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Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

CALLISTO status report #34

New location in Kenya operational:

From November 7th until 12th there was a Callisto installation/configuration workshop at University of Nairobi in Kenya. Due to strikes the antenna installation was delayed until January 2012. Since February 1st UoN is delivering data (FIT-files) to the e-Callisto network.

Fig. 1: Low frequency logarithmic-periodic antenna covering about 20 MHz – 160 MHz pointing to zenith. The antenna was built in the mechanical workshop of UoN with aluminum profiles from local stores. Preamplifier and Callisto are directly underneath the antenna in one of the offices of UoN.

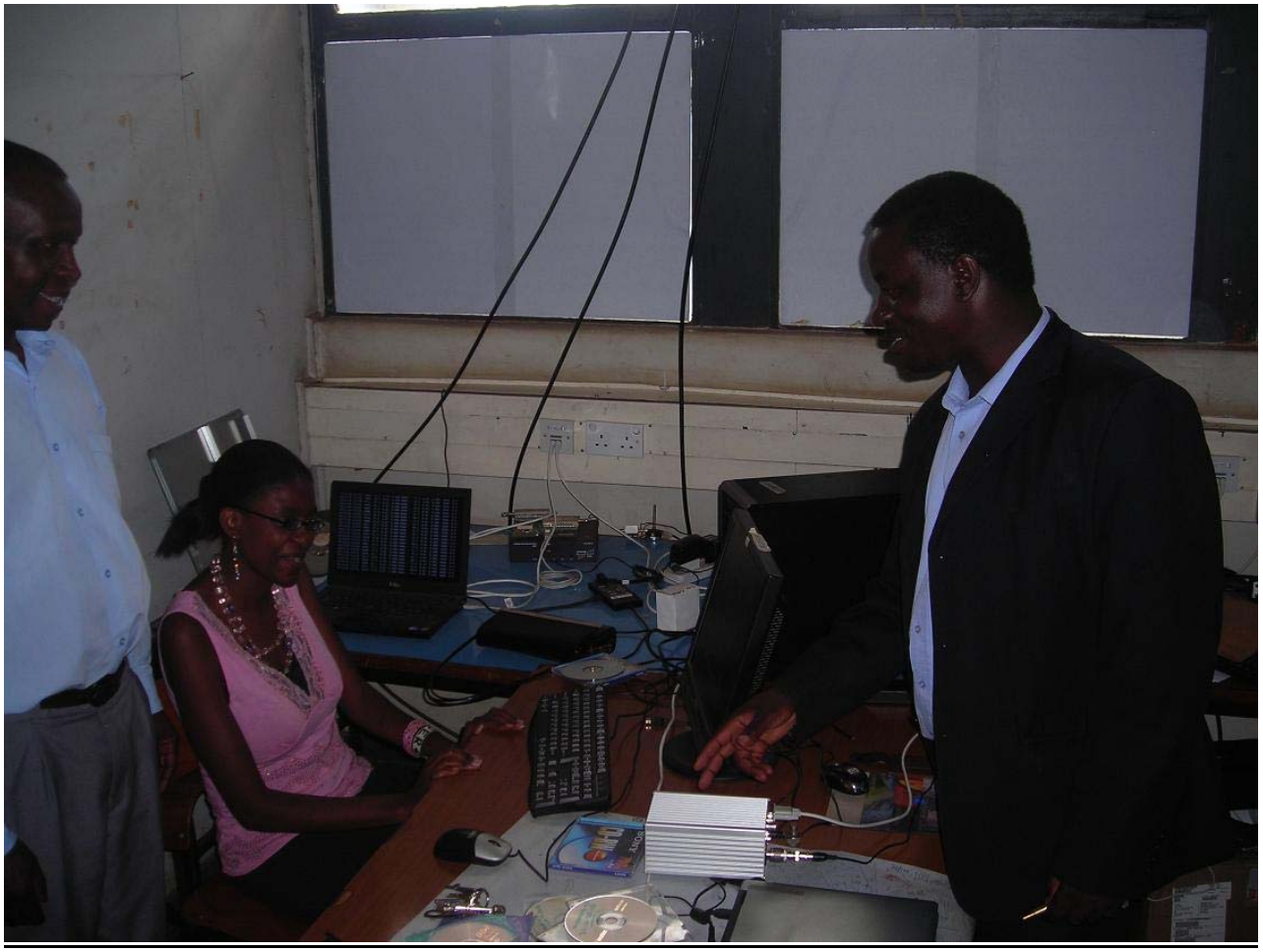


Fig. 2: Preamplifier is a ZX60-33LN-S+ from MiniCircuits. Callisto connected via RS232 cable to Windows PC in the background. Francis Juma Omollo, Hyder Karimi N'Goki, Geoffrey Okengo (pointing to Callisto) discussing Callisto operating and maintenance procedures.

Welcome UoN on the e-Callisto network!

Callisto installation workshop in Malaysia

Callisto project in Malaysia is hosted by Malaysian National Space Agency (ANGKASA) and there are three (3) universities that collaborate in this project: (1) University of Malaya, (2) University Kebangsaan Malaysia and (3) Universiti Teknologi MARA.

The Malaysian National Space Agency (ANGKASA) is one of the government agencies that are responsible in leading and observing the development of space science in Malaysia through the following efforts:

- Providing leadership in the educational aspect and the research of space science.
- Assisting the government in formulating and executing the National Space Fundamentals.
- Providing quality service to customers to help achieve the above mentioned goals.

ANGKASA (National Space Agency) consist of four (4) divisions including:-

- 1. Operations and Space System Division with its operations center based at the National Space Center.
  2. Technology Development & Space Applications Division based at the Putrajaya Headquarters.
  3. Space Science & Education Division based at National Planetarium, Kuala Lumpur.
  4. Administration & Human Resource Division based at Putrajaya Headquarters'.

University of Malaya

Researcher Leader: Dr Zamri Zainal Abidin

Researcher: Prof Dr Zainol Abidin Ibrahim

At University Malaya, there is the Radio Laboratory for Radio Astronomy, located inside the Electronics Laboratory at the Physics Department, Science Faculty, and University of Malaya. The lab was founded by Dr Zamri Zainal Abidin and Prof Dr Zainol Abidin Ibrahim in 2005 and is the first and, currently, the only radio astronomical laboratory facility in Malaysia. The 'Radio Lab', as it was called then, is now officially a research group in University of Malaya under the Advanced Fundamental Research (AFR) Cluster under the name Radio Cosmology Research Laboratory. The Radio Lab provides facilities such as a Faraday-caged lab, a 3-meter radio spectrometer, a 2.3-meter research grade Hydrogen spectral line radio telescope system and radio frequency interference (RFI) monitoring system, which includes 2-GHz and 3-GHz spectrum analyzers. We also have a basic radio solar monitoring system. The latest project is monitoring solar burst by using the Callisto spectrometer under International Space Weather project (ISWI).

Currently there is one PhD student, one MSc student and 4 undergraduate students that focus on Callisto project:

PhD student: Zety Sharizat Hamidi
MSc student:
Undergraduate student

1. 'Afifah binti A.Rahman
2. Indriani Sukma
3. Nur Syafikah Binti Ahmad Shukri
4. Nurul Syazwani Binti Rohizat

So far, UM has procured two Callisto and they will be installed at Jelebu, Negeri Sembilan and University of Malaya.

University Kebangsaan Malaysia
Leader: Prof. Madya Dr. Mohammad Tariqul Islam
At UKM, there is the Institute of Space Science also known as (ANGKASA) established on August 1, 2003. SPACE was established as an interdisciplinary research center conducting teaching at the postgraduate level and research in the field;

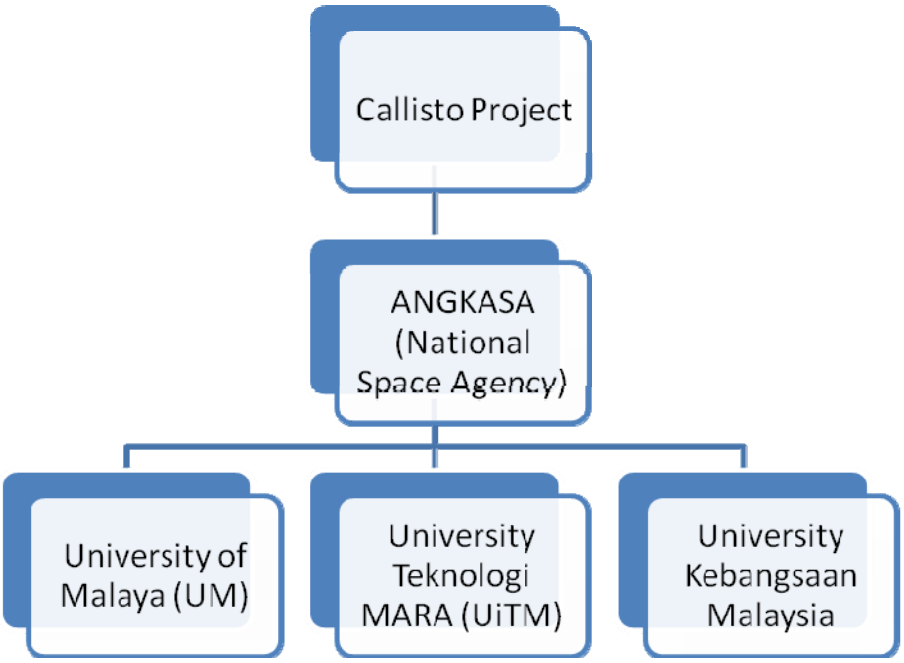
1. Space Science: Astronomy, astrophysics, astrobiology, chemical space, planetary geology and meteorology
2. Space Technology: Design and installation of systems for communication, control and drive the rocket and spacecraft
3. Space Technology Applications: Covering field of meteorology, environmental management, disaster management and land use
4. Governance Space: space law and international relations in connection with exploration activities and the use of space

Currently there are two PhD students that focus on solar flare and are involved in the Callisto project:

1. Radial Anwar
2. Ajmal Hussain Shah

UKM also has one Callisto spectrometer and it will be setup at UKM.

University Teknologi MARA (UiTM)
Leader: Zety Sharizat Binti Hamidi
Physics Program, Faculty of Applied Sciences, University Teknologi MARA (UiTM) also participate this research collaboration. UiTM plans also to buy one Callisto spectrometer this year. So far, there are two students that focus on constructing the LPDA and solar flare and burst monitoring.



In the period February 20th until 22nd, there was an ISWI-installation/configuration/education workshop at ANGKASA. During the workshop also an antenna was erected and connected to Callisto.

Fig. 3: Logarithmic-periodic antenna built at ANGKASA covering about 100 MHz – 900 MHz. Students install the coaxial cable to one of the booms of the antenna. Outside temperature was +37º C.

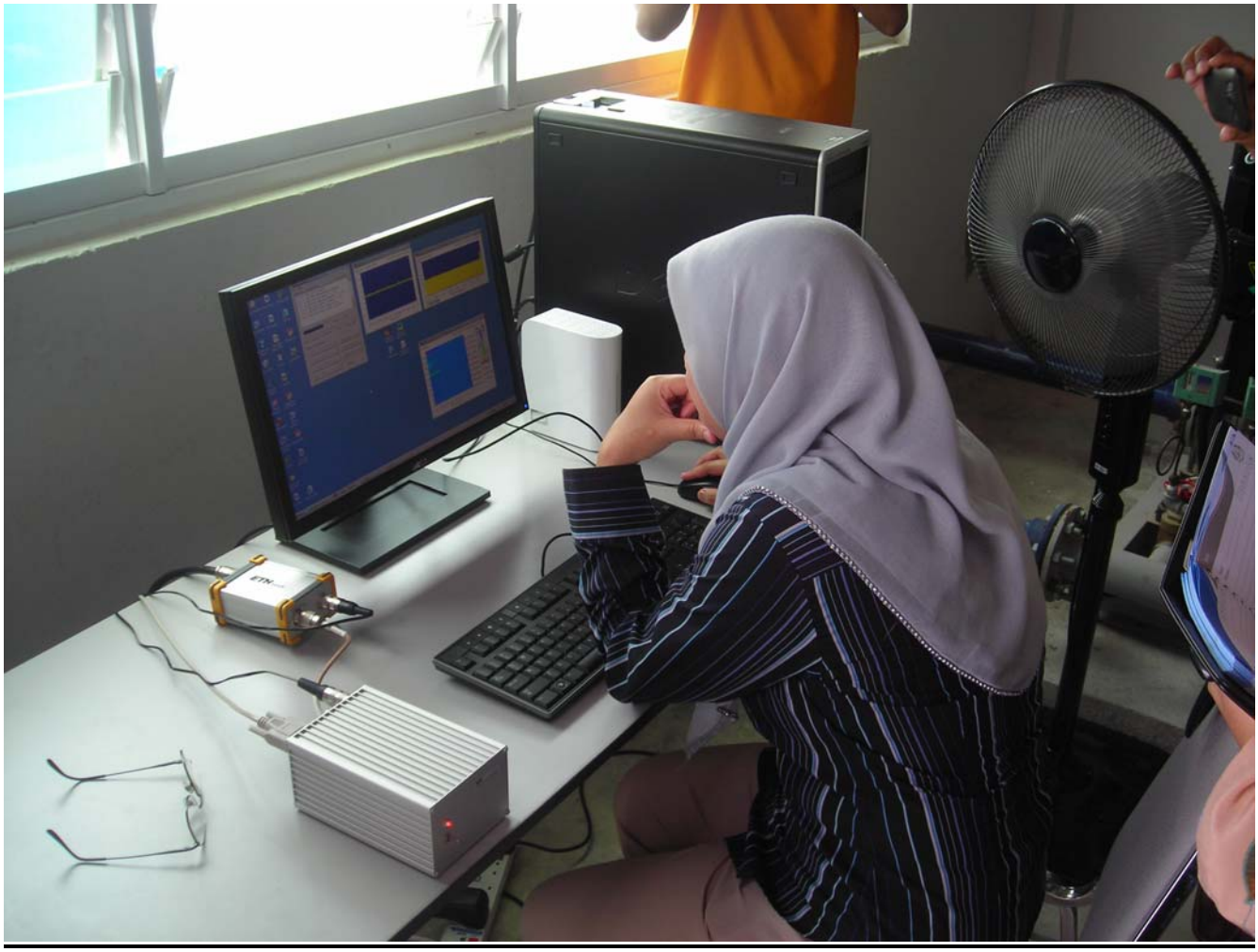


Fig. 4: Preamplifier ZX60-33LN-S+ from MiniCircuits in separate housing connected to Callisto. It is a preliminary installation in a pumping-station close to the antenna on the roof of ANGKASA.

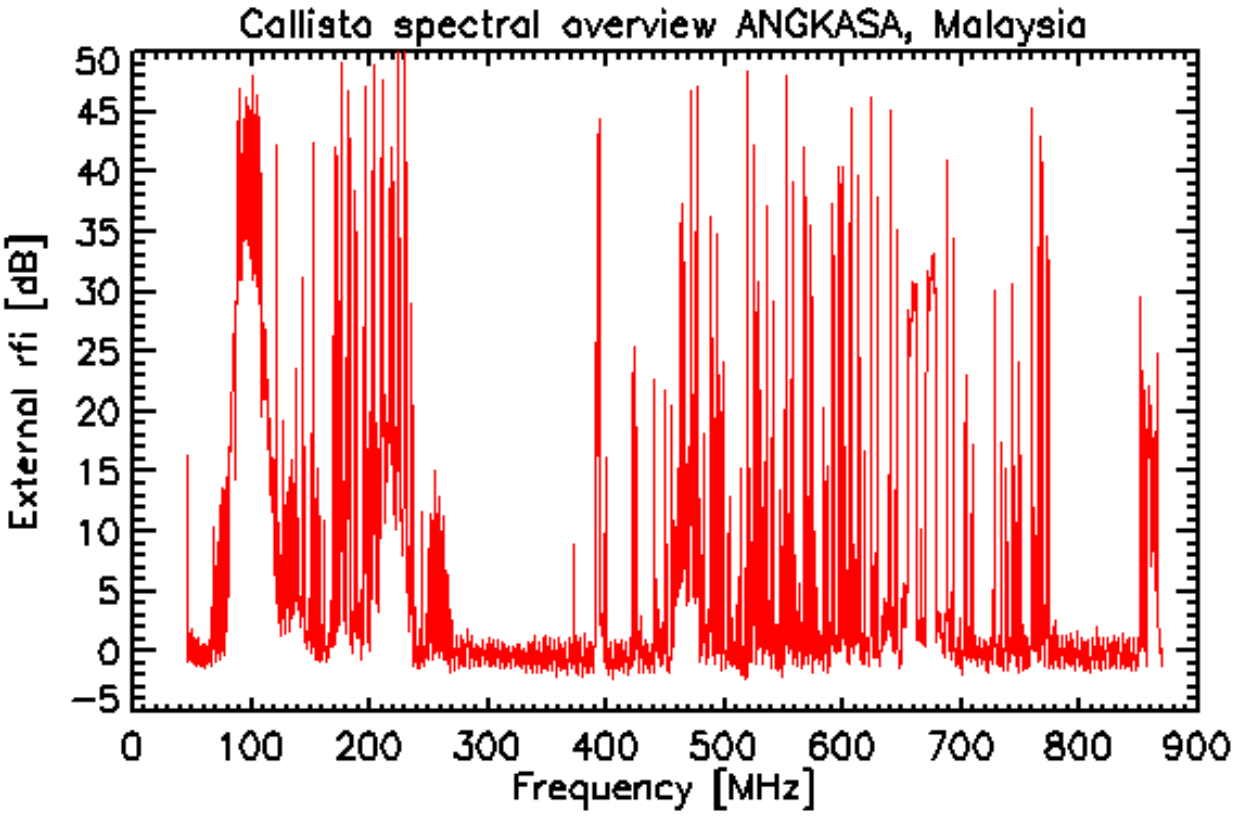


Fig. 5: Spectral overview at ANGKASA, measured with a 20 dB preamplifier. Interference level is rather high with up to 50 dB external interference. High level interference is received from FM-band (80 MHz – 108 MHz), from VHF-band and from UHF-band. In the UHF-band we can recognize (beside a lot of analog-TV) two DVB-T channels between 650 MHz and 700 MHz. Above 850 MHz we detected mobile phone transmission while around 390 MHz we get strong signals from TETRA (international police communication). An interesting feature we can see between 240 MHz and 280 MHz. It shows downlinks from US military satellites with about 10 dB above noise level. This 'comb' of signals proves that the whole system is working correctly, sensitivity is o.k. This feature can be used to check the system as part of periodic maintenance. The noise floor at all frequencies below 3 dB is in fact NOT noise, it represents standing waves due to the fact that the LPD antenna is not matched to the 50Ω coaxial cable (boom distance is too small). Total sensitivity can be improved by impedance matching of antenna and coaxial cable. Three frequency ranges can be identified for useful astronomical observations:
a) between 45 MHz and 80 MHz
b) between 240 MHz and 380 MHz
c) between 780 MHz and 850 MHz

Fig. 6: Group photo after the workshop in the entrance hall of ANGKASA

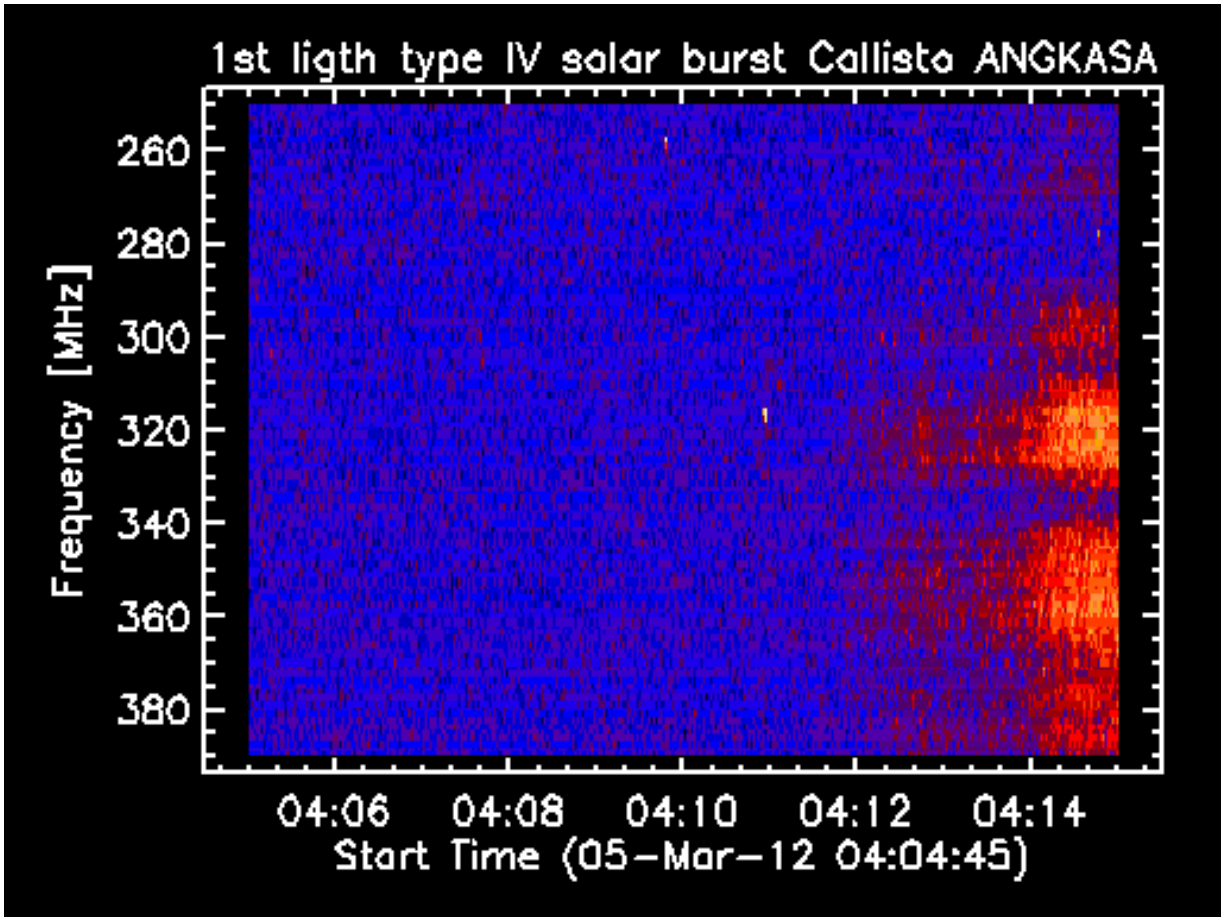


Fig. 7: 1st light of CALLISTO at ANGKASA. It shows the beginning of a very strong solar radio burst.

1140	0230	0409	0443	G15	5	XRA	1-8A	X1.1	3.7E-01	1429
1140	0252	////	0427	PAL	C	RSP	039-056	CTM/1		1429
1140	0316	0348	0643	LEA	3	FLA	N17E52	2B	PRB	1429
1140	0333	0432	0606	LEA	G	RBR	4995	5300		1429
1170	0333	////	0833	LEA	U	RSP	025-075	VI/2		
1140	0333	0442	0615	LEA	G	RBR	410	480000		1429
1140	0334	0434	0601	LEA	G	RBR	2695	12000		1429
1140	0336	0442	0607	LEA	G	RBR	610	650000		1429
1140 +	0345	0441	0615	LEA	G	RBR	245	57000		1429

Welcome ANGKASA on the e-Callisto network!

AOB

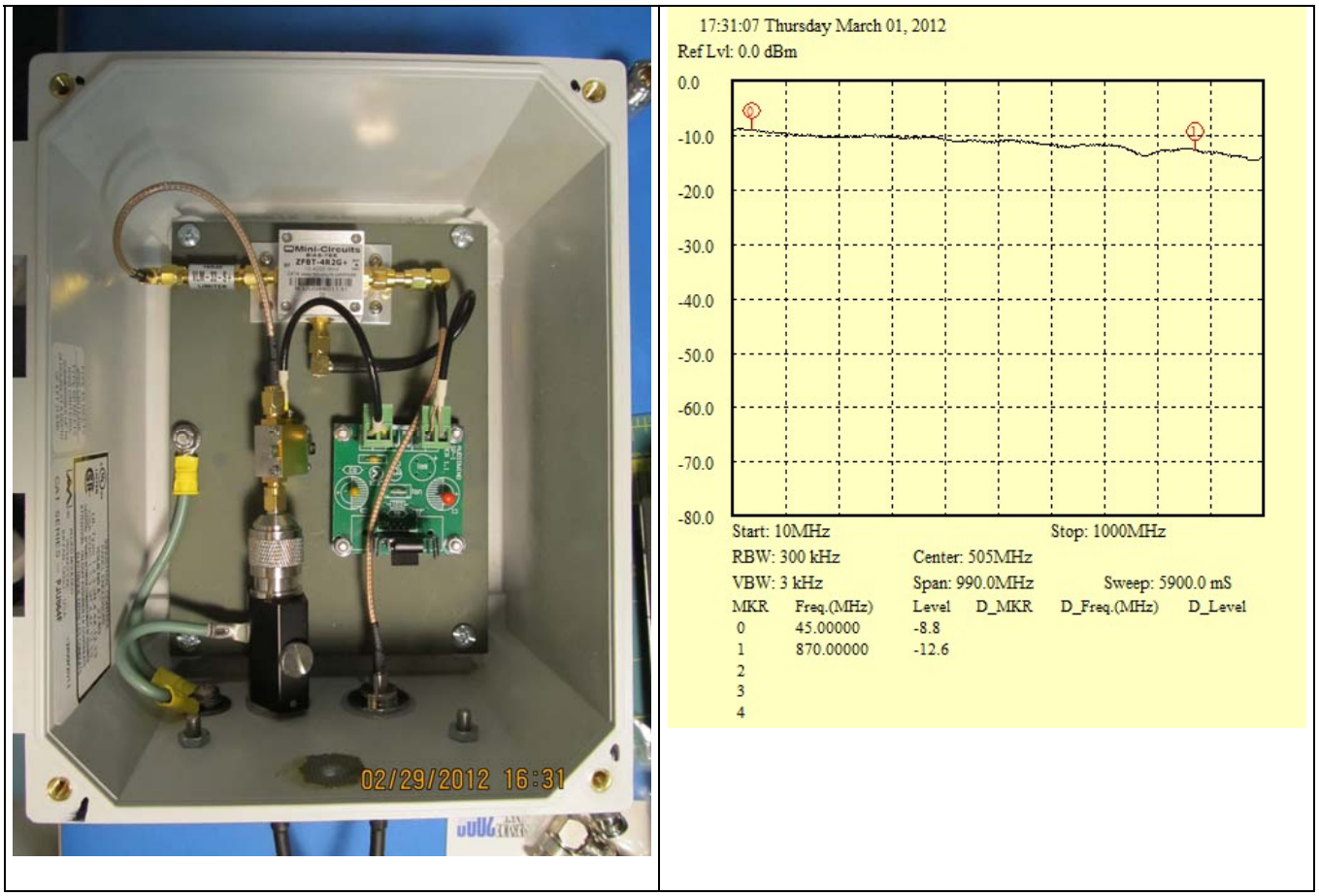


Fig. 8: Professional low noise front-end (left) from Whitham Reeve Anchorage, Alaska. This unit mounted close to the antenna improves sensitivity of a Callisto system. The unit contains lightning protection and stabilized power supply.
Detailed information about this tower mounted amplifier (TMA) here:
http://www.reeve.com/Solar/e-CALLISTO/e-callistoOrderInfo.htm
Spectrum sweep plot (right) shows flatness of gain versus frequency. Add 30 dB to get the amplifier gain.

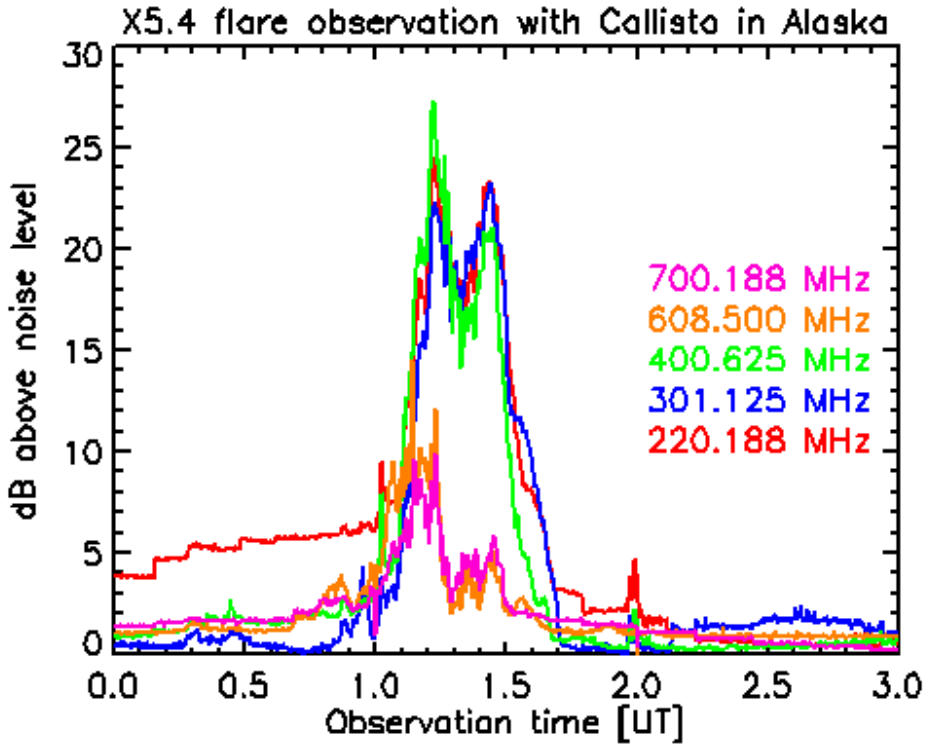


Fig. 9: Light curves at different frequencies observed in Alaska during the X5.4 flare of March 7th.

Relevant Callisto-related links can be found here: http://e-callisto.org/

Direct access to all Callisto data available here: http://soleil.i4ds.ch/solarradio/callistoQuicklooks/

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