Report from event
supported by RadioNet

TITLE	*CASA-VLBI WORKSHOP*
DATE:	*2-6 NOVEMBER 2020*
LOCATION:	*DWINGELOO, THE NETHERLANDS*
MEETING WEBPAGE:	*https://www.jive.eu/casa-vlbi2020/index.php*
HOST INSTITUTE:	*JIVE*
RADIONET BENEFICIARY / NO:	*JIVE/05*

Report:

1 SCIENTIFIC SUMMARY

The event website: https://www.jive.eu/casa-vlbi2020/index.php

From 2-6 November, JIVE hosted the CASA-VLBI workshop in virtual space, using Zoom and Mattermost as the main platforms to connect with the participants. Over 200 people registered for this free workshop. As expected, roughly half of them participated actively during the first day. Since ~2/3 of the participants identified as beginner in CASA and/or VLBI data processing, the participation dwindled to around 60 people for the more advanced lectures later in the week.

The workshop was set-up in two equal blocks: one in the morning and one in the afternoon of the workshop time zone, each consisting of 2-3 lectures and a data processing session. Participants were spread over 16 time zones, from Korea (UT+7) to the US (UT-8), and this set-up enabled everyone to participate in at least one block per day. Live streaming to YouTube ensured that also non-registered participants could join for the lectures, and people with hearing difficulties or language problems could watch with live captioning. The recordings and slides of lectures were made available instantly for participants, so people could watch these at a convenient time for them. Each day started with a plenary question session, so participants who had worked during UT night time could ask questions or raise issues they had encountered. Two more such sessions were scheduled on each day.

The data processing sessions were one hour, with most interaction occurring on the Mattermost channels. With 5-6 tutors online at all times, we had our hands full with answering all the questions. Subsequently, there was a half hour plenary discussion session where the most important topics were discussed between tutors. A few times, tutors prepared a quick presentation on a topic that required more clarification. Participants were invited to actively participate, but most were reluctant to speak up in live sessions.

1.1 SCIENTIFIC SUMMARY

This workshop was entirely educational, and as such does not have a true scientific summary. Below is described how the workshop was organized by topic.

The lecture topics covered a broad range of topics and levels, but assumed a basic knowledge of interferometric data processing. The first three lectures on Monday all focused on the basics of CASA, teaching participants how the software is launched and used, which tasks are of importance and how to access the documentation to find answers to any questions they might have.

The following day dealt with calibration of VLBI observations, with strong focus on EVN data processing. The participants were shown the basic process of EVN data reduction, the specific tasks and notebooks that have been developed at JIVE, and how to use them. An additional lecture demonstrated how specific data issues can be quickly identified in the data. The plenary discussion sessions dealt with how to plot and flag visibility data in CASA.

On Wednesday the main topic was imaging, starting with a basic explanation on how to image VLBI data in CASA and the use of interactive clean, moving to self-calibration and then to wide-field imaging. The imaging lectures had dedicated materials available, to enable participants to repeat the demonstration given by the lecturers.

In the afternoon we had our first social event: a joint walk (or exercise of choice) with everyone who was available. Participants were encouraged to plan some time away from their screens at a time convenient to their time zone, which made this a truly global event. We used the WorldWalking platform, where participants can share their distance walked, and contribute this to a joint walk effort through the Netherlands. In the end we jointly walked from Maastricht to Rotterdam.

The final day had two advanced lectures in the morning block, covering polarization calibration and mm-VLBI data processing with the rPICARD pipeline. The afternoon block started with data processing, and at the end, we asked the participants for feedback, which was overwhelmingly

positive. The closing lecture on the Future of VLBI was advertised publicly in ASTRON and JIVE, and very well attended. For the registered participants it was followed by a pub-quiz, which was good fun. The winner will receive a unique JIVE mug.

Originally Friday morning was intended for in-depth discussion between tutors and advanced participants, but due to the format of the online workshop, and the very dense programme of the previous days, we decided to cancel this.

The social events were much appreciated and provided the necessary breaks in a very dense programme. Nevertheless, we did not find a good alternative for the networking that usually happens during the breaks, nor did we find a good way to work with participants in one-on-one setting. It is difficult to understand what people do and help them to identify the mistakes or problems. The Zoom break-out rooms that we planned to use for this did not perform as advertised, and we had to resort to plenary sessions for the data processing, which made people even more screen shy.

In spite of this, participants indicated that they found the workshop extremely useful and educational. Several participants noted that they could not have joined for an in-person workshop due to financial or personal limitations.

1.2 RADIONET RELEVANCE

The focus of the workshop was on teaching the data processing of EVN data, but it was obvious that many people were interested in processing of additional VLBI instruments, such as ALMA, VLBA, e-MERLIN and LOFAR. At the end of the workshop all the participants had gained experience with processing EVN data, preparing them for processing their own observations, or exploring the opportunity to request an EVN observation for themselves. The workshop has clearly broadened the EVN user base.

1.3 IMPACT

The event had participants from around the world, and very notable was the interest from several African countries, Peru, Turkey, and Indonesia. At least 20 of the active participants resided in countries not classically known for their radio astronomy, and this workshop has laid a first basis for establishing new relationships.

From Turkey and Indonesia came reports that they are interested in (or already attempting to) refurbishing existing communication dishes for radio astronomy. This is of interest to JIVE and the EVN, where we are currently working on expansion of the network as part of the JUMPING JIVE project. The WP leaders within JJ have been informed of these interests and will explore this further.

The overwhelming interest in the workshop demonstrates that there is a great need for easy access to materials and support for VLBI data processing. Workshops like this can help build human capital and set-up knowledge platforms in regions that are taking their first steps into radio astronomy. They are also essential for bringing the latest software developments to the users, and ensure that new functionality is thoroughly exercised by experts. Feedback from users will help prioritizing future software development and choosing the most efficient path forward.

All materials from the workshop, slides, lecture recordings and tutorials, will remain available on the workshop website for the indefinite future. There will be a follow-up event under the new PILOT project, with the aim of making this an annual or bi-annual event. Though tutors agree that for in-depth educational purposes an in-person meeting is more efficient, everyone was positively surprised at the efficiency of the online format. Therefore, online participation should definitely be a part of future workshops, and the aim is to move to a hybrid format. Future events will be coordinated with organisers of the ERIS, NRAO and LOFAR schools to avoid clashing dates or too large overlap of educational goals.

A submission for the ASTRON/JIVE Daily Image has been prepared, to highlight the workshop and availability of materials to non-participants.
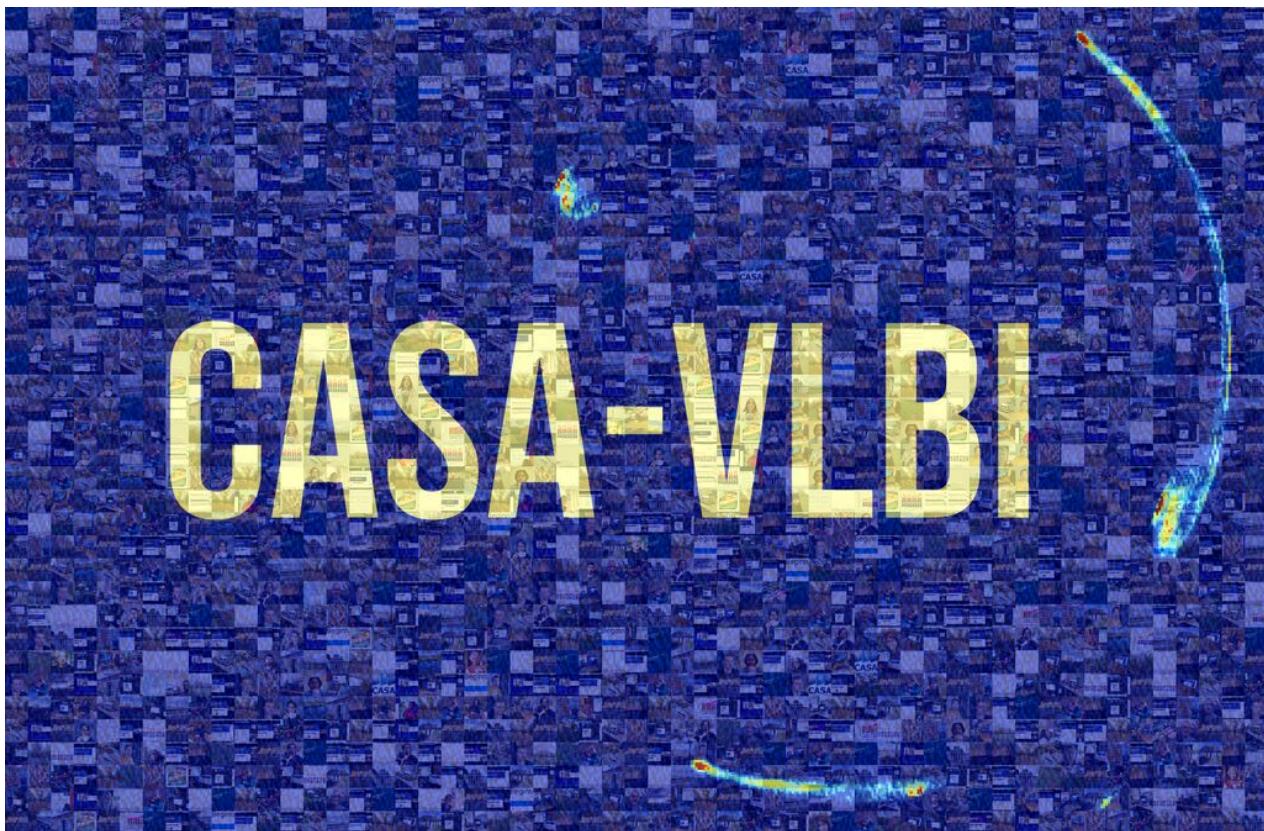
Figure 1. The "conference picture": using images submitted by the participants, a mosaic image was created to share with all the participants instead of a formal conference picture.
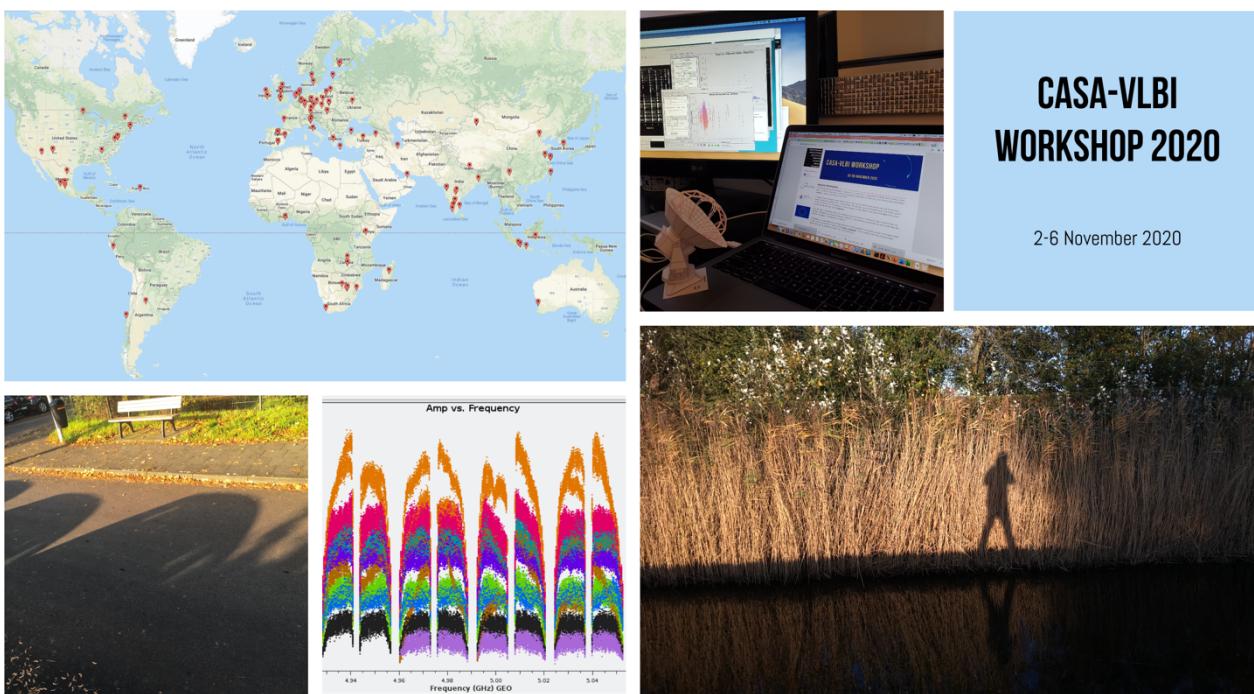
Figure 2. The collage of images submitted to the ASTRON/JIVE Daily Image, together with the mosaic shown above in Figure 1.

2   AGENDA OF THE EVENT

The agenda was shared with participants using a Google Calendar, which eased the translation of the lecture times into the different time zones. In the agenda below, all times are listed as UT.

Monday	CASA basics	Lecturer
12:00	Welcome by the director	Paco Colomer
12:05	Logistical notes for the workshop	Ilse van Bemmel
12:15	L1. Introduction to CASA	Olga Bayandina
13:00	Questions	
13:15	L2. Plot tools in CASA	Benito Marcote
14:00	Questions	
14:15	L3. CASA calibration framework	Mark Kettenis
15:00	Questions	
15:15	Break	
15:45	Data processing A	
16:45	Questions	
17:15	End of day 1	
Tuesday	VLBI calibration	Lecturer
8:00	Discussion and questions from yesterday	
8:30	L4. EVN calibration basics	Benito Marcote
9:15	Questions	
9:30	L5. Latest VLBI tasks in CASA	Des Small
10:15	Questions	
10:30	Break	
11:00	Data processing B	
12:00	Questions	
12:30	Break	
13:30	L6. Typical data problems	Ivan Marti-Vidal
14:15	Questions	
14:30	L7. Jupyter Notebooks and the EVN pipeline	Ilse van Bemmel
15:15	Questions	
15:30	Break	
16:00	Data processing C	
17:00	Questions	
17:30	End of day 2	

Wednesday	VLBI imaging	Lecturer
8:00	Discussion and questions from yesterday	
8:30	L8. Basic imaging of VLBI	Cristiana Spingola
9:15	Questions	
9:30	L9. Self-calibration	Javier Moldon
10:15	Questions	
10:30	Break	
11:00	Data processing D	
12:00	Questions	
12:30	Break	
13:30	L10. Wide field imaging	Jack Radcliffe
14:15	Questions	
14:30	Social event: walk or exercise	
15:30	Break	
16:00	Data processing E	
17:00	Questions	
17:30	End of day 3	
Thursday	Advanced calibration techniques	Lecturer
8:00	Discussion and questions from yesterday	
8:30	L11. Polarization calibration	Ivan Marti-Vidal
9:15	Questions	
9:30	L12. mm-VLBI and rPICARD pipeline	Michael Janssen
10:15	Questions	
10:30	Break	
11:00	Data processing F	
12:00	Questions	
12:30	Break	
13:30	Data processing G	
14:30	Questions	
15:00	Break	
15:30	L13. Future of VLBI	Cristina Garcia-Miro
16:30	Questions	

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16:45	Social event: pub-quiz	
17:15	Wrap up: final comments	
17:30	End of the workshop	

3 PARTICIPANTS

The workshop attracted more than 200 registrations, causing us to close registration prematurely, as the Zoom break-out room interface that we intended to use could only handle up to 200 people. People registered covered 40 countries and spanned 16 time zones. The map in Figure 3 shows the geographical distribution. Though there is a clear concentration of participants in Europe, participants spread through the Middle East, Far East, and into Africa and South America. Though not everyone participated, the statistics of YouTube and monitoring of the active participants in Zoom indicate that this distribution is also representative of the active participants during the workshop.

The registration did not request the gender of the participant. Based on a rudimentary first-name analysis, women constituted about 20-25% of the participants. In the engagement on the Mattermost platform it was notable that a much larger fraction than 25% of the questions came from women.

The majority (66%) of the participants identified as beginner and early-career scientist. It was good to have some senior representatives from NRAO, the institute that develops CASA and is the main partner of JIVE in the development of CASA-VLBI tasks. Several of them provided helpful feedback on CASA details. Future workshops will be more closely coordinated with NRAO.

The tutors were selected by the organisers to have a gender ratio of almost 40% women, and the LOC consisted solely of women. Both the tutors and LOC had representation from early career scientists, helping them gain valuable experience in teaching and organization of events.
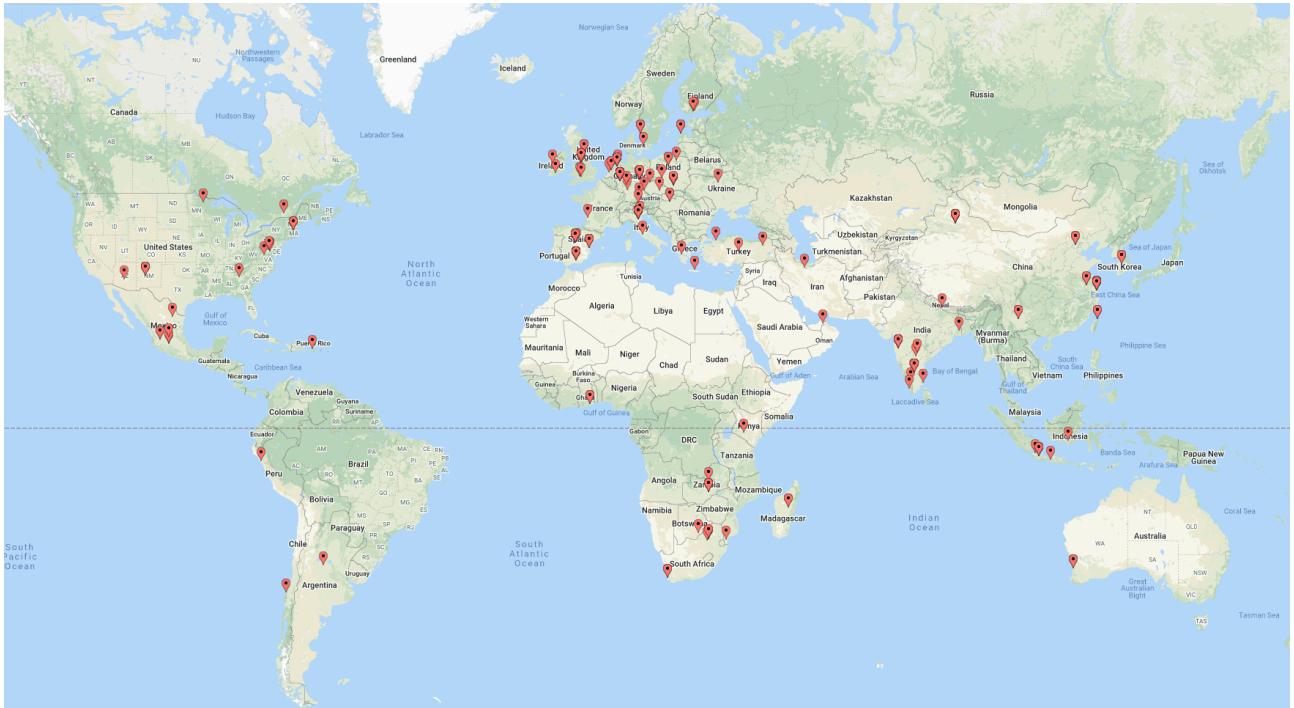
Figure 3. *Geographical location of the registered participants.*

3.1 RADIONET NEWSLETTER

- List the names and email addresses of the subscribers for the Newsletter

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4   RADIONET FINANCIAL CONTRIBUTION

The original funding request for the workshop was for an in-person meeting, and RadioNet allocated generous funds for this. However, due to the COVID-19 situation, the workshop had to be moved to a virtual environment. Upgrades of the Zoom platform were all handled under existing licenses.

In the end, the only expense made was for a package that enabled lecturers to include interactive questions in their presentation. This cost €49 (ex VAT) for a one-time event license.

5   PUBLICATIONS

The website and all slides of the presenters include the requested statement and grant number, as well as the required EU flag symbol, on their last slide. No additional publications are expected.

6   CONFIRMATION

Participants have all agreed with JIVE's Privacy Policy, which includes consent to using the information and materials in this document for the purpose of the workshop and related reporting.