

In [1]:

```
# Import modules
import numpy as np
import xarray as xr
import pandas as pd
import matplotlib.pyplot as plt
import matplotlib.ticker as mticker
import cartopy.crs as ccrs
import cartopy.feature as cfeature
%matplotlib inline
from matplotlib.ticker import (MultipleLocator, FormatStrFormatter, AutoMinorLocator)
```

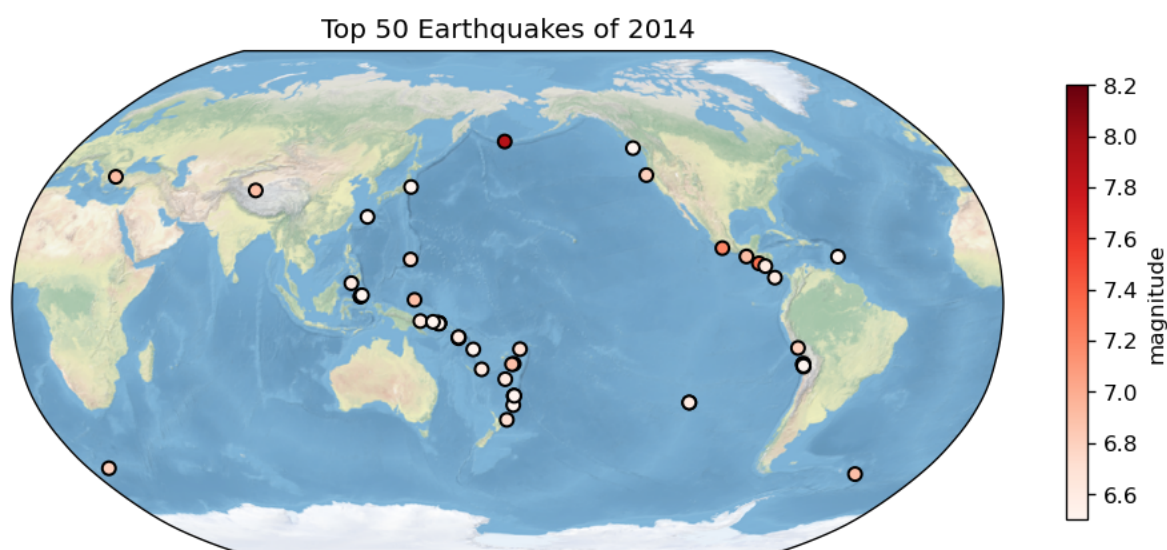
In [48]:

```
#1
#筛选出前50震级
eqs=pd.read_csv("usgs_earthquakes.csv")
eq=eqs.sort_values("mag",ascending=False).head(50)
eq
```

37371	23:46:47.260	-19.6097	-70.7691	25.00	8.2	mww	NaN	23.0	0.60900	0.66	us	usc000h
50562	2014-06-23 20:53:09.700	51.8486	178.7352	109.00	7.9	mww	NaN	22.0	0.13300	0.71	us	usc000
36918	2014-04-03 02:43:13.110	-20.5709	-70.4931	22.40	7.7	mww	NaN	44.0	1.02900	0.82	us	usc000p
33808	2014-04-12 20:14:39.300	-11.2701	162.1481	22.56	7.6	mww	NaN	13.0	2.82800	0.71	us	usc000p
31496	2014-04-19 13:28:00.810	-6.7547	155.0241	43.37	7.5	mww	NaN	16.0	3.82000	1.25	us	usb000p
28557	2014-04-13	44.4688	188.8514	88.88	7.4	mww	NaN	17.0	6.88500	1.88	us	usc000p

In [85]:

```
fig=plt.figure(figsize=(10,6),dpi=120)
#制定proj
proj = ccrs.Robinson(central_longitude=180,globe=None)
ax = plt.axes(projection=proj)
#导入颜色, https://www.cnblogs.com/youxiaogang/p/14262751.html
ax.stock_img()
ax.set_global()
ax.set_title('Top 50 Earthquakes of 2014')
#制作散点图, 参考申涵
ax0=plt.scatter(eq['longitude'],eq['latitude'],marker='o',c=eq['mag'],cmap='Reds',edgecolors='black')
plt.colorbar(shrink=0.6,format='%.1f',ticks=[6.6,6.8,7.0,7.2,7.4,7.6,7.8,8.0,8.2],label='magnitude')
plt.show()
```



In [98]:

```
#2
df= xr.open_dataset("sst.mnmean.nc", engine="netcdf4")
```

In [99]:

```
#加载并以时间为维度取平均值
df.sst.groupby(df.time.dt.month)
df.sst.groupby('time.year')
SST=df.sst.groupby('time.year').mean()
SSTm=SST.mean(dim='year')
SSTm
```

Out[99]:

xarray.DataArray 'sst' (lat: 89, lon: 180)

```
array([[ -1.7998166, -1.799826 , -1.7998332, ..., -1.7998503, -1.7998267,
        -1.7998099],
       [ -1.7998251, -1.7998081, -1.7997981, ..., -1.7999493, -1.7998774,
        -1.7998506],
       [ -1.7999948, -1.7999376, -1.7999    , ..., -1.7999569, -1.7999731,
        -1.799988 ],
       ...,
       [      nan,          nan,          nan, ...,          nan,          nan,
        nan],
       [      nan,          nan,          nan, ...,          nan,          nan,
        nan],
       [      nan,          nan,          nan, ...,          nan,          nan,
        nan]], dtype=float32)
```

▼ Coordinates:

lat	(lat) float32 88.0 86.0 84.0 ... -86.0 -88.0
lon	(lon) float32 0.0 2.0 4.0 ... 354.0 356.0 358.0



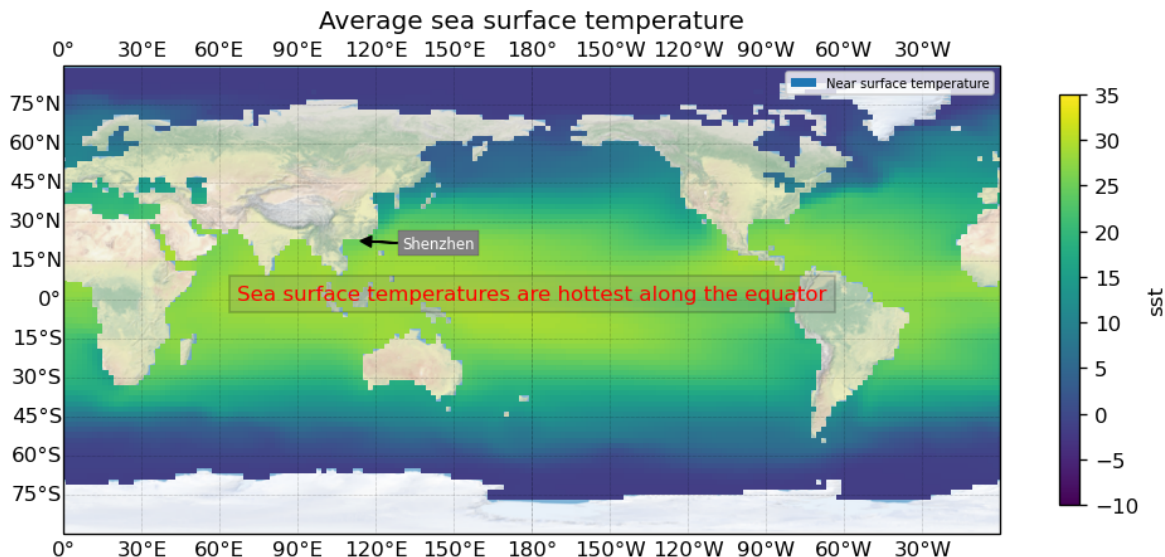
► Attributes: (0)

In [106]:

```
#2.1
fig=plt.figure(figsize=(10,6),dpi=120)
proj = ccrs.PlateCarree(central_longitude=180,globe=None)
ax = plt.axes(projection=proj)
ax.stock_img()
ax.set_global()
SSTm.plot(ax=ax,transform=ccrs.PlateCarree(),vmin=-10,vmax=35,cbar_kwargs={'shrink':0.6})
#设置gridline
gl=ax.gridlines(draw_labels=True,crs=ccrs.PlateCarree(),linestyle=":",linewidth=0.3,color='black',d
#设置横纵坐标范围及刻度,参考袁文婷同学
gl.xlocator=mticker.FixedLocator(np.arange(-180,181,30))
gl.ylocator=mticker.FixedLocator(np.arange(-90,91,15))
ax.set_title('Average sea surface temperature')
#设置注释annotate,参考袁文婷同学的注释
ax.annotate('Shenzhen',xy=(114.06-180,22.54),xytext=(130-180,20), # 深圳
            bbox=dict(boxstyle='square',fc='grey',linewidth=0.1),
            arrowprops=dict(facecolor='black',width=0.01,headwidth=5,headlength=5,shrink=0.005),
            fontsize=7,color='white',horizontalalignment='left',
            transform=ccrs.PlateCarree())

#设置点标签text
plt.text(180,0,'Sea surface temperatures are hottest along the equator',size=10,
        horizontalalignment='center',color='red',
        bbox=dict(facecolor='grey',alpha=0.2),
        transform=ccrs.PlateCarree())

#设置图例legend
plt.legend(['Near surface temperature'],loc='best',fontsize=6)
plt.show()
```



In [127]:

```
plt.figure(figsize=(10,6), dpi=150)
central_lon, central_lat = 114.06, 22.54 #深圳
proj = ccrs.Orthographic(central_lon, central_lat)
ax = plt.axes(projection=proj)
#设置显示范围
extent = [central_lon-40, central_lon+30, central_lat-10, central_lat+30]
ax.set_extent(extent)
SSTm.plot(ax=ax, transform=ccrs.PlateCarree(), vmin=0, vmax=35, cbar_kwags={'shrink':0.4})
ax.add_feature(cfeature.NaturalEarthFeature(category='cultural',
                                             name='admin_0_countries',
                                             scale='110m',
                                             facecolor='none',
                                             edgecolor='black',
                                             linewidth=0.5))

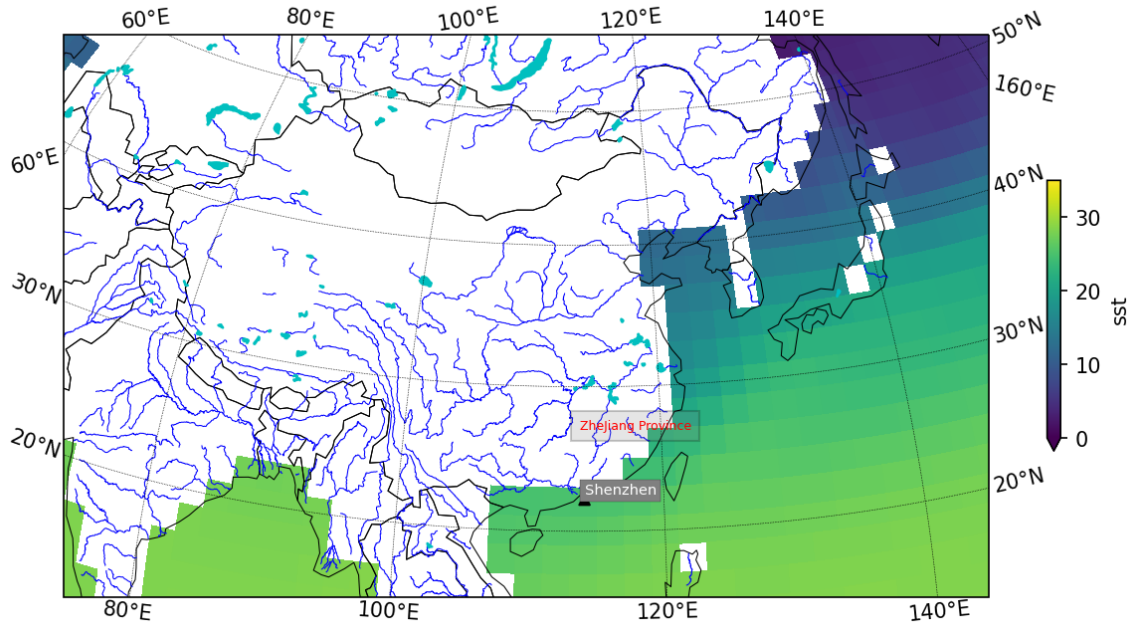
gl=ax.gridlines(draw_labels=True, crs=ccrs.PlateCarree(), linestyle=":", linewidth=0.3, color='black', a
#设置横纵坐标范围及刻度, 参考袁文婷同学
ax.set_title('Average sea surface temperature around China')
#设置annotate
ax.annotate('Shenzhen', xy=(114.06, 22.54), xytext=(120, 20), # 深圳
            bbox=dict(boxstyle='square', fc='grey', linewidth=0.1),
            arrowprops=dict(facecolor='black', width=0.01, headwidth=5, headlength=5, shrink=0.005),
            fontsize=7, color='white', horizontalalignment='left',
            transform=ccrs.PlateCarree())

#设置text
plt.text(118, 27, 'ZheJiang Province', size = 6,
         horizontalalignment='center', color='red',
         bbox=dict(facecolor="grey", alpha=0.2),
         transform=ccrs.PlateCarree())

#加河流、湖泊
rivers_10m = cfeature.NaturalEarthFeature('physical', 'rivers_lake_centerlines', '10m')
ax.add_feature(cfeature.LAKES, edgecolor='c', facecolor='c', zorder=2)
ax.add_feature(rivers_10m, facecolor='None', edgecolor='b', linewidth=0.5)

#设置网格线gridlines
gl=ax.gridlines(draw_labels=False, crs=ccrs.PlateCarree(), linestyle=":", linewidth=0.3, color='k', alph
#分辨率不够导致看起来像马赛克
plt.show()
```

Average sea surface temperature around China



In [ ]: