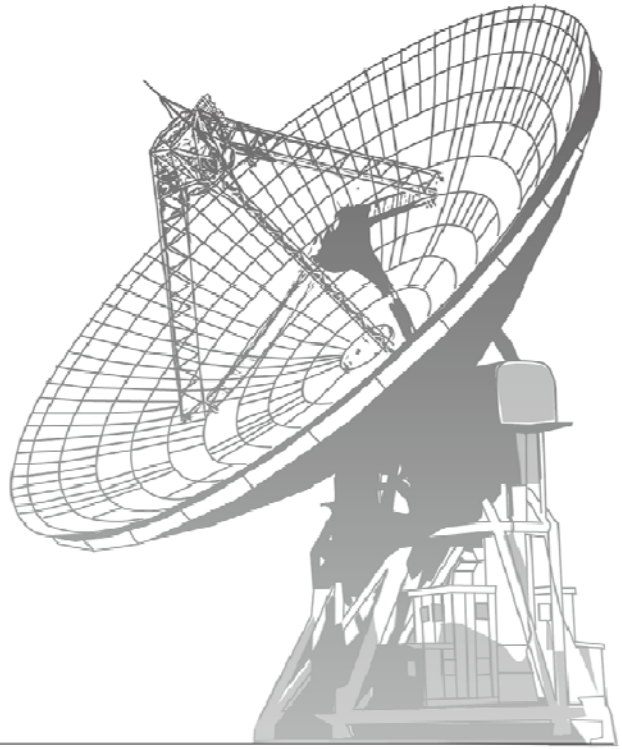
NOBEYAMA

NRO Report and Plans for 2016/2017

Masao Saito
(Nobeyama Radio Observatory)



NINS National Institutes of Natural Sciences
国立天文台 NAOJ
Nobeyama Radio Observatory

NOBEYAMA

Outline

1. NRO Missions
2. NRO Activities 2015-2016
3. NRO Open-use
    1. 2015-2016
    2. 2016-2017
4. Summary

NOBEYAMA

国立天文台 NAOJ NINS National Institutes of Natural Sciences

Bug

- A bug of frequency shift
  - Period: 2012.1.16 - 2016.4.7
  - Rx: T70, T100, TZ, FOREST
  - Obs mode: Position Switching.
- Please go to the following web and enter your proposal id and project name.
- http://www.nro.nao.ac.jp/~nro45mrt/html/shift_err/shift_query.html
- More details http://www.nro.nao.ac.jp/~nro45mrt/html/shift_err/index.html

NOBEYAMA

国立天文台 NAOJ
NINS
National Institutes of Natural Sciences

1. NRO Mission

NOBEYAMA

国立天文台 NAOJ

NINS National Institutes of Natural Sciences

1.1. NRO Mission 2016

1. Operate open-use programs to produce scientific results
2. Make a future plan.
3. Support university research group activities
4. Conduct outreach activities
5. Operate solar radio polarimeters

1.2. NRO Facilities in FY2016

- NRO 45m telescope started in 1982 (20-116 GHz)
- Solar observations over 60 yrs at 3.75 GHz.
- 1, 2, 3.75, 9.4, 17, 35, 80 GHz

NOBEYAMA

国立天文台 NAOJ

NINS National Institutes of Natural Sciences

1.3. Other Facilities in NRO

- Hosting other telescopes/instrument/facility in Nobeyama Campus
  - SPART (NRO-Osaka Pref Univ.)
  - 1.85 m telescope (Osaka Pref Univ.)
  - Heliograph (17&34 GHz: Nagoya Univ.)
  - 60 cm telescope (CO(2-1)) (Univ. of Tokyo)
  - Bolometric interferometer at 3mm (Tohoku Univ.)
  - NINS exhibition building temporarily open

NOBEYAMA

国立天文台 NAOJ

NINS National Institutes of Natural Sciences

2. NRO Activities 2015-2016

NOBEYAMA

国立天文台 NAOJ

NINS National Institutes of Natural Sciences

2.1. Key Activities 2015-2016

	Period	Success level
FOREST	2009-2017	Forest mixer replaced. Spectral window mode open.
Z45	2013-2018	Z45 total power mode open. Polarization under commissioning.
Antenna Master Plan	2013-2017	MMC drivers replaced. Mount painted white. Panel to panel adjustment on-going.
Remote Observations	2011-2017	Available from domestic institute/univ. Test from KASI (Korea) succeeded.
Proposal System	2016	Proposal Review Process merged with ASTE. New Categories: large, joint, DDT
Archive/CASA	2015-2017	Archive on-going and CASA tested internally.
Facility Operation	2015-cont	Open the NINS exhibition temporarily including 4D2U.

NOBEYAMA

国立天文台 NAOJ NINS National Institutes of Natural Sciences

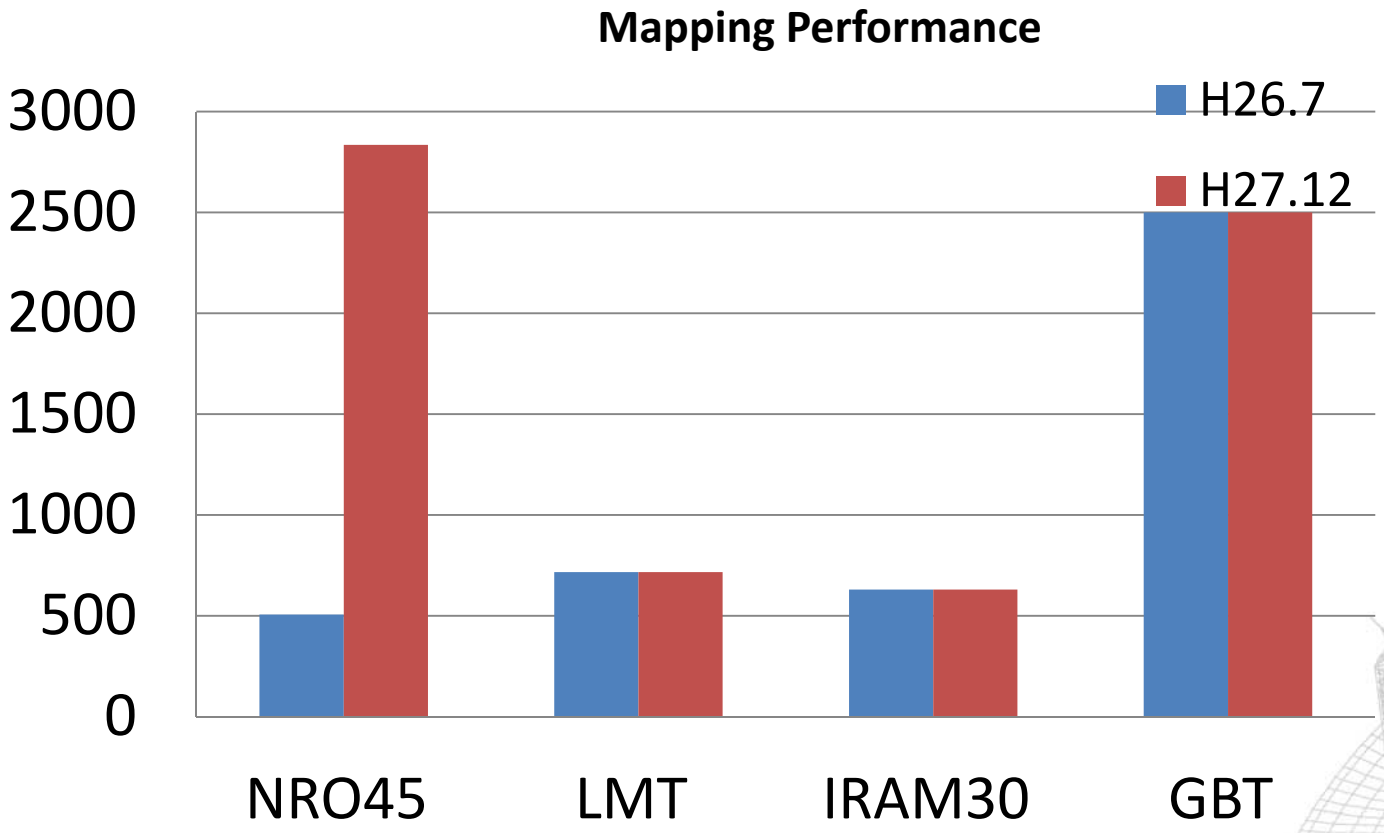
2.2. Status Report

Freq	HPBW	Aperture eff.	Main Beam eff.	Tsys (K)
23 GHz(H22)	74.2	0.61	0.83	100
43 GHz (Z45)	37.1	0.59	0.71	100
75 GHz (T70	20.2	0.51	0.55	200
86 GHz (TZ)	18.5	0.45	0.54	150
110 GHz (TZ)	14.6	0.37	0.44	150
110 GHz (FOREST)	14.4	0.37	0.43	200

Backend: SAM45 16 Ifs 2GHz (Spectral window mode open)

2.3. Mapping performance at 3 mm

Aperture area x aperture efficiency x Rx pix



Best performance achieved at 3 mm mapping

2.4. Whitening

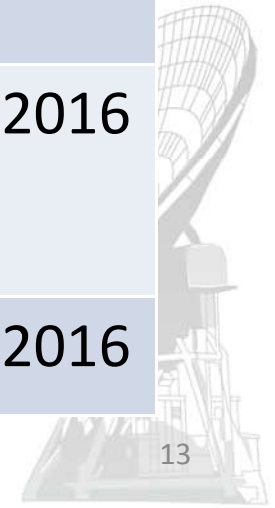
NOBEYAMA

国立天文台 NAOJ NINS National Institutes of Natural Sciences

2.5. Legacy Projects

- 2014-2016 seasons (three years)
- Proposals reviewed by TAC

Title	PI	Publication acc (sub)	period
Star formation	Nakamura (NAOJ)	0 (0)	2014-2016
FUGIN	Umemoto/Minamidani(NRO)	1 (1)	2014-2016
COMING	Sorai (HokkaidoUniv.)	1 (1)	2014-2016

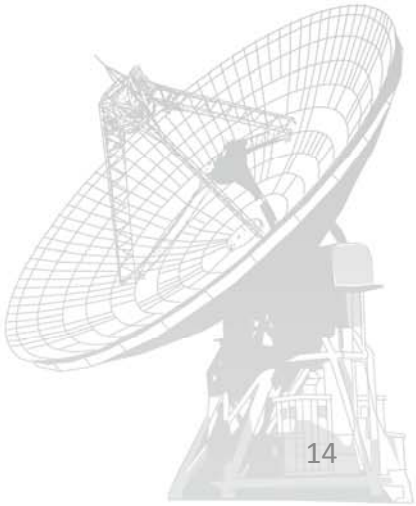


NOBEYAMA

国立天文台 NAOJ NINS National Institutes of Natural Sciences

2.6. NRO Promotion

- Promotion outside Japan done
  - Italy
  - Vietnum
  - UK
  - Thailand
  - Korea (EAMA10)
  - US (e.g. GBT)
- Promotion outside Japan planned
  - China (JCMT users meeting)
  - Taiwan (+remote observation test?)
  - Chile



2.7. Public Outreach

- 52614 visitors in FY2015
- 651914 web viewers, 27 newspaper articles, 7 TV/radio programs, 25 magazines (or webs) in FY2015
- NINS exhibition room was open for 3 months.
- New attempts:
  - Starry night in the Nobeyama Campus
  - Nagano: AstroPrefecture event

NOBEYAMA

国立天文台 NAOJ
NINS
National Institutes of Natural Sciences

3. NRO Open-Use

NRO 45-m Telescope
Radio Polarimeters

NOBEYAMA

国立天文台 NAOJ NINS National Institutes of Natural Sciences

3.1 Open-Use 2015-2016 (Dec 1 – May 15)

NOBEYAMA

国立天文台 NAOJ

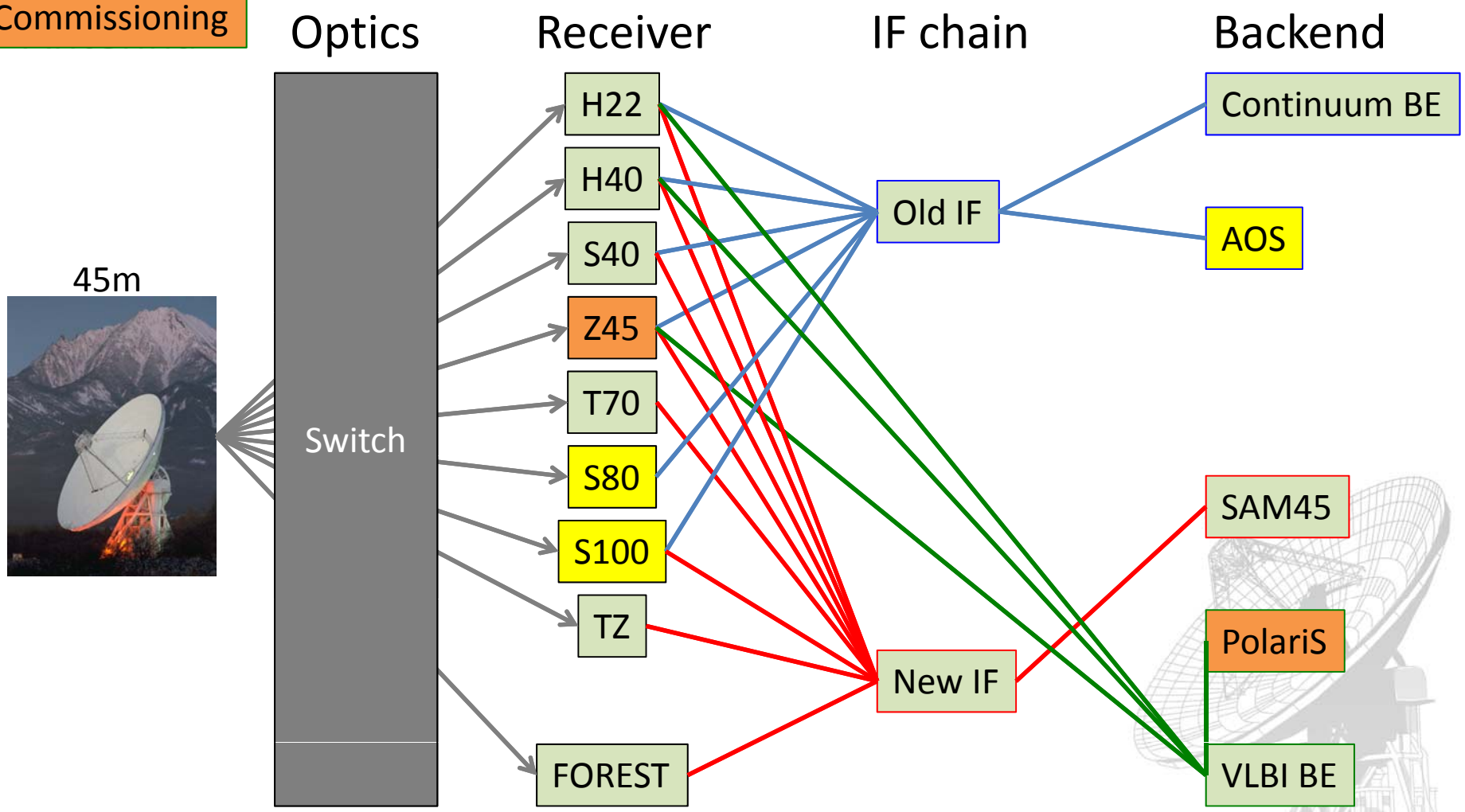
NINS National Institutes of Natural Sciences

OPEN USE

Internal Use

Commissioning

3.1.1. 2015-2016 System

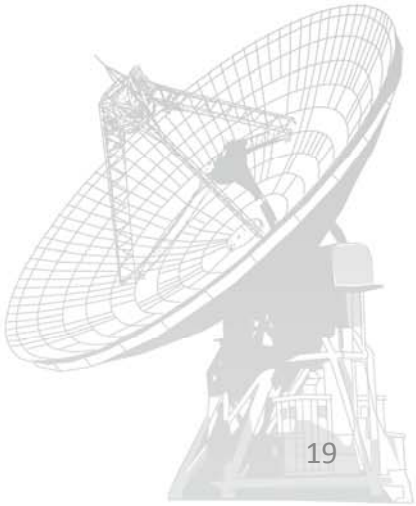


NOBEYAMA

国立天文台 NAOJ NINS National Institutes of Natural Sciences

3.1.2. Overview

- Observed less than last season in 2015-2016 season
- S80/S100/AOS was decommissioned, but FOREST officially open in 2015-2016 season
- Remote Observations from Mitaka available
- Proposal Categories
  - General
  - Short
  - Backup



NOBEYAMA

国立天文台 NAOJ NINS National Institutes of Natural Sciences

3.1.2. Overview

FY	2013	2014	2015
Open-use	1974	2231	1862*
Internal	2123	2132	2532+
Total	4097	4353	4394

[hours]

* Less compensation by 200 hrs because of higher performance. Less short programs by 100 hrs. 100 hr downtime assumed. In total 400 hr less than planned.

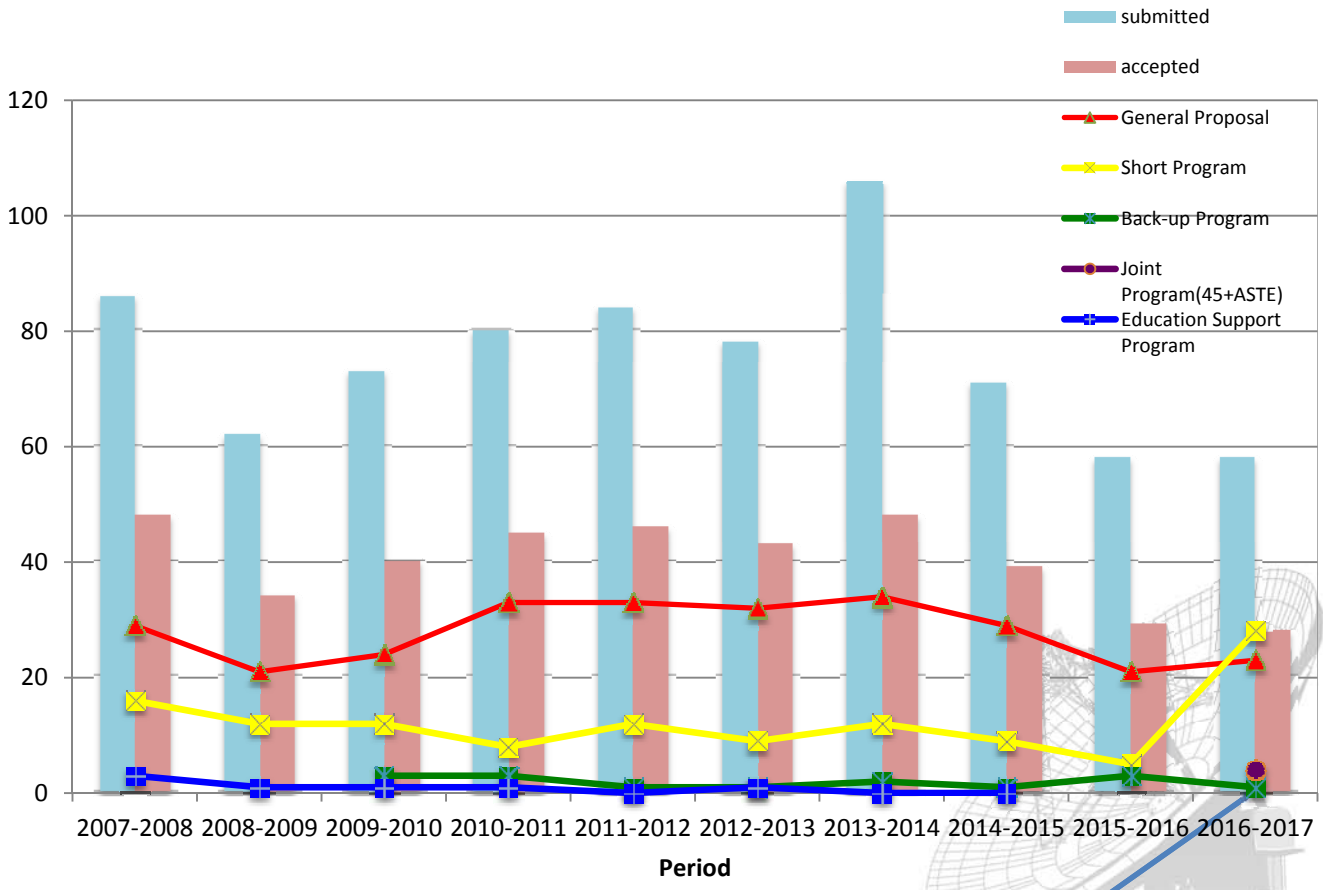
+ maintenance/commissioning 642 hr (FOREST+spectral window)

+ internal/legacy 1890 hr

3.1.3. Proposals 2015-2016

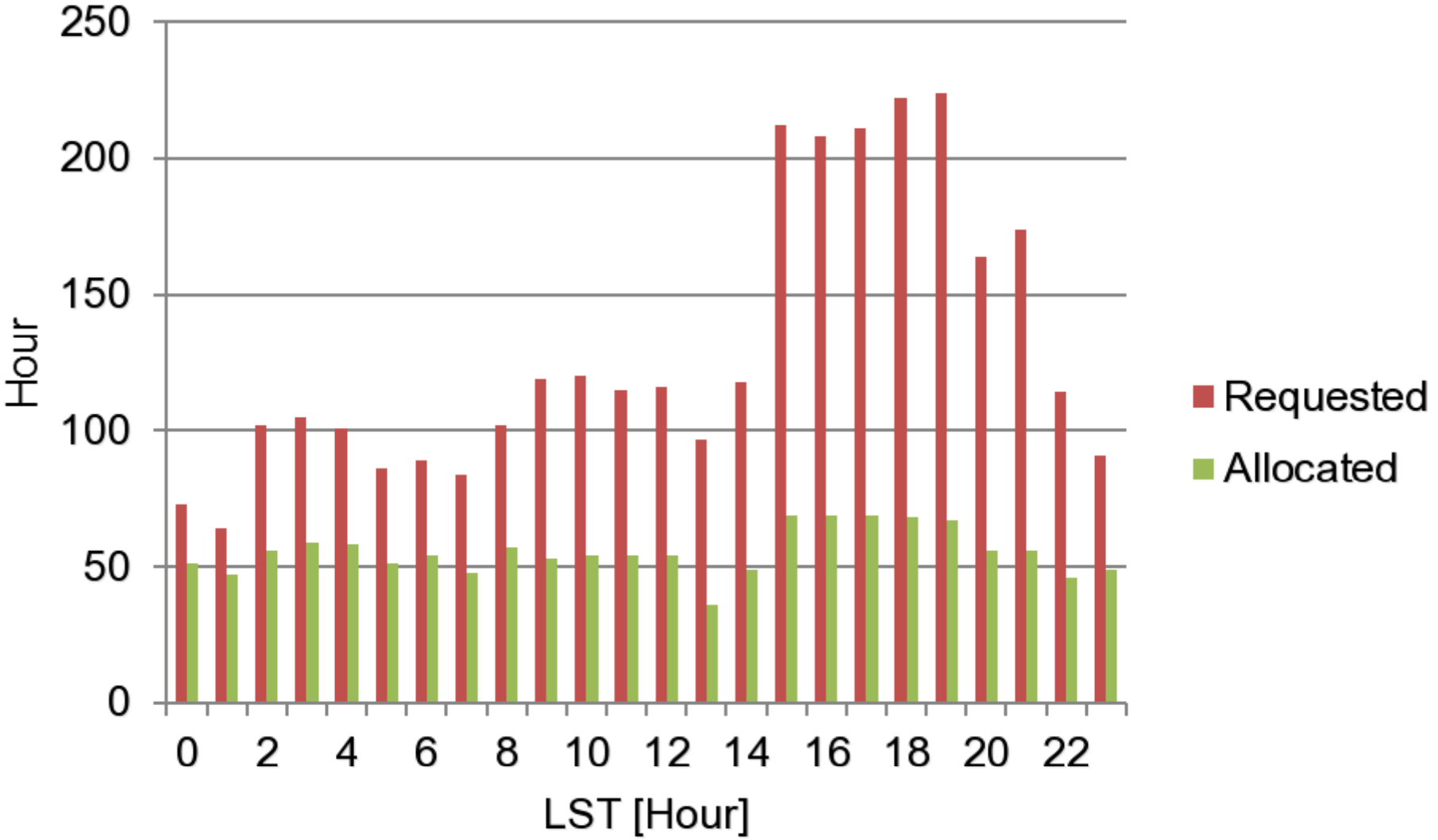
2015-2016 (FOREST open)

Category	Submit	accept
General 1st	25	12
General 2nd	21	8
Short	9	5
Backup	3	3



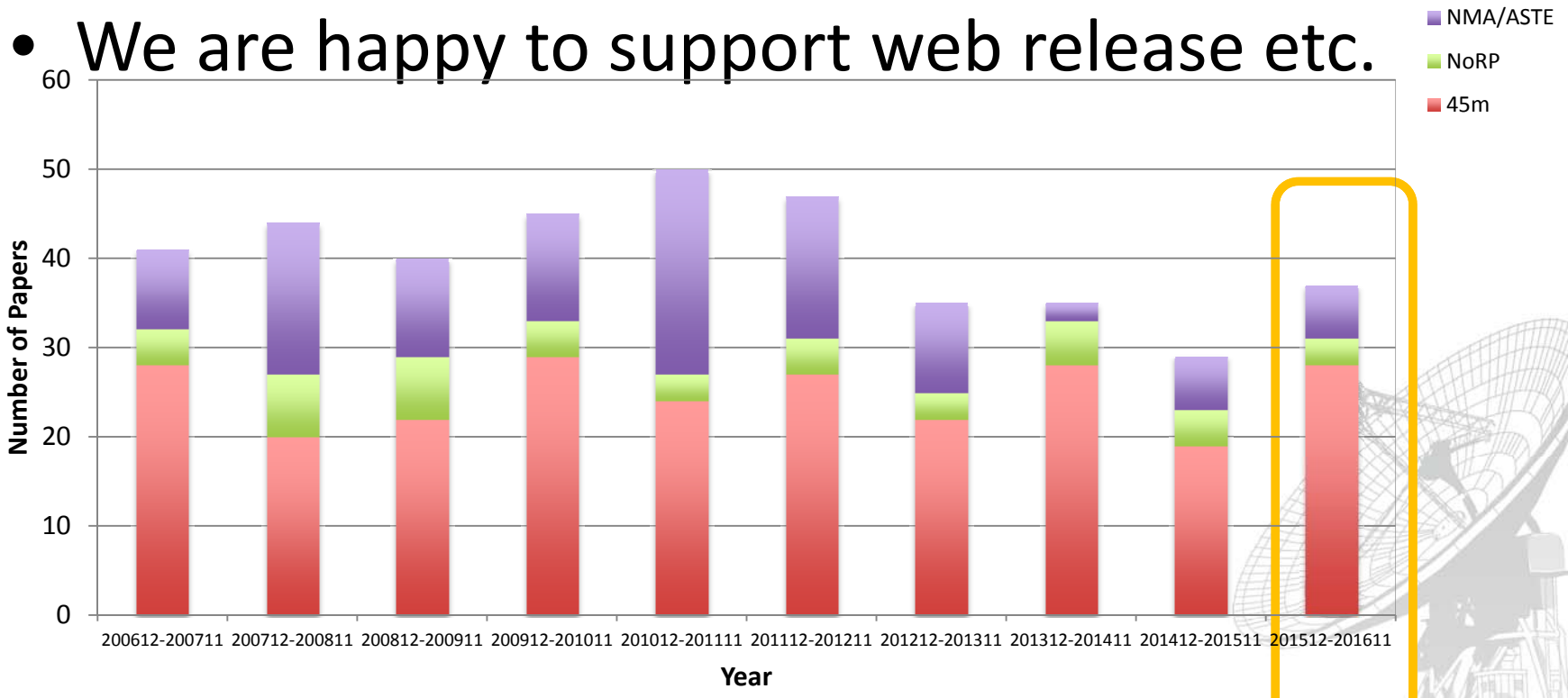
Without accepted short program

3.1.4. LST Pressure



3.1.5. Open-use: Publications

- Please let us know when you publish with NRO data
- We are happy to support web release etc.



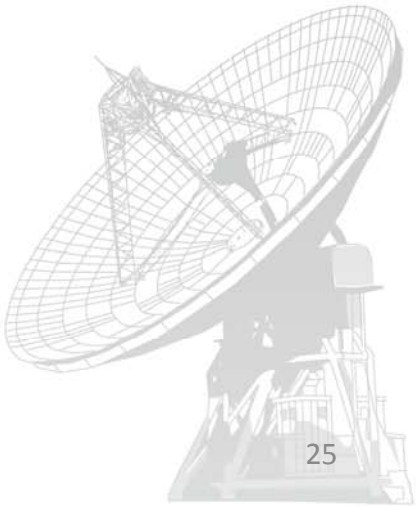
NOBEYAMA

国立天文台 NAOJ NINS National Institutes of Natural Sciences

3.2 Open-Use 2016-2017

TAC

- Chair: Shigehisa Takakuwa (Kagoshima Univ.)
- Shih-Ping Lai (NTHU/Taiwan)
- Woojin Kwon (KASI/Korea)
- Yoichi Tamura (U. Tokyo)
- Shinya Komugi (Kougakuin U.)
- Aug 29th, 2016 (1st meeting)



3.2.1. New Review System

- Provide scientific merit (Large/DDT)
- Make synergy between NRO45m and ASTE (Joint)
- Common TAC and referees for NRO45m and ASTE
- Call for proposal at the same time
- Proprietary period of 18 mo clearly mentioned

	NRO 45m telescope	ASTE
General	Once	Twice
Short	Once	N/A
Large*	Once (> 200 hr up to 2 yrs)	under consideration
DDT+	Every two months	Every two months

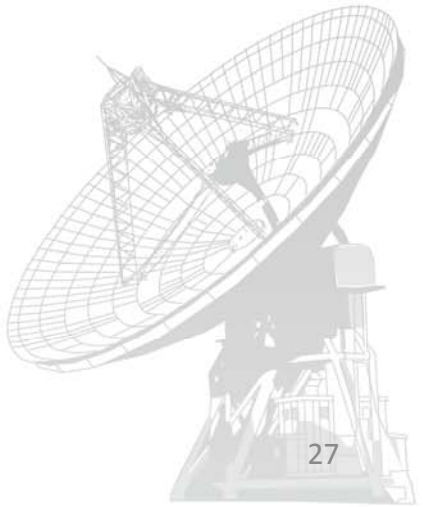
NOBEYAMA

国立天文台 NAOJ

NINS National Institutes of Natural Sciences

3.2.2. Changes from last season

- 2300 hrs for open-use including VLBI
- FOREST open with nearly full capabilities
- Spectral Window Mode (see next page)
- S40 not open, but Z45 open in total power mode
- Q. How much proposal info should be public after proprietary period?
  - Title
  - PI
  - Instrument
  - Spectral info (Line, $\Delta\nu$)
  - Abstract

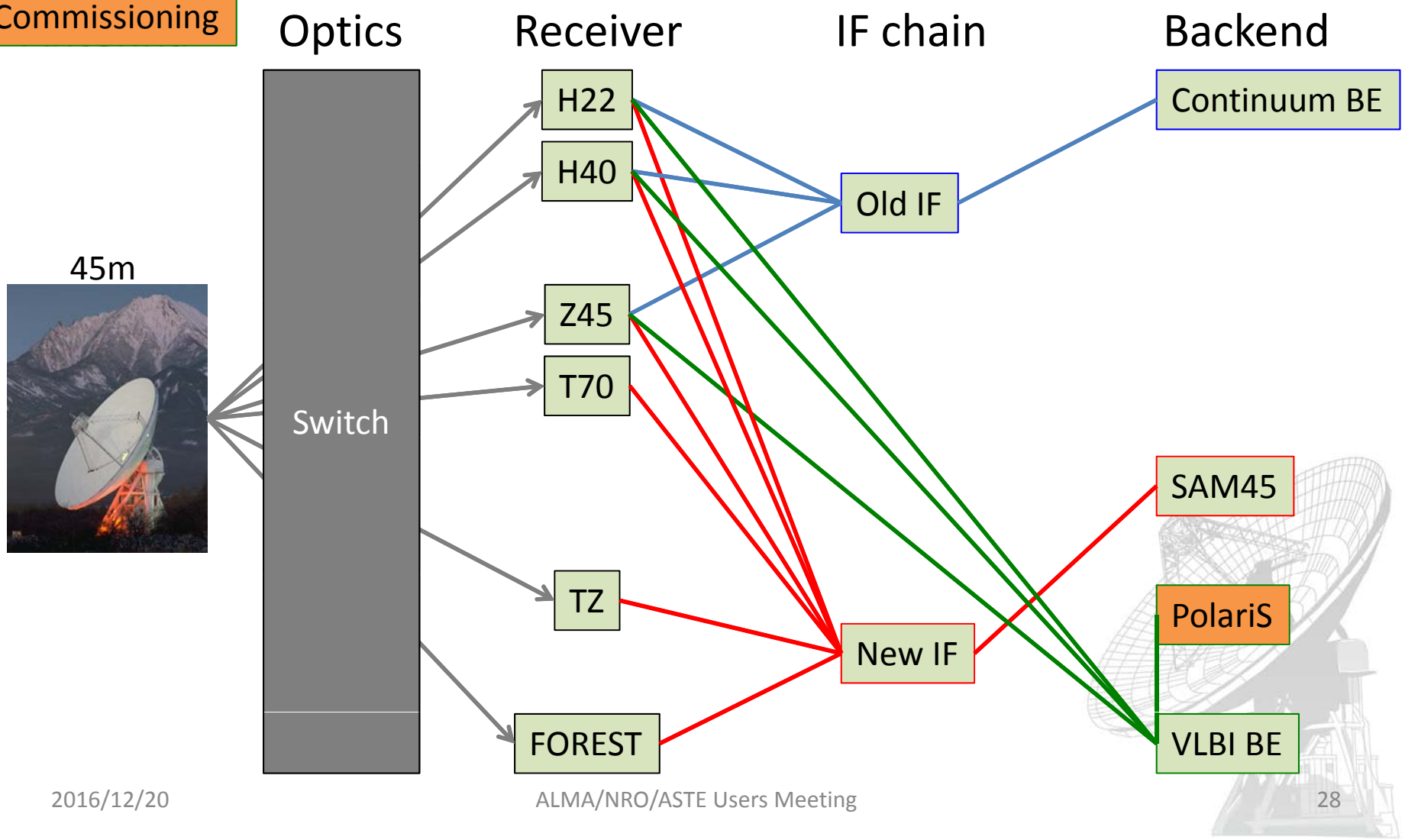


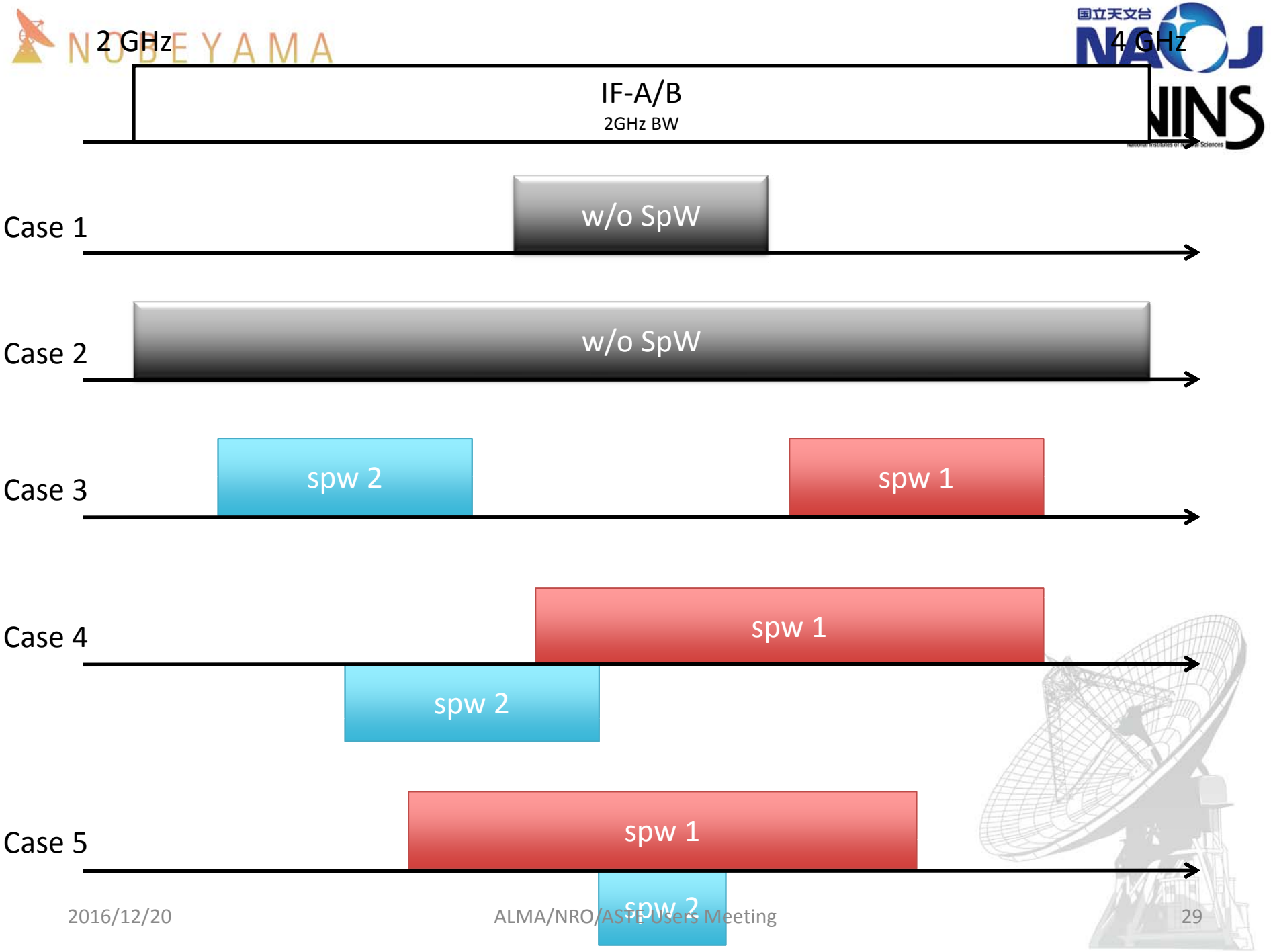
NOBEYAMA

3.2.3. 2016-2017 System

OPEN USE

Commissioning




2 GHz
4 GHz
IF-A/B
2GHz BW
Case 1
w/o SpW
Case 2
w/o SpW
Case 3
spw 2
spw 1
Case 4
spw 1
spw 2
Case 5
spw 1
spw 2

NOBEYAMA

国立天文台 NAOJ

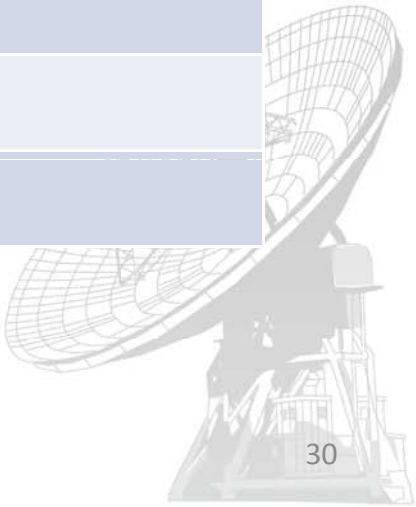
NINS National Institutes of Natural Sciences

3.2.4. Open-Use: Proposals

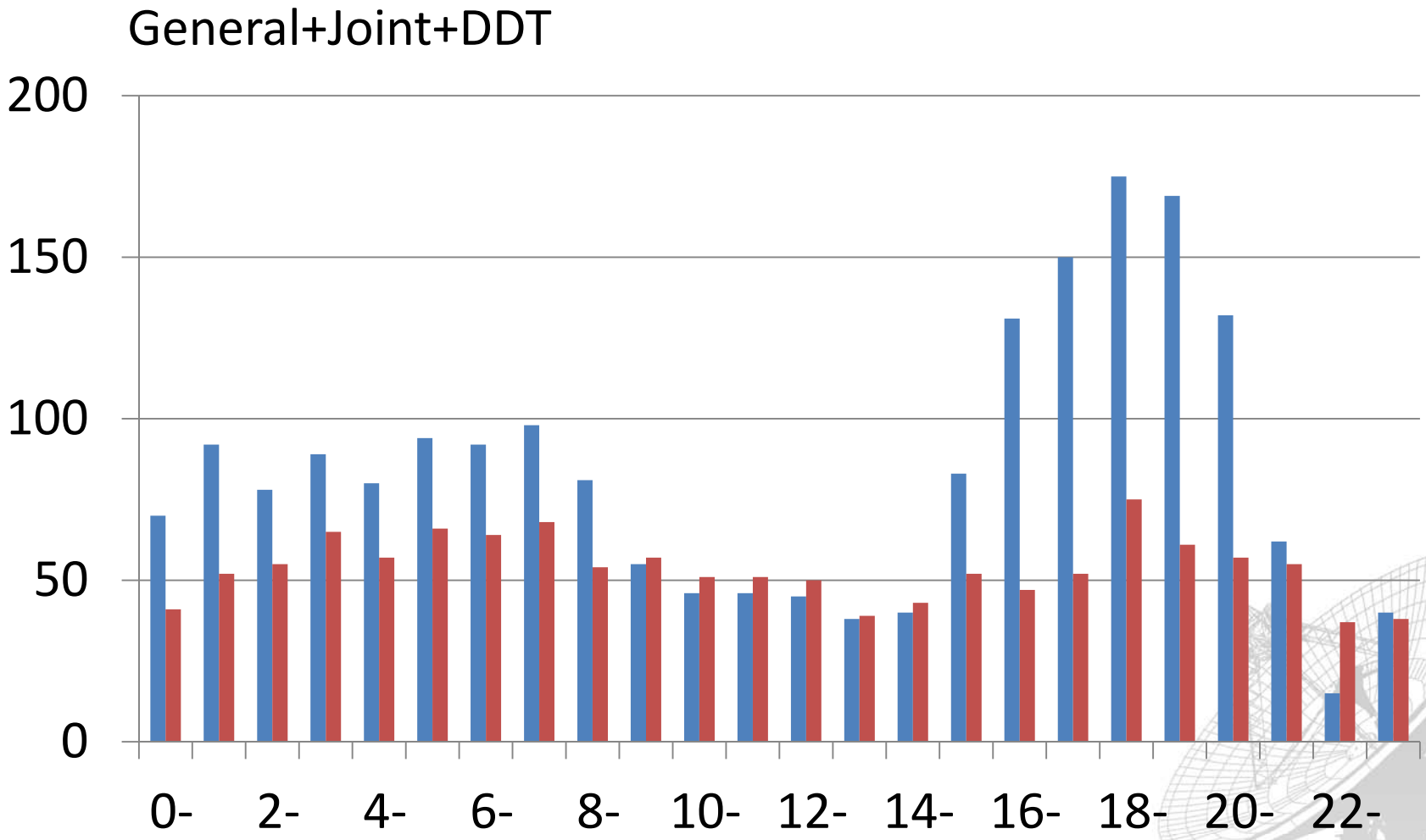
2016-2017 (2015-2016)

Category	Submit	accept
General	29 (46)	23 (20)
Joint	6 (-)	4 (-)
Short	28 (9)	- (5)
Backup	1 (3)	1 (3)
Large > 200 hr	0 (-)	0 (-)
DDT*	2 (-)	1 (-)
Total	65 (58)	29+ (28)

FOREST (submitted) 10 -> 31



3.2.5. LST range distribution



NOBEYAMA

国立天文台 NAOJ NINS National Institutes of Natural Sciences

4. Summary

- NRO aims at being scientifically competitive.
  - Provide good open-use programs
  - Better Observing Efficiency
  - Simplify and Ease Observing Cycle
  - More hours go to open-use in 2017-2018 season
- NRO and ASTE joint operation
  - New TAC system including Joint, Large, and DDT proposals started