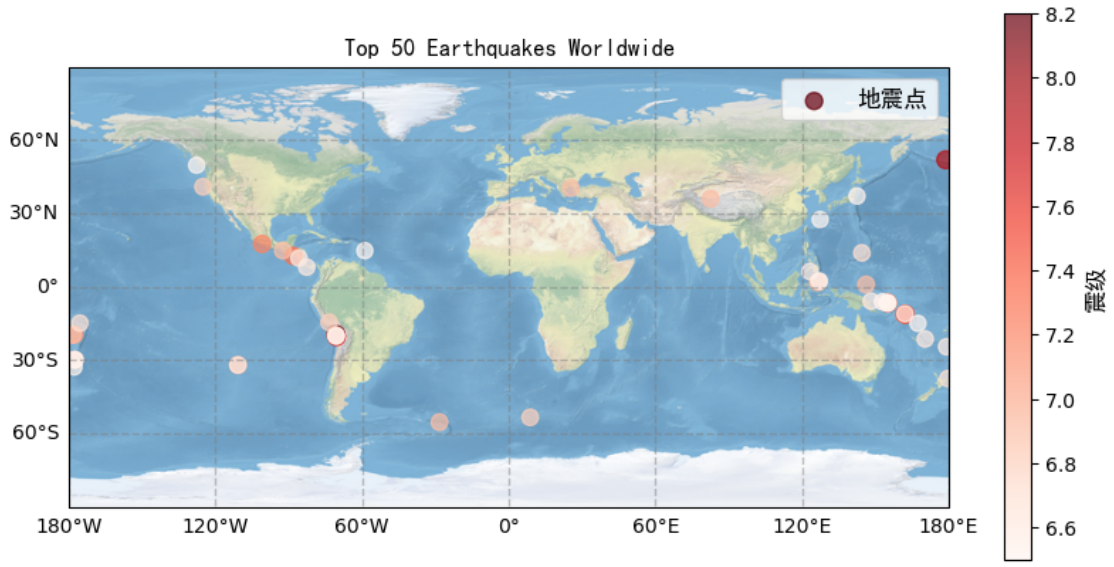
Untitled7

December 6, 2023

[53]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import cartopy.crs as ccrs
from cartopy.mpl.gridliner import LONGITUDE_FORMATTER, LATITUDE_FORMATTER
from matplotlib.font_manager import FontProperties

#
font_properties = FontProperties(fname='C:\\Windows\\Fonts\\simhei.ttf',␣
 ↪size=12)  #

def plot_earthquakes():
    #   CSV
    df = pd.read_csv('usgs_earthquakes.csv')

    #       50
    top_50_earthquakes = df.sort_values(by='mag', ascending=False).head(50)

    #    NaN   inf
    top_50_earthquakes = top_50_earthquakes.dropna(subset=['latitude',␣
 ↪'longitude'])
    top_50_earthquakes = top_50_earthquakes.replace([np.inf, -np.inf], np.nan).
 ↪dropna(subset=['latitude', 'longitude'])

    # Filter out any remaining NaN or inf values in latitude and longitude
    top_50_earthquakes = top_50_earthquakes[np.
 ↪isfinite(top_50_earthquakes['latitude']) & np.
 ↪isfinite(top_50_earthquakes['longitude'])]

    #       PlateCarree
    fig, ax = plt.subplots(figsize=(10, 5), subplot_kw={'projection': ccrs.
 ↪PlateCarree()})

    #
    ax.stock_img()

    #
```

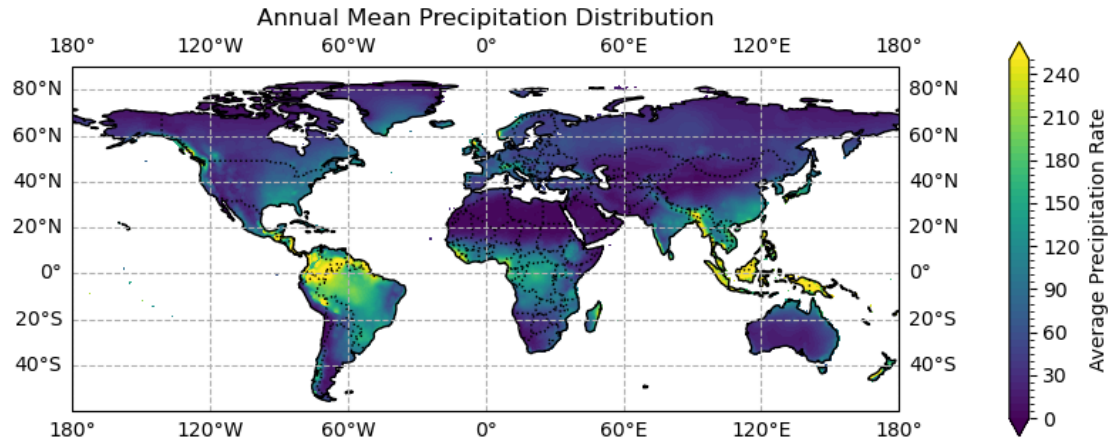
```
    scatter = ax.scatter(top_50_earthquakes['longitude'],␣
↪top_50_earthquakes['latitude'],
                         c=top_50_earthquakes['mag'], cmap='Reds',␣
↪s=top_50_earthquakes['mag'] * 10, alpha=0.7,
                         label='  ', transform=ccrs.PlateCarree())

    #
    cbar = plt.colorbar(scatter, label=' ')
    cbar.set_label(' ', fontproperties=font_properties)

    #
    gl = ax.gridlines(crs=ccrs.PlateCarree(), draw_labels=True, linewidth=1,␣
↪color='gray', alpha=0.5, linestyle='--')
    gl.xlabels_top = False
    gl.ylabels_right = False
    gl.xformatter = LONGITUDE_FORMATTER
    gl.yformatter = LATITUDE_FORMATTER

    #
    plt.legend(prop=font_properties)

    #
    plt.title('Top 50 Earthquakes Worldwide', fontproperties=font_properties)
    plt.show()

if __name__ == '__main__':
    plot_earthquakes()
```

```
C:\Users\jiaji\anaconda3\Lib\site-packages\cartopy\mpl\gridliner.py:451:
UserWarning: The .xlabels_top attribute is deprecated. Please use .top_labels to
toggle visibility instead.
  warnings.warn('The .xlabels_top attribute is deprecated. Please '
C:\Users\jiaji\anaconda3\Lib\site-packages\cartopy\mpl\gridliner.py:487:
UserWarning: The .ylabels_right attribute is deprecated. Please use
.right_labels to toggle visibility instead.
  warnings.warn('The .ylabels_right attribute is deprecated. Please '
```



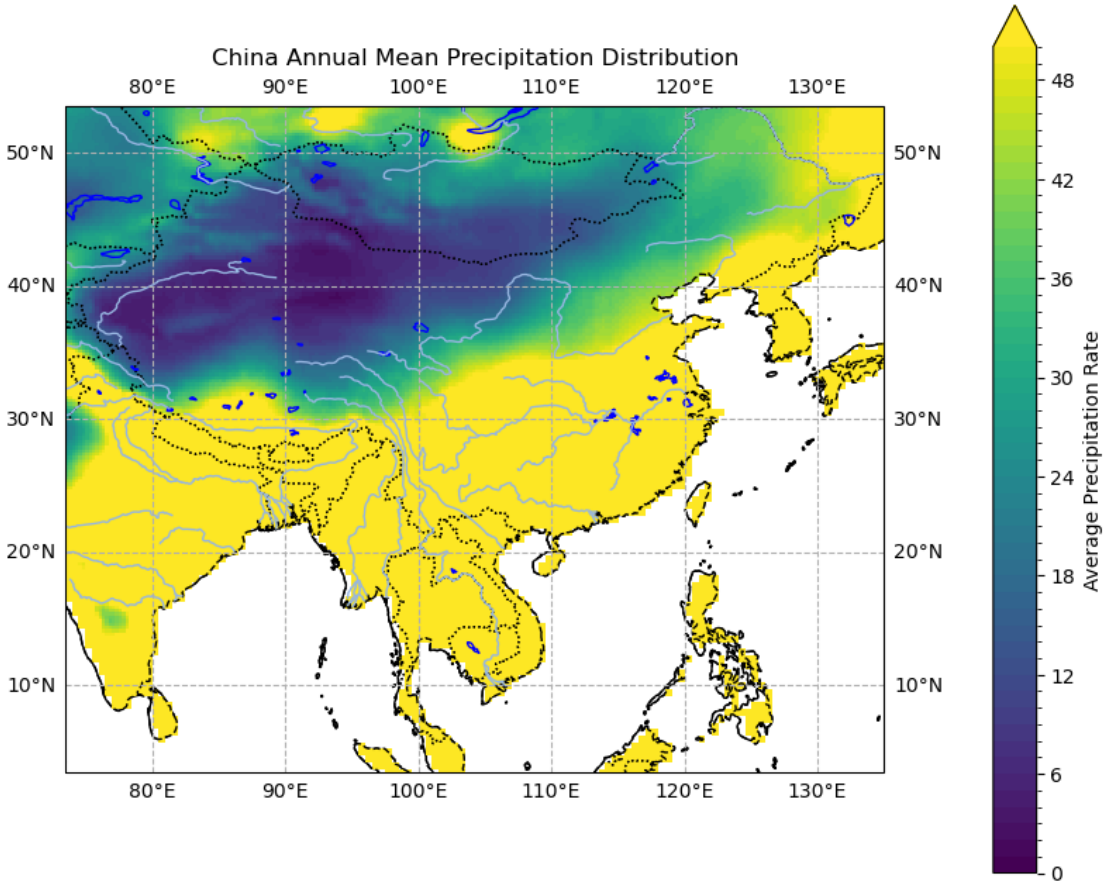
[86]:
```
import xarray as xr
import numpy as np
import matplotlib.pyplot as plt
import cartopy.crs as ccrs
import cartopy.feature as cfeature

#
file_path = "pr_2021_YM.nc"
data = xr.open_dataset(file_path)

#
annual_mean_pr = data['pr'].mean(dim='time')

#
fig, ax = plt.subplots(figsize=(10, 6), subplot_kw={'projection': ccrs.
 ↪PlateCarree()})

#
ax.add_feature(cfeature.COASTLINE, edgecolor='black')
ax.add_feature(cfeature.BORDERS, linestyle=':')
ax.add_feature(cfeature.LAND, facecolor='lightgray')

#
levels = np.linspace(0, 250, 51)  # 0 250 51

#
im = annual_mean_pr.plot.contourf(ax=ax, transform=ccrs.PlateCarree(),
```

```
                                    cbar_kwargs={'label': 'Average Precipitation␣
 ↪Rate', 'pad': 0.1, 'shrink': 0.6},
                                    levels=levels, cmap='viridis')
#
ax.gridlines(draw_labels=True, linestyle='--')

#
plt.title('Annual Mean Precipitation Distribution')
plt.xlabel('Longitude')
plt.ylabel('Latitude')
plt.show()
```



[97]:
```
import xarray as xr
import numpy as np
import matplotlib.pyplot as plt
from shapely.geometry import box
import cartopy.crs as ccrs
import cartopy.feature as cfeature

# 1.
file_path = "pr_2021_YM.nc"
data = xr.open_dataset(file_path)

# 2.
china_bbox = box(73 + 29/60 + 59.79/3600, 3 + 31/60, 135 + 2/60 + 30/3600, 53 +␣
 ↪33/60)

# 3.   where
china_data = data.where((data.lon >= china_bbox.bounds[0]) & (data.lon <=␣
 ↪china_bbox.bounds[2]) &
```

```
                        (data.lat >= china_bbox.bounds[1]) & (data.lat <=␣
 ↪china_bbox.bounds[3]), drop=True)

# 4.
levels = np.arange(0, 51, 1)
fig, ax = plt.subplots(figsize=(10, 8), subplot_kw={'projection': ccrs.
 ↪PlateCarree()})
im = china_data['pr'].mean(dim='time').plot.imshow(ax=ax, transform=ccrs.
 ↪PlateCarree(),
                                                   cbar_kwargs={'label':␣
 ↪'Average Precipitation Rate','pad': 0.1},
                                                   levels=levels,␣
 ↪cmap='viridis')

ax.add_feature(cfeature.BORDERS, linestyle=':')
ax.add_feature(cfeature.COASTLINE, linestyle='--')
ax.add_feature(cfeature.LAND, edgecolor='black', facecolor='none')
ax.add_feature(cfeature.BORDERS, linestyle=':')
ax.add_feature(cfeature.LAKES, edgecolor='blue', facecolor='none')
ax.add_feature(cfeature.RIVERS)
ax.set_title('China Annual Mean Precipitation Distribution')
ax.set_xlabel('Longitude')
ax.set_ylabel('Latitude')

#
ax.gridlines(draw_labels=True, linestyle='--')

plt.show()
```


China Annual Mean Precipitation Distribution
80°E
90°E
100°E
110°E
120°E
130°E
50°N
40°N
30°N
20°N
10°N
Average Precipitation Rate
0
6
12
18
24
30
36
42
48

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