Unique Capabilities of TAO/MIMIZUKU

✓ Wide wavelength coverage

Covers 2-38 μm wavelength region
with 3 channels (H1RG / Si:As / Si:Sb)

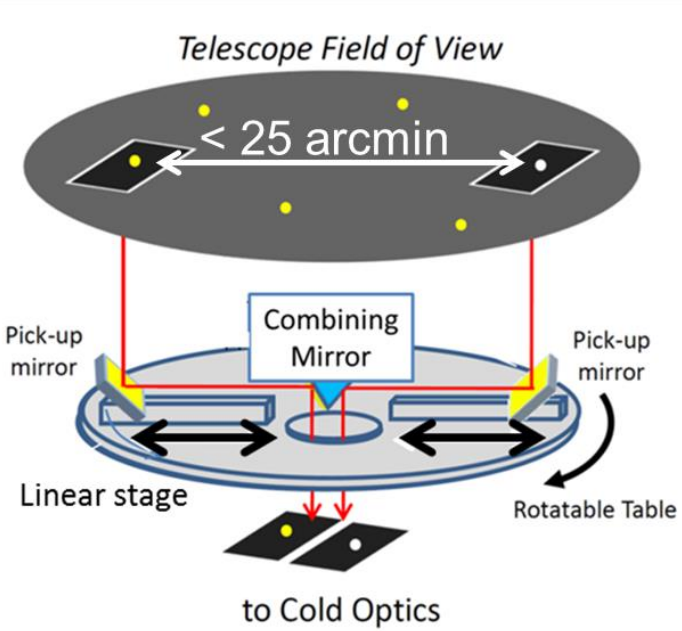
✓ High spatial resolution

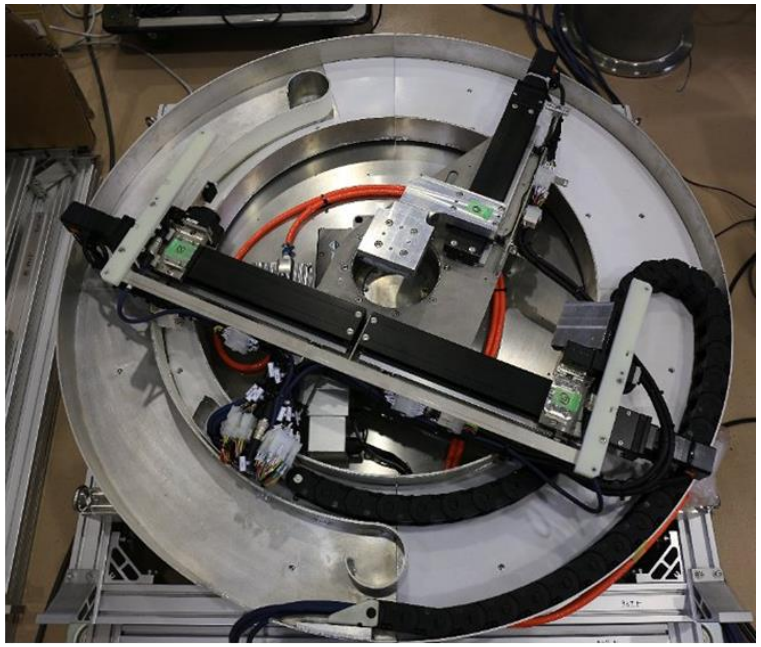
Achieves diffraction-limited spatial resolution
0.4”@10 μm / 0.8”@20 μm / 1.2”@30μm

✓ Highly accurate photometry

with a newly developed device **“Field stacker”**

Field Stacker





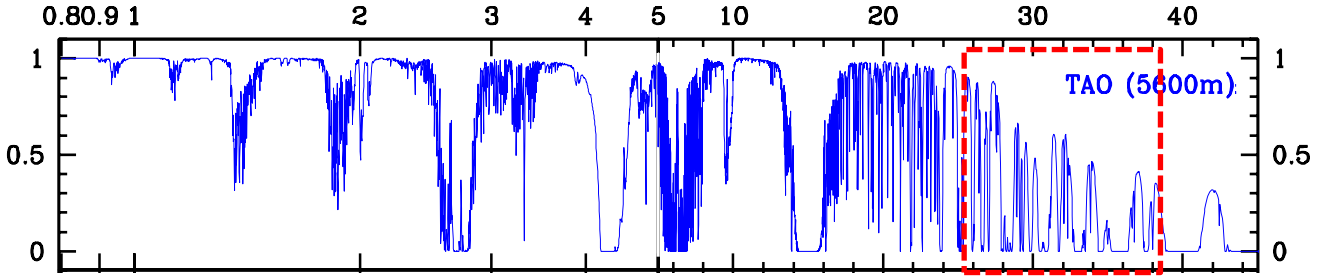
enables simultaneous observations of two (or more) stars

➔ ・Accurate Photometry (~ a few %)

・Reliable Ratioing for Spectroscopy

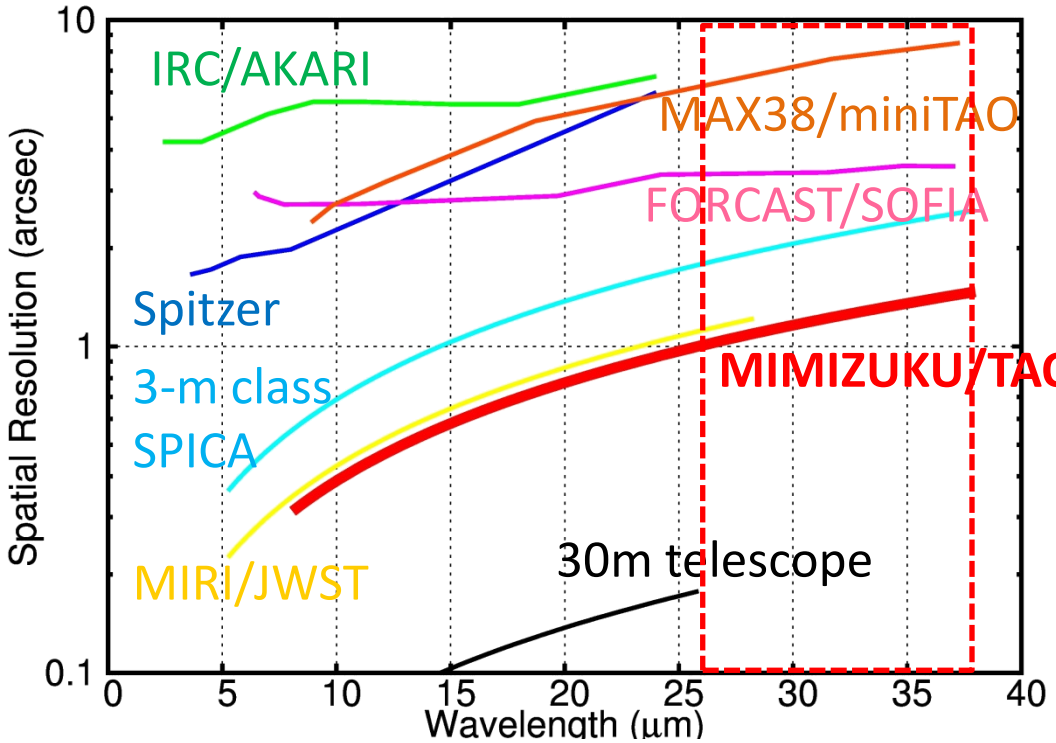
New windows @ 30 μm

"New windows" @ 30μm



✓ Longest infrared wavelength accessible from the ground
➔ Cold component

✓ Highest spatial resolution
~ 1-1.5 arcsec



New windows @ 30 μm

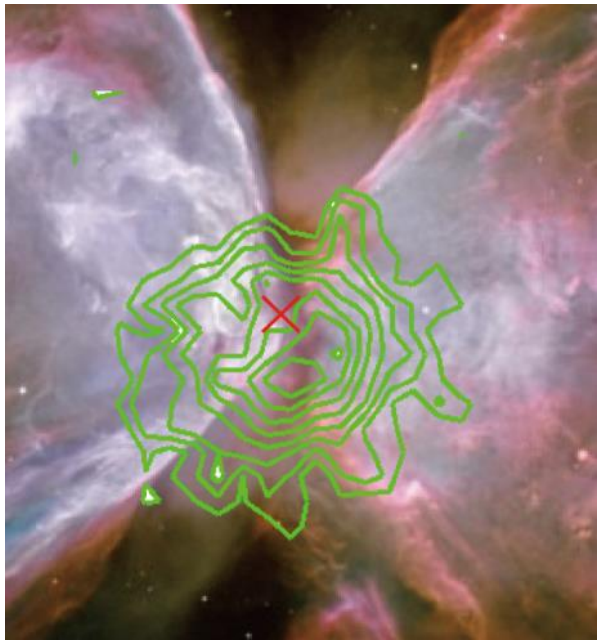
30μm imaging by miniTAO/MAX38

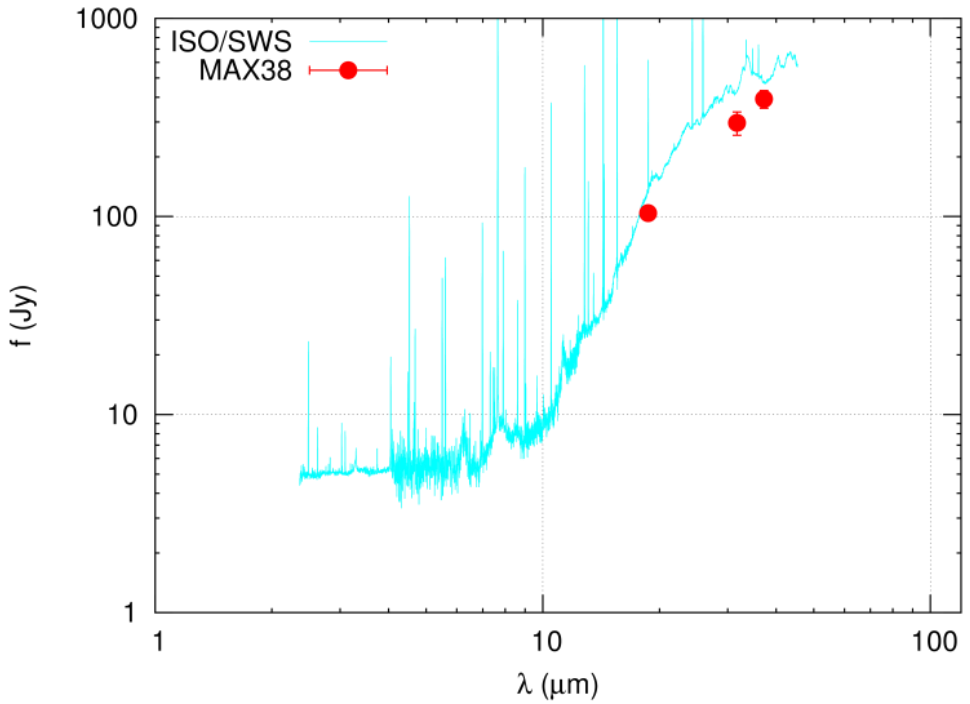
Massive dusty torus detected

dust mass > 2.5 * 10-2 Mo (gass mass > 2.5Mo?)

Very compact

large grains?

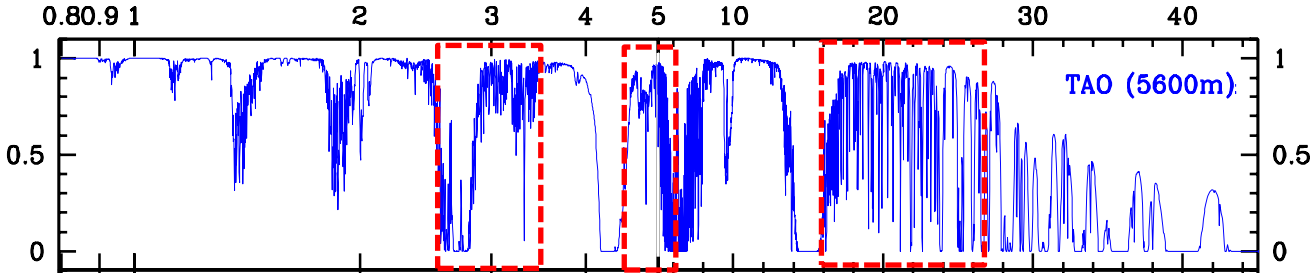




Asano+2015

L/M/Q-band revisit

Hazy wavelength regions in L-, M-, and Q-bands



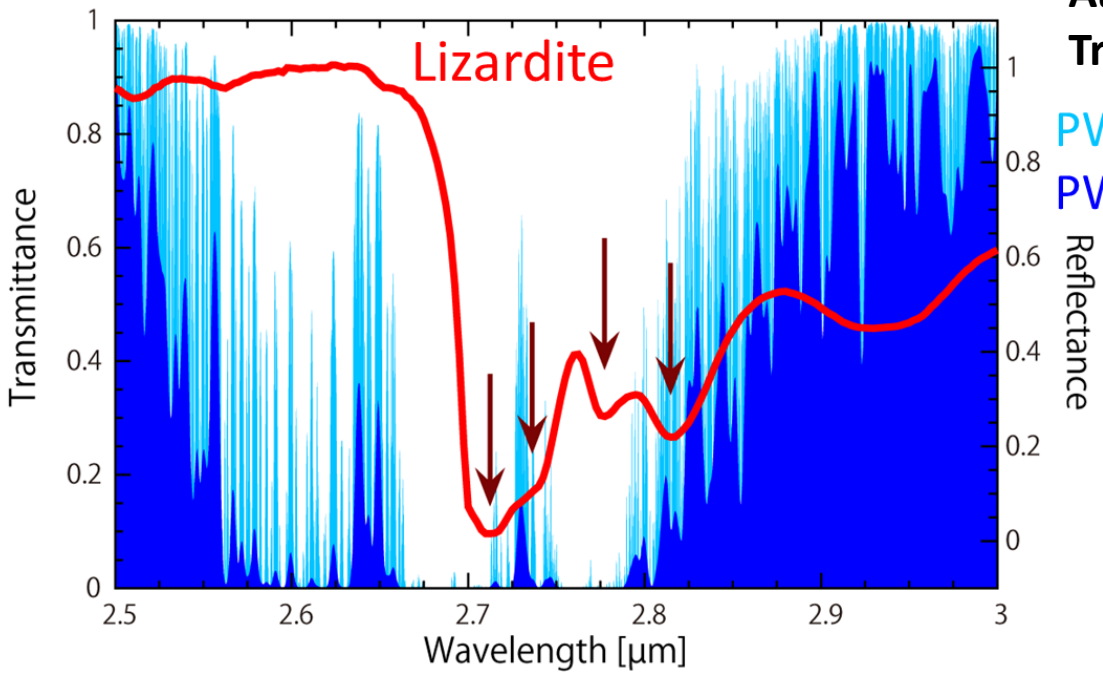
✓ Shorter side of the L-band : 2.5-3.5μm
M-band : 4.5-5.1μm
Q-band : 16-26μm
→ Many absorptions by atmospheric water vapor

✓ Difficulties for canceling the atmospheric absorptions
Reliable spectra cannot be obtained

➔ Simultaneous observations of the target and the reference star
w/ the field stacker solve this problem

L/M/Q-band revisit

Hydrated silicate in asteroids



Atmospheric Transmittance

PWV 0.38mm

PWV 0.91mm

✓ Hydrated Silicate (HS) is a key material to find out water in the Solar nebula

✓ Systematic survey of HS in 300 asteroids w/MIMIZUKU（P.I. S. Hasegawa）

Monitoring capability

Accurate monitoring capability with Field Stacker

+

(Relatively) Sufficient and Flexible observing time

※ accuracy of a few % can be achieved

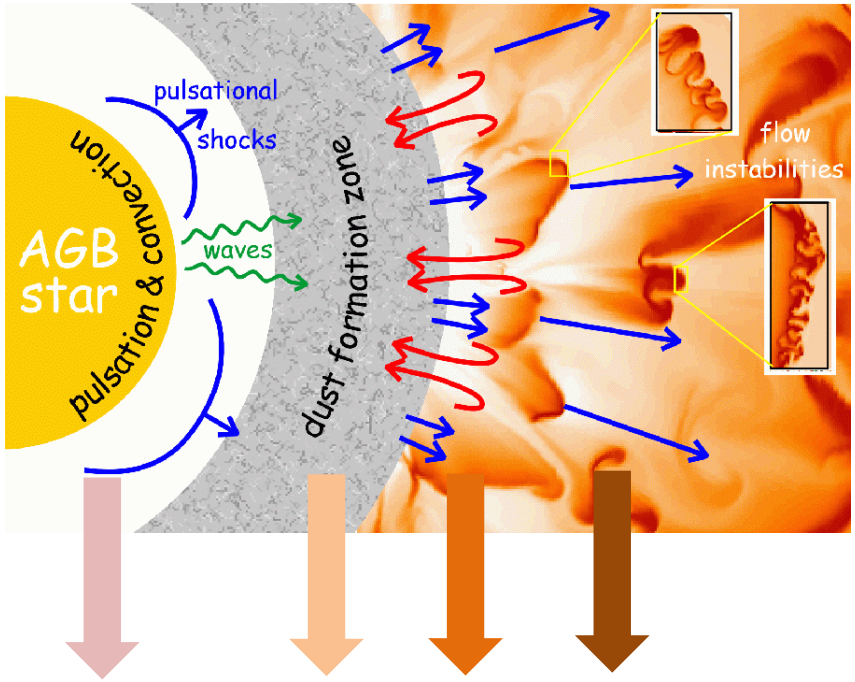
※ ~150 nights/year is used as “project time”

Monitoring observations in mid-infrared wavelengths!

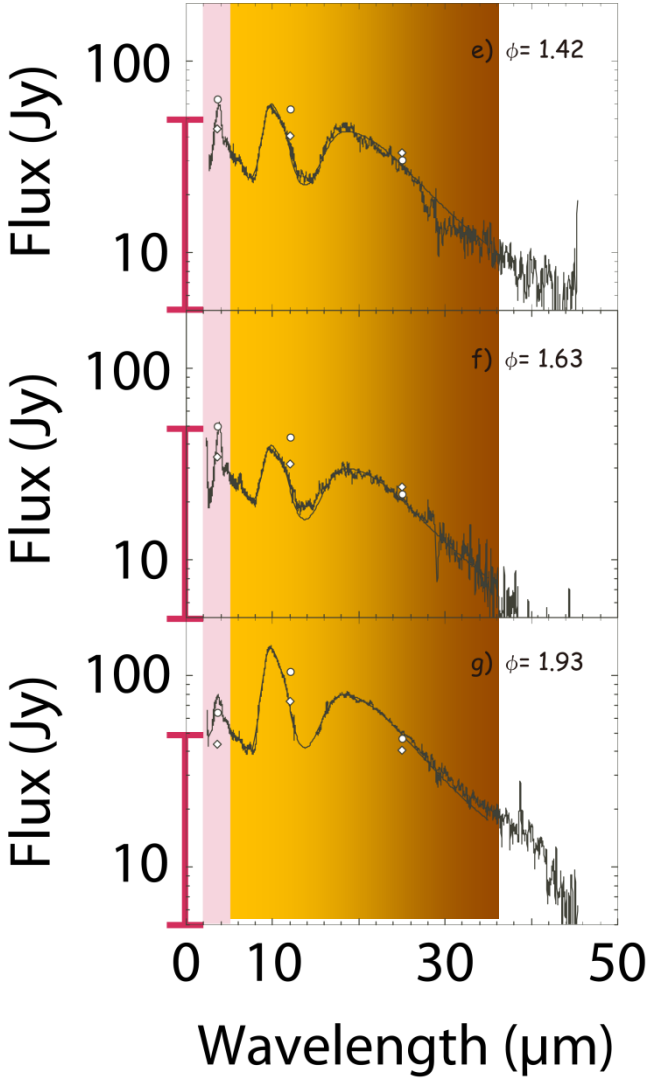
Monitoring capability

Infrared monitoring of late-type variables

✓ Monitoring in the wide-wavelength region
NIR side = photosphere/molsphere
MIR side = dust shell

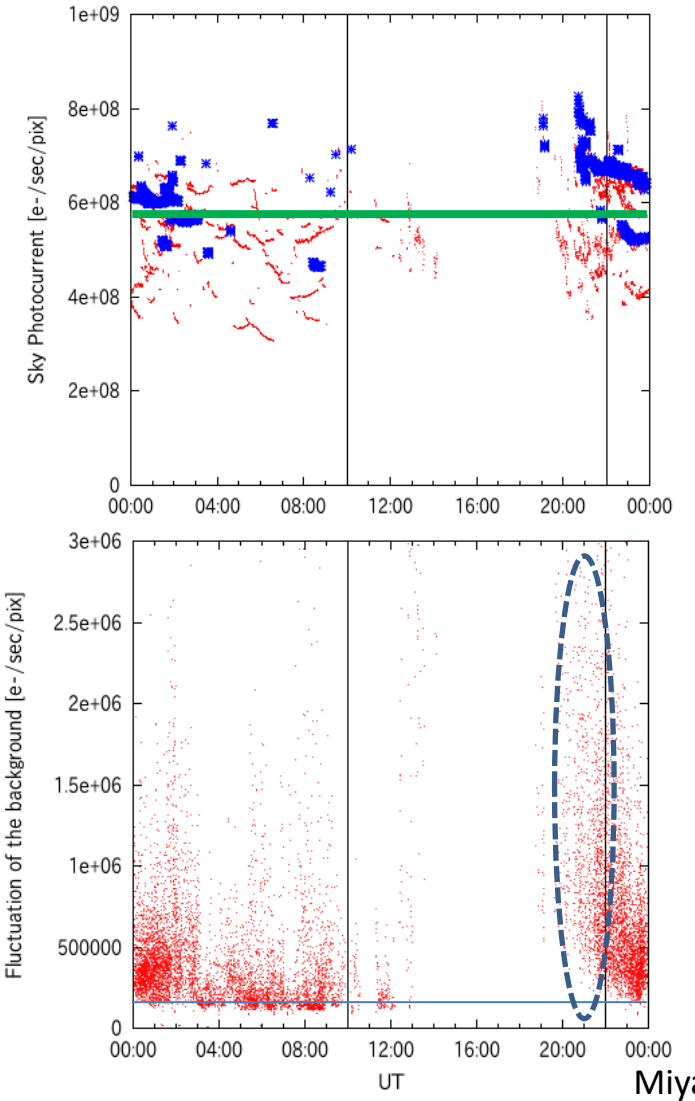


Onaka+2009



Daytime observation

Daylight does not seriously affected for the mid-infrared observations (>8μm)



Advantages for
- continuous monitoring of LPVs
- observations of inner planets/comets

Miyata+ 2012

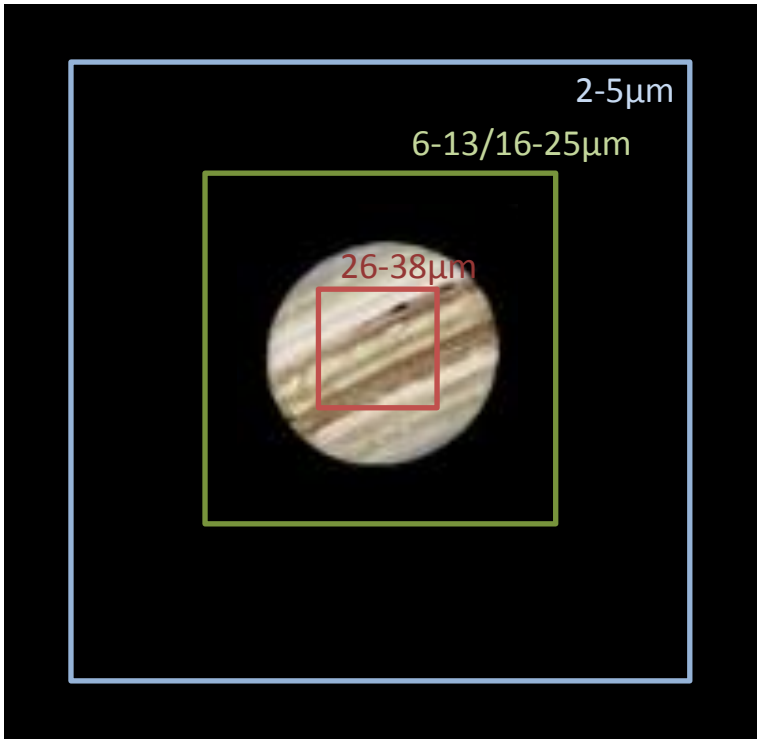
Wide field of view

State-of-Art Infrared Arrays → wider FoV

Subaru/COMICS

Si:As 320x240

TAO/MIMIZUKU



HgCdTe 1024x1024
Si:As 1024x1024
Si:Sb 128x128

※ Jupiter : 44” @2016/03

Specifications

Specifications of TAO/MIMIZUKU

# of channels	3 (NIR/MIR-S/MIR-L)		
Channel	**NIR**	**MIR-S**	**MIR-L**
Wavelength coverage	**2-5 μm**	**6-26 μm**	**20-38 μm**
Detectors	**H1RG-5.3μm cut-off 1k x 1k**	**Si:As Aquarius 1k x 1k**	**Si:Sb MF-128 128 x 128**
Pixel scale	**0.066”/pix**	**0.11”/pix**	**0.18”/pix**
Field of view	**68” x 68” or 34” x 68” x 2 fields**	**120” x 120” or 60” x 120” x 2 fields**	**23” x 23” or 12” x 23” x 2 fields**
Filters	**J / H / K / L’ / M’ + some Narrow filters**	**N-band (R~10) x 4 Q-band (R~20) x 4**	**31 μm (R~10) 37 μm (R~10)**
Spectroscopy	**2.7μm-band: 2.4-2.95μm R~600 KL-band: 2.4-4.2 μm R~230**	**N-band: 7-14 μm R~170 Q-band: 17-26 μm R~100**	**26-38 μm R~64 (*)**

(*) Optional