

EAVNステータス報告

水沢VLBI観測所ユーザーズミーティング

2018/9/25-26

秦 和弘



The East Asian VLBI Network

(Image Credit: Reto Stöckli, NASA Earth Observatory)

- 6.7 GHz
- 8 GHz
- 22 GHz
- 43 GHz

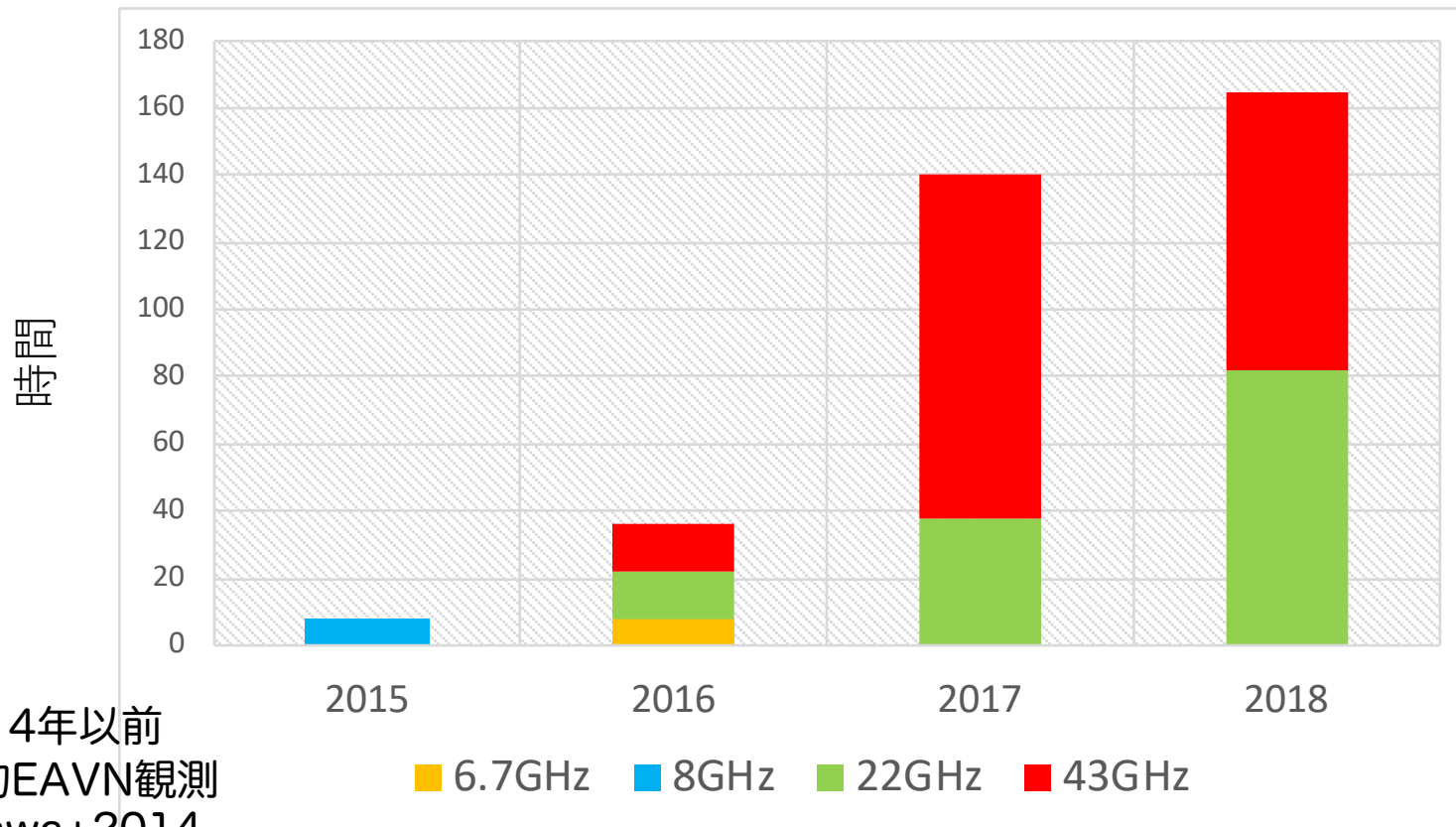
今年の活動

Year	2016	2017	2018	2019	2020
Actions	<ul style="list-style-type: none"> Imaging tests Science commissioning observations at 22/43 GHz Fringe tests at 6.7 GHz Launch of EAVN Science WG 	<ul style="list-style-type: none"> Performance evaluation and science commissioning at 6.7/22/43 GHz Practice of the array operation (scheduling, telescope operation, data handling, etc.) 	<ul style="list-style-type: none"> (Late 2018) Risk-shared open use at 22/43 GHz Performance evaluation at 6.7 GHz Performance evaluation of 2 Gbps mode 	<ul style="list-style-type: none"> (Late 2019) Risk-shared open use at 6.7 GHz (Late 2019 or early 2020) Risk-shared open use of 2 Gbps mode Performance evaluation for extending observation modes (8 GHz, 2-pol., etc.) 	<ul style="list-style-type: none"> (Late 2020) Risk-shared open use of dual-polarization mode Test observation at low frequencies (< 5 GHz)
Freq.	6.7/22/43 GHz	6.7/22/43 GHz	6.7/22/43 GHz	6.7/8/22/43 GHz	(1.6/2/5/) 6.7/8/22/43 GHz

K. Wajima

- EAVN共同利用開始 (22GHz, 43GHz, 1Gbps)
 - Status report, proposal form, website, 運用体制, サポートチーム
- EAVN campaign等に基づくアレイ性能拡張、評価、サイエンスデモ継続

EAVN(試験)観測時間の推移



※2014年以前
先駆的EAVN観測
Fujisawa+2014
Sugiyama+2016
Cho+2017

“EAVN” → KVN+VERA+最低1つの中国局 or JVN局
(今井さんHINOTORI関係は含まれていない)

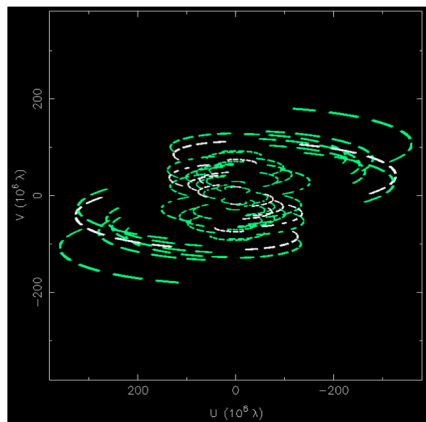
EAVN campaign 2017

Obs. Code	Date	UT time	Target	Freq.	KaVA	Tian ma	Uru mqi	NRO	Hita chi	Kashi ma	Sejo ng	Medi cina	Noto
a17071a	3/12	18:55 – 00:55	SgrA	Q	●	×							
a17077a	3/18	12:45 – 19:45	M87	K	●	●	●		●	○			
a17078a	3/19	11:40 – 18:40	M87	Q	●	●							
a17086a	3/27	13:10 – 23:10	M87+SgrA	Q	●	●							
a17093a	4/3	13:20 – 23:20	M87+SgrA	K	●	●	●		●	○		●	●
a17094a	4/4	12:35 – 22:40	M87+SgrA	Q	●	●							
a17099a	4/9	12:20 – 22:20	M87+SgrA	Q	●	●		●					
a17104a	4/14	12:00 – 22:00	M87+SgrA	Q	●	●							
a17107a	4/17	11:45 – 18:45	M87	K	●	●	●		●	○	×	●	●
a17108a	4/18	11:40 – 21:45	M87+SgrA	Q	●	●							
a17114a	4/24	09:20 – 16:20	M87	K	●	●							
a17115a	4/25	09:15 – 16:15	M87	Q	●	●							
a17116a	4/26	15:55 – 21:55	SgrA	Q	●	●					×		
a17130a	5/10	08:20 – 17:20	M87	K	●	●							×
a17131a	5/11	08:15 – 17:15	M87	Q	●	●							
a17145a	5/25	14:00 – 20:00	SgrA	Q	●	●							
a17146a	5/26	07:15 – 16:15	M87	Q	●	●							

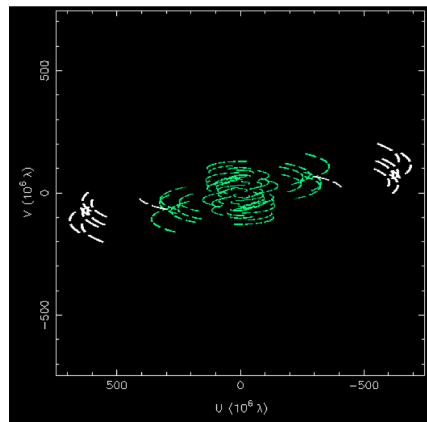
EHT 2017

- : Fringes detected
- × : Fringes not detected
- : Correlation not made yet

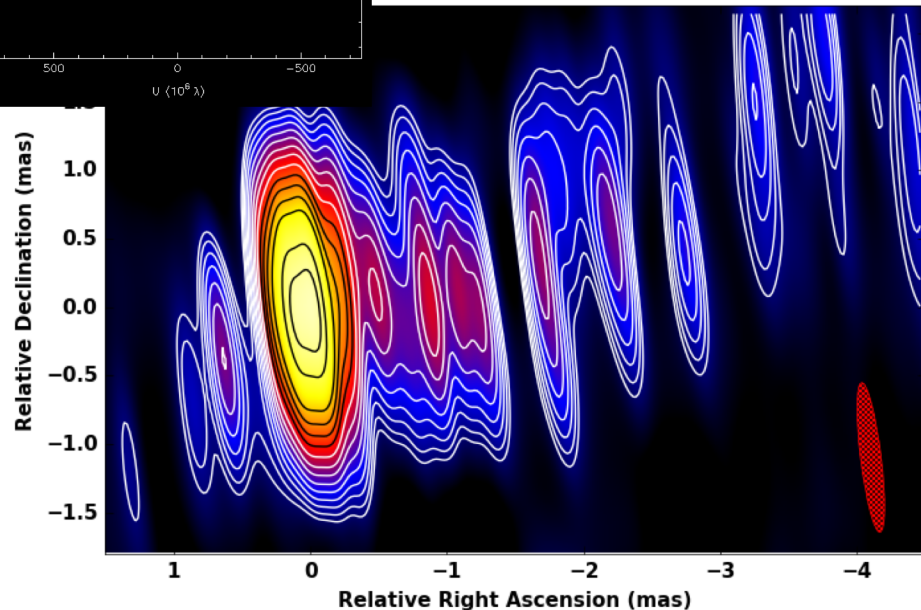
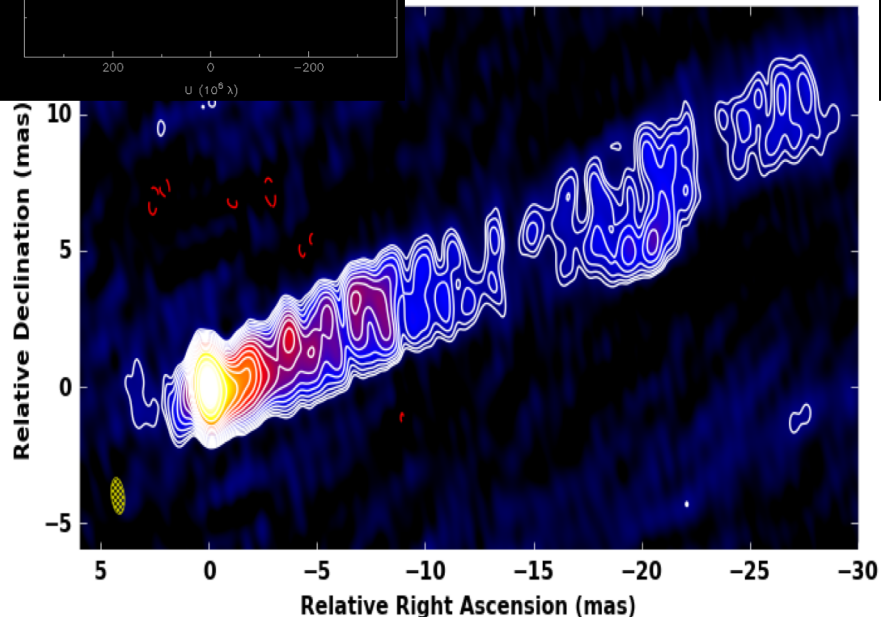
EAVN images of M87 (22GHz)



KaVA+
Tianma+
Urumqi+
Hitachi
(2017/Mar/18)



KaVA+
Tianma+
Urumqi+
Hitachi+Medicina
(2017/Apr/17)



More results & paper plans
=> Kino-san, Cui-san

EAVN campaign 2018

Obs. Code	Date	UT time	Target	Freq.	KaVA	Tianma	Urumqi	NRO	Hitachi	Takahagi	Medicina
a18068a	3/9	13:20 – 20:20	M87	K	●	●	●				●
a18069a	3/10	12:15 – 19:15	M87	Q	●	●					
a18085a	3/26	12:45 – 19:45	M87	K	●	●	●				●
a18087a	3/28	11:05 – 18:05	M87	Q	●	●					
a18088a	3/29	17:45 – 23:50	SgrA	Q	●	●					
a18100a	4/10	10:45 – 22:45	M87+SgrA	K	●	●	●	●	●		
a18101a	4/11	10:40 – 17:40	M87	Q	●	●					
a18110a	4/20	10:35 – 22:35	M87+SgrA	K	●	●	●	●	●	●	●
a18111a	4/21	10:00 – 22:00	M87+SgrA	Q	●	●					
a18117a	4/27	09:35 – 21:35	M87+SgrA	Q	●	●		●			
a18118a	4/28	10:00 – 22:00	M87+SgrA	K	●	●	●		●	●	●
a18123a	5/3	09:15 – 21:15	M87+SgrA	Q	●	●					
a18124a	5/4	08:10 – 16:10	OJ+CenA	Q	●	●					
a18127a	5/7	08:25 – 20:30	M87+SgrA	Q	●	●		●			
a18128a	5/8	08:25 – 20:25	M87+SgrA	K	●	●			●	●	●
a18140a	5/20	14:30 – 20:30	SgrA	Q	●						
a18141a	5/21	07:40 – 14:40	M87	K	●				●	●	
a18143a	5/23	02:00 – 22:05	Mrk501+	K	●				●		●

● TeV flare M87
● EHT 2018

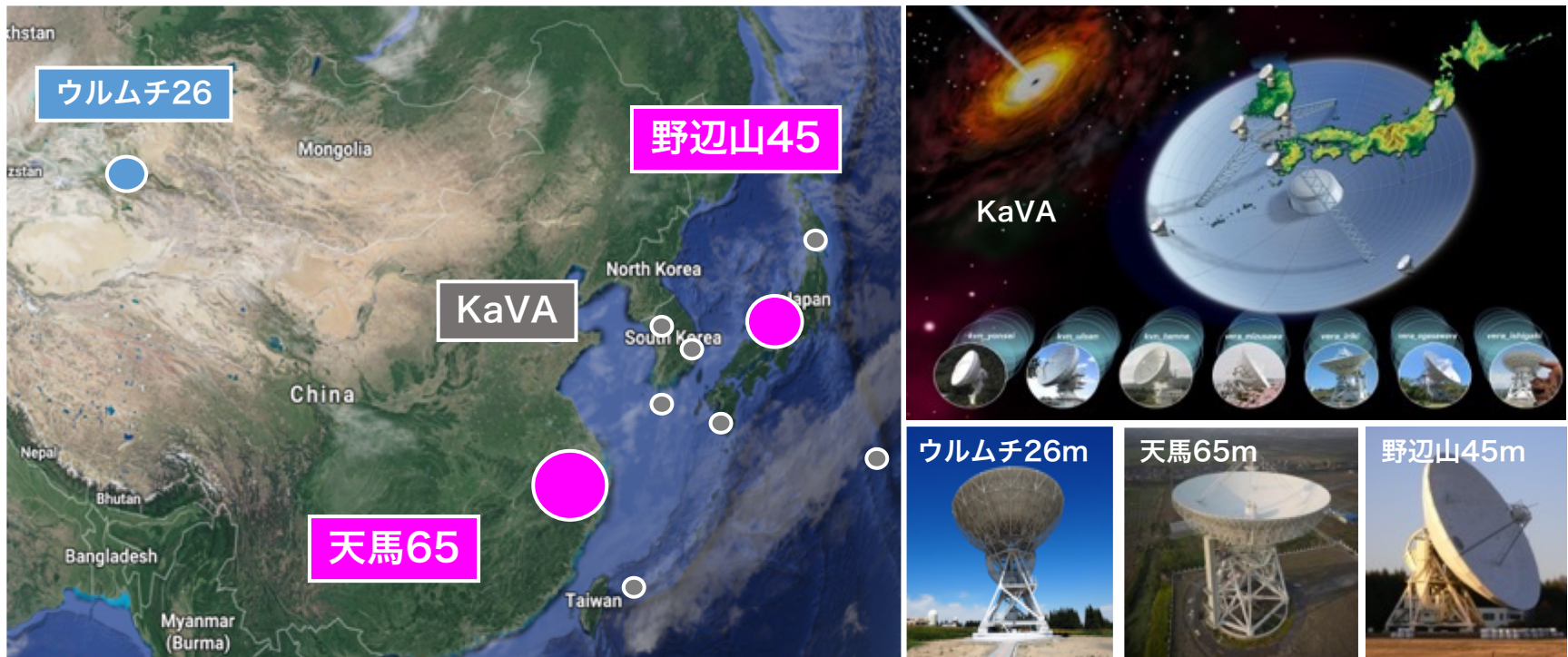
Total 13 stations. K-band: 8 epochs, Q-band: 10 epochs

Correlation finished: 068a, 069a, 087a, 101a, 111a, 123a, 124a, 140a

EAVN Workshop 2018, Sep/4-9, 平昌



EAVN 共同利用観測スタート 2018B



- 2018年後期 (2018年10月~2019年1月初旬)
- 22GHz: KaVA+天馬
- 43GHz: KaVA+天馬+野辺山
- KaVA公募時間(250時間/半年)のうち100時間をEAVN枠 (野辺山は50時間)
- 記録: 1Gbps
- 全世界から提案募集。Large Programのみウルムチも提案可

EAVN 2018B 結果

- Submitted
 - 6件 (うち1件LP) , 全てAGN , 136hr
 - K 2, Q 1, K+Q 3 (74hr@K, 62@Q)
 - 日本 3, 韓国2, 米国1
- Approved
 - 5件 (うち 1 件LP) , 98hr (54@K, 44@Q)
 - KaVA+TM: 4件 60hr
 - KaVA+TM+NRO: 3件 26hr
 - KaVA+TM+NRO (LP): 1件 12hr
 - ウルムチ結果は？

Summary of Total Time Requested/Approved

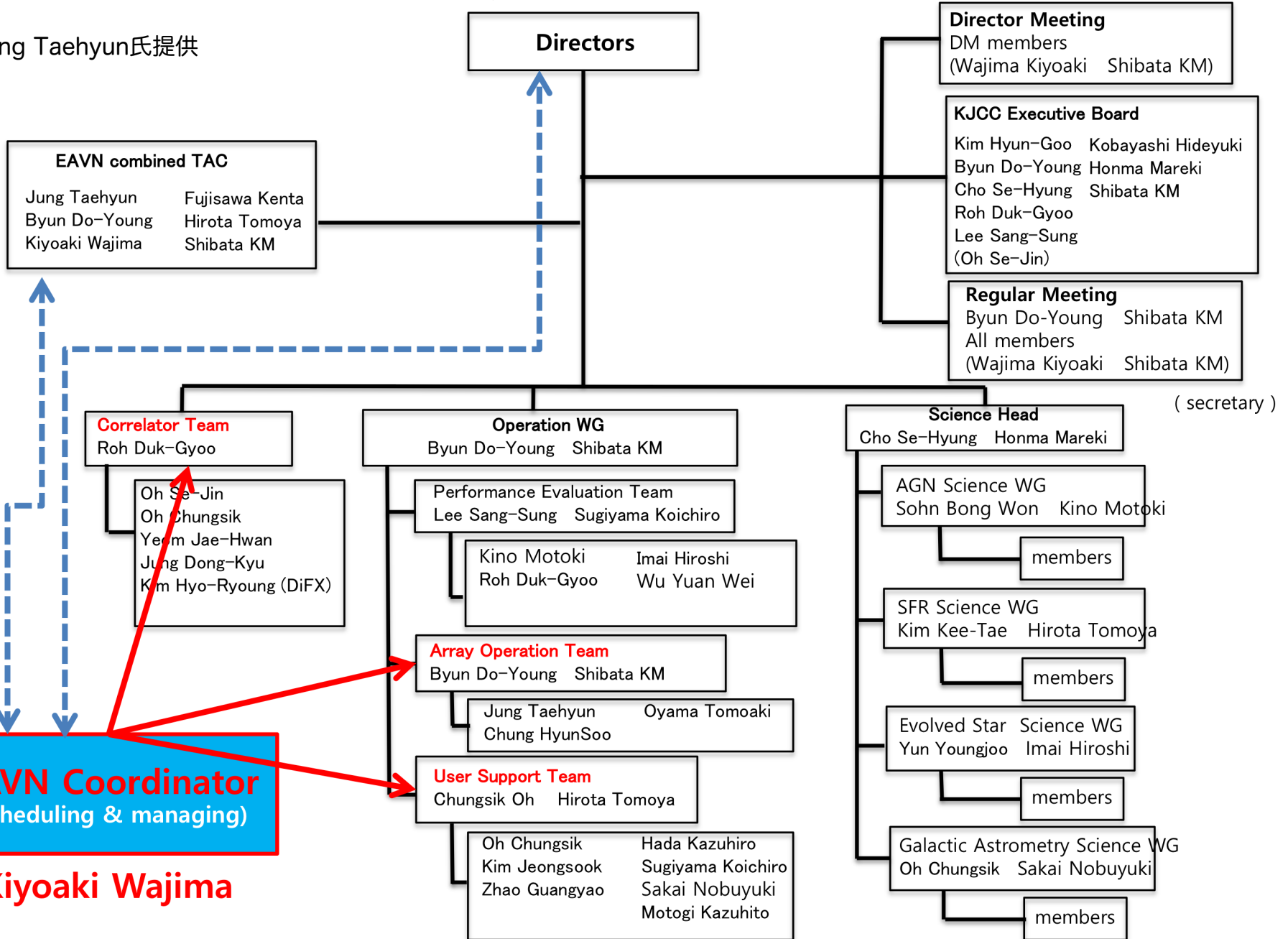
Array	Category	Time requested/approved									
		KaVA			Tianma			Nobeyama		Nanshan	
		K	Q	OSR	K	Q	OSR	Q	OSR	K	OSR
EAVN	Total	74/ 54	32/ 32	1.06	74/42	62/56	1.36	62/38	1.24	51/**	0.51
	GOT	74/ 54	32/ 32		74/42	32/32		32/26		–	
	LP	(0)	(30)†		0/ 0	30/12		30/12		51/**	
KaVA	Total	205/157	213/133		–	–		–		–	
	GOT	111/ 63	189/109	2.00	–	–		–		–	
	ToO	94/ 94	24/ 24		–	–		–		–	

輪島氏
提供

EAVN Organization Chart (Draft)

March 20, 2018

Jung Taehyun氏提供



EAVN Coordinator
(scheduling & managing)

Kiyooki Wajima

Summary of Responsible Person

Jung Taehyun 氏
提供

Roles	SHAO	XAO	VERA	KVN	KJCC
Scheduler at each telescope	Jiang Wu	Lang Cui	K.M. Shibata	Hyun-Soo Chung	-
EAVN .key file for SCHED	Jiang Wu	-	Kazuhiro Hada	Jeongsook Kim	-
Vex check	Jiang Wu & Bo Xia	Lang Cui	K.M. Shibata NRO45: N. Sakai	Jeongsook Kim	-
User Support Team (Support Scientist)(1)	Jiang Wu	Lang Cui	Tomoya Hirota Nobuyuki Sakai Kazuhiro Hada Sugiyama (D. Sakai)	Chungsik Oh Guangyao Zhao Jeongsook Kim	-
Diskpack preparation & (e-)shipping(2)	Jiang Wu & Bo Xia	Lang Cui	each site	each site	-
Observation contact(3)	Jiang Wu & Bo Xia	Lang Cui	K.M. Shibata (AOC) NRO45: N. Sakai	KVN AOC	-
Correlation Contact	Wu Jiang	-	T. Oyama	-	Dong-Kyu Chung
Correlated Data Quality Analyzer	Wu Jiang	-	-	-	Se-Jin Oh Chungsik Oh Jungsook Kim
EAVN homepage	-	-	-	-	Jae-Sik Shin

(1) A representative one should be decided to manage UST, status report and homepage

(2) Diskpack delivery from SHAO to XAO: KJCC will ship diskpacks to SHAO, not XAO. KJCC prepare necessary diskpacks and e-shipping capability

(3) Observation log & feedback upload on the webpage, telescope calibration and its logs (pointing, Tsys/opacity, antenna gain, ANTAB)

A responsible person from VERA also in charge of NRO observation/feedback(i.e. schedule, drudge, log, ANTAB)

Oter Issues	Note
Observing Mode (fixed)	<ul style="list-style-type: none"> 1Gbps : (1) 32MHz x 8 Channel, (2) 16MHz x 16 Channel Above two versions of example .key files for each FIXED setup is prepared
To DO LIST	<ul style="list-style-type: none"> Sample VEX file for EAVN/KaVA (EAVN: Hada, KaVA 2Beam+FS → N. Sakai KaVA C2 vex sample → G. Zhao, NRO45m → need to make schedule for NRO45m → Hada Need to update the station information (KVN (position & Rx) updates → Jung, VERA position update → Hada) → new .key & location*.dat station*.dat file Station logs & antab (+image) uploading FTP → to open to SHAO/XAO, then direct link from the feedback page log/antab etc. EAVN observing guidelines Jaesik Shin's email notice

EAVN 2019A

- 期間: 2019/1/15 – 2019/6/15
- KaVA公募時間のうち100時間をEAVN枠 (野辺山は50時間)
- 周波数と参加局:
 - 22GHz: KaVA, 天馬, 野辺山, ウルムチ
 - 43GHz: KaVA, 天馬, 野辺山
- 記録: 1Gbps (256MHz帯域)
- 偏波: LHCP
- その他
 - ToO不可
 - サブアレイ可 (KaVA7局は必須)
- 提出締切: 11月1日 08:00 UT
- 春のEHTキャンペーン (もし実施する場合) :
 - 天馬・ウルムチ: 上記の公募時間の枠外で実施。別途個別に天馬・ウルムチ局にそれぞれプロポーザルを提出してもらう
 - 野辺山: 上記の公募時間の枠内で実施。今回の締切に提出必須

Table 9: Baseline sensitivity of EAVN.

	K-band					Q-band			
	KVN	VERA	TM65	NRO45	NS26	KVN	VERA	TM65	NRO45
KVN	6.1	7.7	1.7	2.8	3.2	9.1	13.6	2.2	5.2
VERA	–	9.7	2.1	3.6	4.1	–	20.2	3.2	7.8
TMRT65	–	–	–	0.8	0.9	–	–	–	1.2
NRO45	–	–	–	–	1.5	–	–	–	–

※ 単位はmJy. 帯域256MHz, 120sec積分

Table 10: Image sensitivity of EAVN.

Array	N_{ant}	N_{bl}	K-band	Q-band
KVN	3	3	320	480
VERA	4	6	360	750
KaVA	7	21	155	268
KaVA+TMRT65	8	28	60	85
KaVA+NRO45	8	28	89	169
KaVA+TMRT65+NRO45	9	36	42	65
KaVA+TMRT65+NSRT26	9	36	44	–
KaVA+TMRT65+NSRT26+NRO45	10	45	35	–

※ 単位はmicroJy/beam. 帯域256MHz, 4時間積分

まとめ

- 2018BよりEAVNが本格稼働・共同利用開始
- 2019Aよりウルムチも定常参加
- EAVN campaign
- JVN, 水沢開発GP, KJCCの皆様の多大なるサポート
 - EAVN with 茨城の観測も準定常的に信号検出
- 短期的(~1年)拡張項目
 - EAVN 6.7GHz
 - ウルムチ43GHz
 - 偏波, 2Gbps, KQ同時
 - EU, AU等との協力 (=> Global VLBI足がかり)

EAVN web site

Radio Astronomy Division Homepage Login

East Asian VLBI Network

[Main](#) [About EAVN](#) [Activity](#) [Proposal](#) [Feedback](#) [Status report](#) [Go to KaVA](#)

Welcome to EAVN

Upcoming Meetings

- [EAST ASIAN VLBI WORKSHOP 2018 \(4-7 September 2018, PyeongChang, Korea\)](#)
- [2018 Radio Telescope User's Meeting](#)

The very long baseline interferometry (VLBI) technique offers angular resolutions superior to any other instruments at other wavelengths, enabling unique science applications of high-resolution imaging of radio sources and high-precision astrometry. The East Asian VLBI Network (EAVN) is a collaborative effort in the East Asian region.

The EAVN currently consists of 21 telescopes with diverse equipment configurations and frequency setups, allowing flexible subarrays for specific science projects. The EAVN provides the highest resolution of 0.5 mas at 22 GHz, allowing the fine imaging of jets in active galactic nuclei, high-accuracy astrometry of masers and pulsars, and precise spacecraft positioning. The soon-to-be-operational Five-hundredmeter Aperture Spherical radio Telescope (FAST) will open a new era for the EAVN.

This state-of-the-art VLBI array also provides easy access to and crucial training for the burgeoning Asian astronomical community.

- EAVNスペック、プロポーザル、観測ログ、相関処理ログ、ニュース等
- 随時アップデートしていく予定