

Ferry_Flight_20151116

November 16, 2015

In this report, we'll review the ferry flight of the ER-2 on 11/16/2015. This was a ~3-h flight that went from Palmdale to McChord AFB. There was little science opportunity on this flight, but the ER-2 did encounter some precipitation in Oregon and Washington. First let's import all the needed modules and ingest and process the raw data.

```
In [1]: from __future__ import print_function
import numpy as np
import matplotlib.pyplot as plt
import os
import glob
import rawpyampr
import pyampr
%matplotlib inline
```

```
In [2]: import warnings
warnings.filterwarnings('ignore')
def delete_file(fname):
    try:
        os.remove(fname)
    except:
        pass
```

```
In [3]: datadir = './'
files = glob.glob(datadir + '*.dat')
print(files)
fname = os.path.basename(files[0])[:-4]
```

```
['./AMPR-20151116-235206.dat']
```

```
In [4]: payload = rawpyampr.ampr_payload.AMPR_Payload(files[0])
l1file = fname + '_L1.nc'
l2file = fname + '_L2.nc'
delete_file(l1file)
payload.writeLevel1B(l1file)
L1B = rawpyampr.ampr_level1b.AMPR_QC(l1file)
delete_file(l2file)
L1B.writeLevel2B(l2file)
```

```
All of file: ./AMPR-20151116-235206.dat : Read Successfully
End of data stream reached
Interpreting Navigation Records as: IWG1
No navigation file found
Navigating pixels using internal recording of nav data.
Number points to converge: 4
Writing to output file: AMPR-20151116-235206_L1.nc
```

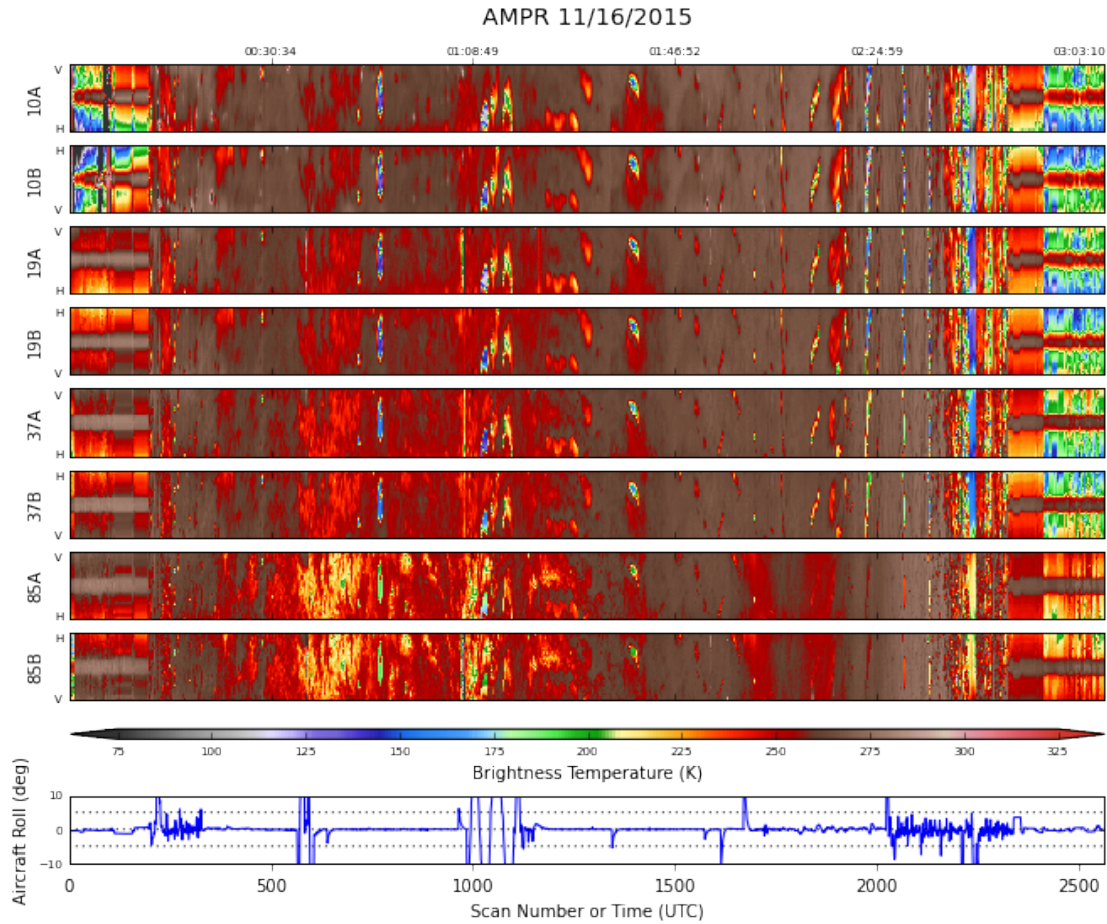
```
Found Navigation Data!  
Writing to output file: AMPR-20151116-235206_L2.nc  
File containing water fraction not on path
```

Now we are ready to read in and display the L2 geolocated brightness temperatures.

```
In [5]: data = pyampr.AmprTb(l2file)  
        data.plot_ampr_channels()
```

```
*****  
read_ampr_tb_level2b(): Reading AMPR-20151116-235206_L2.nc  
Assuming IPHEX data structure.  
Change to proper project if incorrect, otherwise errors will occur.  
Currently available field projects: IPHEX, MC3E, TC4, TCSP, JAX90, COARE,  
CAMEX1, CAMEX2, CAMEX3, CAMEX4, TRMLBA, KWAJEX, TEFLUNA, FIRE3ACE, CAPE  
Default: project = 'IPHEX'  
Found Navigation Data!  
(2560,)  
*****
```

```
*****  
plot_ampr_channels():  
Available scans = 1 to 2560  
Available times = 23:52:20 - 03:07:47  
*****
```

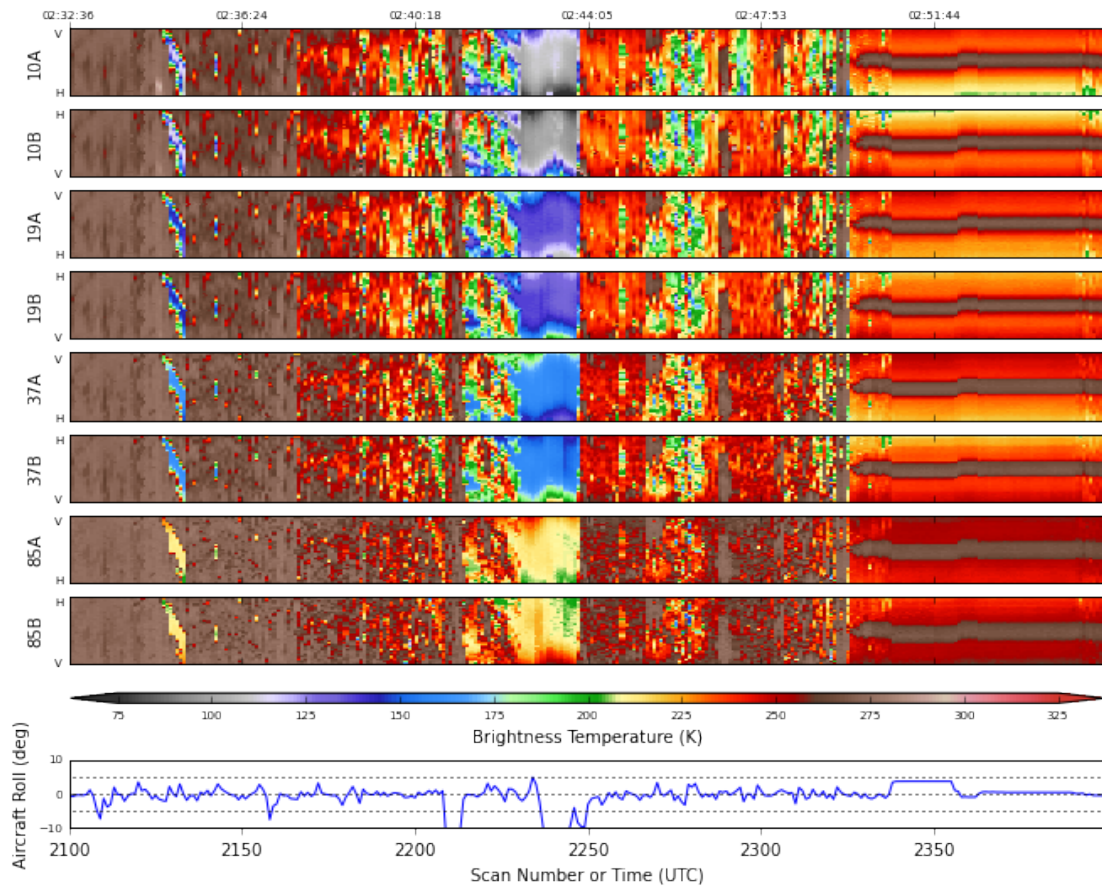


Overall, this looks pretty good. No notable outages, even short-lived ones. The latter portion of the flight looks a little noisy. This is also when the aircraft was encountering precipitation and descending to land. Let's take a closer look at it.

```
In [12]: data.plot_ampr_channels(scanrange=[2100, 2400])
```

```
*****
plot_ampr_channels():
Available scans = 1 to 2560
Available times = 23:52:20 - 03:07:47
*****
```

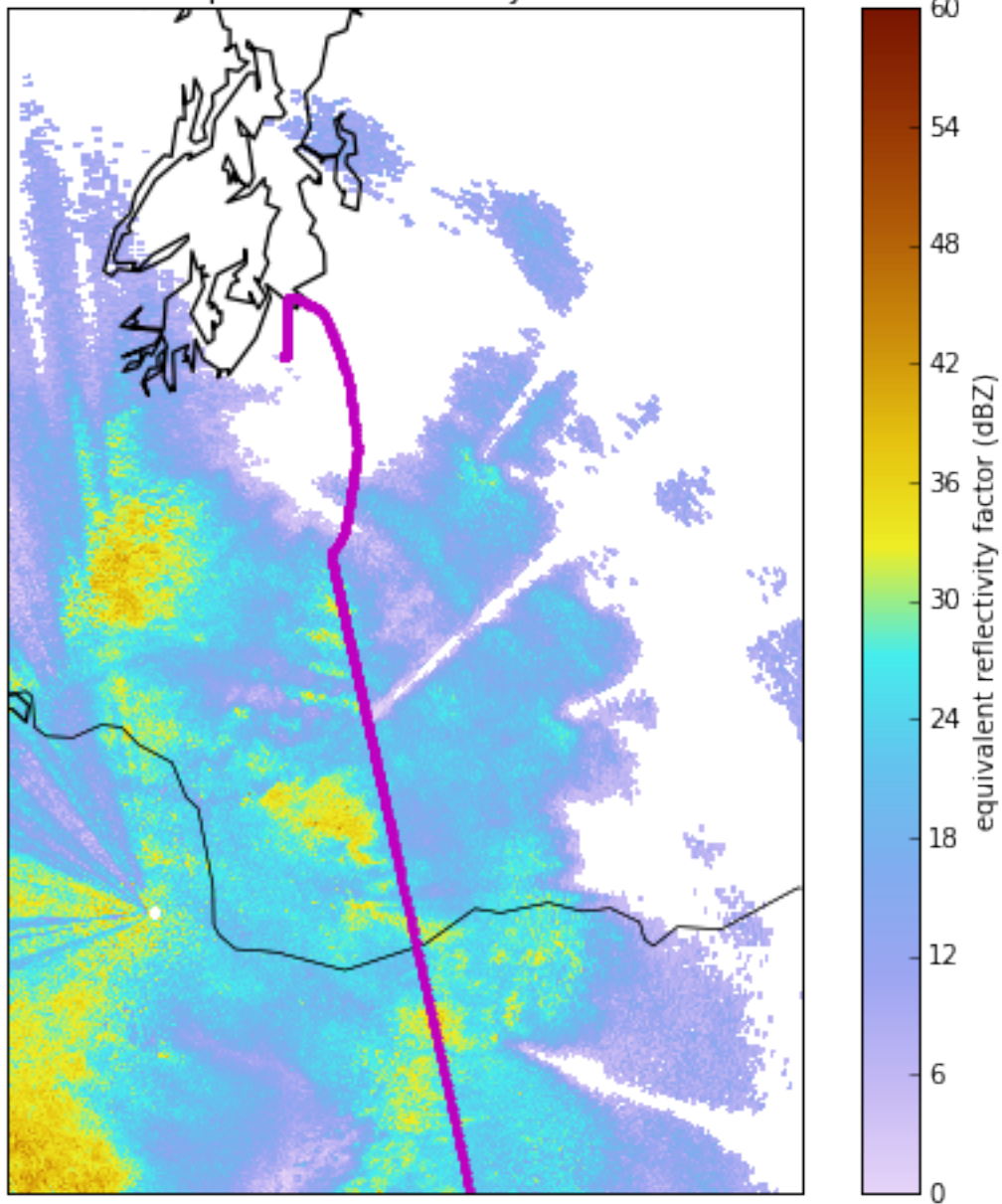
AMPR 11/17/2015



```
In [22]: cond = np.logical_and(data.Scan >= 2100, data.Scan <= 2400)
plt.plot(data.Scan[cond], data.Aircraft_Nav['GPS Altitude'][cond])
plt.ylabel('Altitude (m MSL)')
plt.xlabel('Scan Number')
```

Out[22]: <matplotlib.text.Text at 0x117826358>

KRTX 0.5 Deg. 2015-11-17T02:41:37.106000Z
Equivalent reflectivity factor

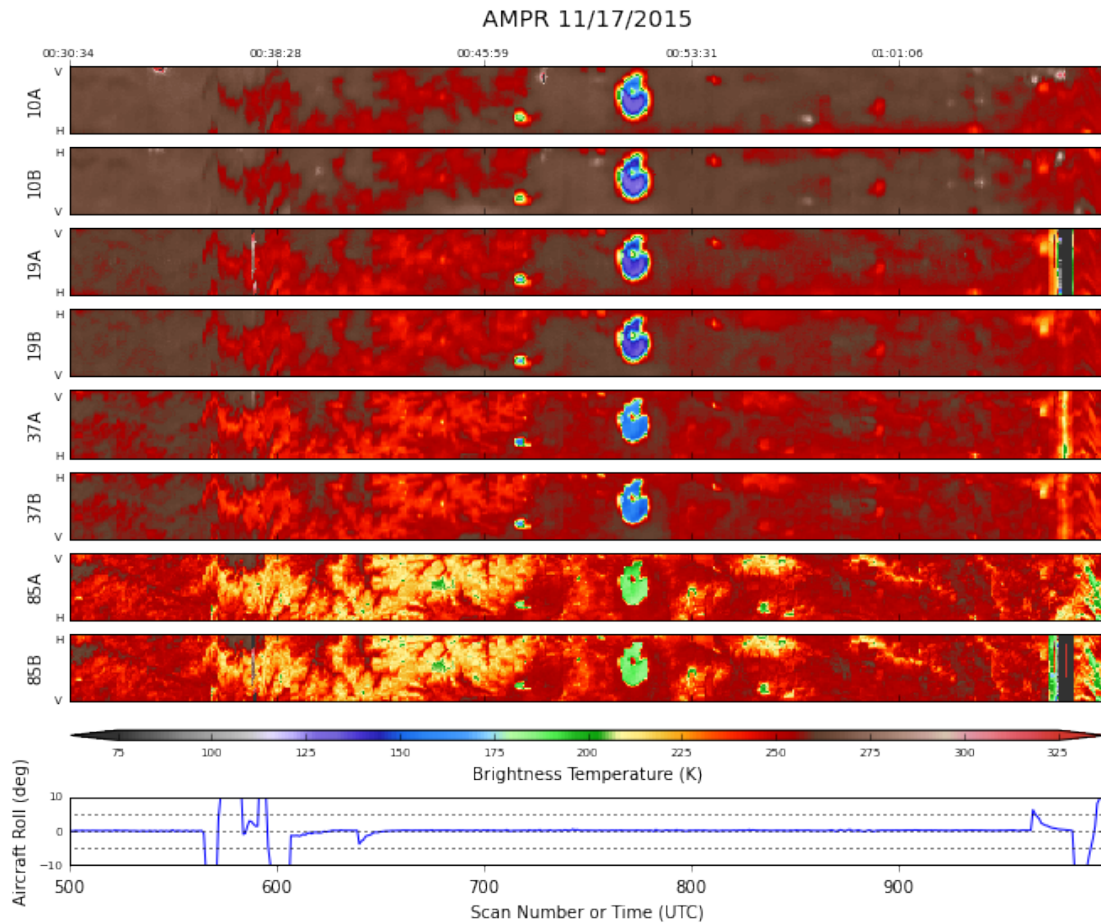


The aircraft track is in magenta above. So not a shock if the ER-2 descended thru some rain. Have not seen any PIREPs yet though. Earlier, the ER-2 overflew some inland water bodies. Let's check out some of those.

```
In [30]: data.plot_ampr_channels(scanrange=[500, 1000])
```

```
*****  
plot_ampr_channels():  
Available scans = 1 to 2560
```


Available times = 23:52:20 - 03:07:47

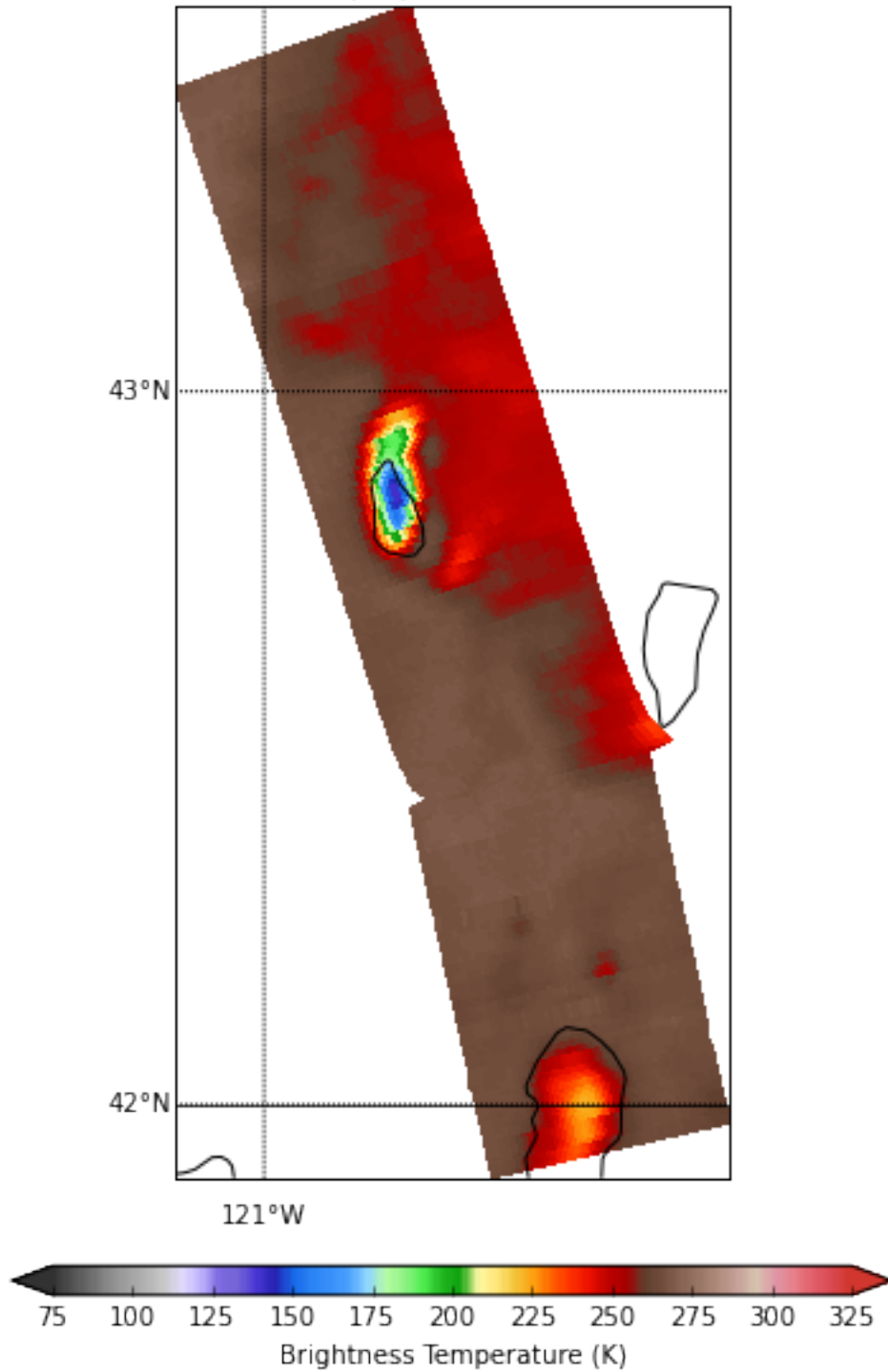


This appears to be Mono Lake. Then there is a short-lived data outage a bit after the overpass. Likely this is due to a spike in the calibration load counts, which happened on a previous check flight. Not much to be concerned about at this point. OK, one more lake ...

```
In [31]: data.plot_ampr_track('10a', timerange=['01:30:00', '01:45:00'],  
                               show_track=False, meridians=1, parallels=1,  
                               resolution='h')
```

```
plot_ampr_track():  
Available scans = 1 to 2560  
Available times = 23:52:20 - 03:07:47  
*****
```

AMPR 10 GHz (A) 11/17/2015, 01:30:00-01:44:57 UTC



The coldest temps occur over Summer Lake in Oregon. Don't be concerned about the apparent offset from the map, as this lake is pretty variable. See, e.g., [https://en.wikipedia.org/wiki/Summer_Lake_\(Oregon\)](https://en.wikipedia.org/wiki/Summer_Lake_(Oregon)). Now for fun, let's show the entire

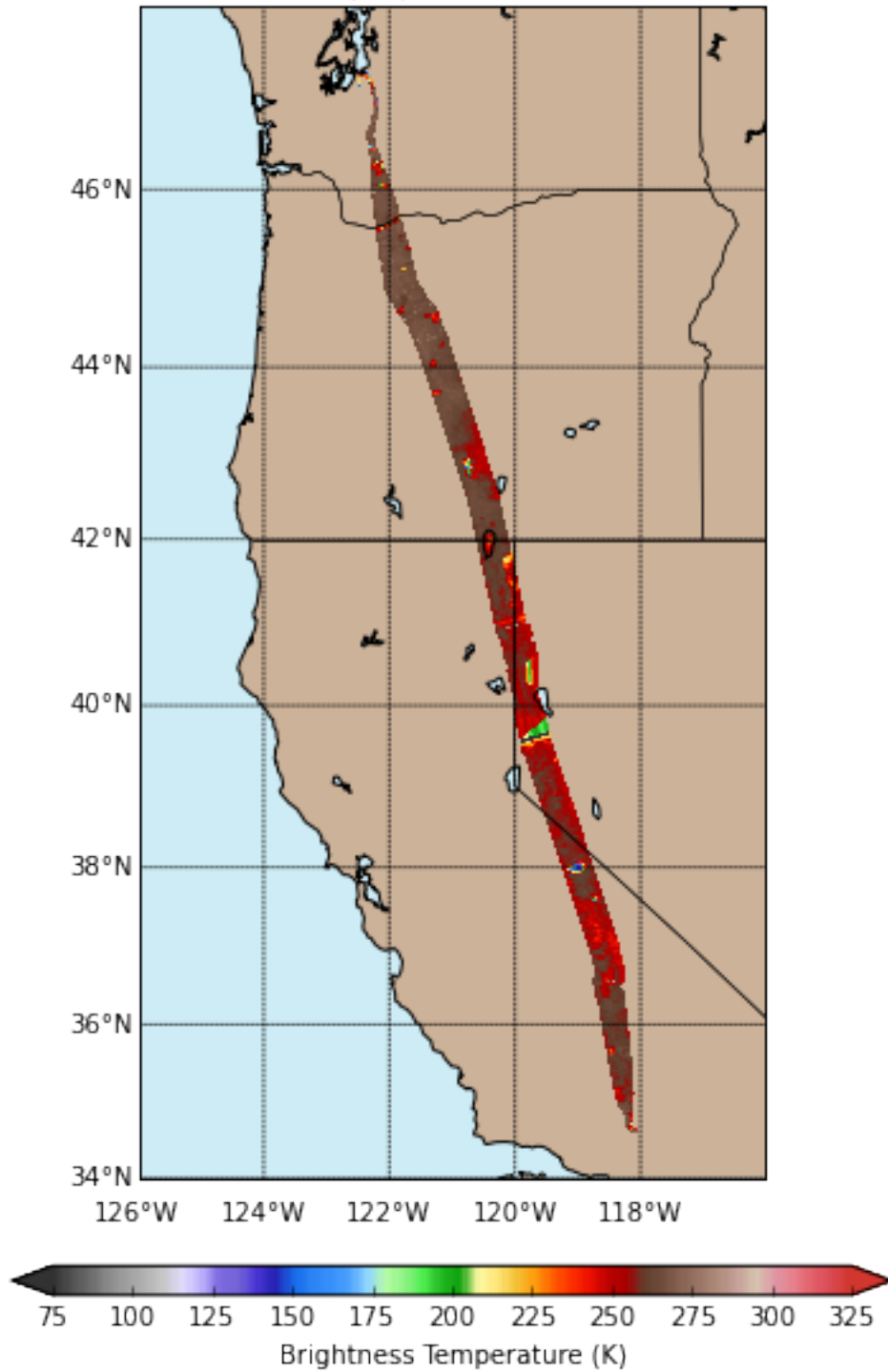
flight track, from CA to WA.

```
In [32]: stuff = data.plot_ampr_track(
        '19a', maneuver=False, meridians=2, parallels=2,
        resolution='i', lonrange=[-126, -116],
        latrange=[34, 48], return_flag=True)
        stuff[2].fillcontinents(color='#CCB299', lake_color='#CEE5F5',
                                ax=stuff[1], zorder=0)
        stuff[2].drawmapboundary(fill_color='#CEE5F5', ax=stuff[1])
```

```
*****
plot_ampr_track():
Available scans = 1 to 2560
Available times = 23:52:20 - 03:07:47
Filtering out significant aircraft maneuvers
*****
```

```
Out[32]: <matplotlib.patches.Rectangle at 0x118db3940>
```

AMPR 19 GHz (A) 11/16/2015, 23:52:20-03:07:47 UTC



Next scheduled flight is Wednesday, 18 November 2015. We'll see if the Inmarsat finally allows realtime data then. AMPR status packets have been available during flights, however.

In []: