

East Asian Observatory (EAO)–Subaru Partnership

Myungshin Im
(Seoul National University)
2019-02-13@K-GMT SP Users Meeting

Background

- ▶ Subaru has been looking for international partners to sustain their operation
- ▶ EAO: potential partner
- ▶ Working group is formed

Subaru International Partnership Working Group (WG)

- ▶ Two members from each EAO country (appointed by each country's director)
- ▶ Wen-Ping Chen (NCU)
- ▶ Jiasheng Huang (NAOC)
- ▶ Myungshin Im (SNU)
- ▶ Taddy Kodama (Tohoku Univ.)
- ▶ Haining Li (NAOC)
- ▶ Nagayoshi Ohashi (NAOJ)
- ▶ Arman Shafieloo (KASI)
- ▶ Shiang-Yu Wang (ASIAA)
- ▶ F2F meeting at SNU (May 8–9, 2018), many telecons

Subaru International Partnership Boundary Condition

- ▶ Partners are expected to:
 - Financially contribute to the telescope operation
 - Participate into the governance of the operation
 - Scientifically collaborate to conduct relatively large observation programs using Subaru
- ▶ Subaru is not looking for partners who merely make financial contributions to obtain telescope time.

WG Recommendation

- ▶ Semi-partner first (two years, 20A or 20B)
- ▶ Then, aim to join as a full-partner

WG Semi-partner Model

- ▶ > 50M JYEN (>500k USD)
- ▶ Limited tel. access/decision making
- ▶ 10:10:2:1 (Japan, China, Korea, Taiwan)
한국 연간 약 1억 원(~1.2 night)
- ▶ Plus 1 additional night/year to China, Korea, Taiwan (to promote Subaru usage) + 1 DDT night
- ▶ Shared-time access

Korea under WG Semi-partner Model

- ▶ **Regional Guaranteed Time (RGT): 2.2 nights/year**
- ▶ Invest 15% of RGT to shared-time pool
- ▶ Shared-time pool: ~35 nights gathered from each partner (their 15% RGT)
- ▶ **Korea: access to 35 nights of shared-time (open-competition, collaboration project)**

Why Shared-time?

- ▶ **Promote regional collaboration**
- ▶ Ground-work for a Subaru Strategic Program (SSP) or a large program (LP) under full-partnership in future
- ▶ Subaru is not looking for partners who merely make financial contributions to obtain telescope time.

TAC Process under WG Model

- ▶ EAO TAC
- ▶ EAO member (1-2) will be in Subaru TAC
- ▶ But, EAO TAC decision will be “EAO recommendation” for Subaru TAC
- ▶ No guarantee for highly ranked EAO program RGT to be carried out

Full-partnership Model?

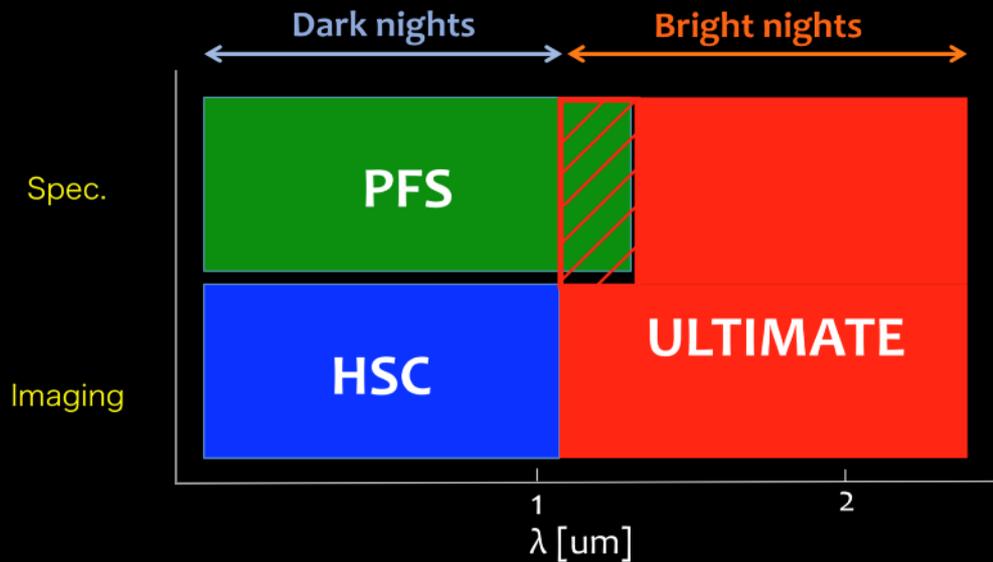
- ▶ >200M Yen (>2M USD)
- ▶ 10:10:2:1 (Japan, China, Korea, Taiwan):
한국 연간 약 5-6억 원
- ▶ 5 RGT nights
- ▶ 1 night to shared time
- ▶ Full access of shared-time, SSP, LP



Subaru's Wide-Field Strategy in 2020s

Recommendation from Subaru Science Advisory Committee

1. Very wide-field optical imager **HSC (2014)**
2. Wide-field multi-object spectrograph **PFS (2022)**
3. Wide-field near-infrared imager and MOS spectrograph including AO assisted IFU **ULTIMATE-Subaru (2026)**



From M. Yoshida presentation
at EAO-Subaru Science Workshop (2019)

Extend Subaru's survey capability to near-infrared

PFS (Prime Focus Spectrograph)

(under development; science operation from 2022)

A fiber fed **multi-object spectrograph** attached to the prime focus of Subaru

2,400 fibers FOV: 1.25 deg²

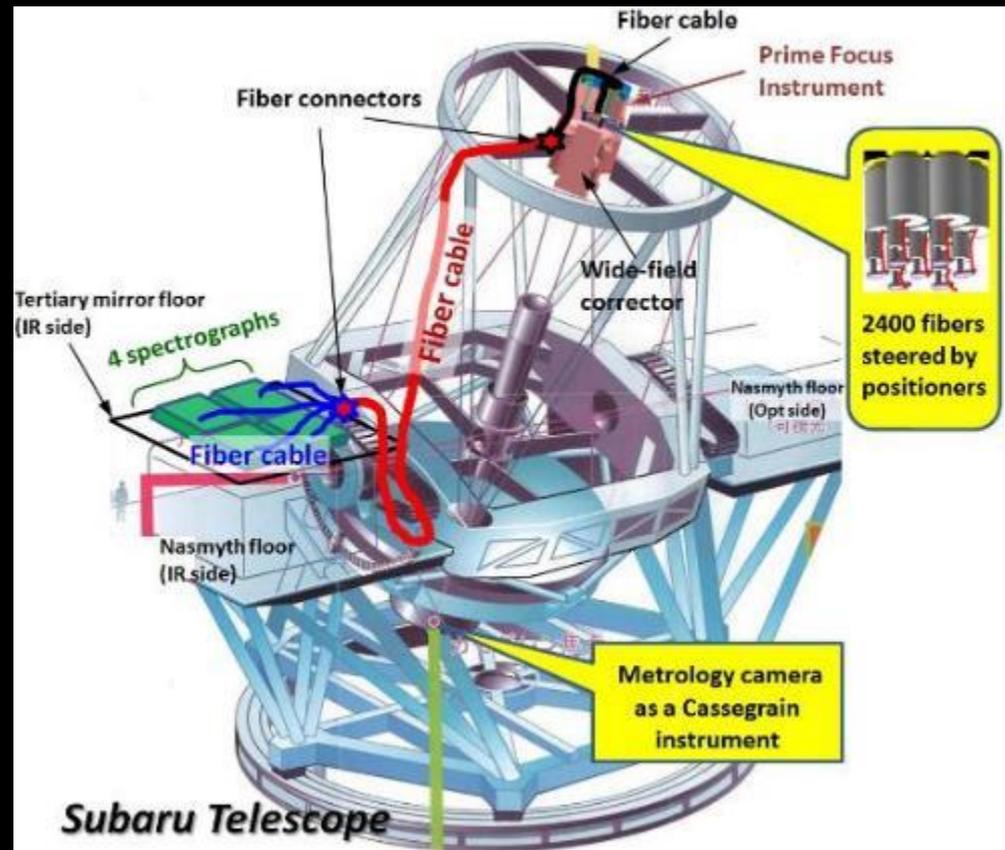
λ range: 0.38 – 1.26 μm

Spec. R: 2,300 – 5,000

Sensitivity

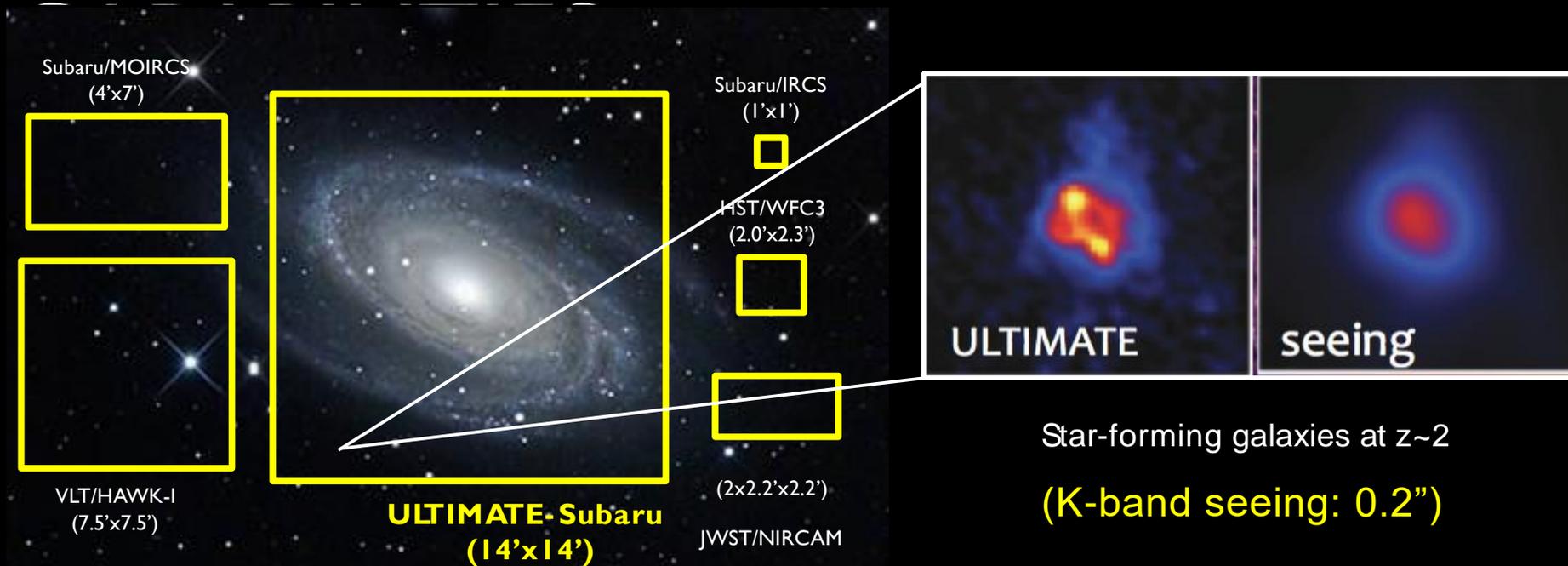
Band	magnitude
Blue (0.38 – 0.65 μm)	22.5
Red (0.65 – 0.97 μm)	22.4
NIR (0.97 – 1.26 μm)	21.4

S/N = 5 @ 1 hour exposure





HIGH-RES “AND” WIDE-FIELD NIR



ULTIMATE-Subaru will deliver:

- ▶ Subaru's original **High-redshift targets to follow-up with TMT**
- ▶ **Spatially-resolved** studies of the objects found by HSC/PFS
- ▶ **SDSS-like** comprehensive imaging/spec. survey for **high-redshift universe ($z > 2$)**.
- ▶ Synergy with the future **surveys by wide-field space missions** (good synergy with **WFIRST**)

From M. Yoshida presentation
at EAO-Subaru Science Workshop (2019)

Should Subaru work with EAO?

- **No need: if Japan has enough budget**
- **No need: if Japan can establish bilateral collaborations**
— eg. Australia, Canada, China, India
- **No need: if Japan has no interest in promoting other regions in Asia**
- **No need: if EAO regions work with Subaru directly**
- **No need: if potential partners will just pay per night**

- **Yes: if EAO brings “positives” to Subaru community**
— budget which will help, not only today, but tomorrow
— users who are collaborators, not just “buyers”
— partners who will build new instruments
— partners who will increase total capabilities (speed)
- **Yes: Japan/NAOJ is EAO**

From Paul Ho presentation
at EAO-Subaru Science Workshop (2019)

Should EAO work with Subaru?

- **No need: if Subaru has no interest**
- **No need: if EAO regions have no need or desire**
- **No need: if Subaru participation does not help EAO**

- **Yes: if EAO partnership has advantage over bilateral partners**
 - **if EAO members prefer this path (eg. new funds)**
 - **if EAO can share time on Subaru with other partners**
 - **if EAO can become major Subaru partner faster**
 - **if EAO/Subaru attracts new EAO members**
 - **if EAO becomes stronger**
- **Yes: Japan/NAOJ is EAO; EAO should help Subaru**

From Paul Ho presentation
at EAO-Subaru Science Workshop (2019)

East Asian Collaboration in 2020's+

❖ Korea

- ◆ GMT
- ◆ Gemini

❖ Japan

- ◆ TMT
- ◆ Subaru

❖ China

- ◆ TMT
- ◆ LOT 12m telescope (?)

❖ Taiwan

- ◆ CFHT
- ◆ ?

East Asian ELT Program!



+?

From Narae Hwang presentation
at EAO-Subaru Science Workshop (2019)

Discussion

- ▶ EAO-Subaru partnership worth pursuing?
- ▶ Korea-Subaru partnership instead?
- ▶ Korean investment appropriate (more or less)?
- ▶ Shared-time too much or too small (15% → 7.5%?)?
- ▶ Full-partnership direction ok?