plotting

October 29, 2015

1 Plotting the Seal Data on a map

- Dependend on the previous pandas tutorial.
- File seal-behav.csv

```
In [3]: import os
        import pandas as  pd
        import numpy as np
```

```
In [4]: df = pd.read_csv("seal-behav.csv", parse_dates=[1])
        df.head(5)
```

Out[4]:

	timestamp	longitude	latitude	individual	event-id	behavior
0	2011-06-15 17:35:18	-59.97949982	43.924957	E 87	677436629	-0.283397
1	2011-06-15 17:50:19	-59.98273849	43.925488	E 87	677436630	-1.784967
2	2011-06-15 18:05:32	-59.98968887	43.925827	E 87	677436631	-1.428955
3	2011-06-15 18:21:27	-59.99033737	43.926136	E 87	677436632	0.160293
4	2011-06-15 18:36:31	-59.9889679	43.925255	E 87	677436633	1.749530

1.0.1 Selecting one seal

```
In [5]: wd = df.pivot(index='timestamp', columns="individual") #row, column, values (optional)
        f104 = df.ix[df["individual"] == "F104"]
        f104.head()
```

Out[5]:

	timestamp	longitude	latitude	individual	event-id	behavior
26206	2011-06-15 17:03:12	-59.98400116	43.925816	F104	643021737	0.852755
26207	2011-06-15 17:19:25	-59.98004532	43.924236	F104	643021738	-0.159810
26208	2011-06-15 17:35:57	-59.97705078	43.925224	F104	643021739	0.684866
26209	2011-06-15 17:52:48	-59.97263336	43.924267	F104	643021740	-0.163912
26210	2011-06-15 18:07:57	-59.97813416	43.925846	F104	643021741	-0.059264

2 Plotting the seal path

Several steps: 1. Create a map centered around the region 2. Draw coastlines 3. Draw countries 4. Fill oceans and coastline 5. Draw the oberservations of the seal on map

```
In [6]: %matplotlib inline

        import matplotlib.pyplot as plt
        from mpl_toolkits.basemap import Basemap
```

2.1 Drawing an empty map of the region

```
In [7]: f104.dtypes
```

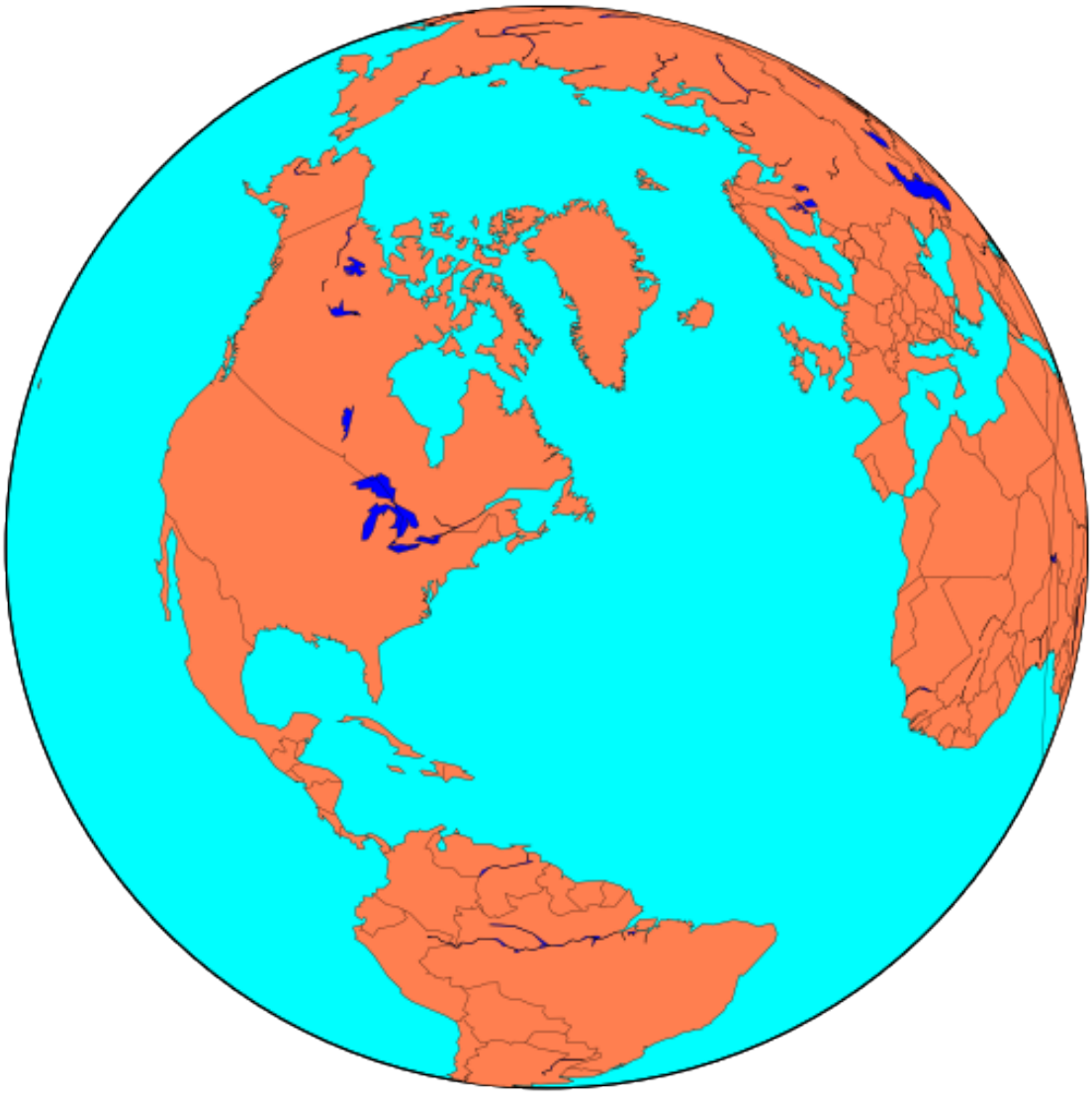
```
Out[7]: timestamp      object
        longitude      object
        latitude      float64
        individual     object
        event-id        int64
        behavior      float64
        dtype: object
```

```
In [7]: lons = f104["longitude"].values
        lons = lons.astype(np.float)
        lats = f104["latitude"].values
        lons_c=np.average(lons)
        lats_c=np.average(lats)
        print (lons_c, lats_c)
```

```
(-60.215205263449604, 44.182538132720715)
```

```
In [9]: #
        map = Basemap(projection='ortho', lat_0=lats_c,lon_0=lons_c)

        fig=plt.figure(figsize=(12,9))

        # draw coastlines, country boundaries, fill continents.
        map.drawcoastlines(linewidth=0.25)
        map.drawcountries(linewidth=0.25)
        map.fillcontinents(color='coral',lake_color='blue')

        # draw the edge of the map projection region (the projection limb)
        map.drawmapboundary(fill_color='aqua')
```

```
Out[9]: <matplotlib.patches.Ellipse at 0x116ab9f10>
```

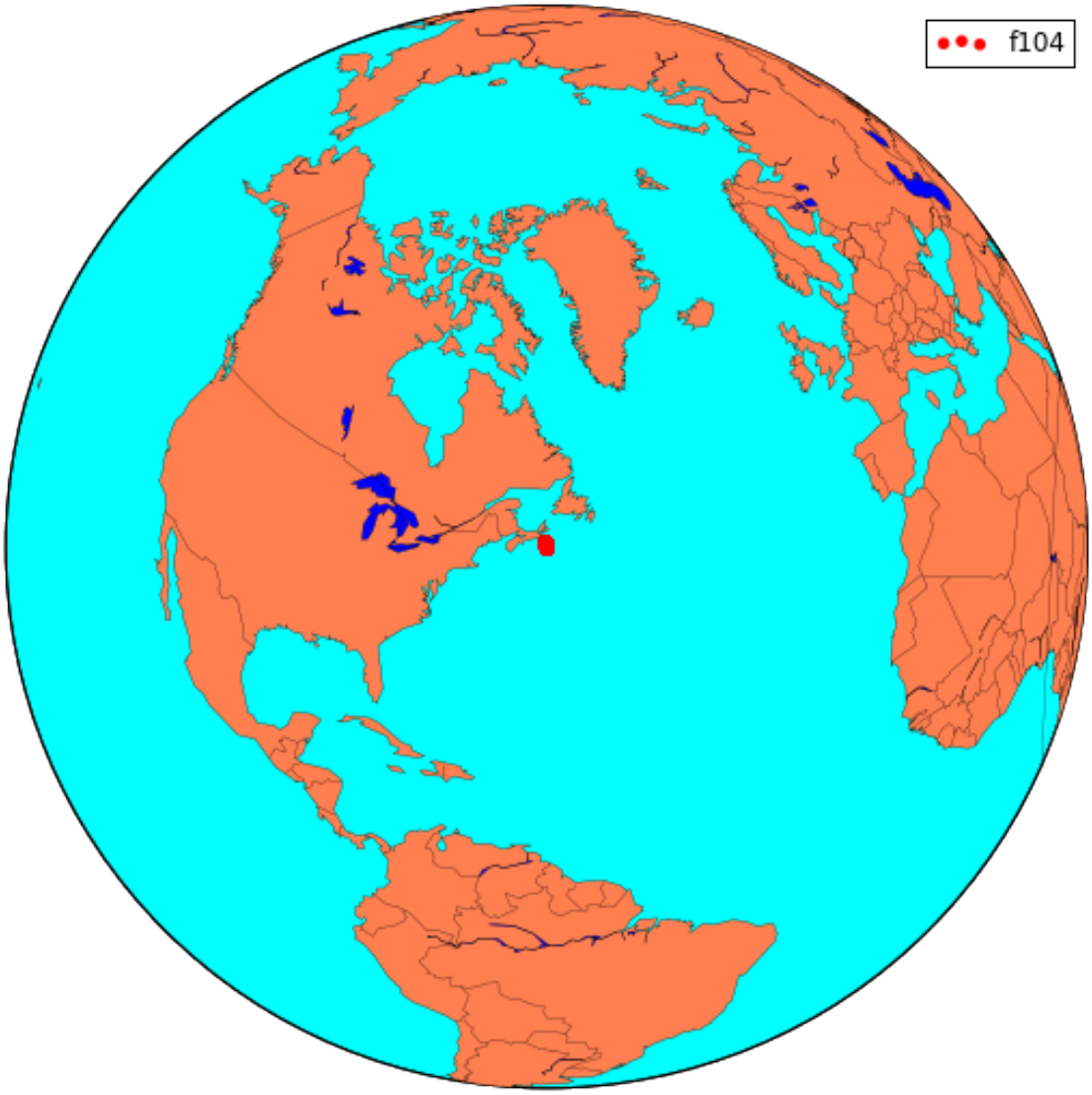


2.1.1 Plotting seal observations

In [12]:
```
#
map = Basemap(projection='ortho', lat_0=lats_c,lon_0=lons_c)

fig=plt.figure(figsize=(12,9))

# draw coastlines, country boundaries, fill continents.
map.drawcoastlines(linewidth=0.25)
map.drawcountries(linewidth=0.25)
map.fillcontinents(color='coral',lake_color='blue')

# draw the edge of the map projection region (the projection limb)
map.drawmapboundary(fill_color='aqua')
```

```
        # Seal F104
        x, y = map(lons,lats)
        map.scatter(x,y,color='r',label='f104')

        plt.legend()
```

Out[12]: <matplotlib.legend.Legend at 0x118690fd0>

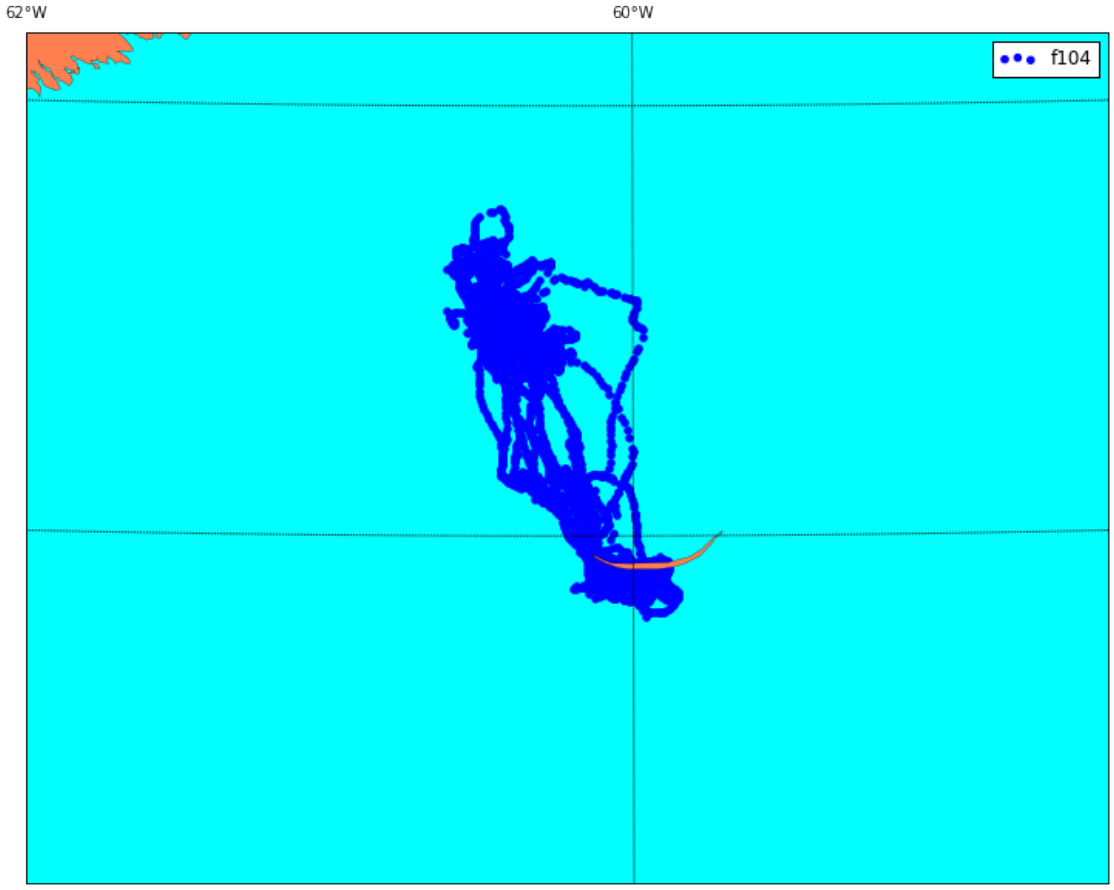


2.1.2 Plot all zoomed in

```
In [13]: #
        map = Basemap(width=280000,height=220000,projection='lcc', resolution='h',
                      lat_0=lats_c,lon_0=lons_c)

        fig=plt.figure(figsize=(12,9))
        ax = fig.add_axes([0.05,0.05,0.9,0.85])
```

```
# draw coastlines, country boundaries, fill continents.
map.drawcoastlines(linewidth=0.25)
map.drawcountries(linewidth=0.25)
map.fillcontinents(color='coral',lake_color='blue')

# draw the edge of the map projection region (the projection limb)
map.drawmapboundary(fill_color='aqua')

# create a grid
# draw lat/lon grid lines every 2 degrees.
map.drawmeridians(np.arange(0,360,2), labels=[False, True, True, False])
map.drawparallels(np.arange(-90,90,1), lables=[True, False, False, True])

# Seal f104
x, y = map(lons,lats)
map.scatter(x,y,color='b',label='f104')

plt.legend()
```

Out[13]: <matplotlib.legend.Legend at 0x118043f90>



In [ ]: