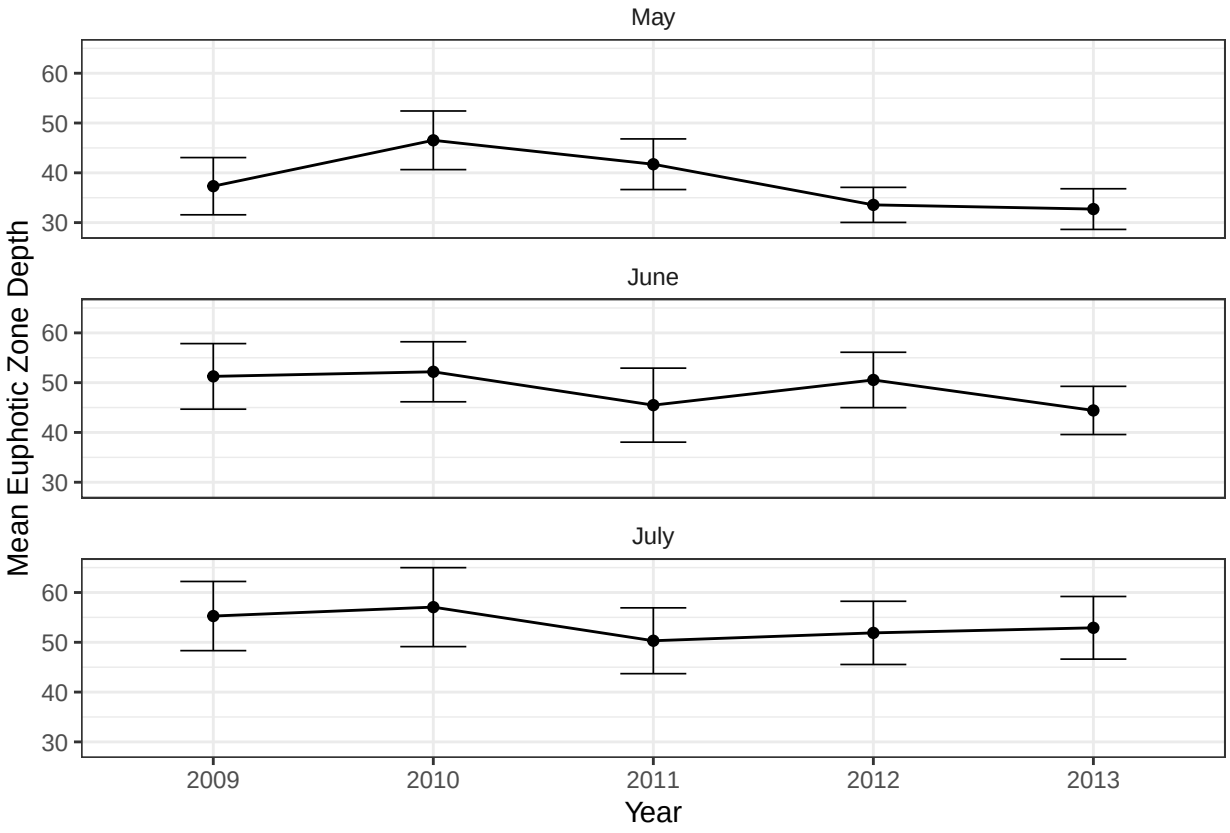
Mole Concentration of Ammonium in Sea Water

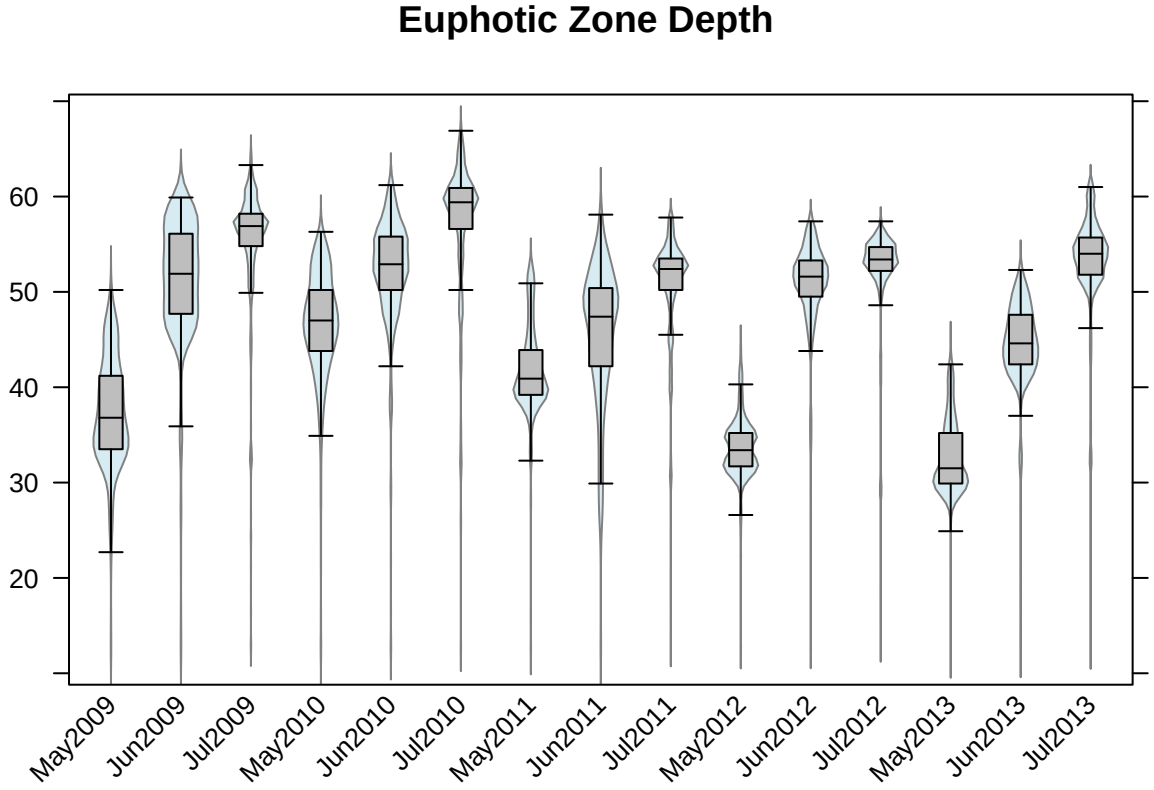


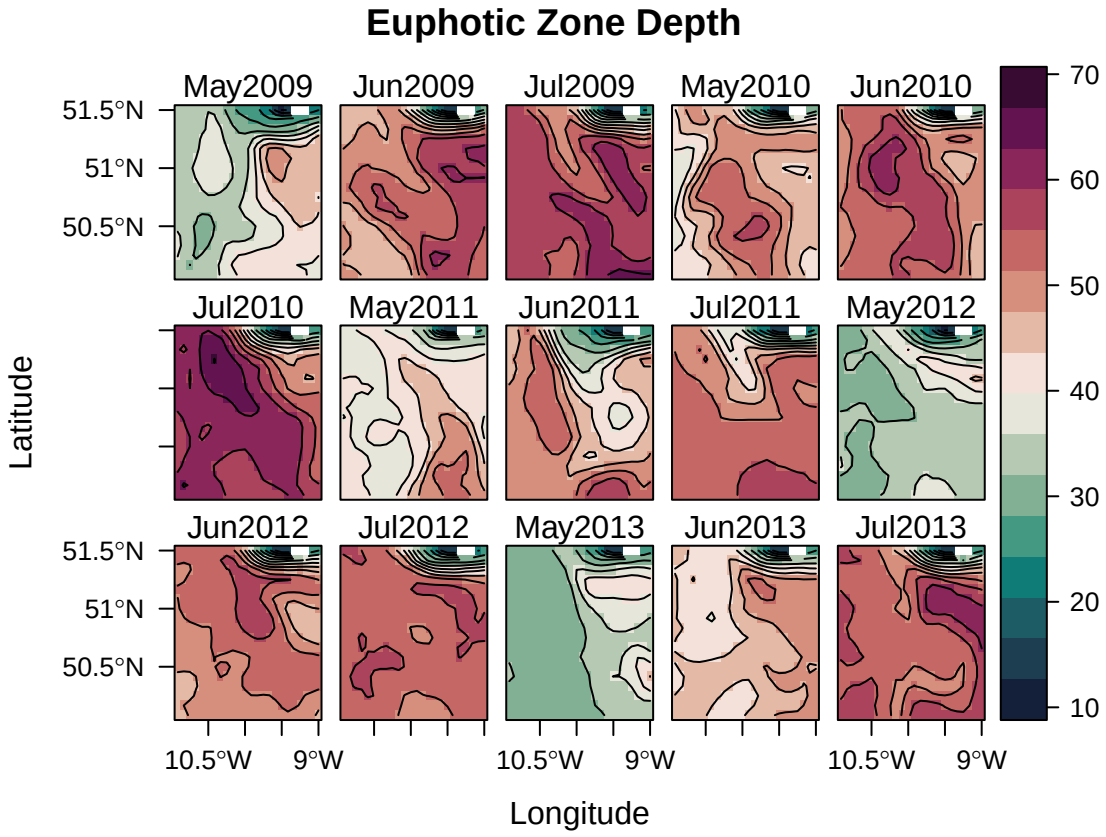



Mole Concentration of Ammonium in Sea Water
May2009
Jun2009
Jul2009
May2010
Jun2010
Jul2010
May2011
Jun2011
Jul2011
May2012
Jun2012
Jul2012
May2013
Jun2013
Jul2013
51.5°N
51°N
50.5°N
10.5°W
9°W
Latitude
Longitude
0.8
0.6
0.4
0.2
0.0

Euphotic Zone Depth

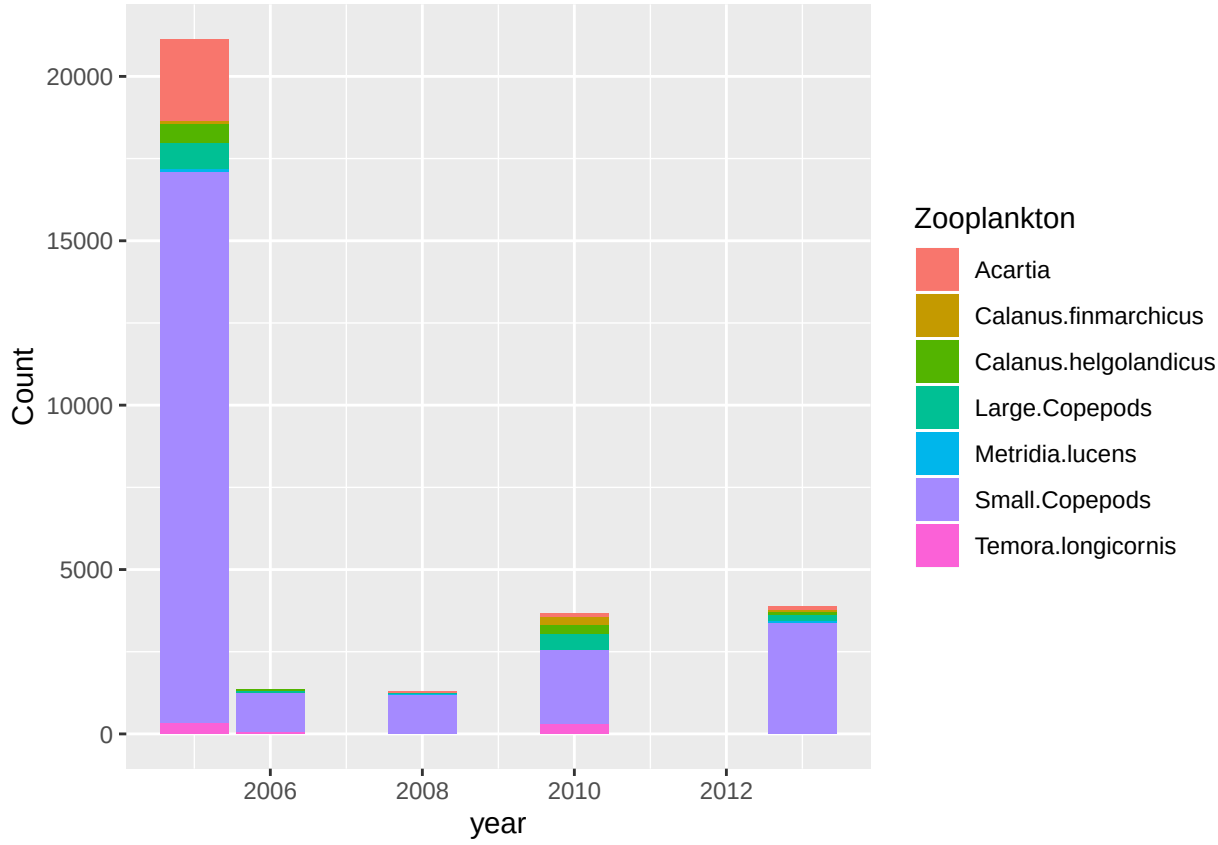





Euphotic Zone Depth
May2009
Jun2009
Jul2009
May2010
Jun2010
Jul2010
May2011
Jun2011
Jul2011
May2012
Jun2012
Jul2012
May2013
Jun2013
Jul2013
51.5°N
51°N
50.5°N
10.5°W
9°W
Latitude
Longitude
70
60
50
40
30
20
10

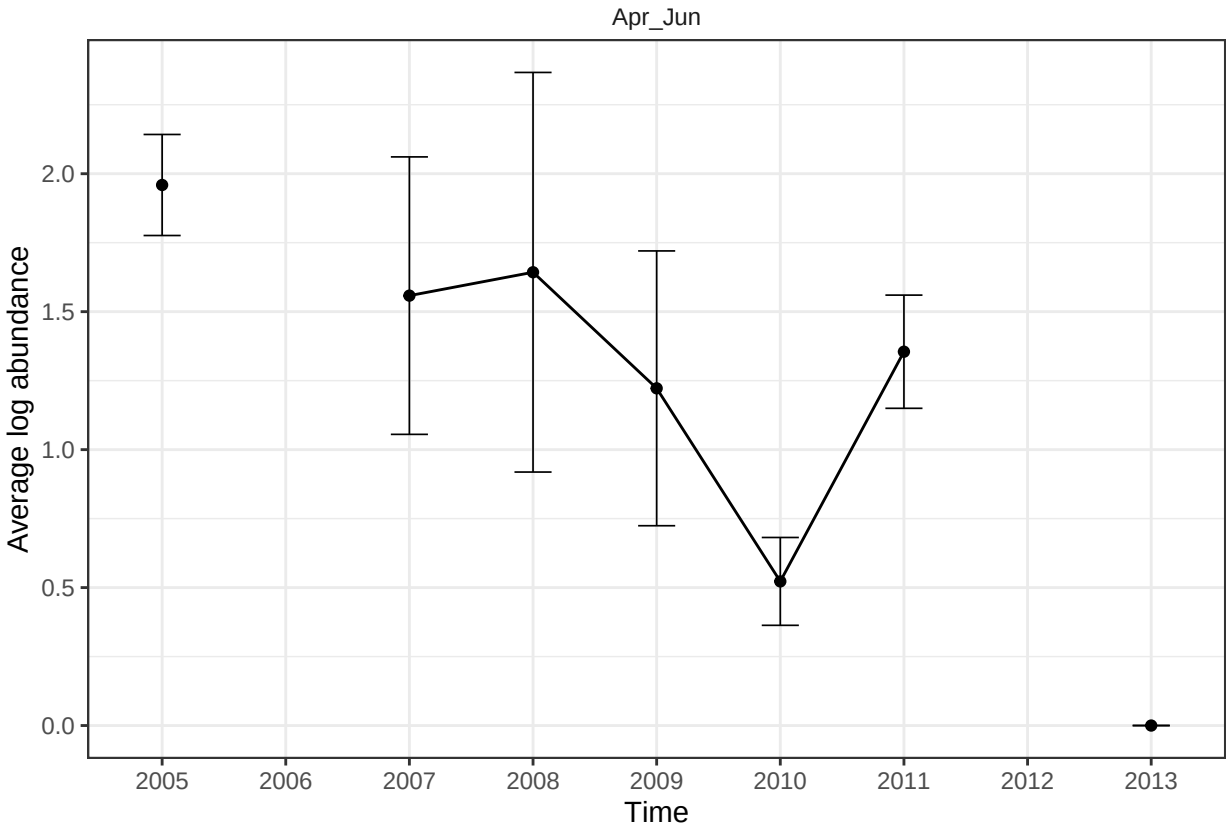
An operational zooplankton data service

Observed Counts

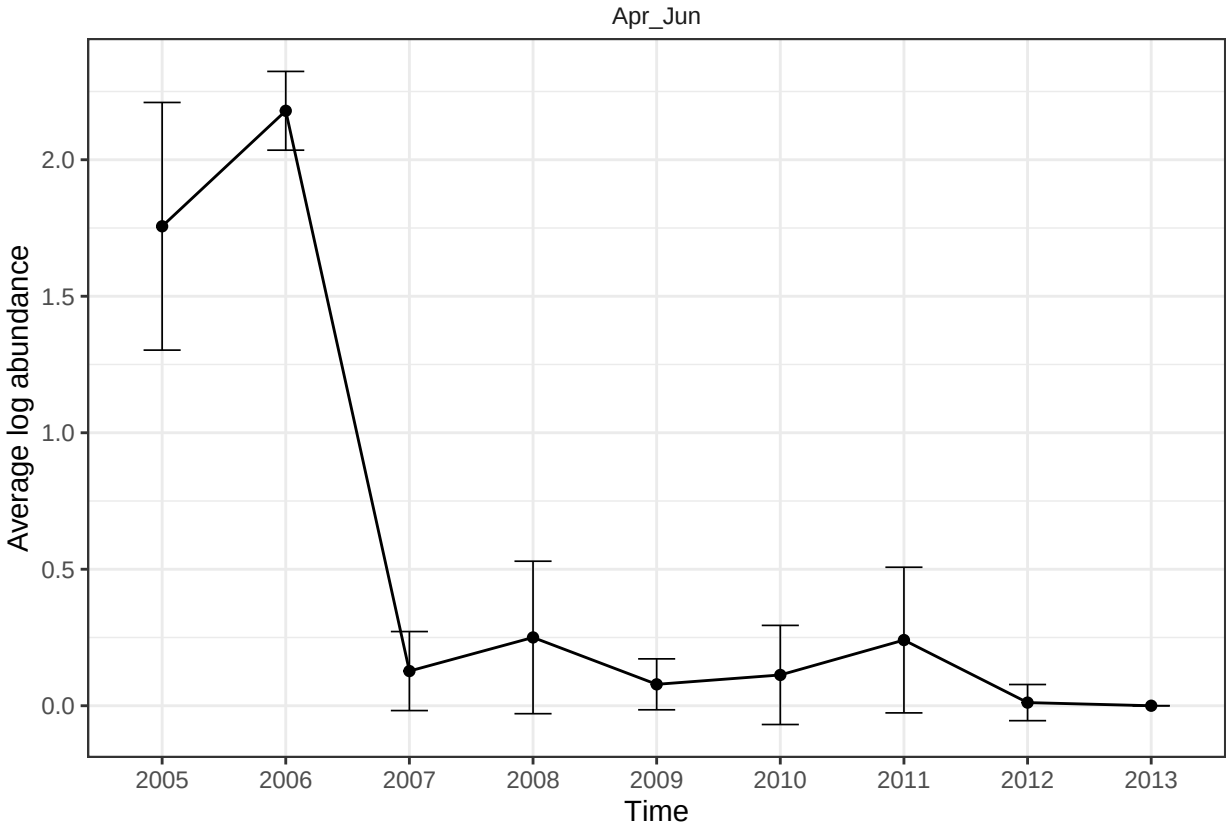


Data Interpolation and Variational Analysis

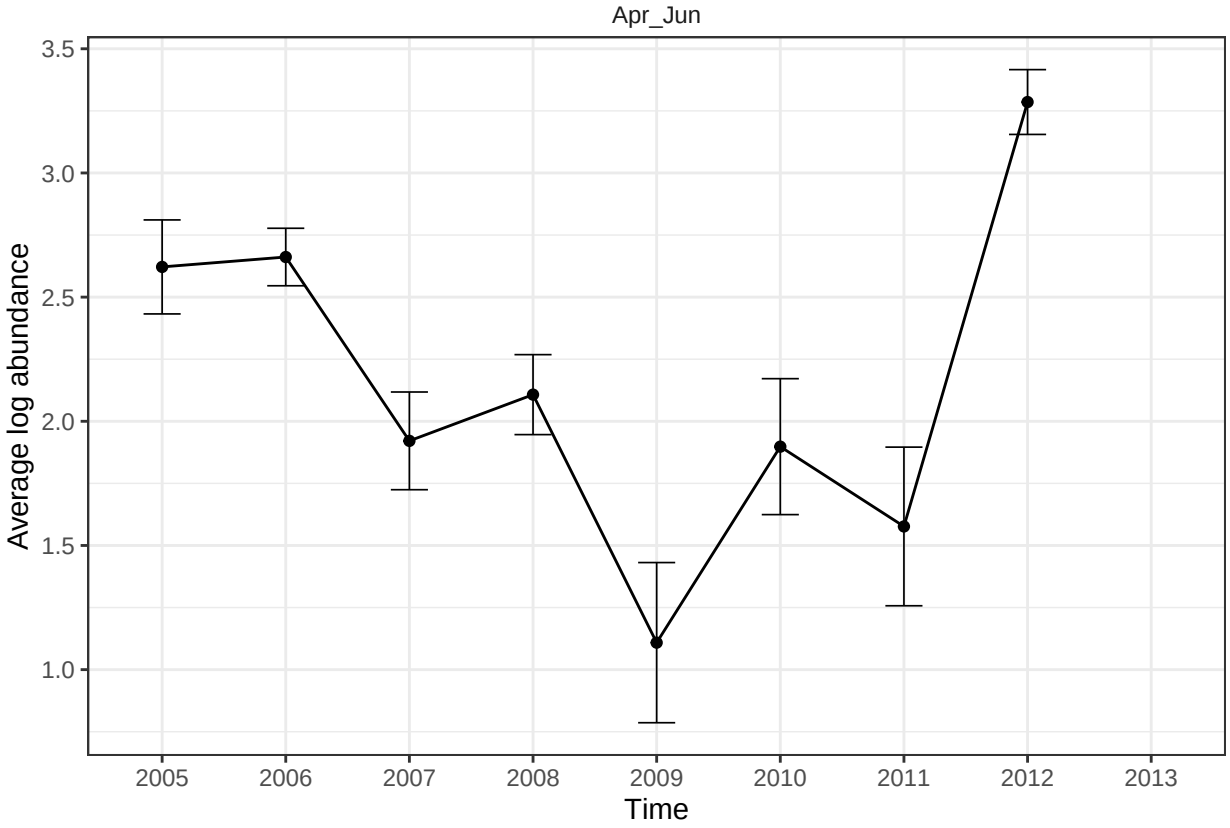
Acartia



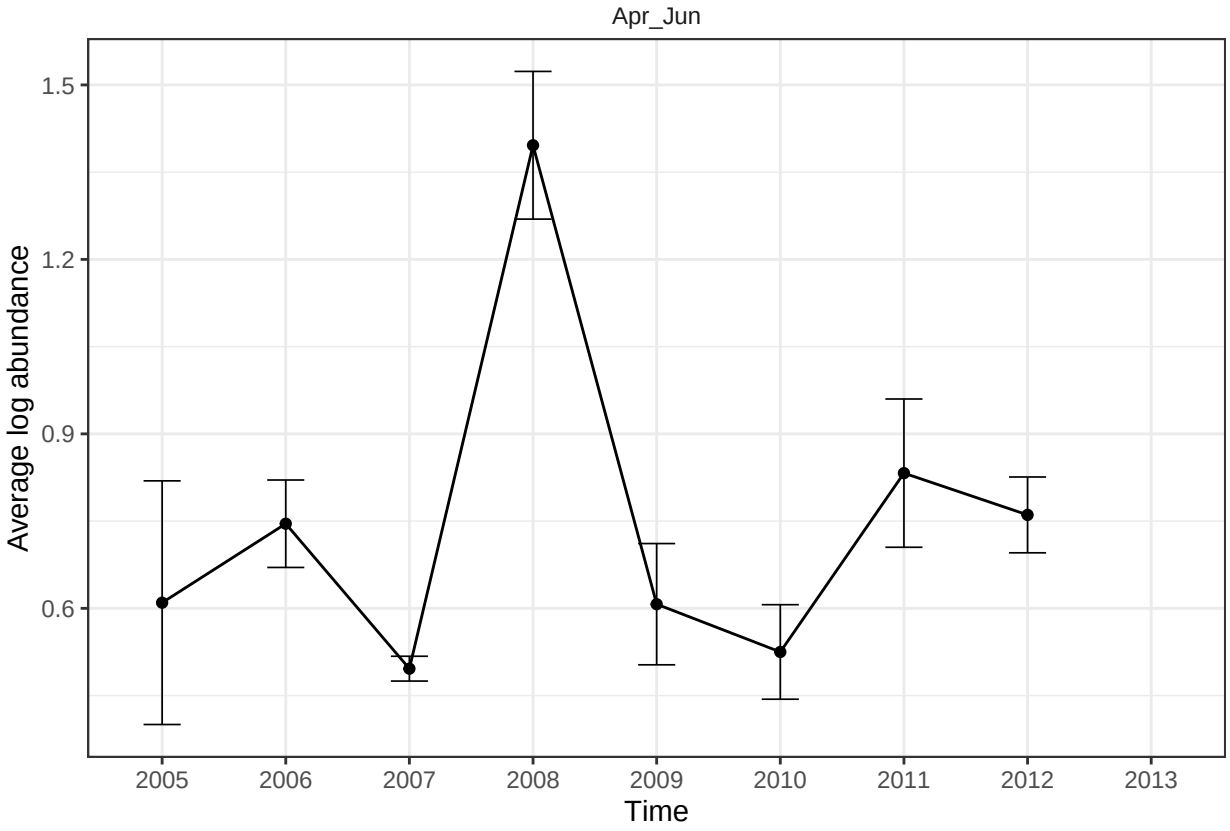
Calanus_finmarchicus



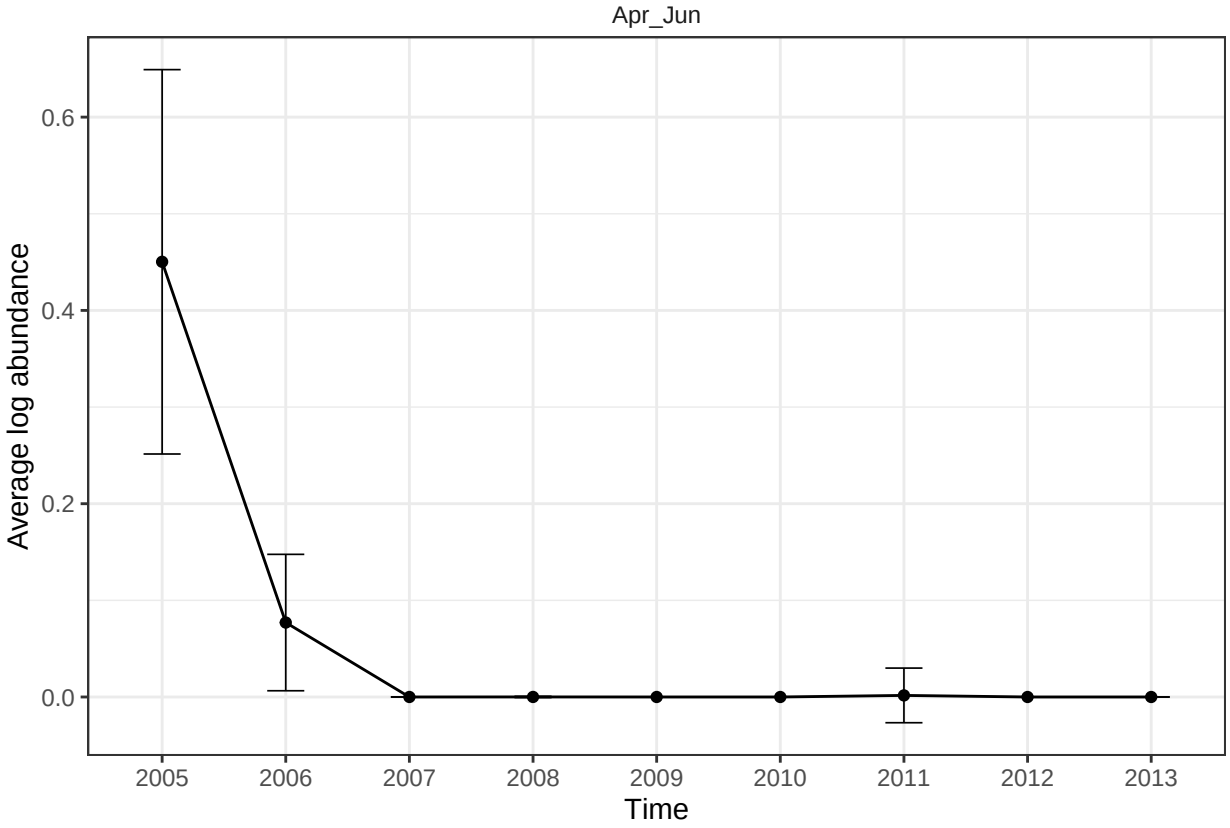
Calanus_helgolandicus



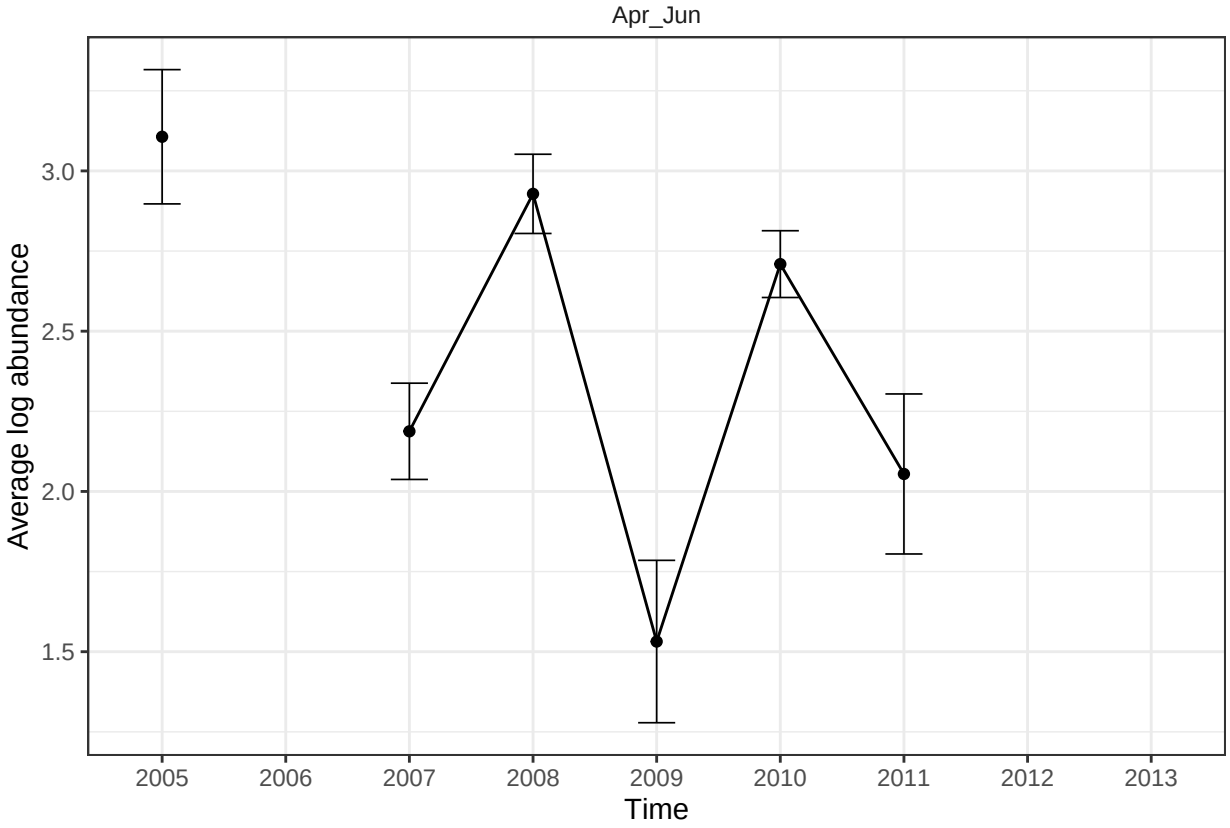
Metridia_lucens



Temora_longicornis



Large_copepods



Small_copepods