M2O Telecom, No. 23

New ATNF and EVN proposals: 4 Proposals in total. See Reports for details on VLBI proposals.

New data From KaVA observations of G034.196-0.592 and G35.200.74, both well detectrd, see Reports.

EVN mini Symposium abstracts accepted: At least 4 contributions were accepted from our group. Titles and speakers are listed in the Reports

VLBA proposal TAC result: granted 48 hrs (2x events, 3x epochs each, 8hrs each) with a score of 0.59 (where 0 is a high score, 10 is a low score). This is better than our previous ranking of 1.82 which implies that the committee are satisfied with the new results shown in the updated proposal's resubmission.

New maser flares: None reported this month

1 Activity since the previous Telecom

- **SamePage:** +1 member: Callum Macdonald (UTAS), total 77 members.
- **Papers accepted:** +0; Total: 16
- **Papers in revision:**
  A.E. Volvach, L.N. Volvach, M.G. Larionov, "Composite powerful short flare of water maser in young binary system IRAS 16293-2422"
  MacCarthy et al., ATCA observations of the G24 and G359 methanol maser flare events.
- **Updates on papers in prep:**
  - Bayandina et al., VLA masers in G358, first draft ready
  - Burns et al., 6.7 GHz VLBI movie in G358. Drafting and further analyses (see Telecom18 Report)
  - Burns et al., VLBI maps of rare maser lines in G358. (See Telecom15 Report)
  - Orosz et al., 7.6 and 7.8 GHz methanol masers in G358, aiming for ApJL
  - Hirota et al., G24.33+0.14 ALMA follow-up; pre- and post- flare phases. (see Telecom 20 Report)
  - Kobak et al., VLBI images and SD monitoring of G24.33 during the maser flare(s).
  - Gray et al., Two additions to the maser flare series: compression and skyplane overlap scenarios.

- **M2O targets:**

Name	Maser [GHz]	Pre-burst Flux [Jy]	Max Flux [Jy]	Current Flux [Jy]	Reported by	Reobserved by	Status
G359.617-0.251	6.7	120	200	90	Yonekura	Ib, Hh,	decreasing
Orion S6	6.7	3.1	9	2	Yonekura	Ib, Tr, Sz, Hh	variable
G85.411+0.002	6.7	12	95	80	Yonekura	Ib, Ef, Sz, Tr, Hh, Ky, Vs	decreasing
G33.641-0.228	6.7	-	236	60	Bringfried	Hh, Ib, Vs	eruptive
IRAS 16293-2422	22	-	30k	-	Sunada, Mc	Vr, Mc, Hh, Sz, Ib, Mc	-
NGC2071	22	1k	7k	920	Sunada, Hh	Vr, Hh, Sz, Ib	post-burst
G53.22-0.08	22	3	800	30	Sunada	Vr, Hh, Ib	post-burst
G358.93-0.03	6.7	5	1000	15	Yonekura	Hh, Ib	decreasing
G24.33+0.14	6.7	-	800	5	Torun	Hh, Ib, Vs, Mc	decreasing
G25.65+1.05	22	-	60k	2150	Volvach	Hh, Sz, Mc	post-burst
G034.196-0.592	22	-	120	120	Ladeyschikov	Sz, Oa, Hh, Mc	?
G35.200.74	22	600	4k	4k	Volvach	Sz, Hh, Ib	?

(Ib = Ibaraki) (Tr = Torun) (Sz = Simeiz) (Hh = HartRAO) (Ef = Effelsberg) (Ky = KVN Yonsei) (Vs = Ventspil) (Vr = VERA stations) (Mc = Medicina) (Ps = Puschino) (Oa = OAO-WFC)

- **New observing proposals:**
  EVN: Triggered ToO programme resubmission (PI: R Burns)
  Parkes, ATCA, LBA: South Triggered ToO trio resubmissions (PIs: J. Green, T. McCarthy, R Burns)

- **Active trigger proposals:**

Array	Code	Grade	Hours granted target x epoch x hour	Hours remaining	Active period	Resubmit deadline
EVN	EB083	1.2 / 5.0 (0 is best)	(3x2x8)x2 bands = 96	96	15/SEP/20 - 15/SEP/21	1/JUN/22 *
KaVA	EAVN21A-213	7.6 / 10.0 (10 is best)	2 x 1 x 8 = 16	16	16/JAN/21 - 15/JAN/22	15/NOV/21 #
EAVN	EAVN21A-214	8.3 / 10.0 (10 is best)	1 x 2 x 8 = 16	16	16/JAN/21 - 15/JAN/22	15/NOV/21 #
LBA	V581	4.1 / 5.0 (5 is best)	96	88	01/OCT/20 - 01/OCT/21	16/JUN/22 *
VLBA	BB418	1.82 / 10.0 (0 is best)	48	48	01/AUG/20 - 01/AUG/21	01/FEB/22 #
VLA	VLA/21A-035	[score]	12	12	[dates]	-
SOFIA	90053	[score]	3.46	3.46	[dates]	-
ATCA	C3321	[score]	50	50	[dates]	-
Subaru	S20B0051N	[score]	0.5*2 or 1 night	0.5*2 or 1 night	01/AUG/20 - 01/JAN/21	-
JWST	01906	1st quintile	24.9	24.9	Cycle 1	-

(*/#) New proposals already (submitted/accepted) for the following observing semester

- **Follow-up observations conducted (see Record Keeping):** None this month

2 Reports

Short reports on specific activities, please send me an email (ross.burns@nao.ac.jp) in advance if you have something to report in an upcoming telecom.

New KaVA data: R Burns

The latest epoch (a21d1b) of KaVA observations of the water maser flares in G034.196-0.592 and G35.200.74 have been correlated and delivered. A quick data check (using a ParselTongue pipeline I've developed for this purpose, I'm happy to share it if anyone wants to use it) shows that the water masers are both well detected (Fig 1). The continuum sources also look good. Overall these will be good data sets for investigating the water maser flares in these sources.

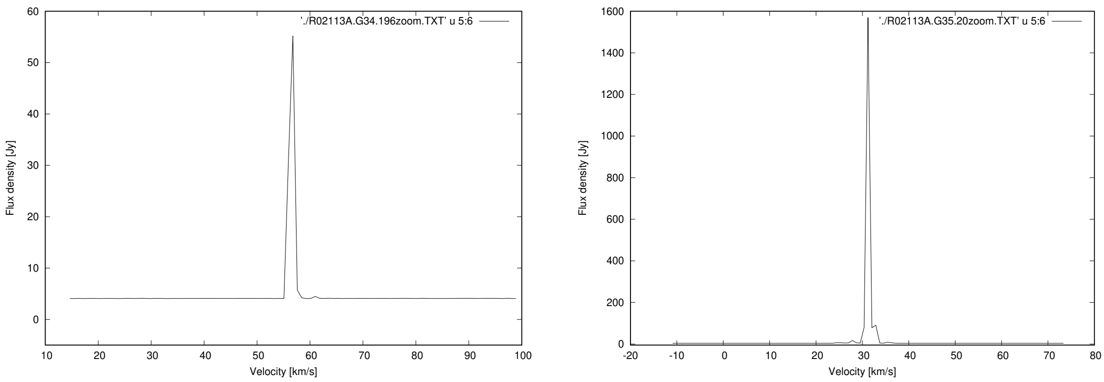

*Figure 1: 22 GHz water maser spectra of (*Left*) G034.196-0.592 and (*Right*) G35.200.74. Fluxes have been calibrated using a-priori gains and should be roughly accurate. These are scalar averaged cross-power spectra for KaVA and represent the final epoch of VLBI observations of these sources. See row numbers 51 to 55 in the Record Keeping "M2O follow-up data" for details of this campaign.*

EVN mini Symposium abstracts accepted: R Burns

The following abstracts were accepted, please put a notification on SamePage if yours is not listed here.

VLBI studies of accretion onto young massive stars: synergy with single-dish monitoring and submm/IR observations
(Talk)
A. M. Sobolev, R. Burns, O. Bayandina, M2O

Single base line interferomteter for mJy observations
(Poster)
Jānis Šteinbergs Artis Aberfelds, Vladislavs Bezrukovs, Karina Šķirmante, Artūrs Orbidans, Ivar Shmeld, Ross Burns

VLBI monitoring of the 6.7 GHz methanol masers during a high-mass protostellar accretion burst
(Oral)
Ross A. Burns, Tomoya Hirota, KeeTae Kim, Yoshinori Yonekura, Tanabe Yoshihiro, Koichiro Sugiyama, M2O Members

Recent activity of the Maser Monitoring Organisation
(Poster)
Ross A. Burns, M2O Members

New ATNF and EVN proposals: R Burns

Repeating our 2020 approach, three ATNF proposals: Parkes (PI: Jimi Green), ATCA (PI: Tiege McCarthy) and LBA (PI: R Burns) will be submitted. The LBA Science Justification is shown on the following pages. The EVN Triggerable ToO proposal has also been updated and resubmitted, the science justification is similar to that of the LBA proposal so I wont duplicate it here. See SamePage > Proposals.

1 Topic: Massive star formation

"High-mass" stars are those of at least 8 solar mass (M_o). Even though these stars represent fewer than 1% of stellar populations they are the main drivers of Galactic evolution and produce heavy elements above the atomic mass of Iron. However, there has never been a clear theory as to how high mass stars achieve their final masses [1]. While continuous disk-aided accretion has become accepted as a mechanism by which equitorial accretion flows can avoid the outwardly driven radiation pressure coming from the central high-mass young stellar object, the necessity of high continuous accretion rates are not backed up observationally by investigations of accretion tracers and luminosity.

Disk-aided 'episodic accretion' proposes that high-mass protostars gain their mass in short bursts of intense accretion, such as assimilating a large clump or spiral arm fragment from its circumstellar accretion disk, interspersed within longer low accretion rate periods which better reconcile the observed luminosities and tracers aforementioned. Simulations predict that accretion bursts are extremely rare events, typically occurring every 10^{3-4} yrs, with short, transient durations, typically a few years or less [2].

In addition to the rarity of events, high-mass stars form in deeply embedded environments which are not accessible to wavelengths shorter than near infrared (NIR). They are also few in number and often located at large distances in the Galactic plane, further making them difficult to observe at high spatial resolution, impeding efforts to test theory with observation.

To date there have been 3 published, observationally confirmed accretion bursts in high-mass protostars: S255IR-SMA1 [3], NGC6334I [4] and G358.93-0.03 [5]. **This new field of observational research has already revealed a *variety* of burst types [5]. Due to the small sample size the breadth and origins of this variety is yet to be discovered, and further, simulated predictions of disk composition, physical conditions and sub-structures [6] remain untested.**

2 Maser-traced accretion bursts

Maser emission is very sensitive to its environment [7]; a change in physical conditions can selectively favor or unfavor the pumping/sink mechanism of different maser transitions [8]. Consequently, maser flares have been identified as markers of accretion bursts, as was seen in S255IR-SMA1 [9; 10], NGC6334I [11], and G358.93-0.03 [12; 13], thus promoting maser observations as an accessible approach to investigating episodic accretion on the 10^{1-3} AU scales of disks and jets in high-mass protostars. VLBI is the only approach capable of truly resolving these regions while also being unhindered by extinction which effects the NIR and optical wavelengths.

The Maser Monitoring Organisation (M2O) was formed in order to maximise the identification of new maser bursts, and to arrange follow-up observations (see `masermonitoring.org`). The M2O community consists of an alert network of single-dish maser monitoring observatories, teams pursuing follow-up campaigns using a wide variety of spectral line and continuum facilities, and theorists who advise observers on how to maximise scientific output with their observations. When a single-dish observatory identifies a new maser flare, efforts are directed to intensive observational investigation of the astrophysical event.

2.1 M2O Case study: G358.93-0.03 accretion event

In January 2019 a flare of the 6.7 GHz methanol maser in G358.93-0.03 (hereafter "G358"), was reported by the Ibaraki 32m telescope [12; 14]. The initial G358 flare announcement lead to monitoring and various follow-up observations with a wide range of facilities and frequencies organised by the M2O [15; 16; 17; 13; 5; 18; 19]. The accretion burst has now been confirmed by infrared SED observations [20]. The case study below exemplifies the approach we advocate for ToO observations proposed here.

2.1.1 VLBI result: Heat-wave maser movie

The 6.7 GHz methanol maser line is a commonly used disk tracer [21; 22]. During the G358 accretion burst we carried out 6 VLBI observations of this transition spanning 9 months using a combination of the LBA, EVN and VLBA (see Fig 1). It was found that the methanol maser excitation region moves outward through the disk as a "heat-wave" [5] as thermal energy from the accretion activity dissipates to larger radii, which is traced by each consecutive VLBI epoch (Figure 2, *Left*).

By combining the results we produced a 'movie' of the heat-wave. The heat-wave was expanding at $\sim 5\%$ c at the early phases but suddenly slowed to about $\sim 1\%$ c, indicating a physical junction in the disk at a rasdius of 666 $\pm$30 AU (See Fig 2 *Left*), which is close to the expected methanol snow-line predicted by a radiative transfer model of this event [20]. The sudden transition implies that dust desorption beyond the snow line extracted energy from the heat-wave, causing slowing, and a two-phase expansion profile (Burns et al. in prep).

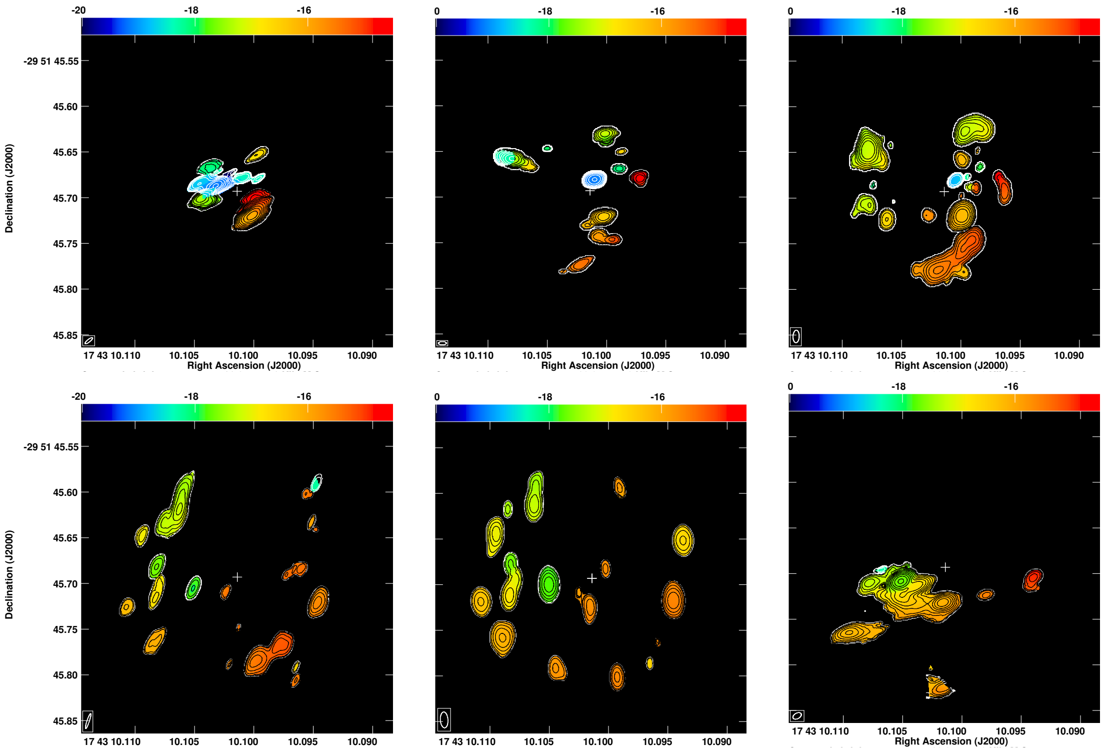

Figure 1: Moment maps of the methanol masers in G358-MM1. Coordinates and colour scales (corresponding to LSR Velocity) are common to all maps. Time runs from left to right; upper row then lower row, facilities were: LBA, LBA, EVN, VLBA, VLBA, LBA. The figures trace the 9 months expansion of a ring of methanol maser emitting regions, which had dispersed by the final epoch.

2.1.2 VLBI result: Disk sub-structure and rotation

We also were able to combine all maser spot-maps to produce an overall view of the methanol maser disk (see Fig 2 *Middle*) which showed spiral-arm like instabilities, consistent with those reported by [16]. Such arms are often produced in simulations and have been seen previously in non-accreting high-mass protostars [23]. Our combined VLBI view also revealed differential rotation (See Fig 2 *Right*). Fitting a Keplerian function to these data revealed an almost face-on disk with a dynamic mass of 8-10 M_o at an inclination angle of 19-24^o in agreement with infrared SED and analyses of this burst [20].

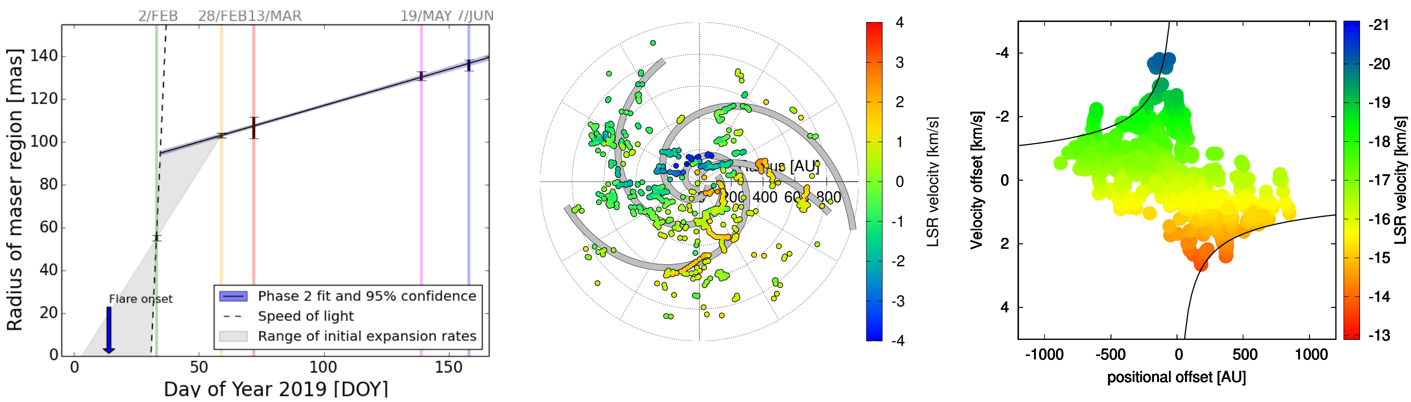

Figure 2: Left*: Expansion of the maser ring distribution seen in Figure 1 as a function of time, where the dates of observations can be read from the top of the figure. The final epoch on 28/SEP was omitted due to the maser ring having dispersed.* Middle*: All-epoch combined spotmaps, revealing non-uniform disk sub-structures such as spiral arms.* Right*: the PV diagram of the full maser-traced protostellar disk delineating a Keplerian function corresponding to 8-10 M_o at an inclination angle of 19-24^o from a face-on view. Publication of these results is currently in prep..*

Triggered LBA 6.7 GHz methanol maser observations have the potential to contribute to our understanding of future high-mass star accretion bursts by enabling investigation of:

- The propagation of accretion energy "heat-wave" through the disk via a 'maser movie'.
- Locating physical radial junctions in the disk such as snow-lines.
- Revealing disk sub-structures such as spiral arms and clumps.
- Tracing the kinematic structure of the disk to determine the enclosed mass of the high-mass protostar.

3 Targets and trigger criteria

Maser burst alerts are sourced from the M2O, therefore targets considered for the trigger criteria are sources of 6.7 GHz methanol masers associated with massive accreting stars that are monitored by the combined M2O observatories, comprising some ~ 800 targets.

Trigger criteria 6.7 GHz: flux increase of $\times 2$ above the median value to avoid non-burst related maser variations which infrequently surpass this criteria (See for example Tables 3 or 4 in the monitoring observations by the Torun radio telescope [24])

4 Technical Justification Summary

This proposal builds upon vx026(a,b,c,d) and v581a, which have demonstrated success. We therefore use the same observation and correlation parameters:

- Full track, ~ 8 hr, depending on GST range.
- Phase referencing and polarisation calibration sources to be included.
- Two BBC of 16 MHz, dual polarisation, 2 bit Nyquist sampling (recording 256 Mbps).
- LL and RR correlation.
- Pass 1: All sources correlated at full bandwidth (2*16 MHz) 32 ch/band, 2s integration.
- Pass 2: All sources correlated for a 4 MHz wide zoom band with a central frequency of relevant maser (See above) 4096 ch/band, 2s integration.

Maximum number of triggers to observe:
The number of 6.7 GHz maser flares reported by the M2O was: one in 2019 and two in 2020. Presently, we request 2 triggers, each with 3 epochs spaced monthly to observe rapid changes such as the subluminal ($\sim 10\%$c) motions as seen in G358.93-0.03 (Fig 2 *Left*). Our proposal requests a maximum of 2 events/yr $\times$ 3 epochs $\times$ 8 hr = **48 hrs/yr**

Linked ATNF proposals and other facilities

This proposal forms part of a South-sky trio, operated together by the M2O. They consist of a Parkes single-dish monitoring campaign to identify new accretion burst candidates (P1073), an ATCA proposal (C3321) triggered to observe maser flares identified by Parkes and other M2O participating stations. ATCA will cover a wide range of frequencies since accretion-driven maser flares seem to arise simultaneously over a wide range of common and exotic transitions. ATCA will also provide source localisation which greatly eases the target source imaging during VLBI data processing, and this LBA proposal (V581) aimed at investigating the flare event at high angular resolution.

M2O observations are pursued in close collaboration with supporting instruments such as ALMA, the SMA, SOFIA, VLA and Subaru. All LBA triggers will be accompanied by requests for supporting observations with such facilities via the M2O communication network in order to maximise the scientific value of each accretion burst event using multi-wavelength analyses.

In order to trace the evolution of the maser emission in future accretion events LBA data will be combined with those of other VLBI facilities such as the EAVN, EVN and VLBA, to enable sufficient coverage in consideration of the limited time available at each facility. We currently have active ToO trigger proposals accepted at all aforementioned VLBI facilities.

References

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[3] Caratti o Garatti, et al., 2017, *Nature Physics*, 13, 276
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[15] Chen, et al., 2020, ApJL, 890, L22
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[18] Volvach, et al., 2020, MNRAS, 494, L59
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[21] Fujisawa, et al., 2014, PASJ, 66, 31
[22] Bartkiewicz, et al., 2016, A&A, 587, A104
[23] Motogi, et al., 2015, PASJ,
[24] Szymczak, et al., 2017, *ArXiv e-prints*,

Upcoming conferences / registration dates?

IAU symposium 362: THE PREDICTIVE POWER OF COMPUTATIONAL ASTROPHYSICS, November 8-12
Abstract and registration deadline: September 15th. A. Sobolev will give a talk. Event details can be found here.

EVN mini symposium and users meeting, July 12-14
Abstract and registration deadline: May 15th. Probably many people will participate. Lets discuss on SamePage. Event details can be found here.

Baltic Applied Astroinformatics and Space data Processing" (BAASP), Sep 23-24 The specific themes are: astronomy, radio astronomy, space technologies, remote sensing. Abstract and registration deadline: July 31st. Event details can be found here.

Next Newsletter / Telecom: 30st June 2021, 18:00 JST

Record keeping

3 M2O Publications

No.	Target	Facility	Author	Frequency (GHz)	Status	Ref	Journal
1	W49N	Sm, Tr	Volvach+	22.2	Published	(1)	MNRAS_L
2	W49N	Sm, Tr, Mc, Ef	Volvach+	22.2	Published	(2)	A&A
3	W49N	Sm, Tr, Mc, Ef, Kvazar	Volvach+	22.2	Published	(3)	Ast.Rep.
4	W49N	Sm	Volvach+	22.2	Published	(4)	MNRAS
5	G25	VLA	Bayandina+	6.7, 12.2, 22	Published	(5)	ApJ
6	G25	Sim/Hh/Tr	Volvach+	22	Published	(6)	MNRAS_L
7	G25	KVASAR	Volvach+	22	Published	(7)	Ast.Rep.
8	G25	EVN	Burns+	22	Published	(8)	MNRAS
9	G25		Aberfelds+	6.7	in prep		-
10	G25		Bayandina+	12.2, 23.1	in prep		-
11	G25		MacCleod+	6.7, 22	in prep		-
12	G358	ATCA	Breen+	mm	Published	(9)	ApJ
13	G358	ALMA-SMA	Brogan+	mm	Published	(10)	ApJL
14	G358	Hh	MacCleod+	New Methanol masers	Published	(11)	MNRAS
15	G358	LBA	Burns+	6.7	Published	(12)	Nat.Ast.
16	G358	Various VLBI	Burns+	6.7 movie	in prep		-
17	G358	Various VLBI	Burns+	Maps of rare masers	in prep		
18	G358	VLBA	Burns+	6.7 and 12.18	in prep		
19	G358	Asia-Pacific VLBI	Orosz+	7.6, 7.8	in prep.		ApJL
20	G358	VLA	Chen+	multiple lines methanol	Published	(13)	ApJL
21	G358	VLA	Chen+	New lines + Methanol	Published	(14)	Nat. Ast.
22	G358		MacCleod+	6.7 GHz monitoring	in prep		
23	G358		MacCleod+	6.2, 12.2, 20.3, 20.9	in prep		-
24	G358	VLA	Bayandina+	6.7, 12.2, 22.2	in prep		-
25	G358	SOFIA	Stecklum+	FIR	published	(15)	A&A
26	G358	Sm and Hh	Volvach+	19.9, 20.9	Published	(16)	MNRASL
27	G358	ATCA	Breen+	Rare transitions	in prep		-
28	G24.33	EVN, VLBA	Olech+	6.7, 12.2, 22.2	in prep		-
29	G24.33	Tr	Olech+	OH, Meth	in prep		-
30	G24.33	Hh	v. d. Heever+		in prep		-
31	G24.33	ALMA	Hirota+	Thermal and maser	in prep		-

References

[1] Volvach, L. N., Volvach, A. E., Larionov, M. G., MacLeod, G. C. & Wolak, P. Unusual flare activity in the extreme-velocity 81 kms1 water-maser feature in W49N. *Monthly Notices of the Royal Astronomical Society: Letters* **487**, L77–L80 (2019). URL https://doi.org/10.1093/mnrasl/slz088.

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[3] Volvach, L. N. *et al.* An unusually powerful water-maser flare in the galactic source w49n. *Astronomy Reports* **63**, 652–665 (2019). URL https://doi.org/10.1134/S1063772919080067.

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[15] Stecklum, B. *et al.* Infrared observations of the flaring maser source G358.93-0.03 – SOFIA confirms an accretion burst from a massive young stellar object. *arXiv e-prints* arXiv:2101.01812 (2021). URL https://ui.adsabs.harvard.edu/abs/2021arXiv210101812S.

[16] Volvach, A. E. *et al.* Monitoring a methanol maser flare associated with the massive star-forming region G358.93-0.03. MNRAS **494**, L59–L63 (2020).

M2O follow-up data

No.	Target	Facility	Date	Frequency (GHz)	Code	PI/comment
1	G25	VLA	Oct 2017	6.7, 12.2, 22	17B-408	OB / Reduced
2	G25+W49N	EVN	Oct 2017	22	RB004	RB / Reduced
3	G25+W49N	KaVA	Oct 2017	22	K17RB01A	RB / Reduced
4	G25+W49N	VLBA	Oct 2017	22	BO058	GO / Reduced
5	G25	VERA	2007-2013	22, 16 x epochs	[archival]	K. Motogi / Processing
6	G358	VERA	31 Jan 2019	6.7	-	SY / Reduced
7	G358	VERA	3 Mar 2019	6.7	-	SY / Reduced
8	G358	VERA	1 Apr 2019	6.7	-	SY / Reduced
9	G358	VERA	3 May 2019	6.7	-	SY / Reduced
10	G358	LBA	2 Feb 2019	6.7	vc026a	RB / Reduced
11	G358	LBA	3 Feb 2019	23.1	vc026b	GO / Abandoned
12	G358	LBA	28 Feb 2019	6.7	vc026c	RB / Reduced
13	G358	EVN	13 Mar 2019	6.7, 6.18	RB005	RB / Reduced
14	G358	KVN	25 Mar 2019	22, 44, 95, 120	n19rb01a	RB / Reduced
15	G358	VLBA	19 May 2019	6.7, 12.2, 23.1	BB414	RB / QuickLook
16	G358	VLBA	7 Jun 2019	6.7, 12.2, 20.7	BB412	RB / Reduced
17	G358	LBA+E.Asia	17 May 2019	7.6, 7.8	vx028a	GO,SE / QuickLook
18	G358	LBA+AusSCOPE	28 Sep 2019	6.7	v581a	RB / Reduced
19	G358	LBA+AusSCOPE	18 Aug 2020	6.7	v581b	RB / Reduced
20	G358	SOFIA	30 April 2019	50...120 μm		BS,JE
21	G358	GROND	8 Feb 2019	NIR		HL,BS,AC
22	G358	SMA	several 2019	mm		THunter,CB
23	G358	ALMA	several 2019	Bands 5,6,7		CB
24	G358	VLA	2019	GHz	-	OB
25	G358	VLA	2019	GHz	-	OB
26	G358	VLA	2019	HNCO	-	XC,AS
27	G24	LBA	8 Sep 2019	6.7	vx026d	RB,MO / Correlated
28	G24	LBA	13 Sep 2019	6.7	s002a	RB,MO / Correlated
29	G24	LBA	28 Sep 2019	6.7	v581a	RB,MO / Correlated
30	G24	EVN	22 Sep 2019	22	RB006A	RB,MO / QuickLook
31	G24	EVN+Merlin	7 Oct 2019	6.7	RB006B	RB,MO / QuickLook
32	G24	EVN+Merlin	17 Nov 2019	1.667	RB007	RB,MO / correlated
33	G24	VLBA	27 Sep 2019	6.7, 12.2, 22	BB416A	RB,MO / QuickLook
34	G24	VLBA	27 Oct 2019	6.7, 12.2, 22	BB416B	RB,MO / correlated
35	G24	VLBA	02 Dec 2019	6.7, 12.2, 22	BB416C	RB,MO / correlated
36	G24	ALMA	26 Sep 2019	Band6	-	THirota / QuickLook
37	G24	SOFIA	25 Oct 2019	FIR		BS,JE
38	G24	ATCA	26 Nov 2019	K-band	C3321	GO,SB
39	G24	ATCA	27 Nov 2019	C-band	C3321	GO,SB
40	NGC2071, Ori-S6	KaVA	13 Mar 2020	22/44/95/130	a20d3a	RB / QuickLook
41	NGC2071, Ori-S6	KaVA	16 Apr 2020	22/44/95/130	a20d3b	RB / QuickLook
42	NGC2071, Ori-S6	KaVA	11 May 2020	22/44/95/130	a20d3c	RB / Correlated
43	G85	VLBA	24/Apr/2020	L/C/Ku/K	BB421B	RB / QuickLook
44	G85	VLBA	22/May/2020	L/C/Ku/K	BB421A	RB / QuickLook
45	G85	VLBA	22/June/2020	L/C/Ku/K	BB421C	RB / correlated
46	G359.617-0.251	LBA	18/Aug/2020	6.7	V581B	RB / Observed
47	G359.617-0.251	VLBA	21/Aug/2020	6.7 / 12.2 / 22	BB418A	RB / Correlated
48	G359.617-0.251	ATCA	25-26/July/2020	6-10 GHz	C3321	GO / Processing
49	G034.196-0.592	VLA	19/NOV/2020	C	VLA/20B-441	DL / Processing
50	G034.196-0.592	VLA	29/NOV/2020	K	VLA/20B-441	DL / Processing
51	G034.196-0.592	KaVA	12/DEC/2020	K(QWD)	a20d4a	RB / Quick Look
52	G034.196-0.592	KaVA	23/JAN/2021	K(QWD)	a21d1a	RB / Correlating
53	G034.196-0.592	KaVA	18/FEB/2021	K(QWD)	a21d1b	RB / Observed
54	G35.200.74	KaVA	23/JAN/2021	K(QWD)	a21d1a	RB / Correlating
55	G35.200.74	KaVA	18/FEB/2021	K(QWD)	a21d1b	RB / Observed

Reminders:
All G25.65+0.15 papers should include a member from the Volvach et al. in the author list and an acknowledgement of their funding.
All G358 papers should include a member from the Ibaraki team in the author list and an acknowledgement of their funding.
All G24.33 papers should include a member from the Torun team in the author list and an acknowledgement of their funding.
All Orion-S6 papers should include a member from the Ibaraki team in the author list and an acknowledgement of their funding.
All NGC2071 papers should include a member from the VERA / Sunada team in the author list and an acknowledgement of their funding.
All G53.22-0.08 papers should include a member from the VERA / Sunada team in the author list and an acknowledgement of their funding.
All G85 papers should include a member from the Ibaraki team in the author list and an acknowledgement of their funding.
All G359 papers should include a member from the Ibaraki team in the author list and an acknowledgement of their funding.
All G034.196-0.592 papers should include a member from the Ladeyschikov et al. in the author list and an acknowledgement of their funding.
All G35.200.74 papers should include a member from the Volvach et al. in the author list and an acknowledgement of their funding.