CALLISTO status report/newsletter #89

New CALLISTO station at DLR in Germany

Fig. 1: New antenna installation at DLR in Neustrelitz, Germany. LPDA in vertical polarization for L-band including tracking system.
Antenna is tracking Sun every day from sun-rise to sun-set. Grey box underneath tracker contains low noise amplifier.

https://www.dlr.de/content/en/sites/neustrelitz.html

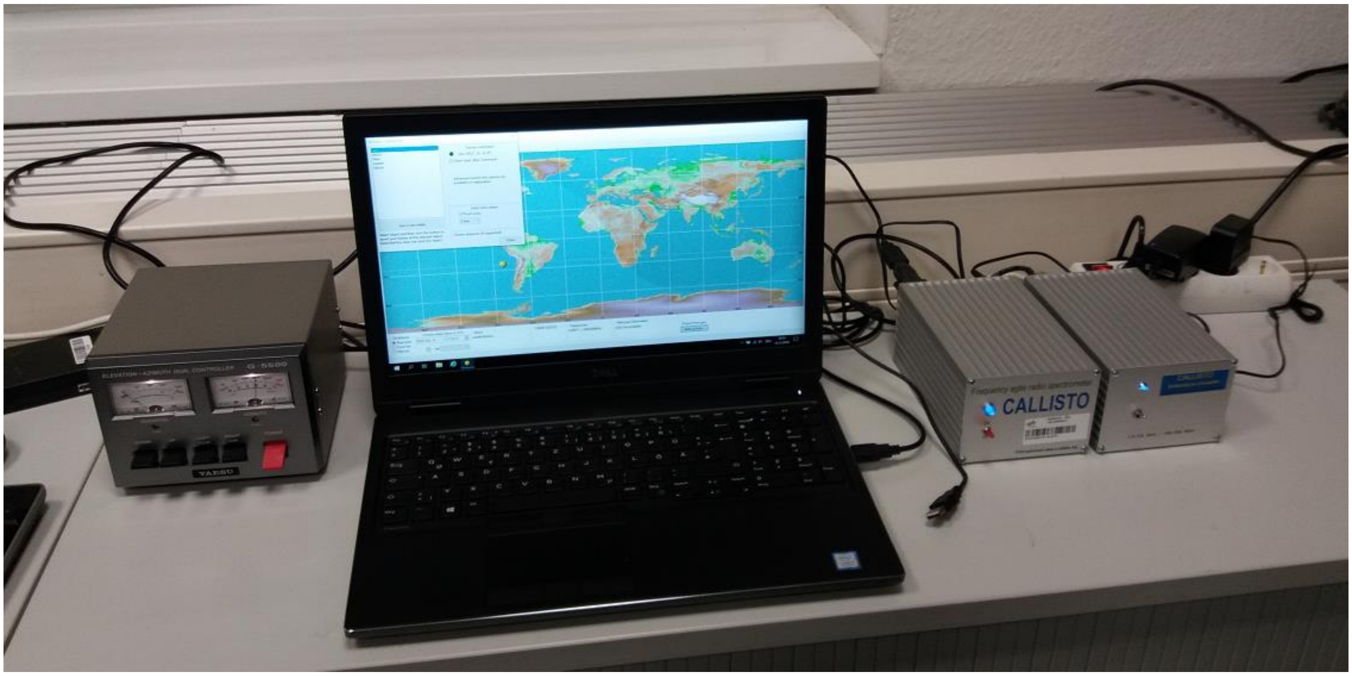

Fig. 2: From left to right: Tracking unit, computer, Callisto and heterodyne converter

Welcome DLR at e-Callisto network!

New equipment at ASSA in Australia

The second phase of our Australia-ASSA Callisto installation began about six months after the first phase (LPDA) was commissioned in 2019. A scratch built Long Wavelength Array (LWA) antenna with Front End Electronics (FEE) was an affordable option, the problem then became which receiver configuration to use. Fortunately, most of the RF components required for a dual circular polarization arrangement were available on Pay(e)Bay leaving only a suitable local oscillator left to be built.
Brian Hicks's design for a wide-band, active antenna system for long wavelength radio astronomy is freely available on the internet so I won't repeat it here. We built a couple of prototypes to trial different methods for supporting the antenna elements. The up-converter with quadrature coupler is housed in a Hammond diecast box. There are two Bias-Tees for passing DC power along coax, out to each of the FEEs on top of the LWA antenna. The signal from the FEEs pass back through each Bias-Tee through to the Anzac (now MA-COM) JH-10-4 Quadrature Hybrid Coupler. Both coupler outputs are fed to the RF inputs (Port R) of a pair of level 7 Watkins-Johnson M1 mixers. Our 200 MHz local oscillator is a crystal controlled device with sufficient output to provide +7 dBm to the LO inputs (Port I) of the mixers. This requires an LO output level of approx. +16 dBm because the 200 MHz bandpass filter

attenuates the LO fundamental frequency by 3 dB and the RF power divider loses 6dB per arm. Additional attenuation has been added prior to the Callisto receivers to reduce any adverse effects from the high gain (+35 dB) of the FEEs.

Deploying this phase of our Callisto project out to the Sunnydale, South Australia site has presented several significant challenges, some of which are still to be finalized. Adding another two receivers to the original hardware suite resulted in the replacement of the Linux based Raspberry Pi computer (courtesy of Whitham Reeve) with a Windows 7 based mini-ATX PC. The additional receivers, computer and ancillary loads prompted an increase in solar harvesting capacity and perhaps, a future battery capacity upgrade. The computer is located some 10 meters away in a container and the communication between it and the 3 receivers is currently being done using a LAN connection to a USR-N540 LAN to 4 port serial device. There are some data buffering issues over the LAN connection that are slowly being resolved. At the time of writing, we're still having some problems with generating the .fits files on the mini-ATX PC. We have the option to replace this computer with another Windows 10 based PC in the hope that it can better handle the job, time will tell.

Peter Gray <weaksignals(at)iinet.net.au>

Fig. 3: LWA installation at ASSA, Australia. https://www.assa.org.au/

Welcome ASSA at e-Callisto network!

New station in Pathumthani, Thailand

Fig. 4: Peter Wright with his students group at university in Bangkok, Thailand. Instruments is providing data since February 3rd, 2021. We are waiting for 1st light …
https://www.ptu.ac.th/ptu/

Welcome Pathumthani at e-Callisto network!

Several 1st lights

Since last news-letter #88, end of 2020 we got several 1st light observations from following stations:

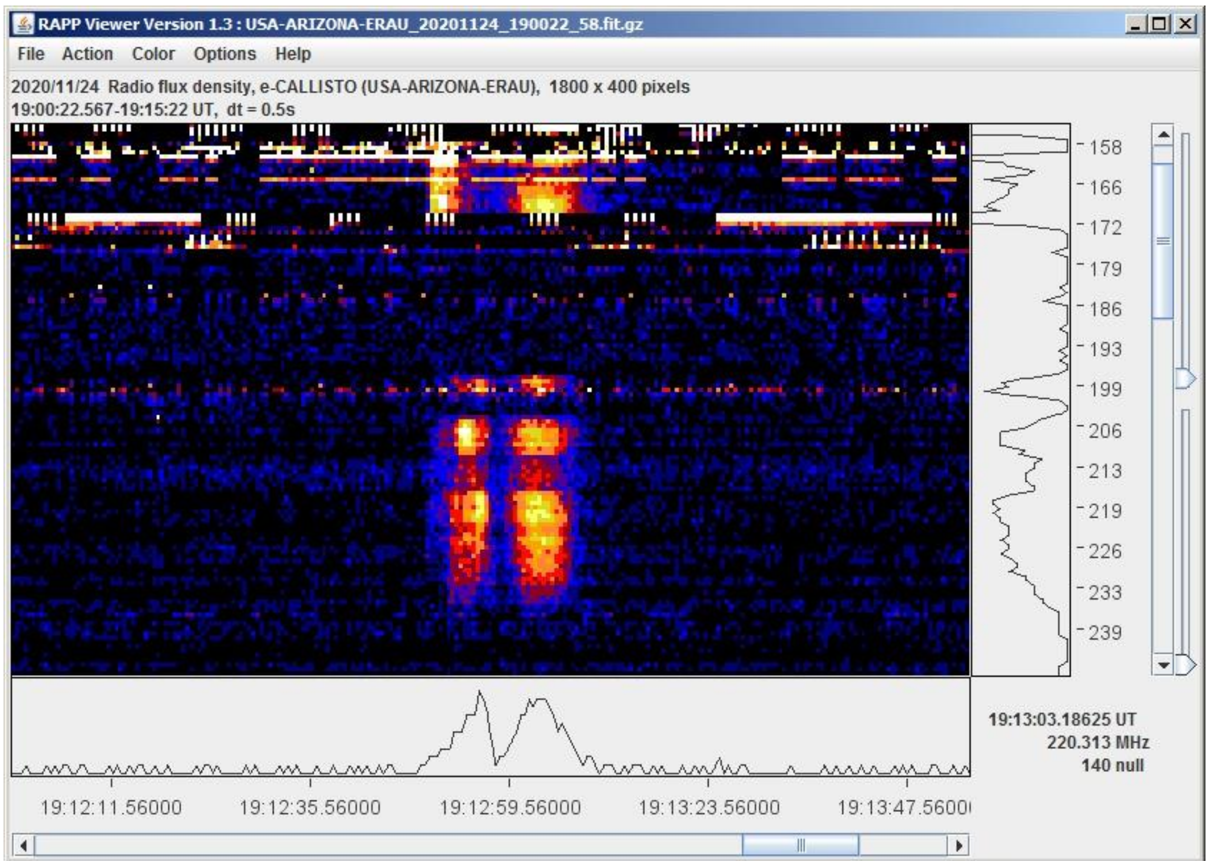

Fig. 5: Nov. 24th, 2020 1st light from Callisto at ERAU in Arizona. Congratulations!
https://prescott.erau.edu/

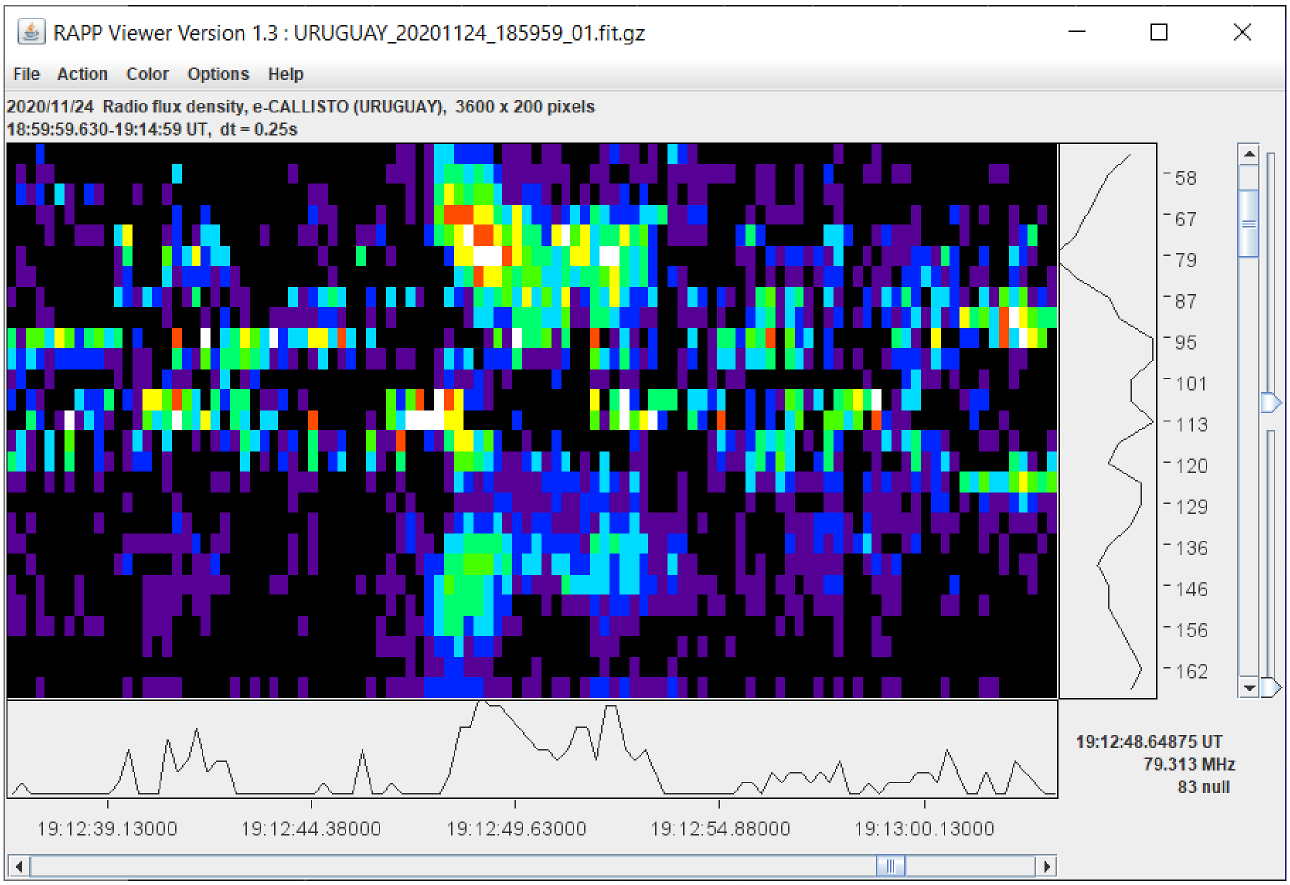

Fig. 6: Same burst as above, observed at OALM in Montevideo, Uruguay. Burst is very week due to low gain LPDA. Burst below 100 MHz is a ‘ghost’ or mirror-image due to saturation effects of the instrument from strong FM-Radio in Montevideo. The only true event is between ~125 MHz and ~160 MHz.

OALM: https://www.oalm.gub.uy/

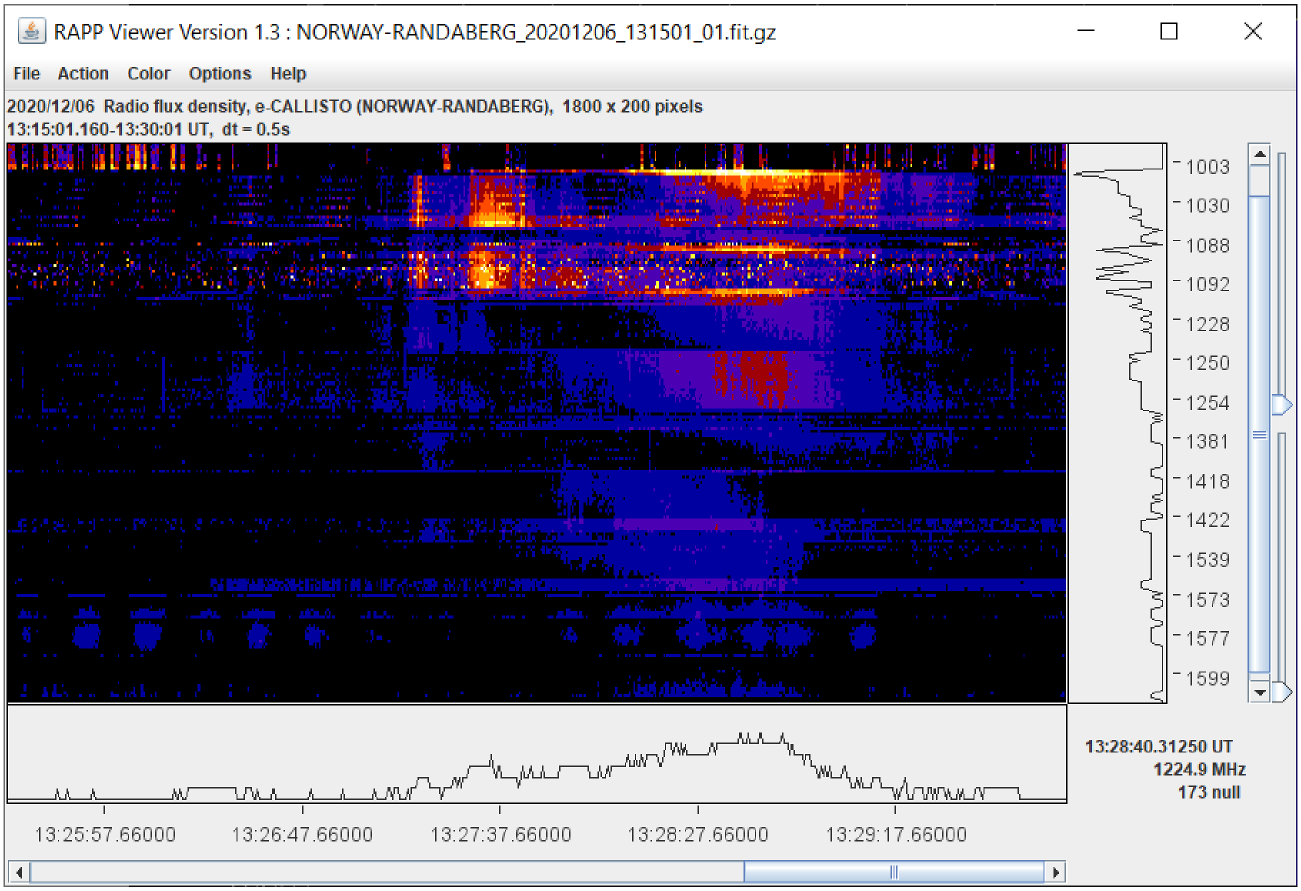

Fig. 7: 1st light at Randaberg, Norway. One out of very few L-band (1000 MHz – 1600 MHz) observatories.

http://www.romsenter.no ++ http://www.spacecentre.no

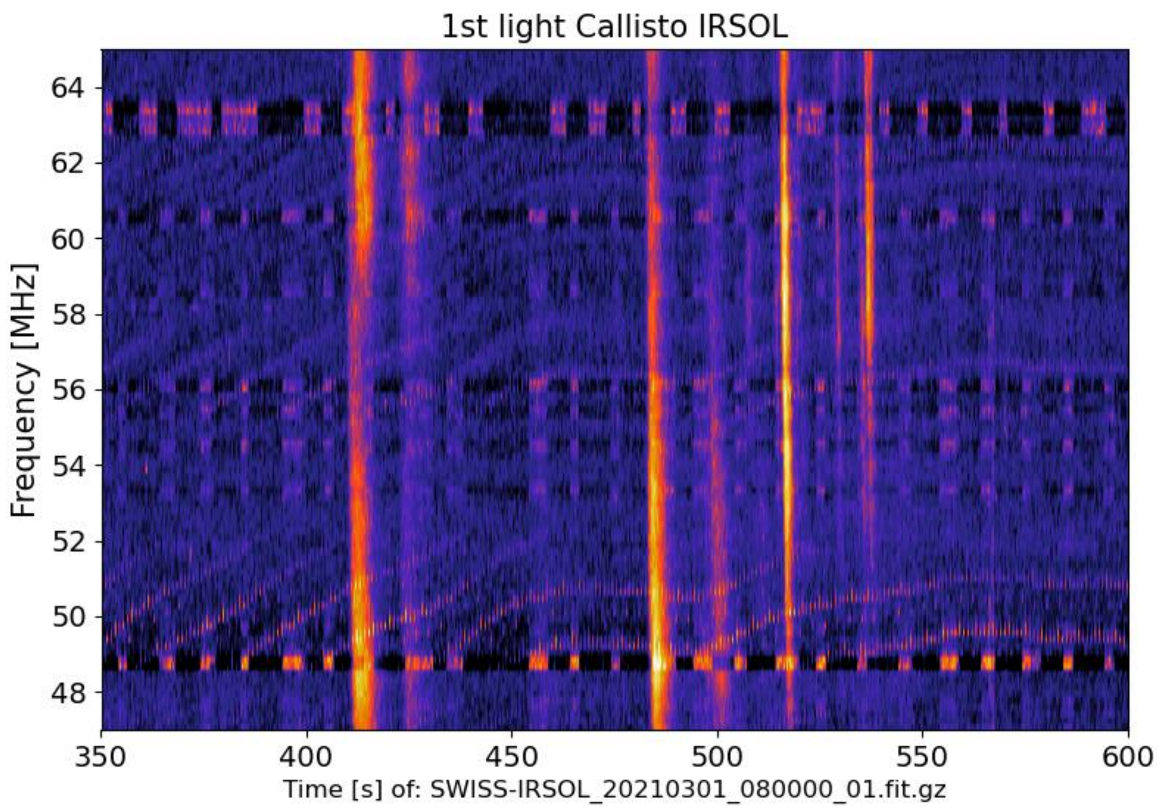

Fig. 8: 1st light CALLISTO IRSOL, Switzerland. Antenna LPDA CLP-5130 without LNA!
https://www.irsol.usi.ch/

CESRA NEWS

Low frequency radio observations of the ‘quiet’ corona
during the descending phase of sunspot cycle 24
by A. Kumari et al.*
http://www.astro.gla.ac.uk/users/eduard/cesra/?p=2698

Magnetic Reconnection during the Post-impulsive Phase of a Long-duration Solar Flare
by S. Yu et al.
http://www.astro.gla.ac.uk/users/eduard/cesra/?p=2711

Radio bursts in the 2017 September 6, X9.3 flare
by M. Karlicky and J. Rybak

http://www.astro.gla.ac.uk/users/eduard/cesra/?p=2725

Estimate of Plasma Temperatures across a CME-driven Shock
from a Comparison between EUV and Radio Data
by F. Frassati et al.*
http://www.astro.gla.ac.uk/users/eduard/cesra/?p=2735

An Explanation of Subsecond Time Evolution of Type III Solar Radio Burst Sources at Fundamental and Harmonic Frequencies by X. Chen et al
http://www.astro.gla.ac.uk/users/eduard/cesra/?p=2760

Electromagnetic Emission Produced by Three-wave Interactions in a Plasma
with Continuously Injected Counterstreaming Electron Beams
by Vladimir Annenkov and Igor Timofeev
http://www.astro.gla.ac.uk/users/eduard/cesra/?p=2778

Propagation Effects in Quiet Sun Observations at Meter Wavelengths
by R. Sharma and D. Oberoi
http://www.astro.gla.ac.uk/users/eduard/cesra/?p=2774

VLA Measurements of Faraday Rotation through a Coronal Mass Ejection Using Multiple Lines of Sight
by J. E. Kooi et al.*
http://www.astro.gla.ac.uk/users/eduard/cesra/?p=2793

On the occurrence of type IV solar radio bursts in the solar cycle 24
and their association with coronal mass ejections
by A. Kumari et al. *
http://www.astro.gla.ac.uk/users/eduard/cesra/?p=2807

Papers:

https://link.springer.com/article/10.1007/s11207-020-01722-z

https://www.researchgate.net/publication/344236038_Estimate_of_Plasma_Temperatures_Across_a_CME-Driven_Shock_from_a_Comparison_Between_EUV_and_Radio_Data

https://link.springer.com/article/10.1007/s11207-020-01686-0

AOB

- IRSOL is meant as the new core-station of the e-Callisto network
- Another access to Callisto data here: https://vwo.nasa.gov/
  See also separate pdf
- OOTY has been renamed to INDIA-OOTY
- CALLISTO or Callisto denotes to the spectrometer itself while e-Callisto denotes to the worldwide network.
- General information and data access here: http://e-callisto.org/
- e-Callisto data are hosted at University of Applied Sciences, Institute for Data Science FHNW in Brugg/Windisch, Switzerland. Additionally, data are available at ESA site here:
  SSA Space Weather Portal (http://swe.ssa.esa.int/).
- In case you (as the responsible person for operating and maintenance of Callisto) are leaving the institute or, if you are retiring, please send me name and email address of the successor.

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