```python
import numpy as np
import matplotlib.pyplot as plt
import xarray as xr
import datetime
from dateutil.relativedelta import relativedelta

import cartopy.crs as ccrs
import cartopy.feature as cfeature
import matplotlib.ticker as mticker
import matplotlib.style as mplstyle
from cartopy.mpl.ticker import LongitudeFormatter, LatitudeFormatter


year_ref=???? # 基準とする年

year_bgn=???? # 解析する年のはじめ
year_end=???? # 解析する年のおわり

month_bgn=??
month_end=??

# 図示する深度set depth level
k=1

# 月でループ
for month in range(month_bgn,month_end+1) :

    # reference year の MOAA GPV data を読む
    rfile='../DATA/MOAA/'+'{}'.format(year_ref)+'/MOAAv2_OI_TS_'+'{}'.format(year_ref)+'{:02}'.format(month)+'15_MON_100deg_5-2000db.nc'
    ncr = xr.open_dataset(rfile)

    date_ref = ncr['CDATE0']
    dtyp_ref = ncr['DATASET_TYPE']
    lat = ncr['LATITUDE'][:]
    lon = ncr['LONGITUDE'][:]
    prs = ncr['PRES'][:]
    toi = ncr['TOI'][:]
    soi = ncr['SOI'][:]
    ncr.close()

    # transpose (lat,lon) (C style) -> (lon,lat) (F style)
    toi_ref = toi.T
    soi_ref = soi.T

    X,Y = np.meshgrid(lon, lat, indexing = 'ij')  # indexing = 'ij' is F style

    # 解析対象年をループで回す準備
    dt    =datetime.datetime(year_bgn,month,15)
    dt_end=datetime.datetime(year_end,month,15)
    while True:

        # read MOAA GPV data
        rfile='../DATA/MOAA/'+dt.strftime('%Y')+'/MOAAv2_OI_TS_'+dt.strftime('%Y%m')+'15_MON_100deg_5-2000db.nc'
        ncr = xr.open_dataset(rfile)

        print(rfile)

        date = ncr['CDATE0']
        toi = ncr['TOI'][:]
        soi = ncr['SOI'][:]
        ncr.close()

        # transpose (lat,lon) (C style) -> (lon,lat) (F style)
        toi = toi.T
```

```
65          soi = soi.T
66
67          # 図の準備
68          fig, # ????
69
70          gl = figa.gridlines(crs=ccrs.PlateCarree())
71          gl.xlocator = mticker.FixedLocator(np.arange(-180,180.1,30))
72          gl.ylocator = mticker.FixedLocator(np.arange(-75,75.1,15))
73
74          data=np.copy(toi_ref[:,:,k])
75          cf=figa.contourf(X,Y,data, #???
76
77
78          data=np.copy(toi[:,:,k])
79          cf=figb.contourf(X,Y,data, #???
80
81          data=np.copy(toi[:,:,k]-toi_ref[:,:,k])
82          cf=figc.contourf(X,Y,data, #???
83
84          data=np.copy(soi_ref[:,:,k])
85          cf=figd.contourf(X,Y,data, #???
86
87          data=np.copy(soi[:,:,k])
88          cf=fige.contourf(X,Y,data, #???
89
90          data=np.copy(soi[:,:,k]-soi_ref[:,:,k])
91          cf=figf.contourf(X,Y,data, #???
92
93          fig.tight_layout()
94
95          fig.show()
96          fig.savefig('../JPG/TSdif'+dt.strftime('%Y%m')+'.jpg')
97          plt.close()
98
99
100         if dt >= dt_end :
101             break
102         dt=dt+relativedelta(months=12)
103
104
```