Python seminar Homework for Chap. 7.3 No.1

1. Please plot the velocity field observed by satellite altimeter (OSCAR: Ocean Surface Current Analysis Real-time).
The description of OSCAR data can be available from
https://podaac.jpl.nasa.gov/dataset/OSCAR_L4_OC_third-deg

The data can be available from PO.DAAC Drive
  https://podaac-
  tools.jpl.nasa.gov/drive/files/allData/oscar/preview/L4/oscar_third_deg
However, to enter to PO.DAAC Drive, you need to register your ID.
Please register to PO.DAAC Drive and download oscar_vel10593.nc.gz.
The number "10593" indicates the date since Oct. 5, 1992.
Please extract the nc.gz file on your drive.

To read the netcdf file, following commands can be applied.
        file_name = " oscar_vel10593.nc"
        nc = netCDF4.Dataset(file_name, 'r', format='NETCDF4')

To see the variables in a netcdf file, the following commands are helpful.
        print (nc.dimensions)
        print (nc.variables)

As an example of observation plan to transect the Kuroshio Extension, I added CTD stations:
x1 = [144.0, 144.0, 144.0, 144.0, 144.0, 144.0, 144.0, 144.0]
y1 = [39.0,   38.5,   38.0,   37.5,   37.0,   36.5,   36.0,   35.5]

To limit the boundaries of the draw field, following commands were used.
extent = [133.5, 145.5, 30.5, 40]
ax.set_extent(extent, crs=proj)

To draw high resolution map, following commands were used.
land_50m = cfeature.NaturalEarthFeature('physical', 'land', '50m',
  edgecolor='face', facecolor=cfeature.COLORS['land'])
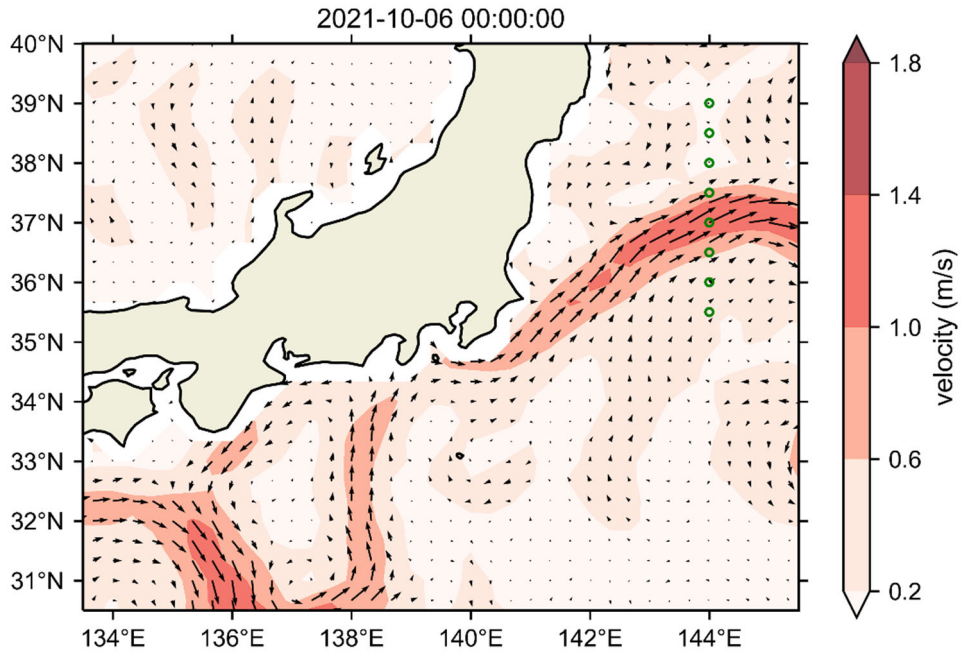ax.add_feature(land_50m, edgecolor='black',zorder=1)

Figure Background colors show amplitude of velocity field and arrows show velocity direction and amplitude. Green open circles are CTD stations.