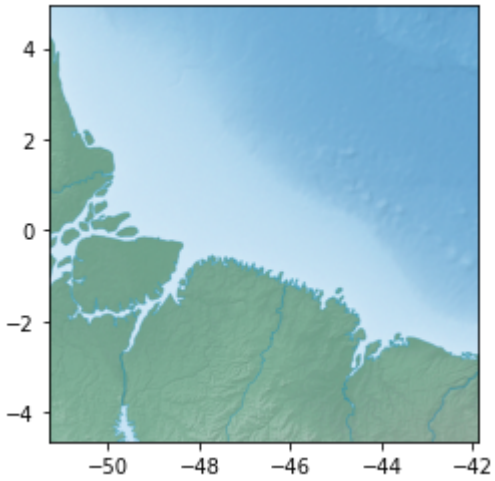
Carrega e explora o arquivo de dados descarregados (.nc) com o XARRAY

Separa série temporal e pickle!

https://data.marine.copernicus.eu/product/WIND_GLO_WIND_L4_REP_OBSERVATIONS_012_006/dow

In [38]:
```
import xarray as xr
import rasterio
from rasterio.plot import show
import matplotlib.pyplot as plt
import matplotlib.dates as mdates
import numpy as np
import datetime
import pickle
```

In [39]:
```
# carrega mapa base para referência visual! Exportado como geotiff pelo QGIS

mapa_path = r'd:\ShapeFiles\\'
mapa_name = 'Plataforma_para.tif'

mapa = rasterio.open(mapa_path + mapa_name)
show(mapa)
```



Out[39]: <AxesSubplot:>

In [40]:
```
# Dados descarregados do CMEMS diretamente pelo site

ds_name = 'CERSAT-GLO-BLENDED_WIND_L4_REP-V6-OBS_FULL_TIME_SERIE_1668714770670.nc'

ds = xr.open_dataset(ds_name, engine='netcdf4')
```

In [4]:
```
# ds_name = 'wind.nc'
# ds_path = r'd:\CMEMS_Copernicus\data\\'

# ds = xr.open_dataset(ds_path+ds_name, engine='netcdf4')
```

In [42]:
```
# explora o conteudo do 'dataset'
# clicando nos ícones do lado direito (folha de papel e pilha de discos) aparecem in

ds
```

Out[42]: xarray.Dataset

► Dimensions: (**lat**: 21, **lon**: 29, **time**: 4384)

▼ Coordinates:

lon	(lon)	float32	-50.0 -49.75 -49.5 ... -43.25 -4...
time	(time)	datetime64[ns]	2015-01-01 ... 2017-12-31T18...
lat	(lat)	float32	-3.0 -2.75 -2.5 ... 1.5 1.75 2.0

▼ Data variables:

northward_wind	(time, lat, lon)	float64	...
sampling_length	(time, lat, lon)	float32	...
eastward_wind_r...	(time, lat, lon)	float64	...
northward_wind...	(time, lat, lon)	float64	...
eastward_wind	(time, lat, lon)	float64	...
surface_type	(time, lat, lon)	float32	...

► Attributes: (72)

In [44]:
```
# pega o conteúdo dos campos de longitude e latitude e gera malha

lon = ds['lon'].data
lat = ds['lat'].data

lonlon, latlat = np.meshgrid(lon, lat)
```

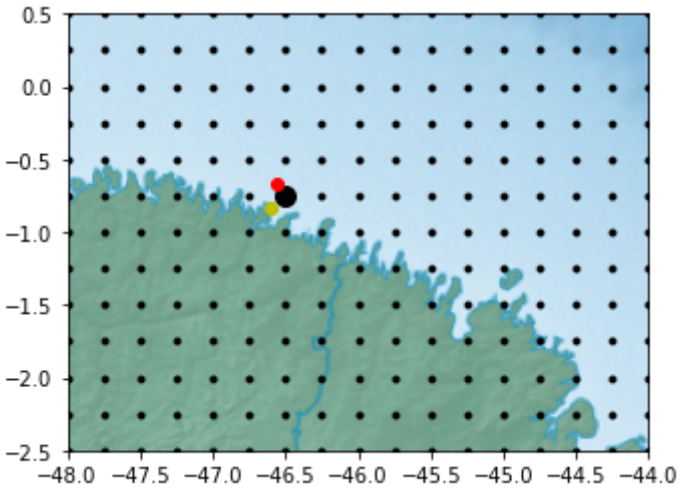
In [7]:
```
print(lon)
print(lat)
```

```
[-50.   -49.75 -49.5  -49.25 -49.   -48.75 -48.5  -48.25 -48.   -47.75
 -47.5  -47.25 -47.   -46.75 -46.5  -46.25 -46.   -45.75 -45.5  -45.25
 -45.   -44.75 -44.5  -44.25 -44.   -43.75 -43.5  -43.25 -43.  ]
[-3.   -2.75 -2.5  -2.25 -2.   -1.75 -1.5  -1.25 -1.   -0.75 -0.5  -0.25
  0.    0.25  0.5   0.75  1.    1.25  1.5   1.75  2.  ]
```

In [8]:
```
# posição do ADCP e da estação meteorológica (Bragança, PA)
adcp_x = -46.564
adcp_y = -0.672

met_x = -46.6037
met_y = -0.8301
```

In [45]:
```
fig, ax = plt.subplots()

# coordenadas da matriz do ponto desejado! Tentativa e erro!
li, co = 9, 14

show(mapa, ax=ax)
```

```
ax.plot(lonlon, latlat, 'k.')
ax.plot(lonlon[li, co], latlat[li, co], 'ko', ms = 10)
ax.plot(adcp_x, adcp_y, 'ro')
ax.plot(met_x, met_y, 'yo')
ax.set_xlim(-48, -44)
ax.set_ylim(-2.5, .5)
plt.show()
```



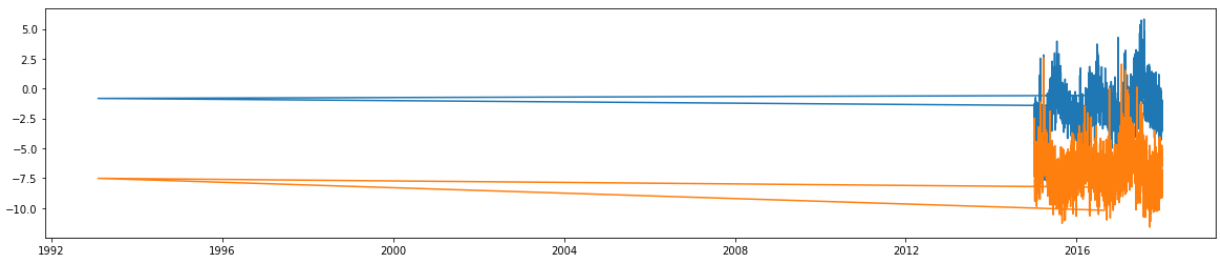
In [46]:
```
# pega o tempo e as componentes do vento

time = ds['time'].data

u = ds['northward_wind'].data
v = ds['eastward_wind'].data

print(time.shape, u.shape)
```

```
(4384,) (4384, 21, 29)
```

In [47]:
```
# separa os dados de vento somente para o ponto de malha desejado
us = u[:, li, co]
vs = v[:, li, co]
```

In [12]:
```
plt.figure(figsize=(20, 4))
plt.plot(time, us)
plt.plot(time, vs)
```

Out[12]:
```
[<matplotlib.lines.Line2D at 0x16d53d83910>]
```



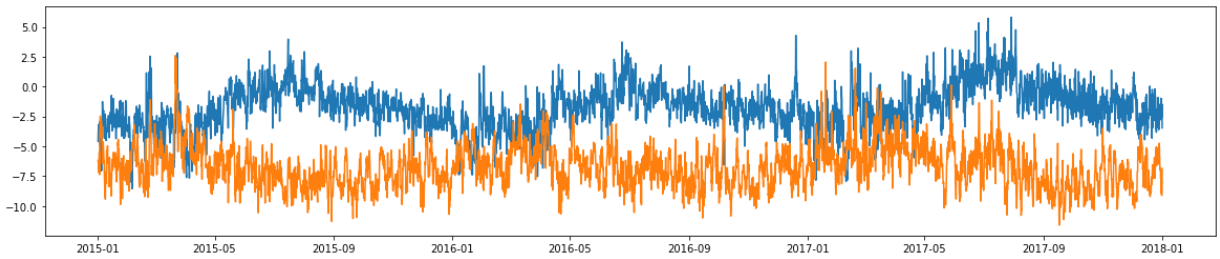
In [36]:
```
# corrige a falha do tempo, interpolando

# coverte o tempo em float
time_n = mdates.date2num(time)
# acha o índice do valor problemático
i = np.array(np.where(time_n < mdates.date2num(datetime.datetime(2000, 1, 1)))).sque
```

```
# interpola
time_n[i] = (time_n[i-1] + time_n[i+1])/2
# gera a série corrigida
time_c = mdates.num2date(time_n)
```

In [37]:

```
# voilá!
plt.figure(figsize=(20, 4))
plt.plot(time_c, us)
plt.plot(time_c, vs)
```

Out[37]: [<matplotlib.lines.Line2D at 0x16d55217e50>]



In [48]:

```
hdr = '''
Dados de vento (u, v) a partir do produto Copernicus/CMEMS: Global Ocean Wind L4 Rep

Para o ponto mais próximo da estação meteorológica, e mesmo ponto da malha do ERA5

lista = [hdr, tempo, u, v]
'''
# j = [hdr, time_c, us, vs]
# with open('Vento_satelite_CMEMS_Para_2015_2017.pkl', 'wb') as io:
#     pickle.dump(j, io)
```