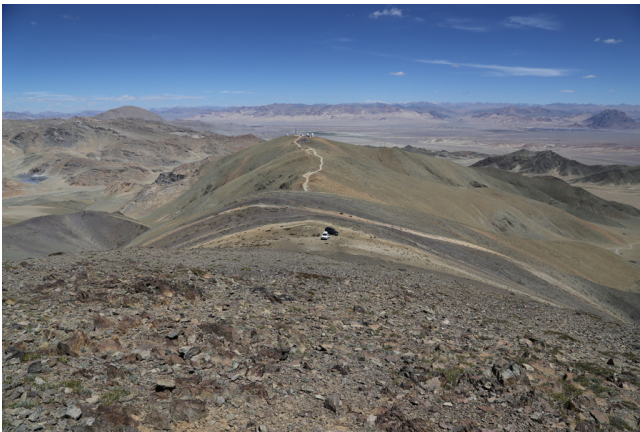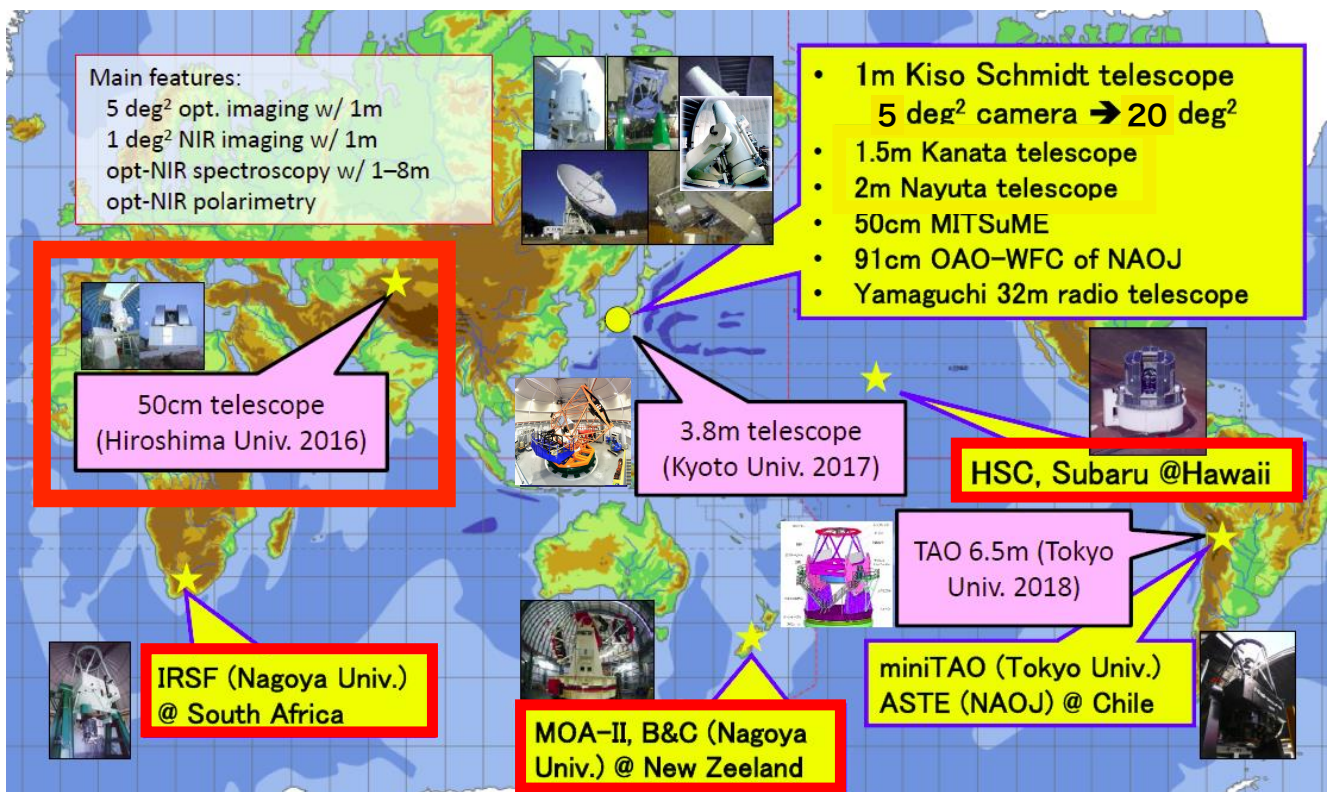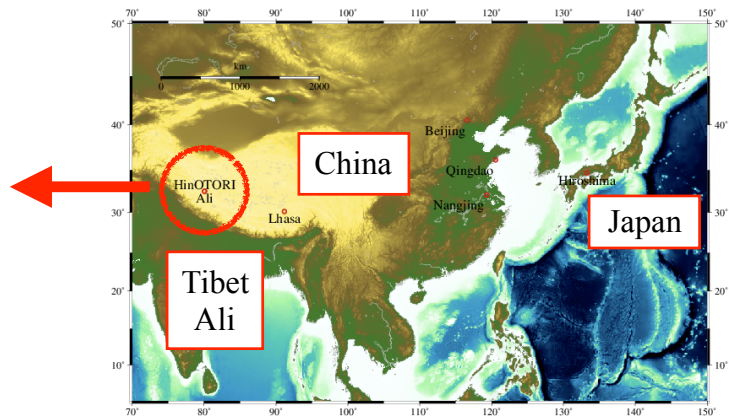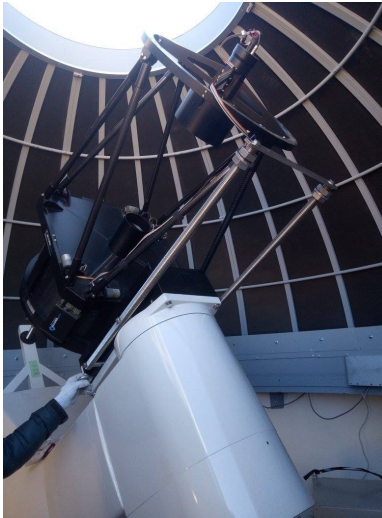# チベット設置50cm望遠鏡（HinOTORIプロジェクト）の進捗

笹田　真人（広島大学）

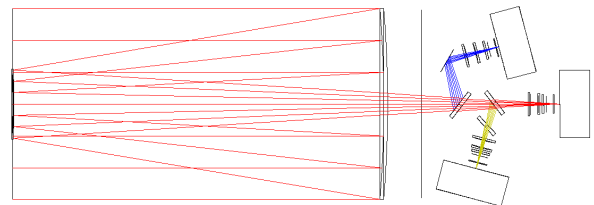**J-GEM** (Japanese collaboration for Gravitational-wave Electro-Magnetic follow-up)

HinOTORI (Hiroshima University Operated Tibet Optical Robotic Imager)
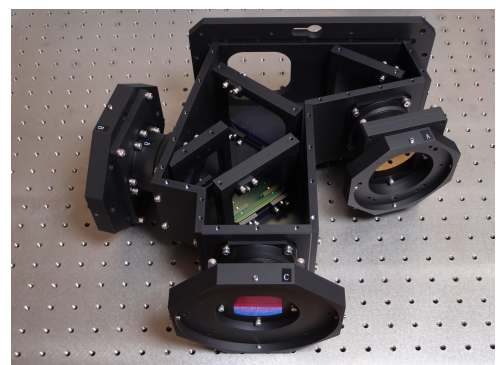

Target
- Gravitational-Wave counterpart
- GRB
- Super novae etc.

- 50-cm Robotic Telescope
- Altitude: 5100m
- Different cadence compared with Japan.
- Started from April 2012.

Telescope and Camera
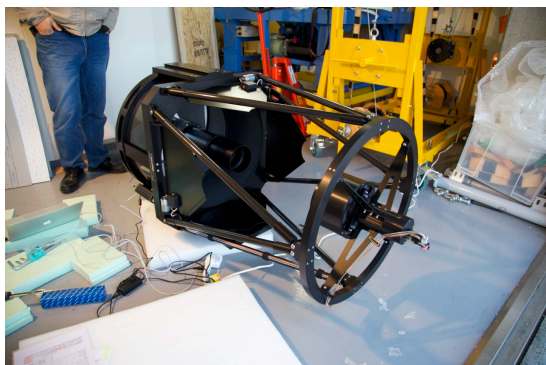
Telescope: Ritchey-Chretien system
Diameter of primary mirror: 510mm

Camera: 3-band simultaneous cameras
FoV: 24 x 24 arcmin2
Available bands: SDSS-u, Rc, Ic

Dome

2016/9/5:
Temporal setting
Did first light

2017/9/22:
Complete dome construction

Current Configuration of HinOTORI

Dome

Dome controller

Trolley

Telescope controller

Power and Internet

HinOTORI PC

Windows
• Server
↑↓

Linux
• Client
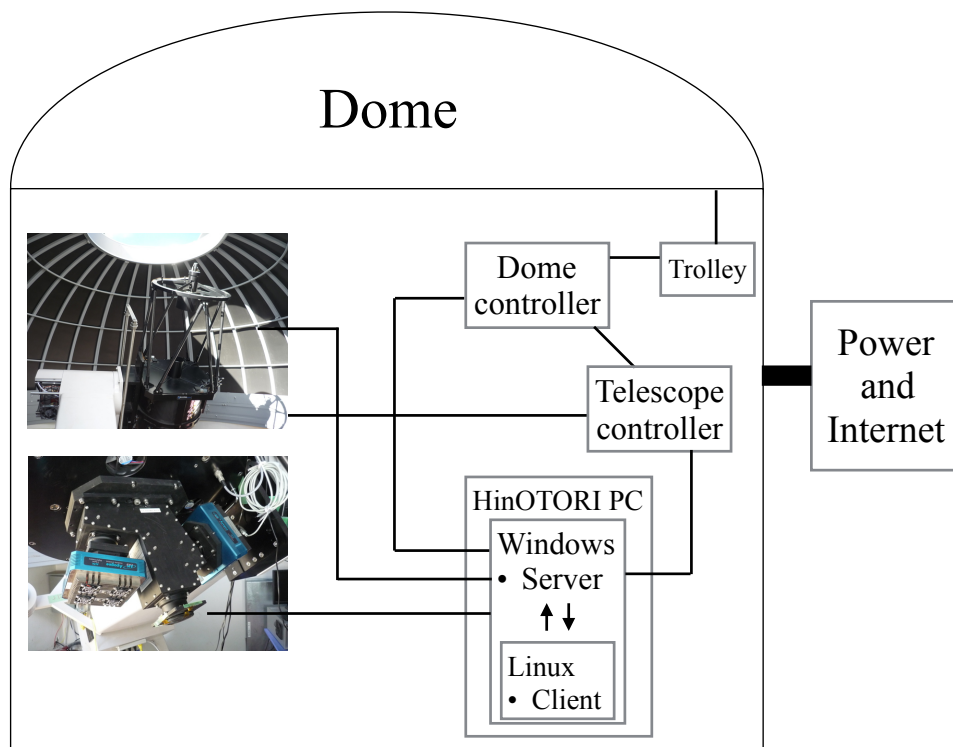
- Telescope and other supplement can be operated by one PC.
- We can access to the PC through the internet.
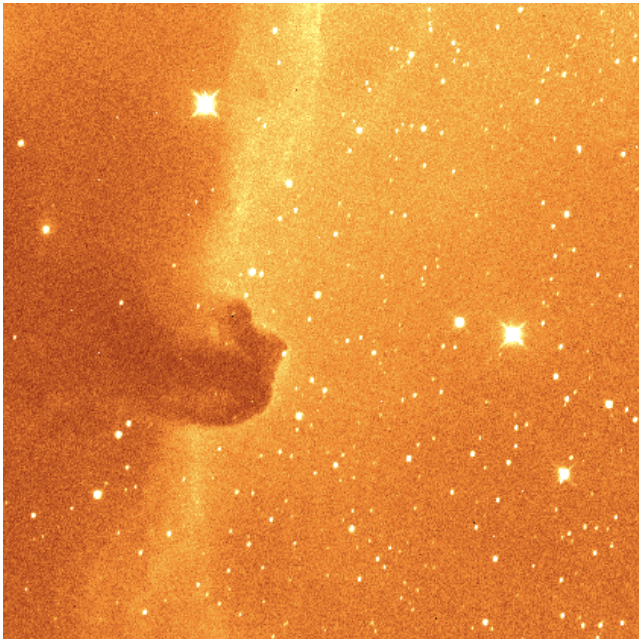
R_C-band image of Horsehead Nebula

Scientific First Light

- On May 2018;
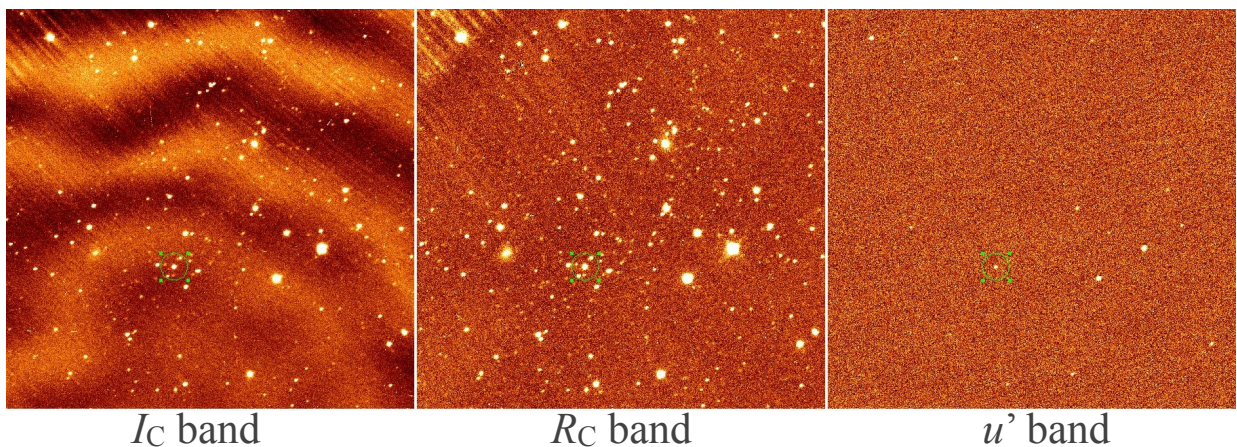 Did commissioning work.

- On Oct. 2018;
  Obtain scientific first light.
  ‣ Photometric standard stars
  ‣ SNe
  ‣ CVs
  ‣ nebula
  and so on

Stacked images of EG Cancer (~7200 sec)

I_C band R_C band u' band

- There is a fringe pattern in the I_C-band image. The peak-to-valley count rate is approximately 10 ADU/s.
- Stray light found in recent images. We will investigate it in the next time.
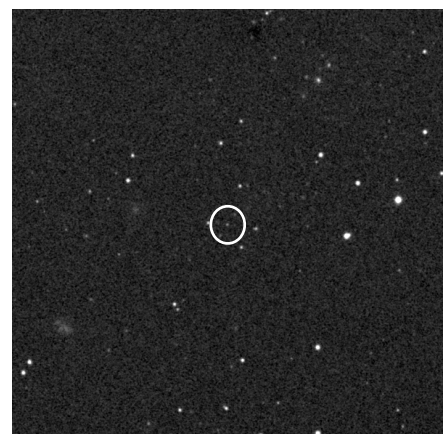
Upper limit estimated from obtained images.

Nagashima 2018; Master thesis
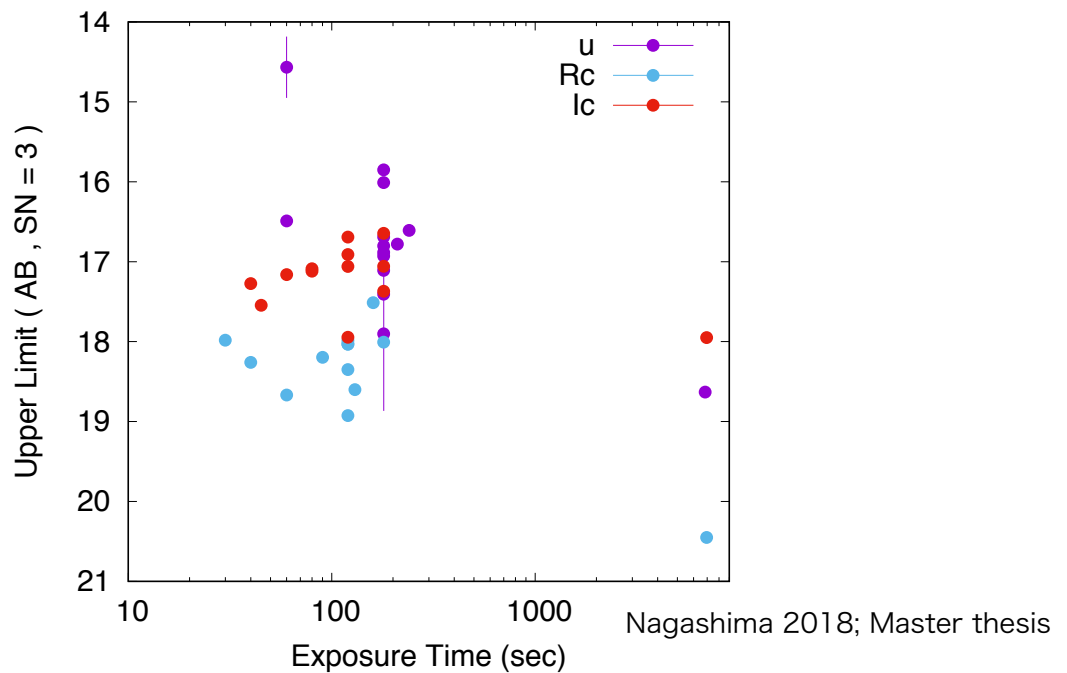
We should take care of the fringe and stray light for the good quality of obtained images

Did Remote Observation

Slack @USA

Hiroshima @Japan

Ali hotel

July 2019

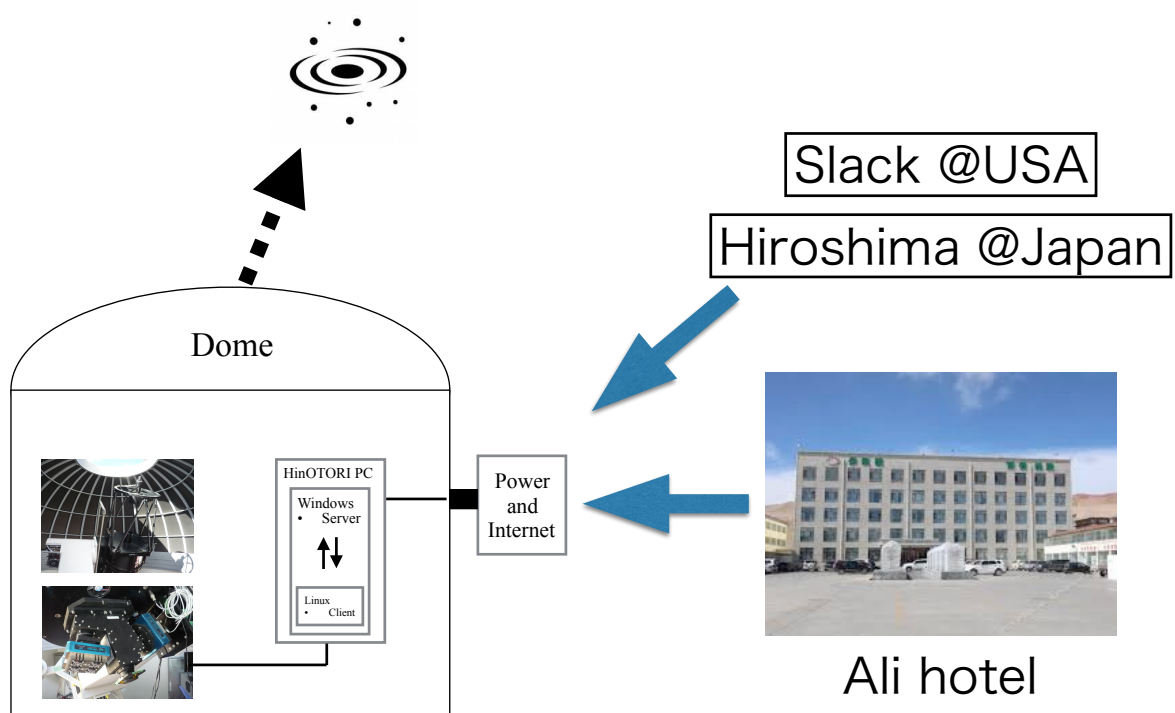- We did not take the Visa to enter Ali. Chinese organization is now reset.

- We are now checking the HinOTORI system remotely.

- We will go to Ali on September 2019.

Technical Problems

- **Power outage**
  The power of our dome sometimes goes out. An electric company cut off the power.
  ✓ We will install a power distribution unit to the HinOTORI system to recover the powers of instruments.

- **Instability to start up of Linux system.**
  When we start up the linux system via VMWare in Windows, the OS sometime does not start normally.

- **Cleaning mirror**
  Because of Sand dust, the primary mirror becomes dirty.
  ✓ We should clean up the mirror regularly.

Summary

- We are progressing the HinOTORI project together with Chinese members since April 2012.
- HinOTORI is located on Ali in Tibet, China, where the altitude at the summit is as high as 5,100m.
- On May and October 2018, HinOTORI members went to Ali to maintain and develop the HinOTORI hardware and software systems.
- We did a first light of scientific objects on Oct. 2018. We will establish a procedure of data reduction of image obtained by HinOTORI to reduce obtained data.
- There are several problems to establish a normal observation (the electrical power outage, OS startup instability, dust in the mirror).

Thank you for your attention.