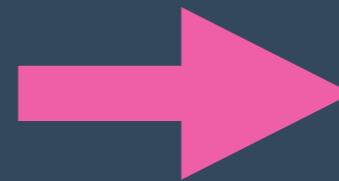




PYTHON
PROGRAMMING

必要物？



NHAO
LAN

192.168.42. ...

~~192.168.11. ...~~



192.168.42.31:8888



**Dual
boot**



ubuntu



jupyter Lorenz Differential Equations (autosaved)

File Edit View Insert Cell Kernel Help Python 3

Code Cell Toolbar: None

Exploring the Lorenz System

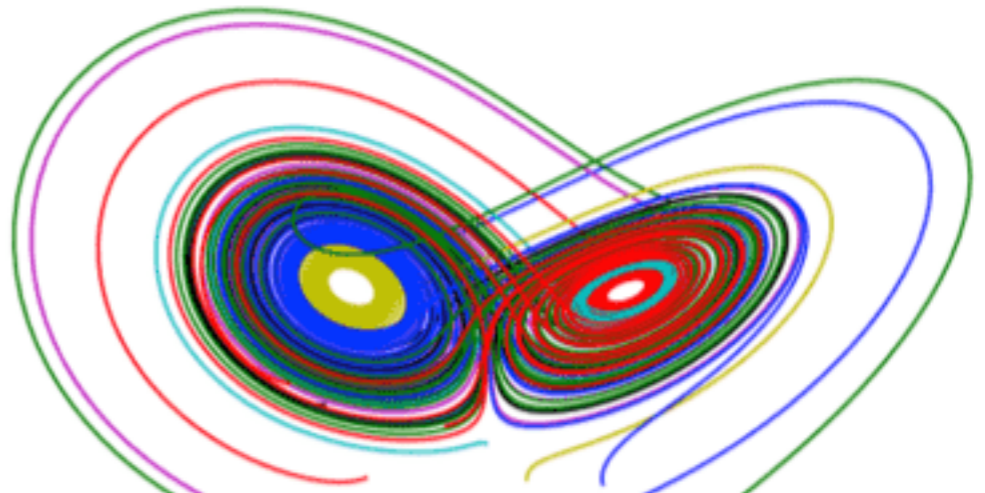
In this Notebook we explore the Lorenz system of differential equations:

$$\begin{aligned} \dot{x} &= \rho(x - y) \\ \dot{y} &= \rho x - y - xz \\ \dot{z} &= -\beta z + xy \end{aligned}$$

This is one of the classic systems in non-linear differential equations. It exhibits a range of complex behavior, from the relatively simple, periodic motion of a pendulum to the chaotic motion of a Lorenz attractor, which was first discovered in the context of atmospheric convection in 1963.

$\sigma=(0.0, 50.0), \beta=(0., 5), \rho=(0.0, 50.0)$

max_time 308.2
 σ 10
 β 2.6
 ρ 28



```
In [ ]: %matplotlib inline
import pandas as pd
import numpy as np
import matplotlib
```

- <https://try.jupyter.org>
- <https://github.com/jupyter/jupyter/wiki/A-gallery-of-interesting-Jupyter-Notebooks>

Terminal



**python
or
ipython**

Real time

```
COM38 - PuTTY
pi@raspberrypi:~$ python
Python 3.5.3 (default, Jan 19 2017, 14:11:04)
[GCC 6.3.0 20170124] on linux
Type "help", "copyright", "credits" or "license()" for more information.
>>> print("Hello, World!")
Hello, World!
>>> █
```

Script/Program

python program.py

Text file

Text editor:

- Vim
- Nano
- gedit
- ATOM

何でPYTHON?

HELLO WORLD

JAVA

hello_world.java

```
public class Hello {  
    public static void  
    main(String[] args) {  
        System.out.println("Hello  
World!");  
    }  
}
```



```
$ javac hello_world.java  
$
```



```
$ java Hello  
Hello World!  
$
```

C

hello_world.c

```
#include <stdio.h>  
  
int main() {  
    printf("Hello World!\n");  
}
```



```
$ cc hello_world.c  
$
```



```
$ ./a.out  
Hello World!  
$
```

Python

hello_world.py

```
print('Hello World!')
```



```
$ python hello_world.py  
Hello World!  
$
```

HowTO Programming



You don't ~~X~~ have to reinvent
the wheel.



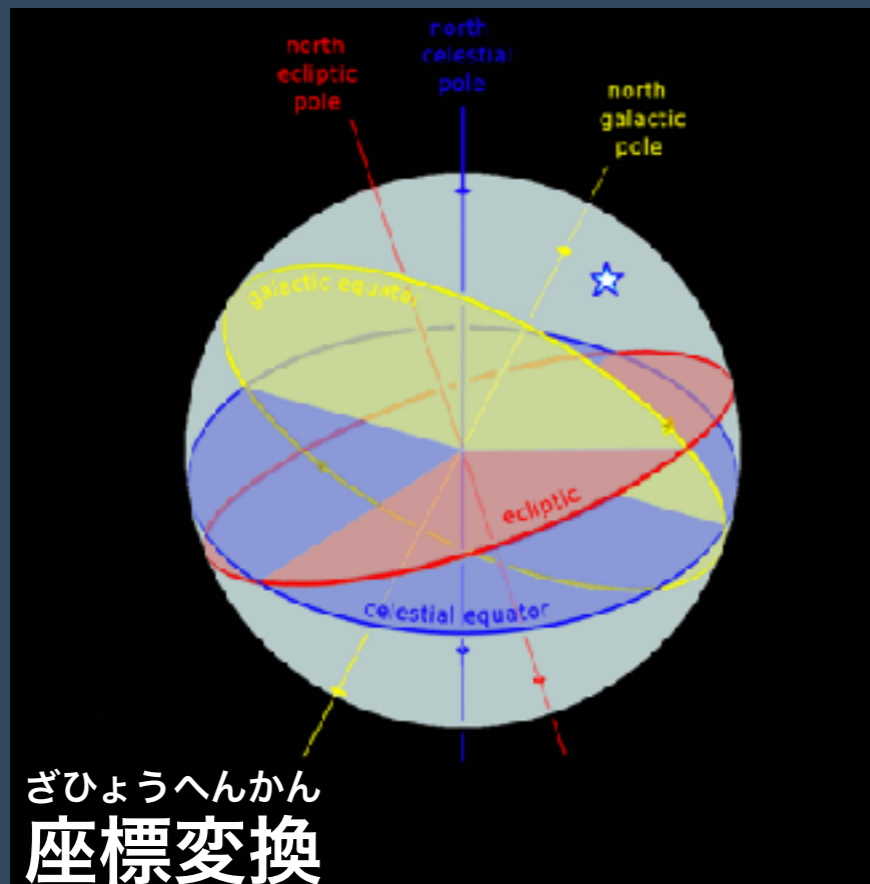
Python do what I want

今木星はどこ？

HARD WAY

[http://www.stjarnhimlen.se/
comp/ppcomp.html](http://www.stjarnhimlen.se/comp/ppcomp.html)

数学 + 時間



EASY WAY

```
import ephem
```

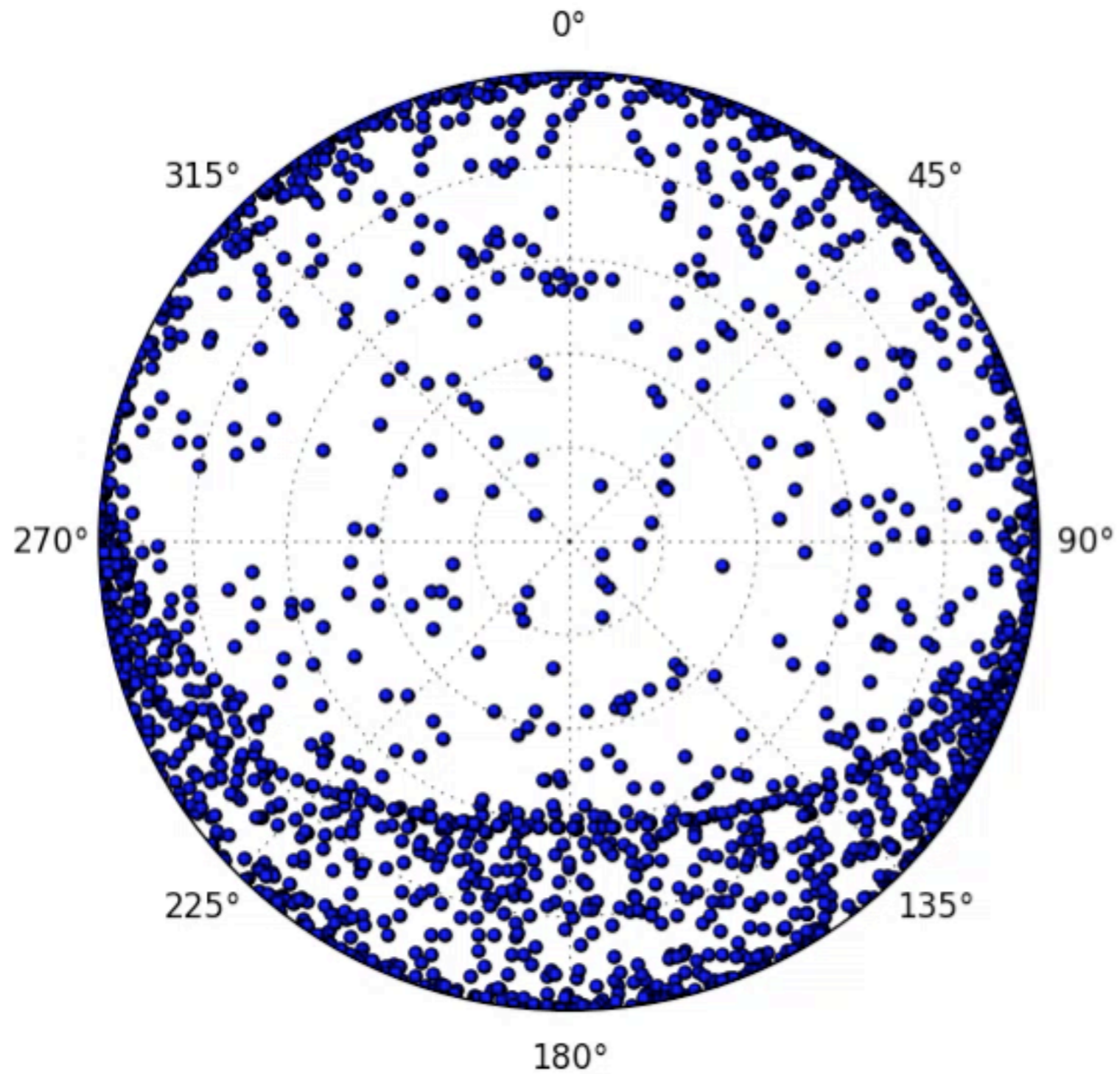
```
NHAO = ephem.Observer()  
NHAO.lon = '134.3356'  
NHAO.lat = '35.025'  
NHAO.date = '2019/04/23 11:00'
```

```
Jupiter = ephem.Jupiter()  
Jupiter.compute(NHAO)
```

```
print(Jupiter.alt)  
print(Jupiter.az)
```

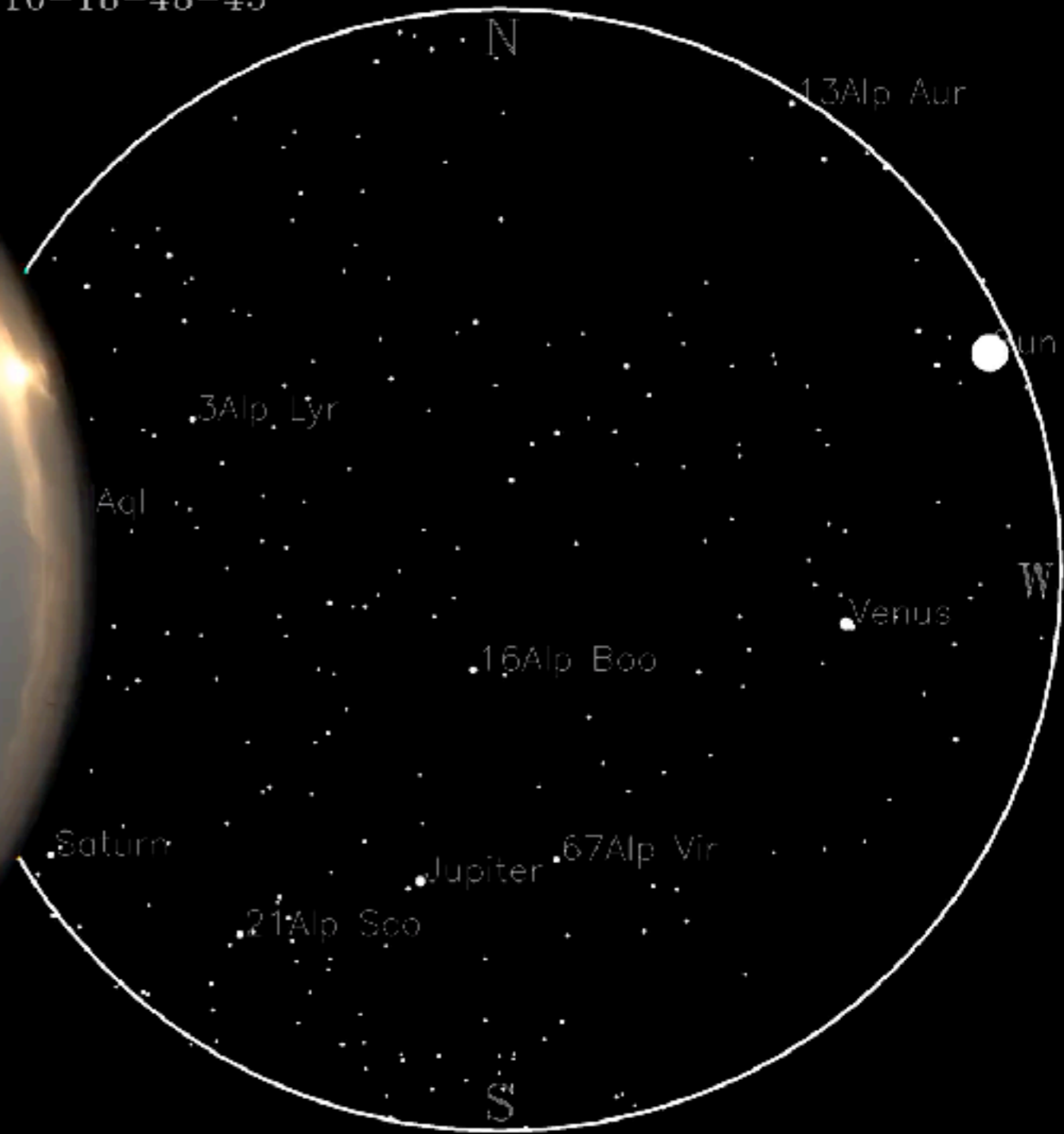
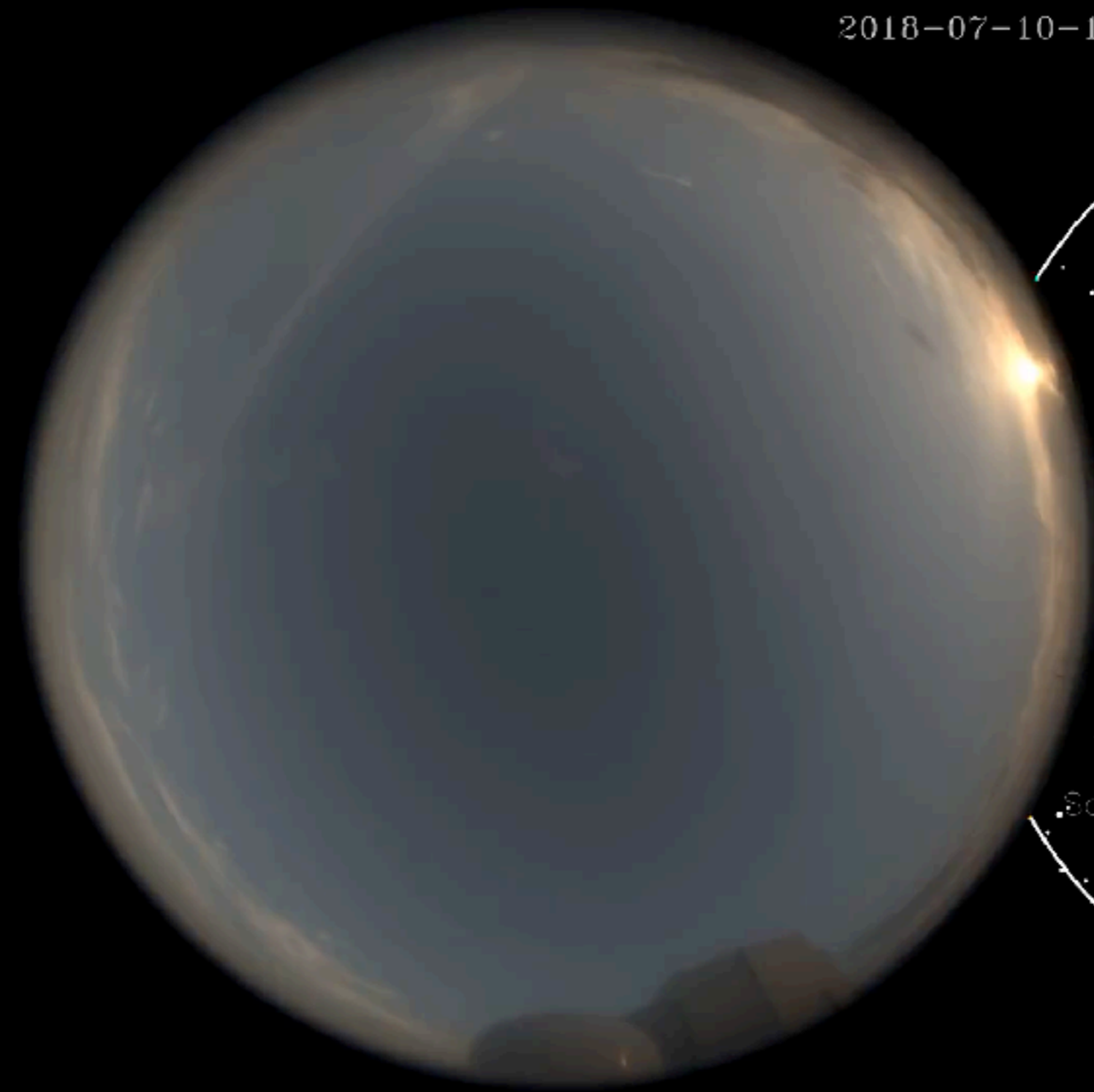
```
-31:08:57.1  
97:15:36.1
```


人工衛星



SKYMONITOR

2018-07-10-18-48-45



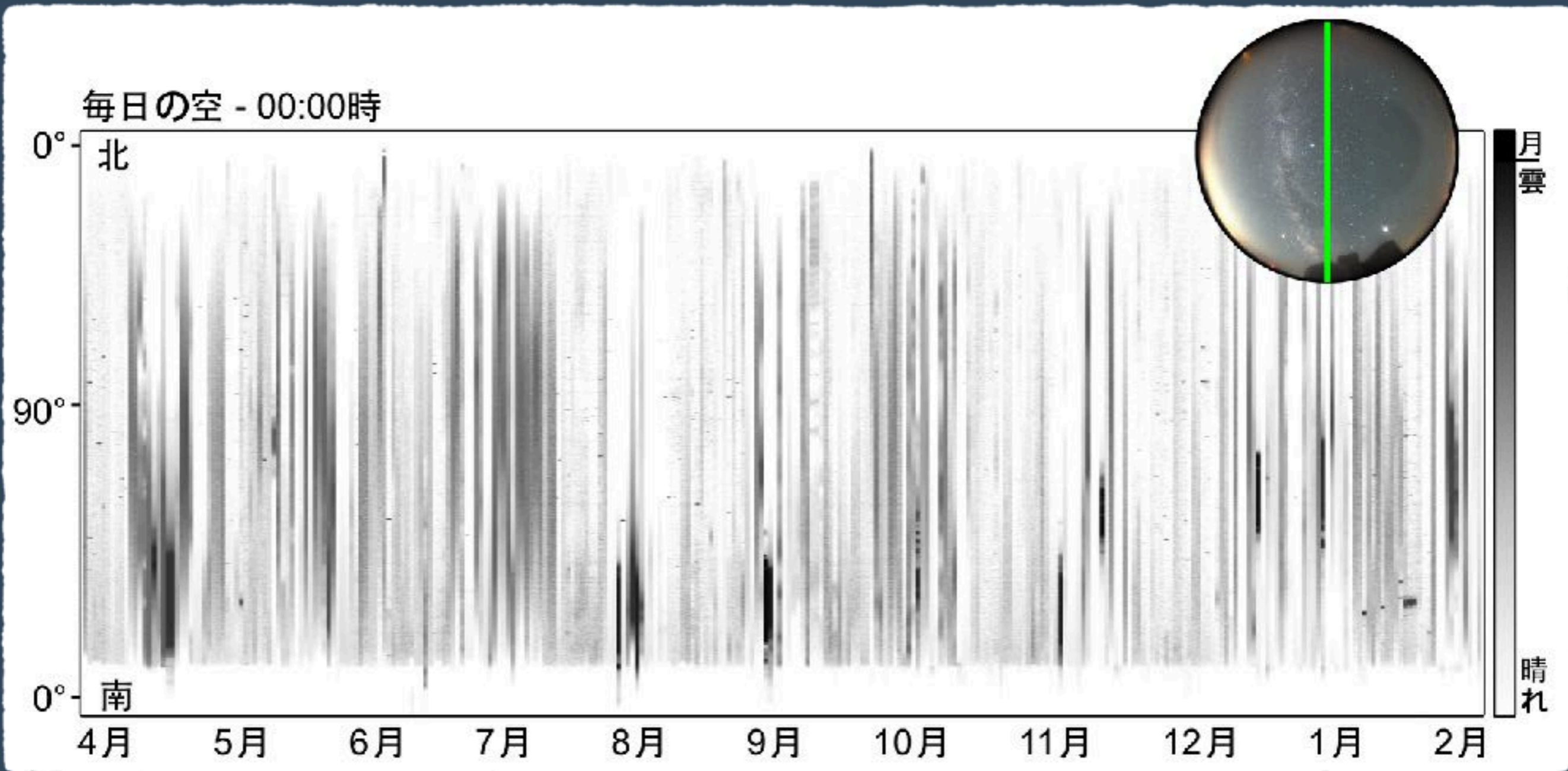
Webpage:

<http://www.nhao.jp/nhao/live/skymonitor.cgi>

YOUTUBE:

<https://www.youtube.com/channel/UCdX7abKP6Xw7LrInJPMLhKw>

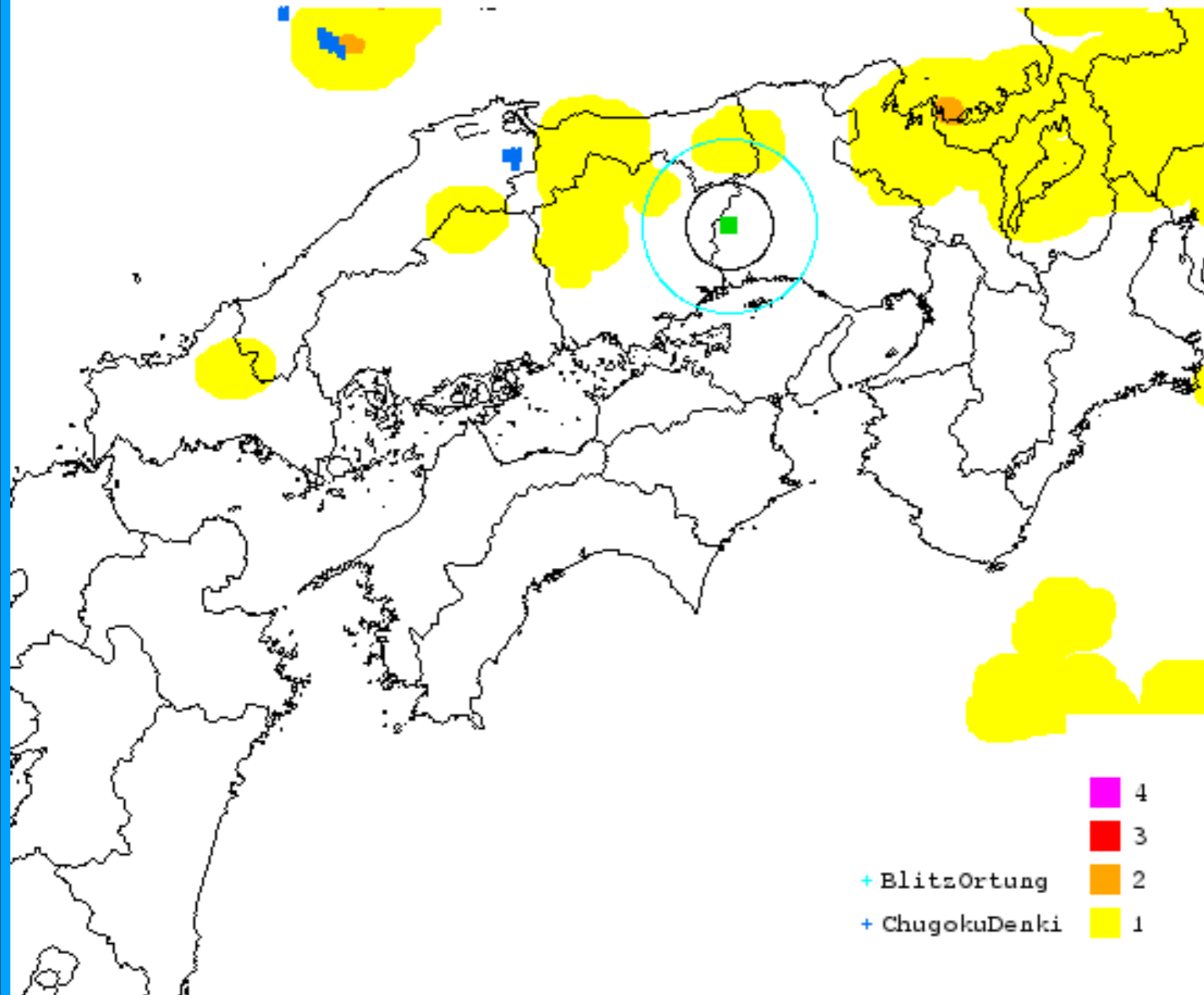
SKYMONITOR



Webpage: <http://www.nhao.jp/nhao/live/skymonitor.cgi>

YOUTUBE: <https://www.youtube.com/channel/UCdX7abKP6Xw7LrInJPMLhKw>

2019-05-14 13h21m +10min



落雷



メール



何ができる？



何でも！

<https://medium.mybridge.co/30-amazing-python-projects-for-the-past-year-v-2018-9c310b04cdb3>

何ができる？



Python Library インストールする方法:

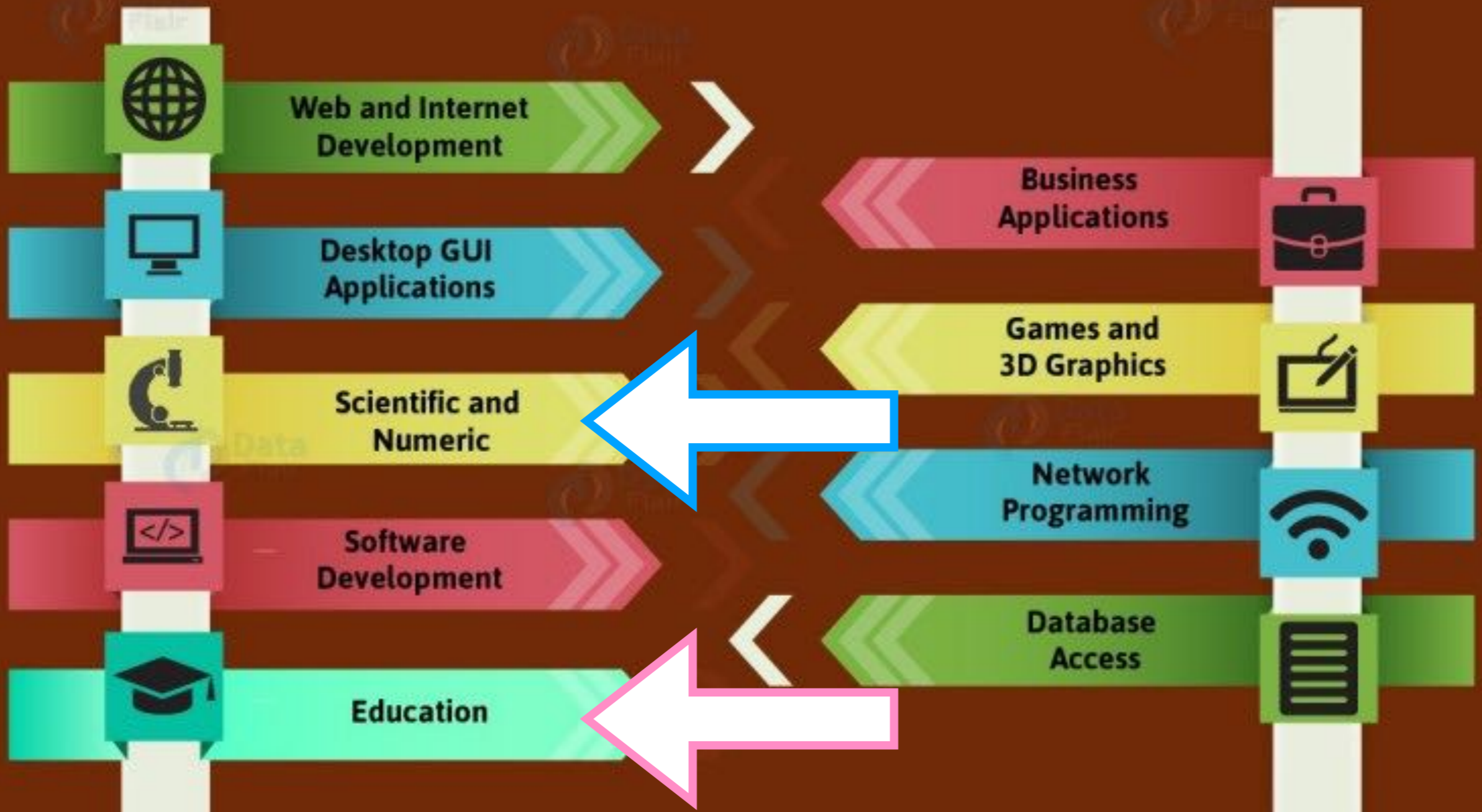
PYTHON PIP

pip install ...

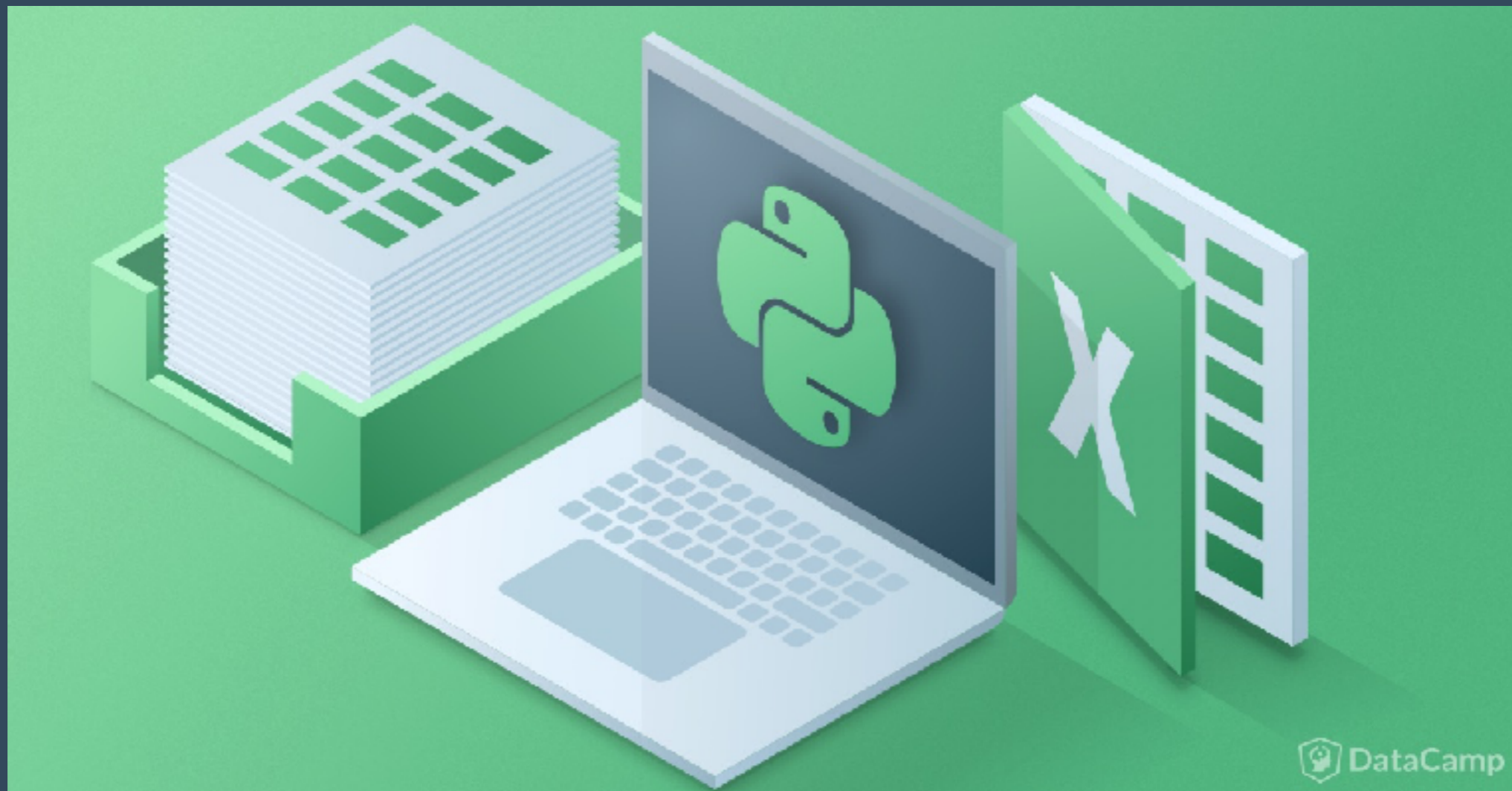
例：pip install ephem



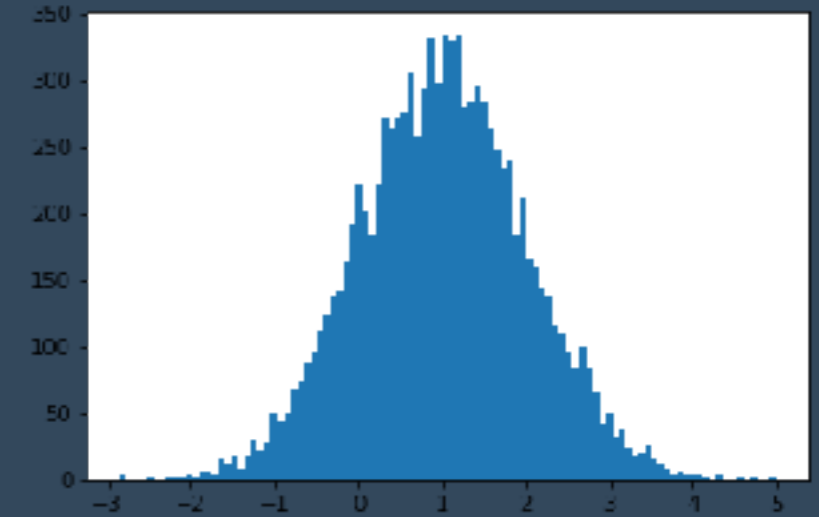
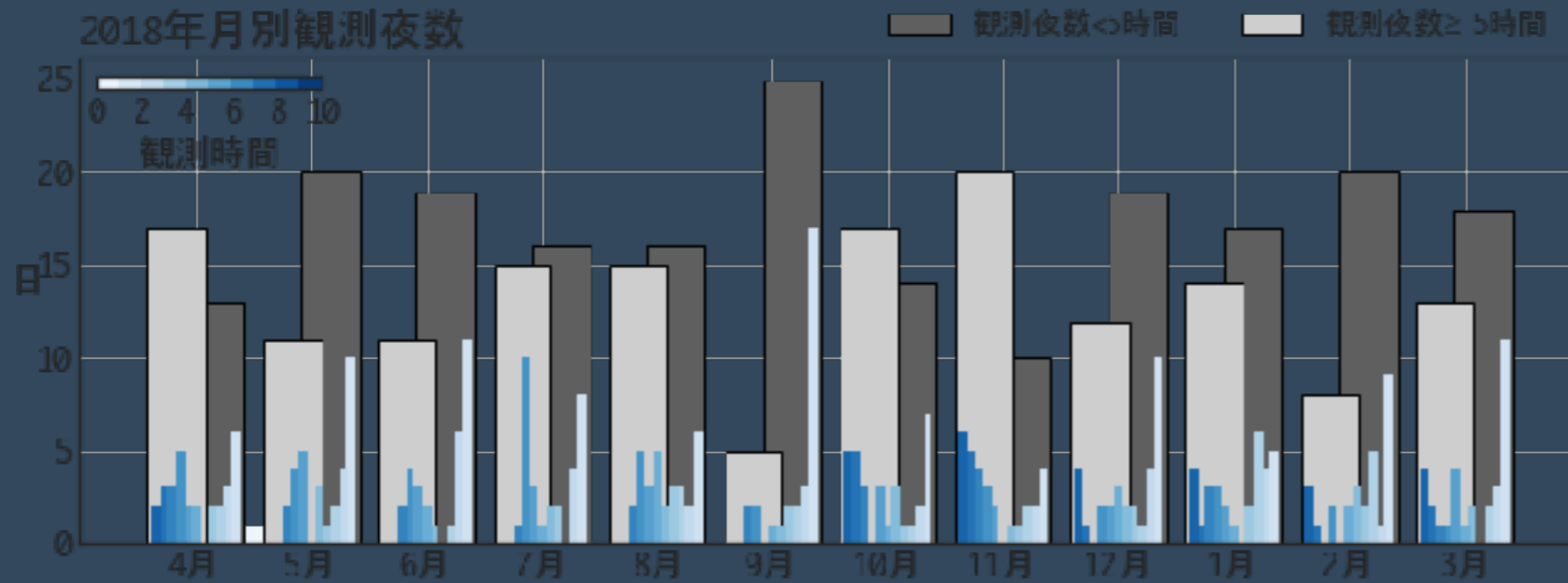
Python Applications



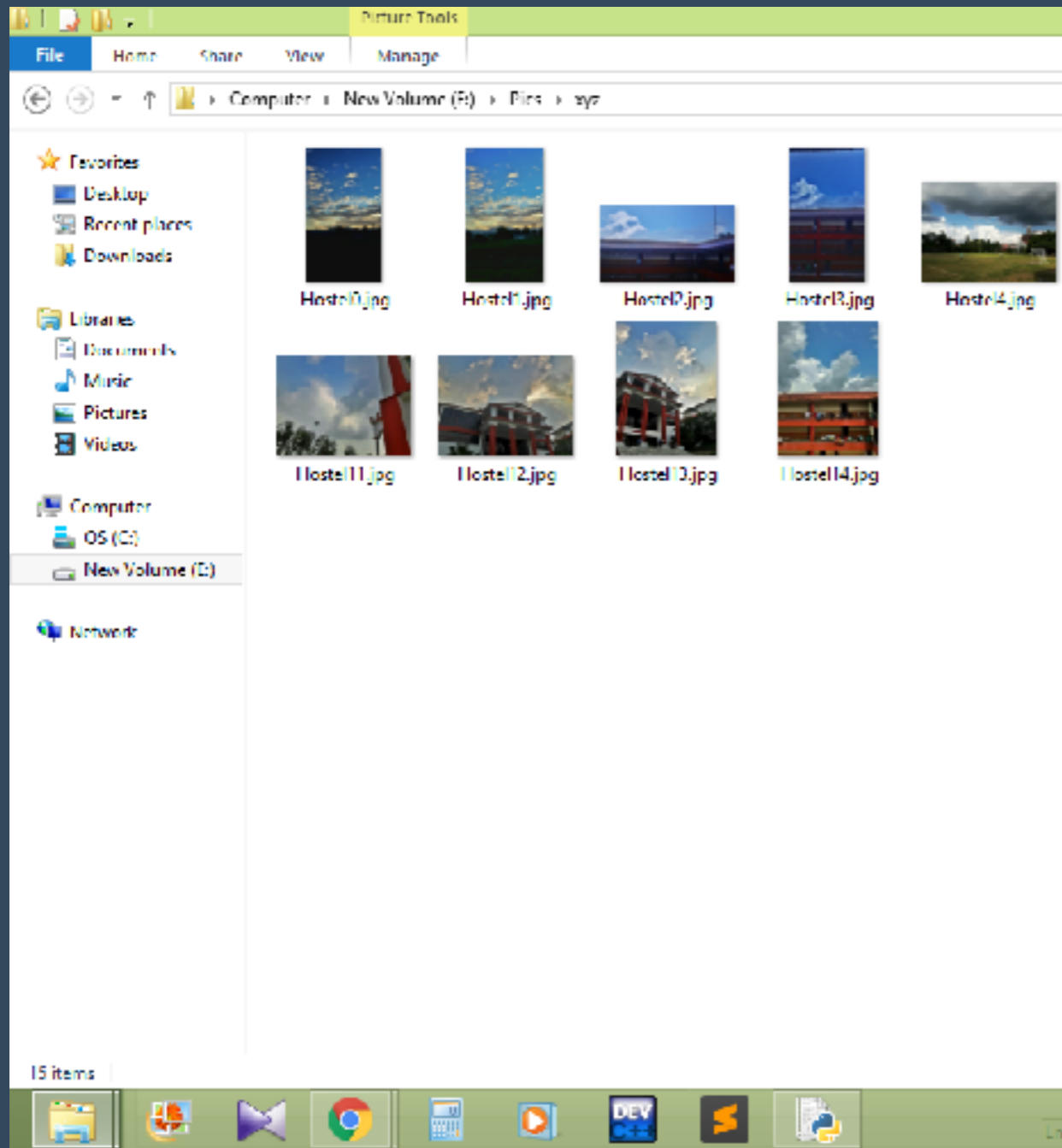
Excel → Pandas



Excel → Pandas



ファイル名を変更する



```
import os

# Function to rename multiple files
def main():
    i = 0

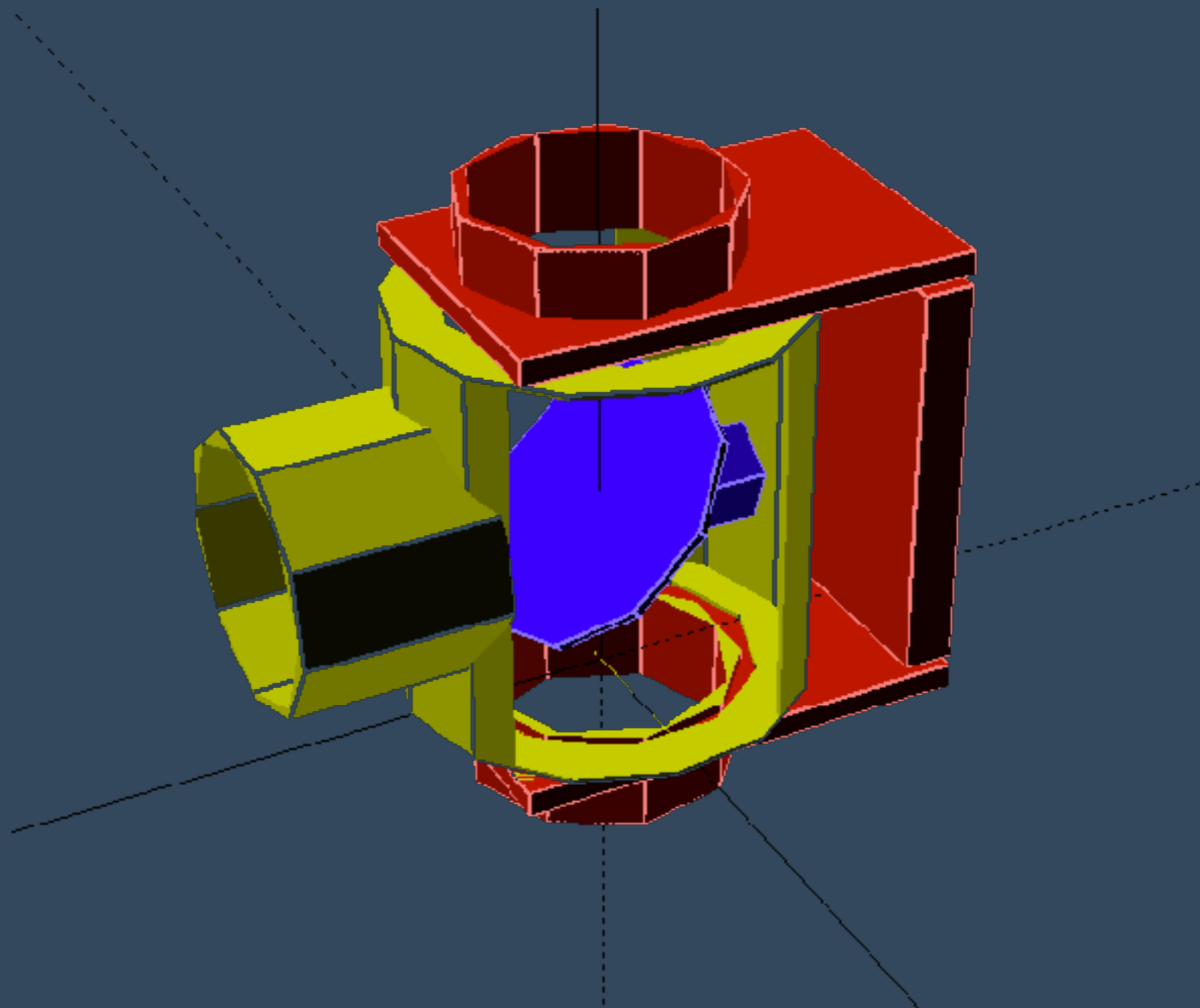
    for filename in os.listdir("xyz"):
        dst = "Hostel" + str(i) + ".jpg"
        src = 'xyz'+ filename
        dst = 'xyz'+ dst
        # rename() function will
        # rename all the files
        os.rename(src, dst)
        i += 1

# Driver Code
if __name__ == '__main__':

    # Calling main() function
    main()
```

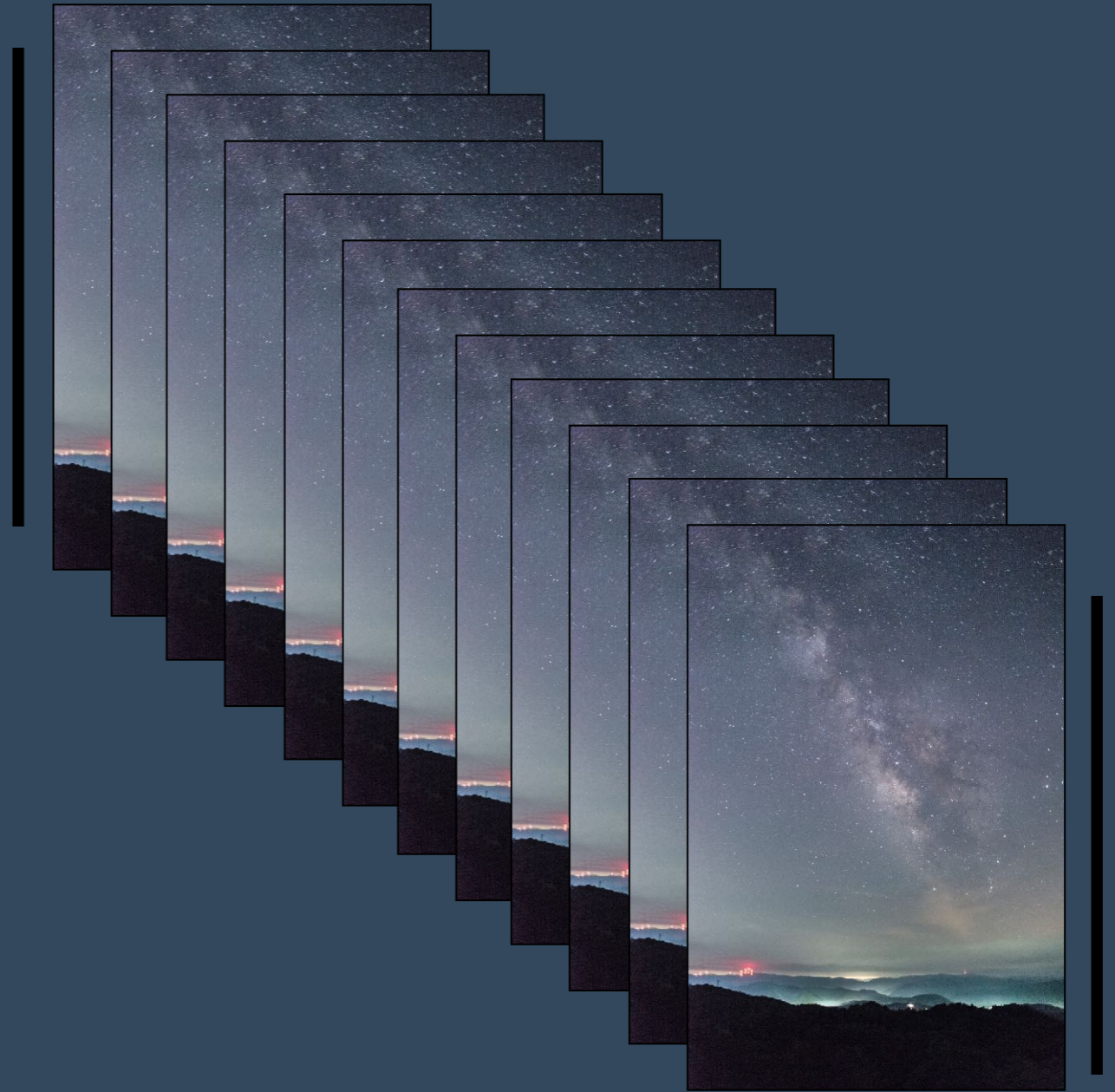
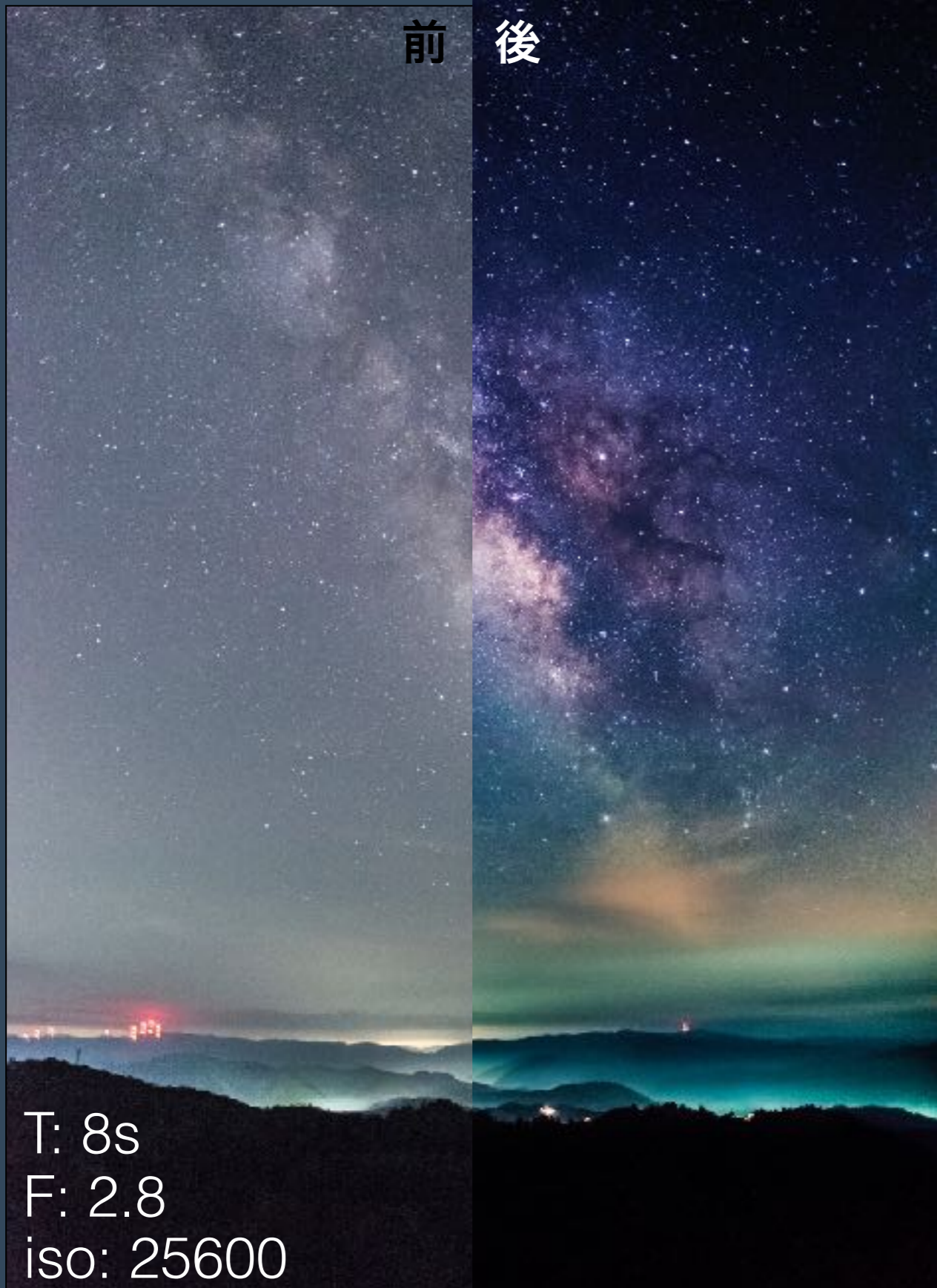
3D モデリング

- openSCAD
- Blender



しより 画像処理

前 後



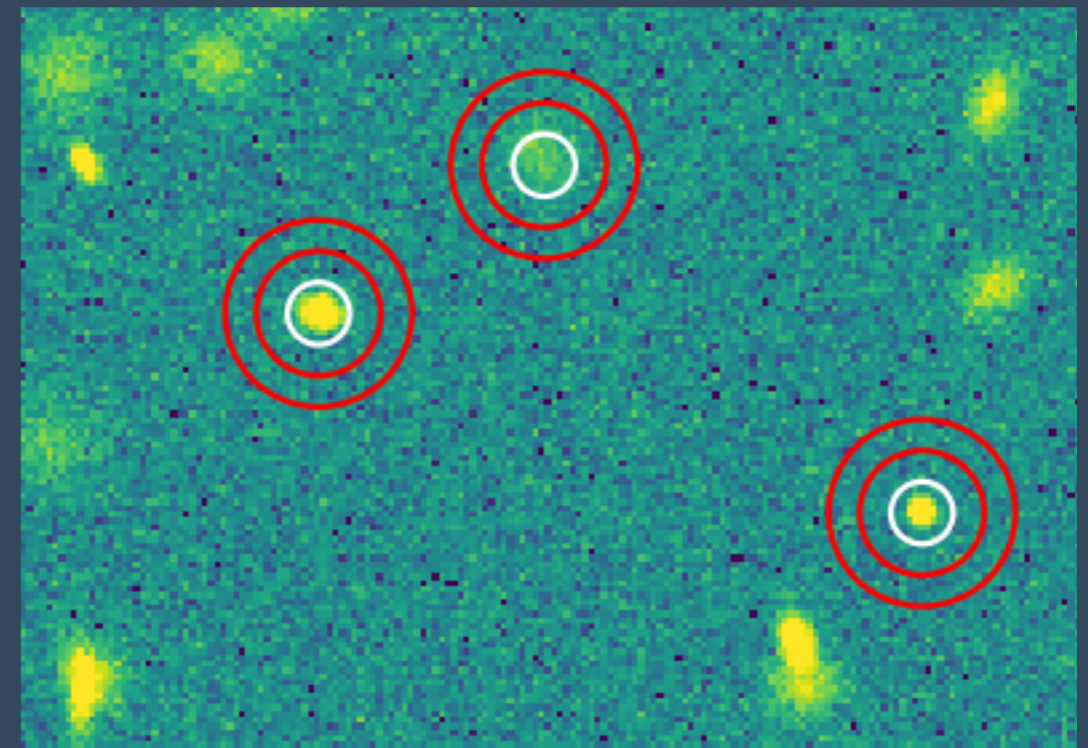
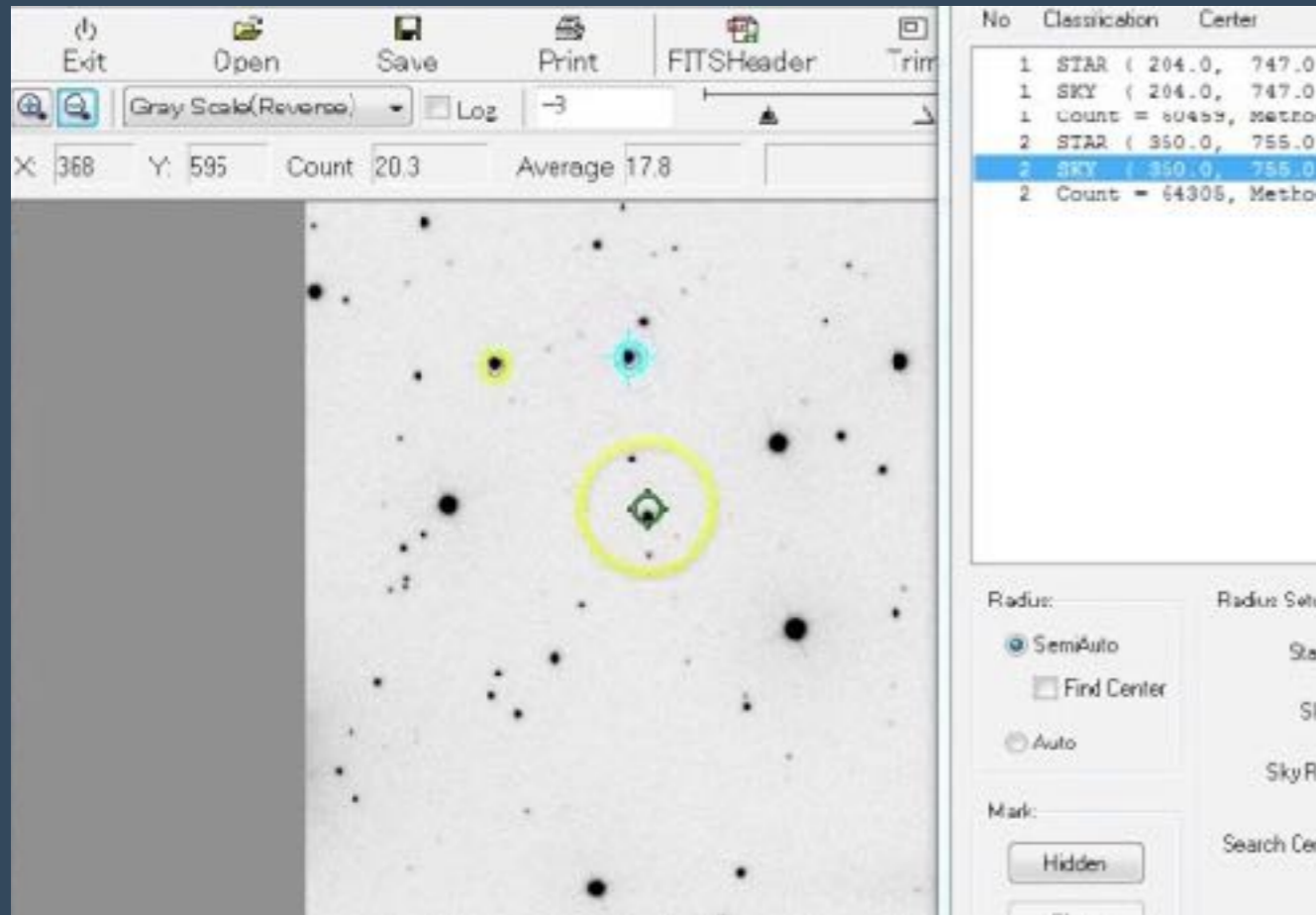
とうごう
統合

Photometry 測光



astropy-powered
astropy.org

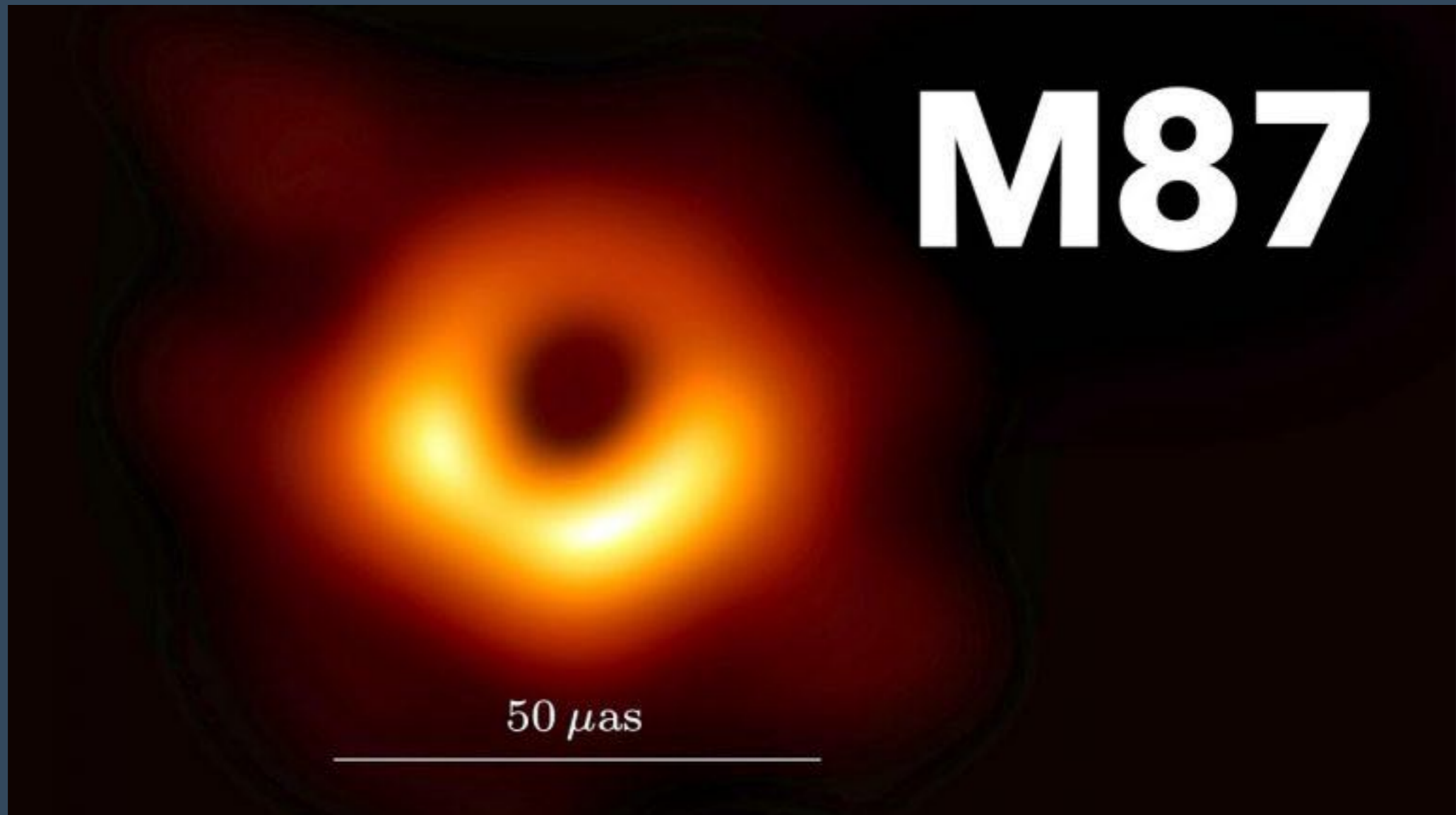
Makali`i



<https://photutils.readthedocs.io/en/stable/aperture.html>

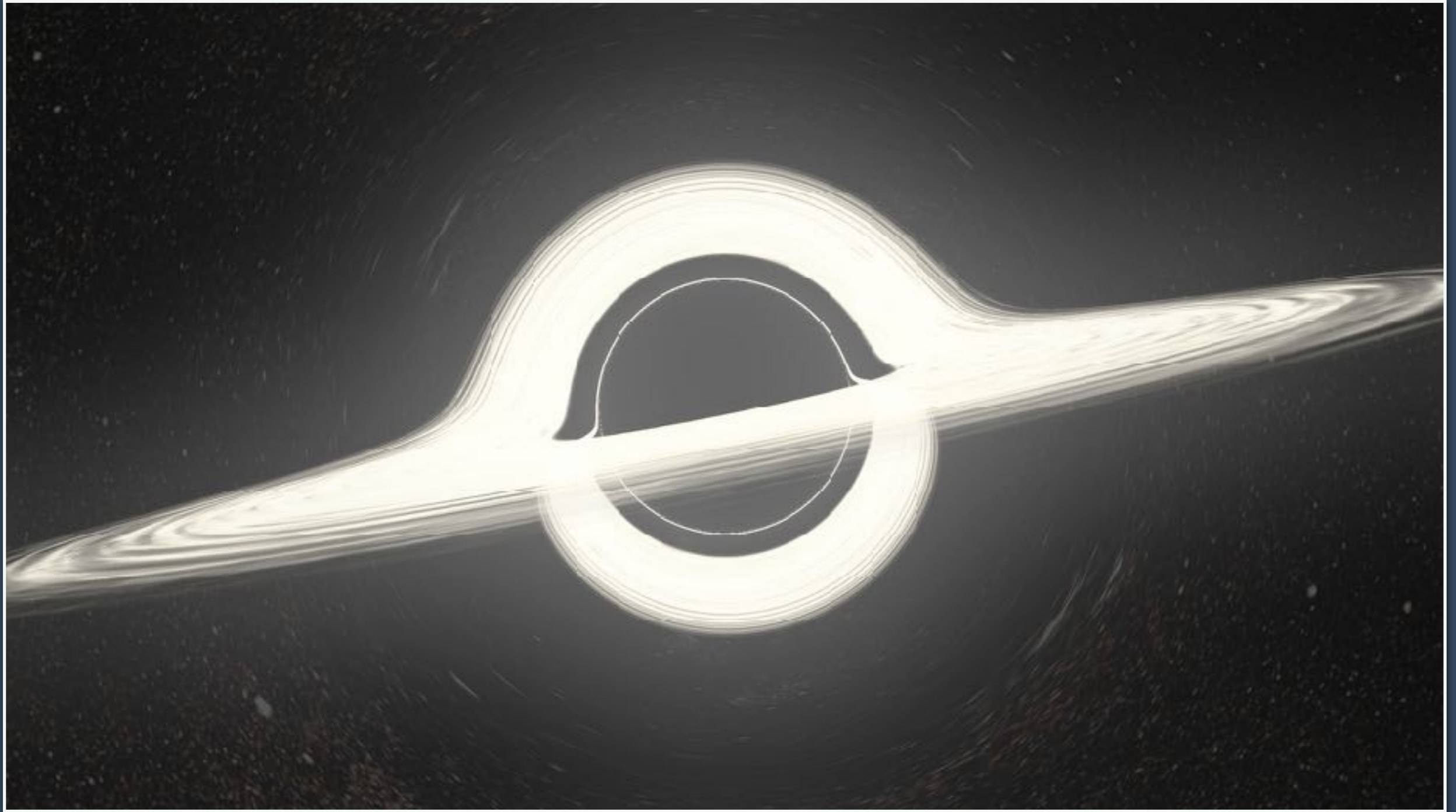
<https://makalii.mtk.nao.ac.jp>

How Imaging A Blackhole Gives Us One More Reason To Embrace Python For Larger Datasets



<https://www.analyticsindiamag.com/how-imaging-a-blackhole-gives-us-one-more-reason-to-embrace-python-for-larger-datasets/>

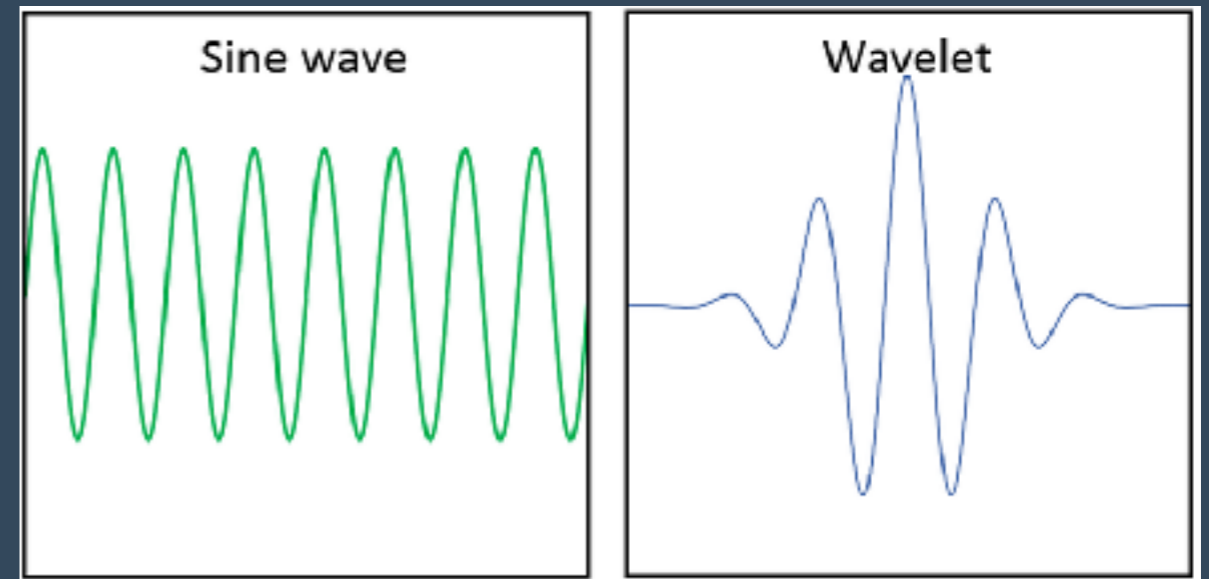
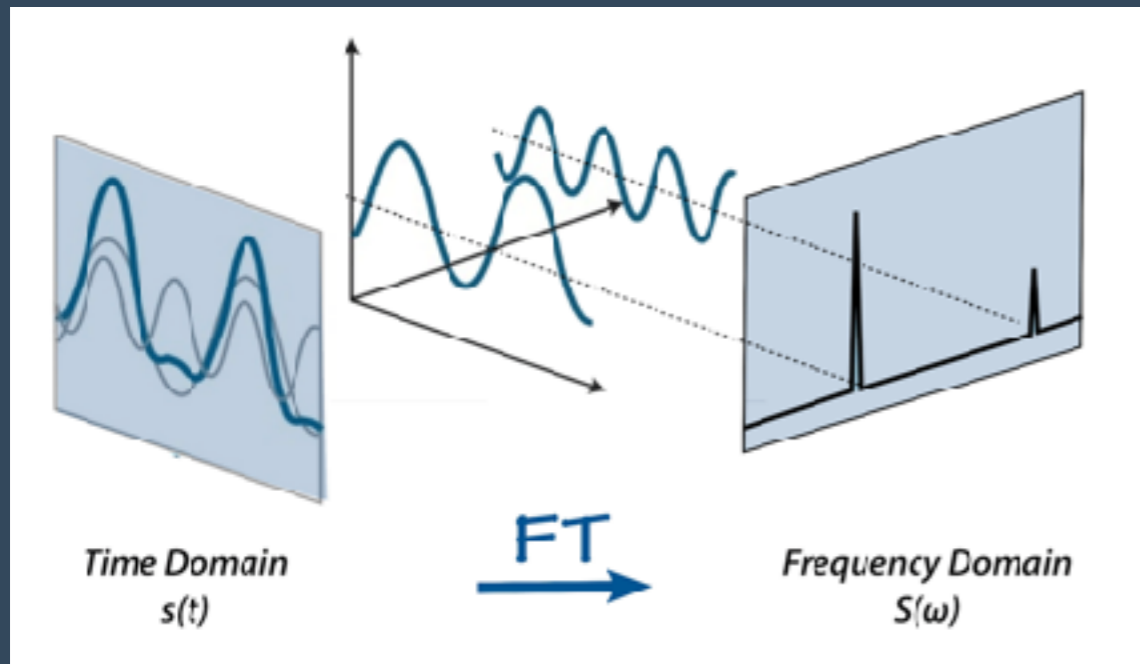
Python Black Hole Raytracer



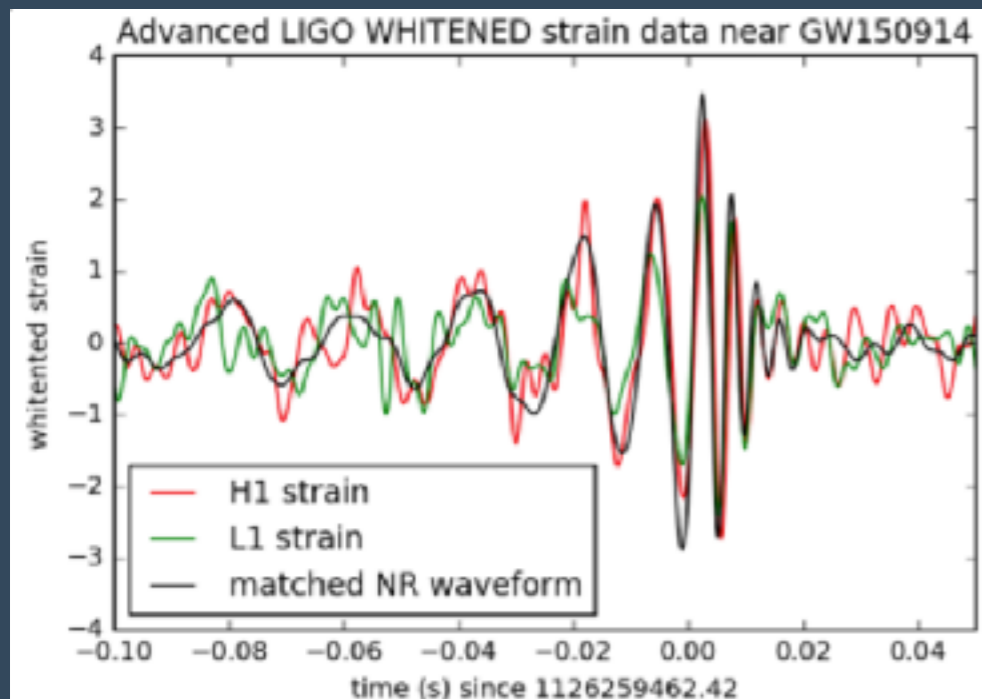
<https://github.com/rantonels/starless>

<http://rantonels.github.io/starless/>

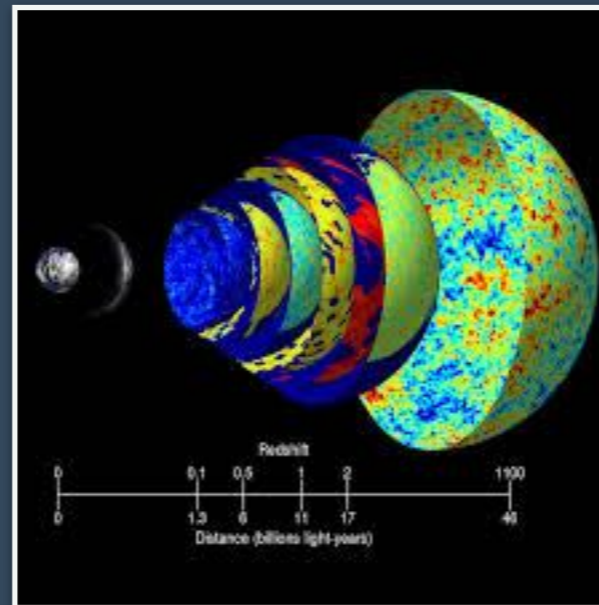
フーリエ変換/ウェーブレット変換



- Ligo/Virgo



- CMB

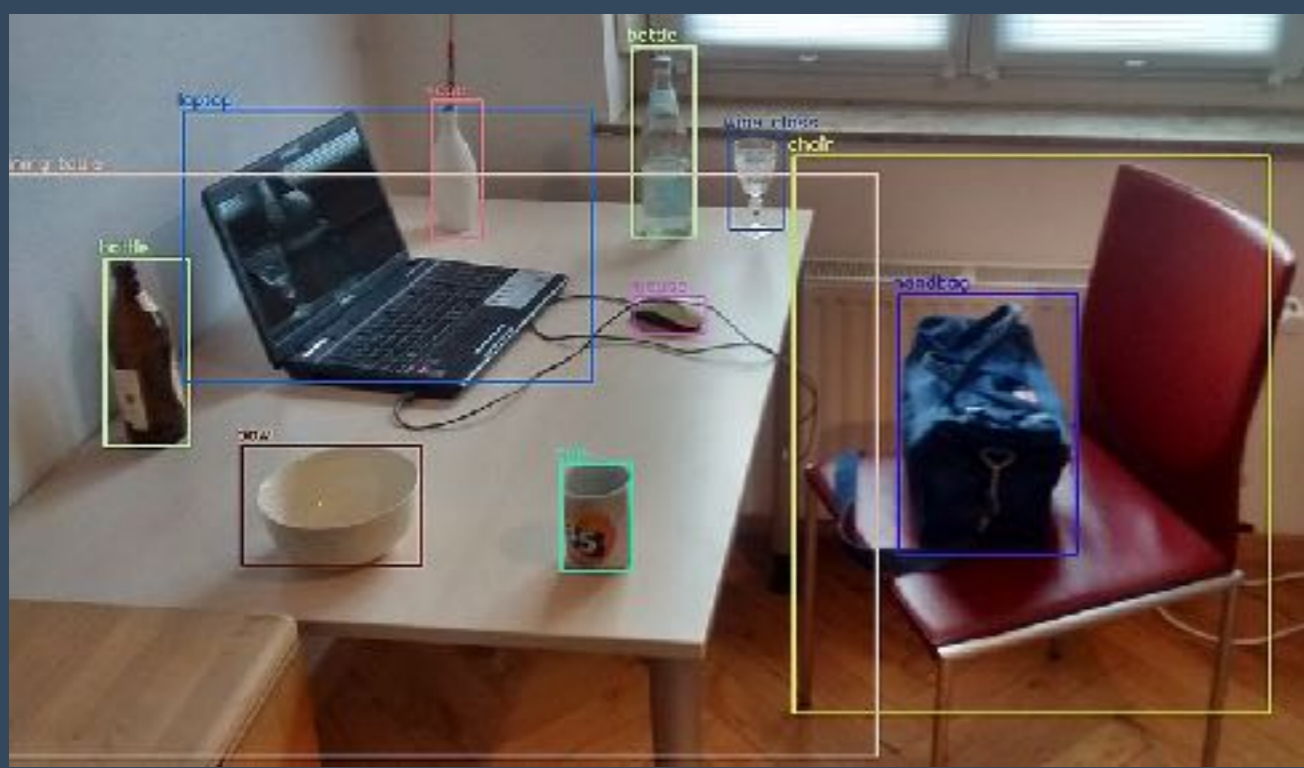


- Gravitational Lens



<https://pywavelets.readthedocs.io/en/latest/>

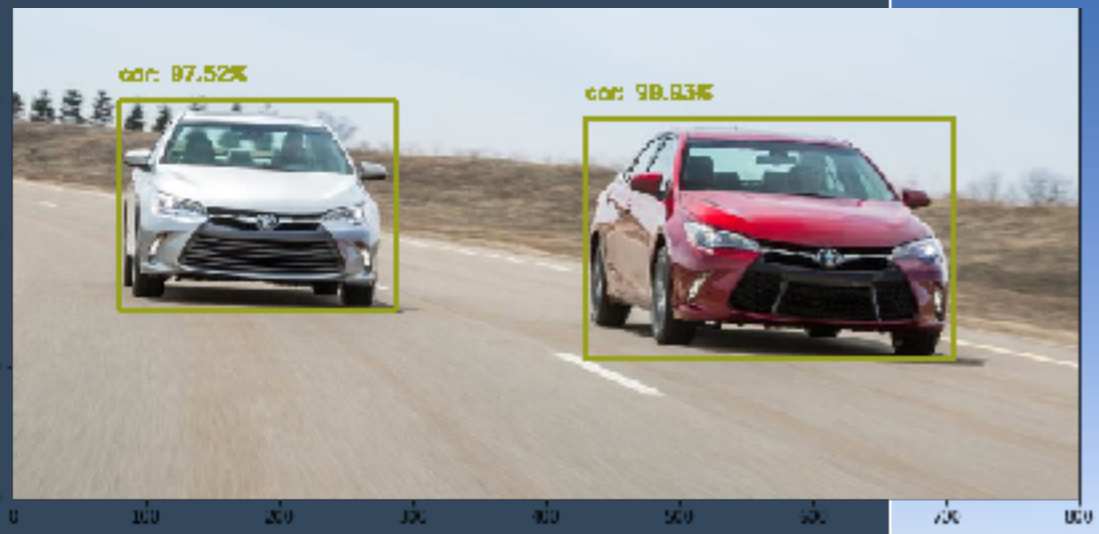
<http://www.nbi.dk/~koskinen/Teaching/AdvancedMethodsInAppliedStatistics2016/WaveletStats.pdf>



- Numpy
- OpenCV
- PyTorch
- Tensorflow

5	7	9	9	2	0	7	1
6	2	1	3	0	4	3	7
2	9	7	4	5	7	6	6
4	3	6	4	0	0	2	9
9	7	5	1	7	9	7	3
0	8	8	4	3	7	8	3
2	0	4	9	4	9	4	1
9	1	7	4	0	2	1	

Object Detection



aeroplane: 99.36%

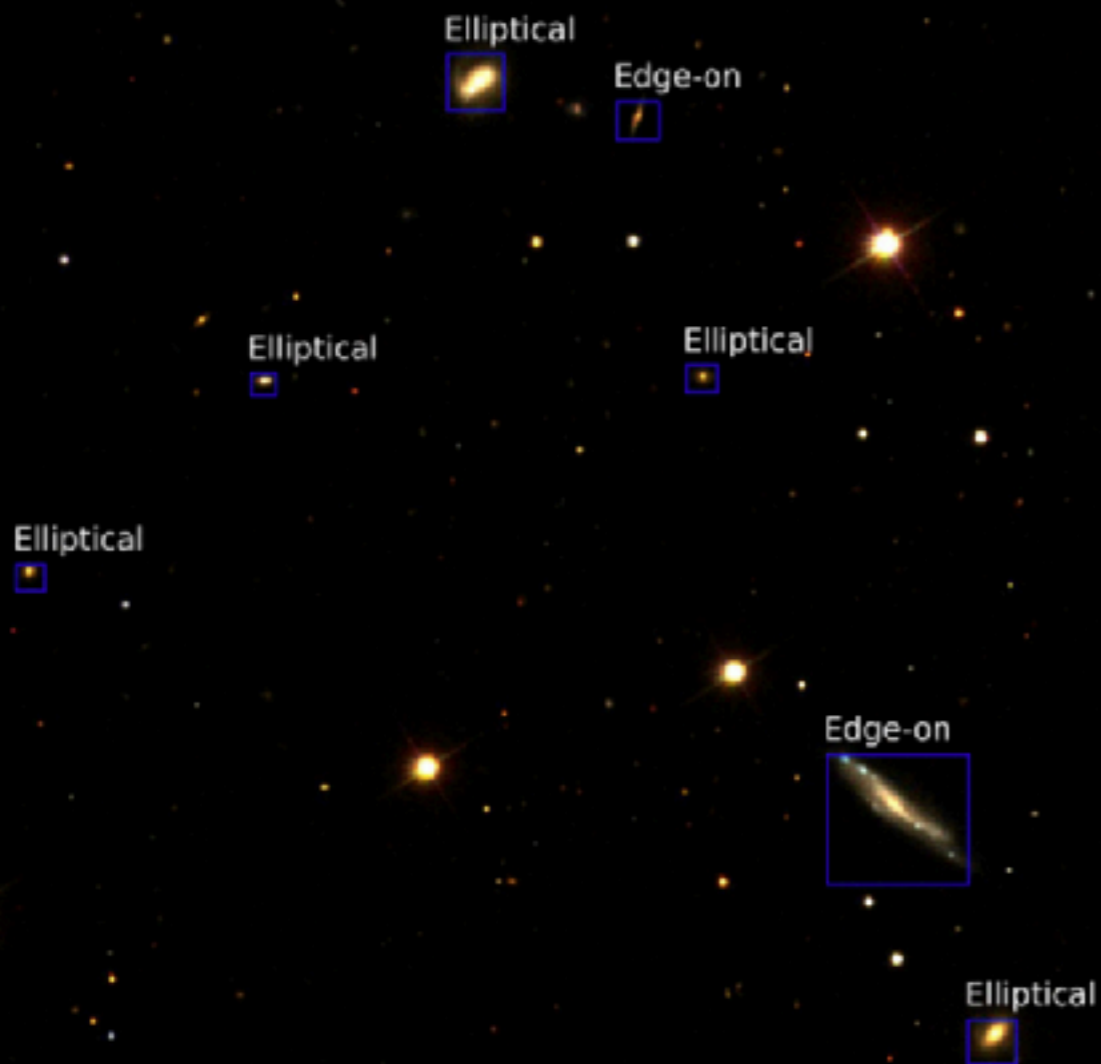




Astrometry

- astroCV
- astroML

<https://arxiv.org/pdf/1809.01691.pdf>



© 2006 Jerry Lodriguss

<http://astrometry.net/gallery.html>

Deep Dream / Deep Fake



き かいがくしゅう
機械 学習

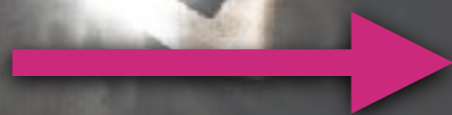
- ニューラルネットワーク
- 人工知能



- <https://github.com/ISourceCell/deepfakes>
- <https://www.alanzucconi.com/2018/03/14/introduction-to-deepfakes/>

<https://github.com/kesara/deepdreamer>

Pythonの
可能性



プログラミングに質問ある？

1. -> internet
2. -> 聞く、メール

sbaar@nhao.jp

