Simple research for sky patch selection

倪书磊

CCNU & IHEP

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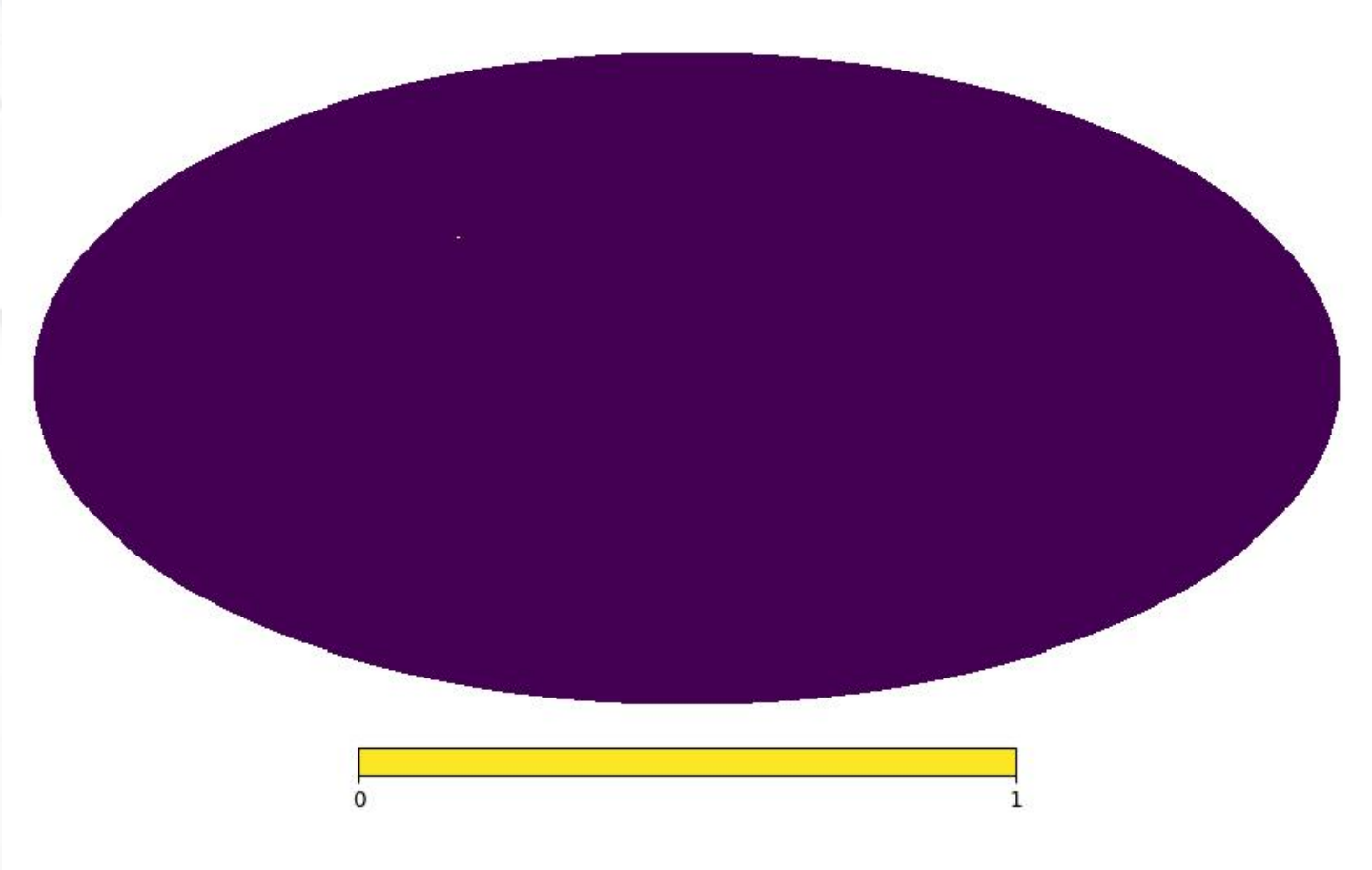
The importance of scan strategy and AliCPT parameters:

Scan strategy:
The scan strategy plays an important role in systematic error rejection.
Because it directly affects the observation time and the noise of the detector.

Parameters:
- For 16.7° radius the AliCPT FOV is about 800 sq. degrees (~2% of sky)
- Longitude: 80E
- Latitude: 32N
- Altitude: 5200m

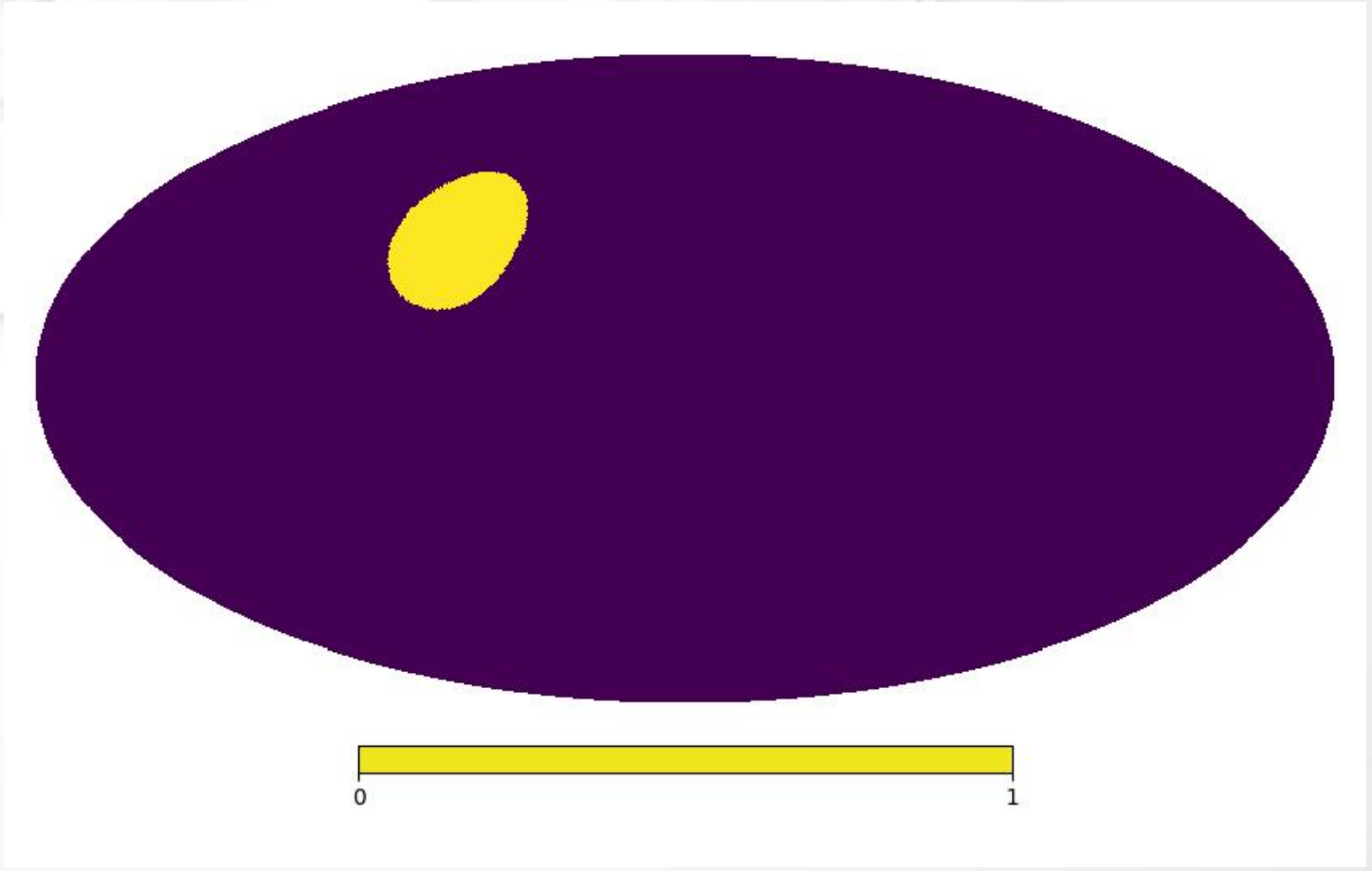
Hits map and map making:

- Time: 2020-10-01 00:00:00
- Longitude: 80E
- Latitude: 32N
- Altitude: 5200m



Hits map and map making:

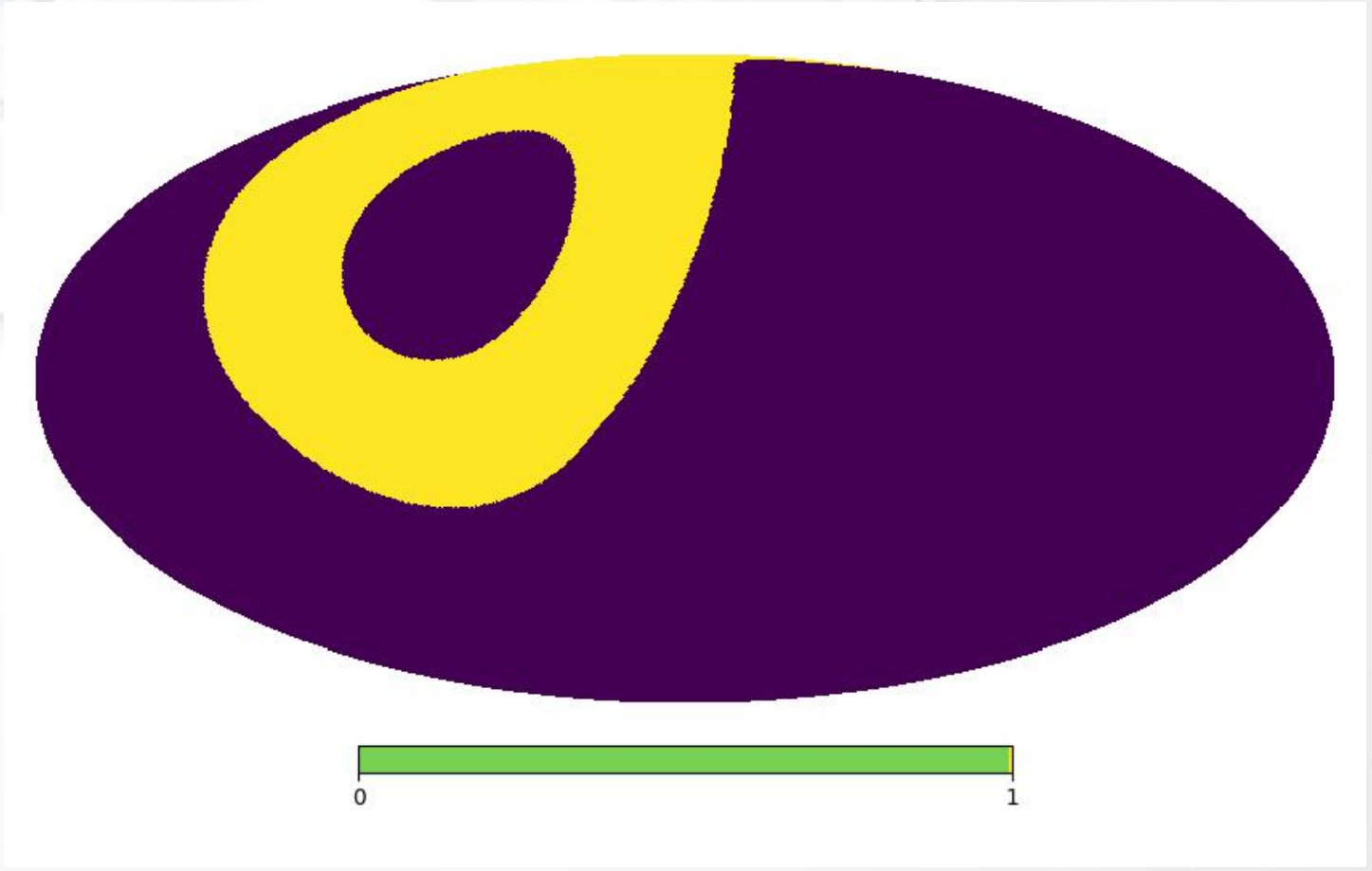
- Time: 2020-10-01 00:00:00
- Longitude: 80E
- Latitude: 32N
- Altitude: 5200m
- FOV = 16.7°



Hits map and map making:

- Time: 2020-10-01 00:00:00
- Longitude: 80E
- Latitude: 32N
- Altitude: 5200m
- FOV = 16.7°

- Ali-CPT1: Azimuth angle = 0°-360°

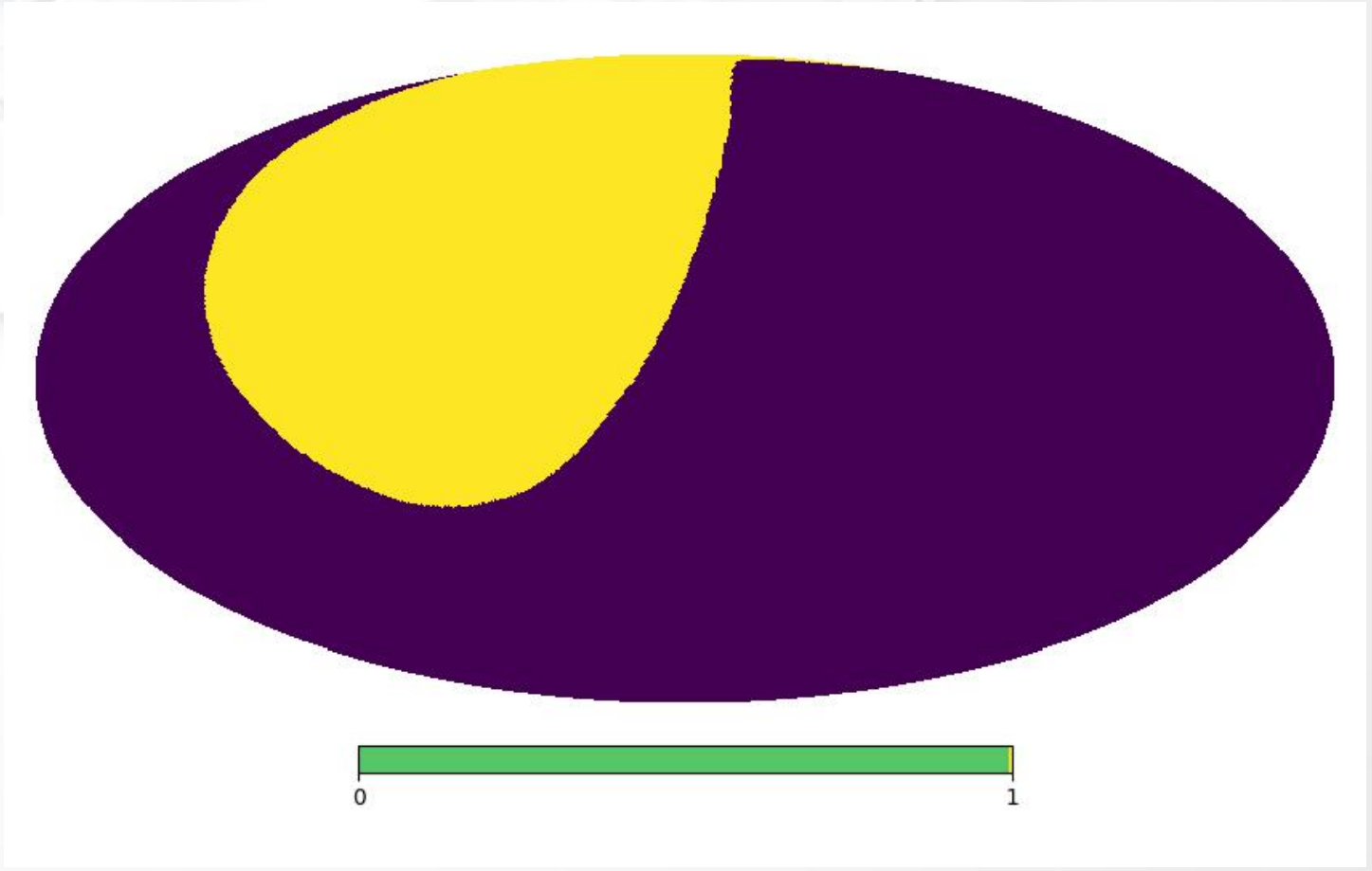


Hits map and map making:

- Time: 2020-10-01 00:00:00
- Longitude: 80E
- Latitude: 32N
- Altitude: 5200m
- FOV = 16.7°

- Ali-CPT1: Azimuth angle = 0°-360°
  Elevation angle = 45°-75°

- Range:
  $\mathrm{Dec} \in [-13, 77] \pm 16.7$
  $\mathrm{Ra} \in [235, 325] \pm 16.7$



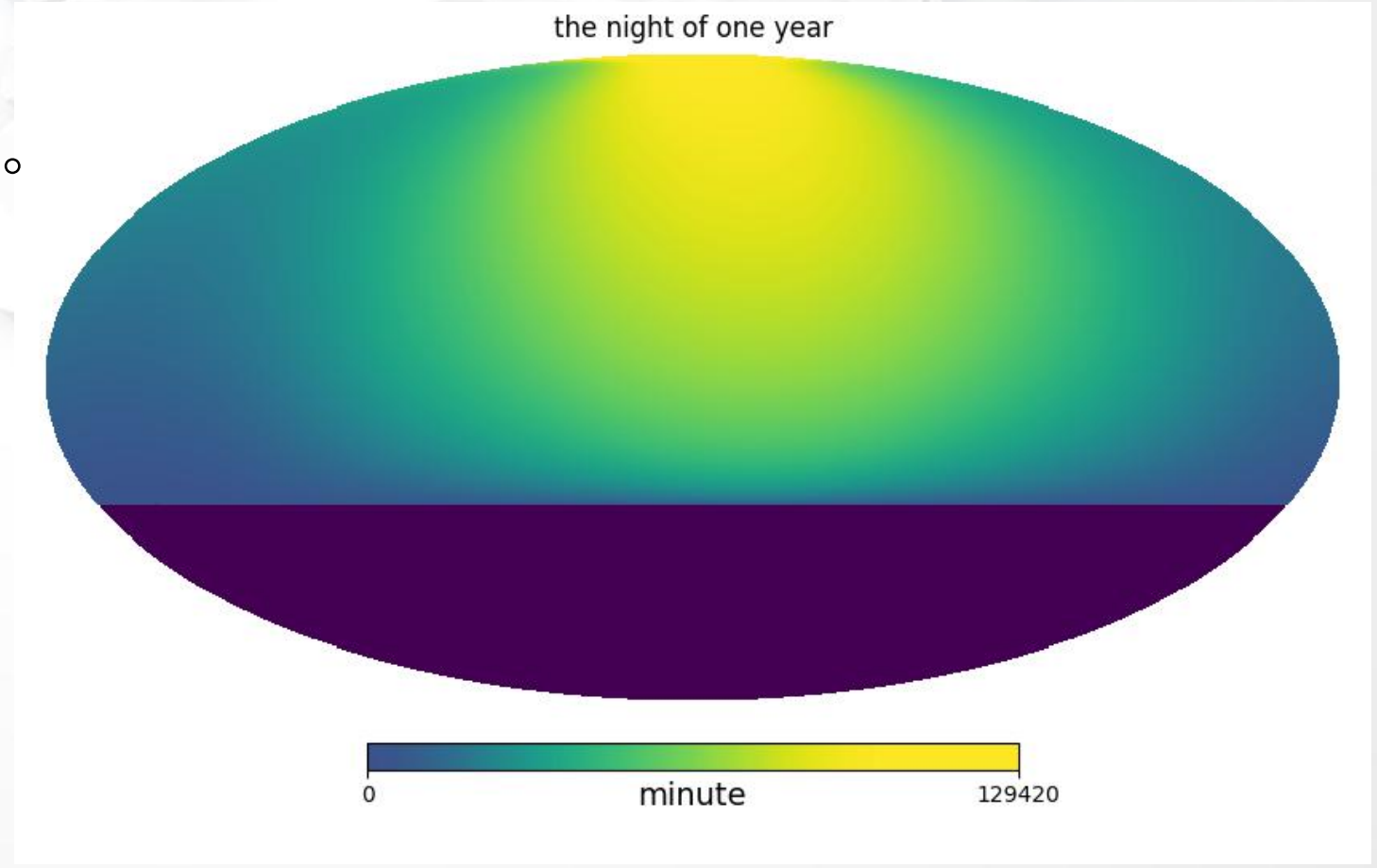
Hits map and map making:

- Longitude: 80E
- Latitude: 32N
- Altitude: 5200m
- FOV = 16.7°

- Ali-CPT1: Elevation angle = 45°-75°
  Azimuth angle = 0°-360°

- Scan time :
  from 2020.10.01 to 2021.03.31
  every night: 18 to 6

Maximum observable time for each pixel.



Briefly analysis and result:

Plot the hit map in Orthographic projection:

Maximum scanning duration:

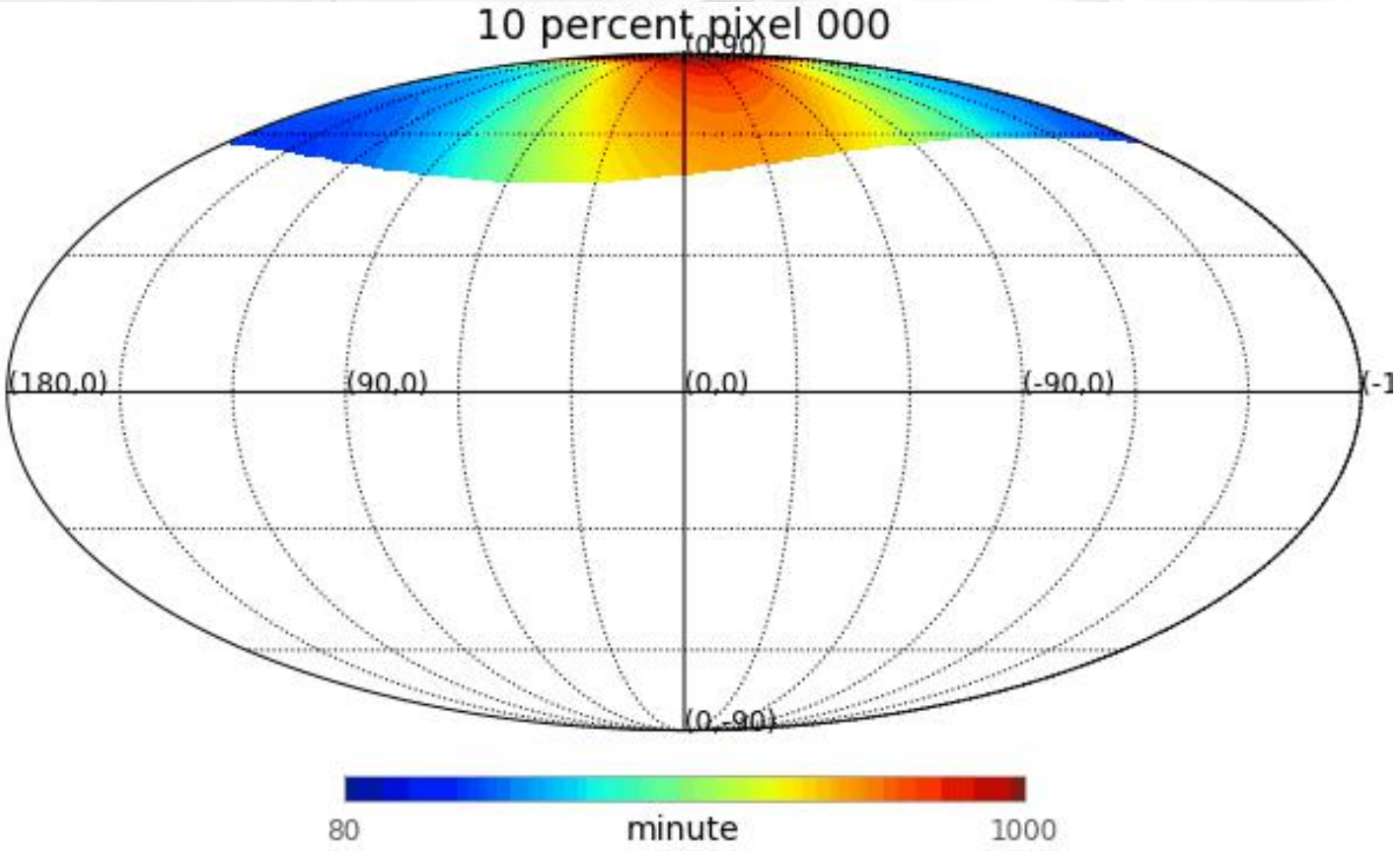
- One month: 74.55%
- Two month : 59.03%
- Three month : 36.25%
- Four month : 19.78%
- Five month : 5.19%
- Six month : 0.33%

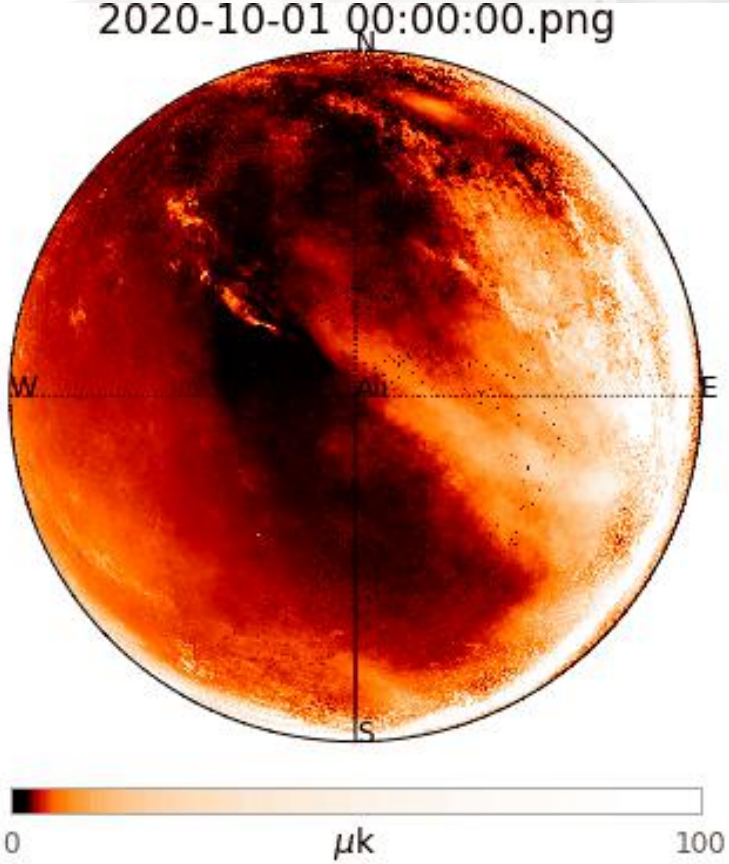
Briefly analysis and result:

The t_{obs} of 10% sky patch :

$$w^{-1/2} = \sigma_{\mathrm{pix}}\sqrt{\Omega_{pix}} = \frac{NET}{\sqrt{\Delta T}}$$

Set the center of every pixel when NISDE=8 as the center of every patch.NET is the detector sensitivity and t_{pix} is the time spent on observing each pixel. Total observation time is ΔT.





Thank you!