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CALLISTO status report/news letter #47

Radio observations of atmospheric gravity waves with Callisto

On December 12th 2013 NOAA reported between 08:04 and 12:08 only radio noise at 245 MHz observed in San Vito. But some European observatories of the e-Callisto network (Germany, UK and Ireland) observed very strange reverse drifting and v-type bursts which was never recognized by the author before. Private communication with P. Zucca from TCD showed that these strange structures are due to focusing effects in the ionosphere.

Abstract from C. Mercier, F. Genova and M. G. Aubier Annales Geophysicae, 1989, 7, (2), 195-202:
The effects of travelling ionospheric disturbances (TID's) on the observations of solar radio storms at decameter wavelengths by the radioheliograph array in Nançay are used to derive basic parameter of atmospheric gravity waves. TID's are modeled as one-dimensional lenses, which produce apparent shifts of the source positions at meter wavelengths, and focusing at decameter wavelengths.

Interestingly it is possible to observe complex ionospheric behavior with cheap and simple radio-telescopes like Callisto. People who are interested in such kind of observations to study ionospheric gravity waves should generate observing programs for frequencies below 100 MHz, ideally with an additional up-converter for frequencies from 15 MHz – 100 MHz. Callisto again proved to be a powerful tool for solar science and radio-monitoring.

Below are shown recent observations from Bir castle in Ireland, Essen in Germany and Glasgow in Scotland. For comparison I added an observation from a LOFAR node from Chibolton in UK which was provided by Richard Fallows from Astron NL. And finally a plot from Nançay radio heliograph, provided by Karl-Heinz Gansel, Dingden Amateur Radio-Astronomy Observatory DARO, Germany.
Although Callisto instruments are almost identical, the spectra look completely different, depending on their geographical longitude and latitude.

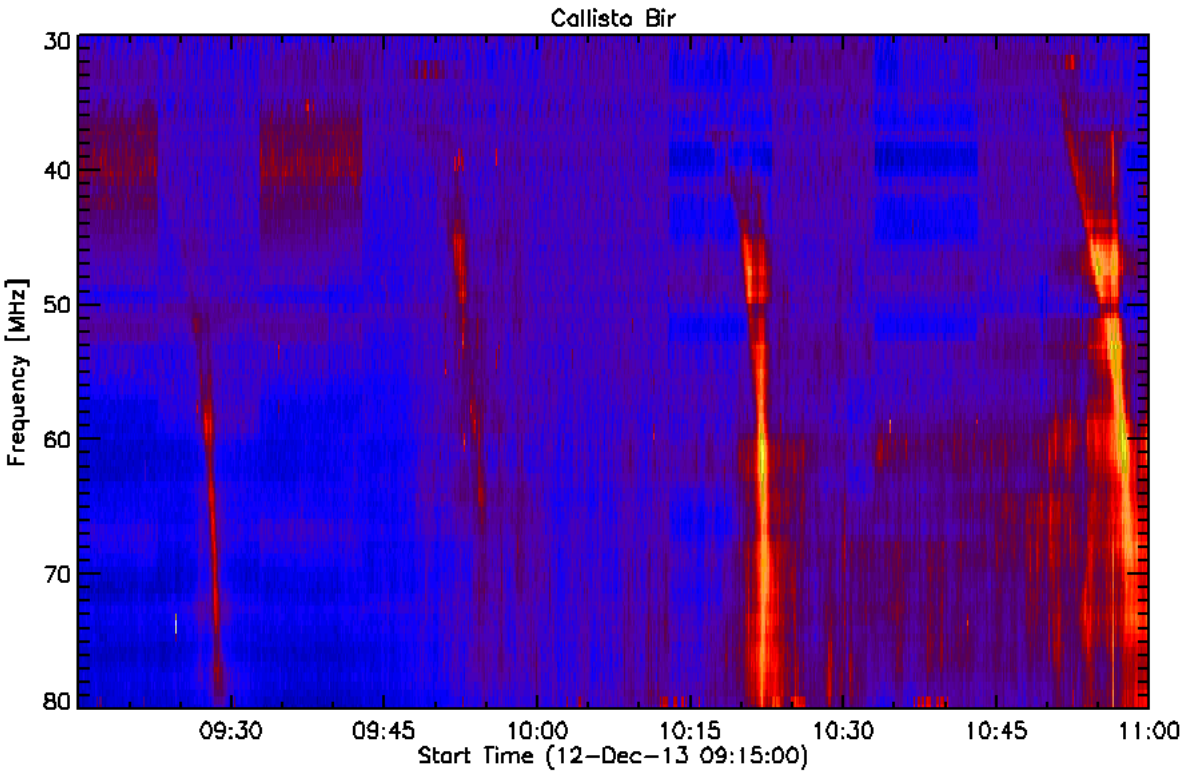

Figure 1: Bursts connected to solar radio noise with drifts towards higher frequencies and a v-type burst around 11:00 UT. Observations from Bir castle, Ireland. Instruments are operated by TCD.

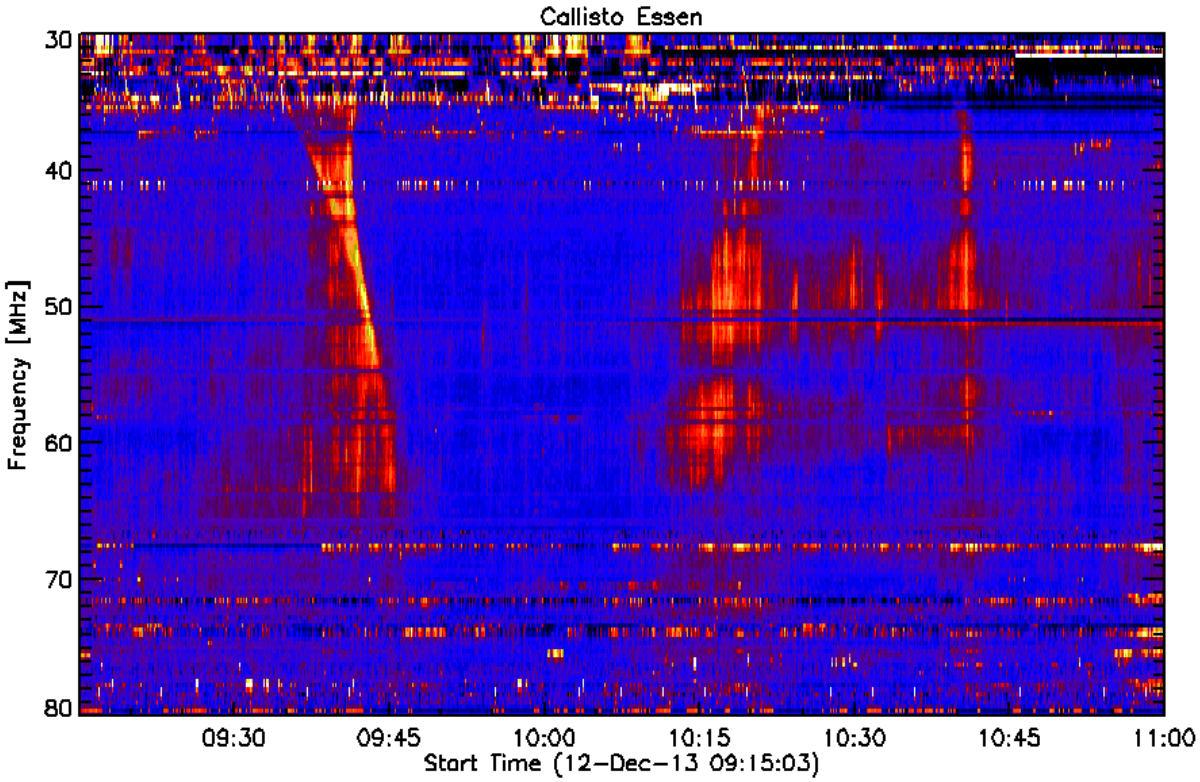

Figure 2: Bursts connected to solar radio noise with drifts towards higher frequencies and a v-type burst around 09:37 UT. Observations from Essen, Germany. Instrument operated by Jochen Plessmann, do1jpa@gmx.de

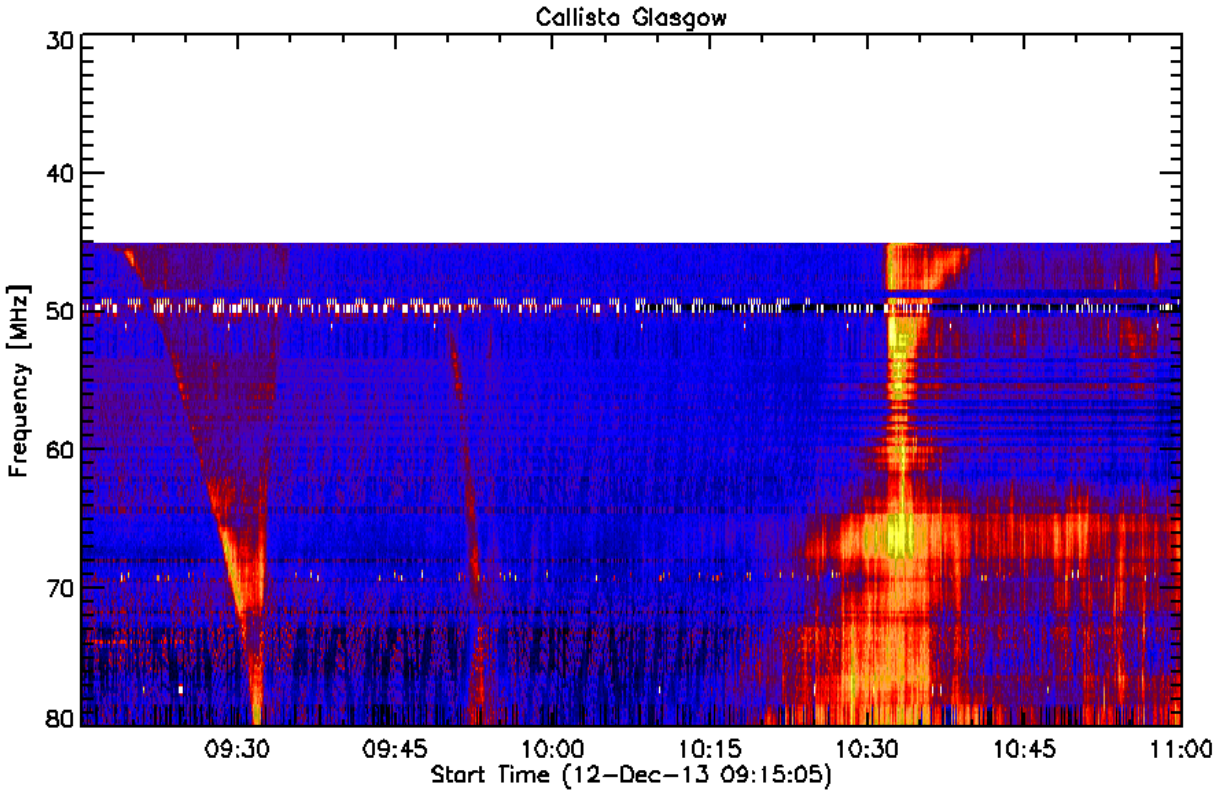

Figure 3: Bursts connected to solar radio noise with drifts towards higher frequencies and a v-type burst around 09:30 UT. Observations from Glasgow, Scotland/UK. Instruments are operated by University of Glasgow.

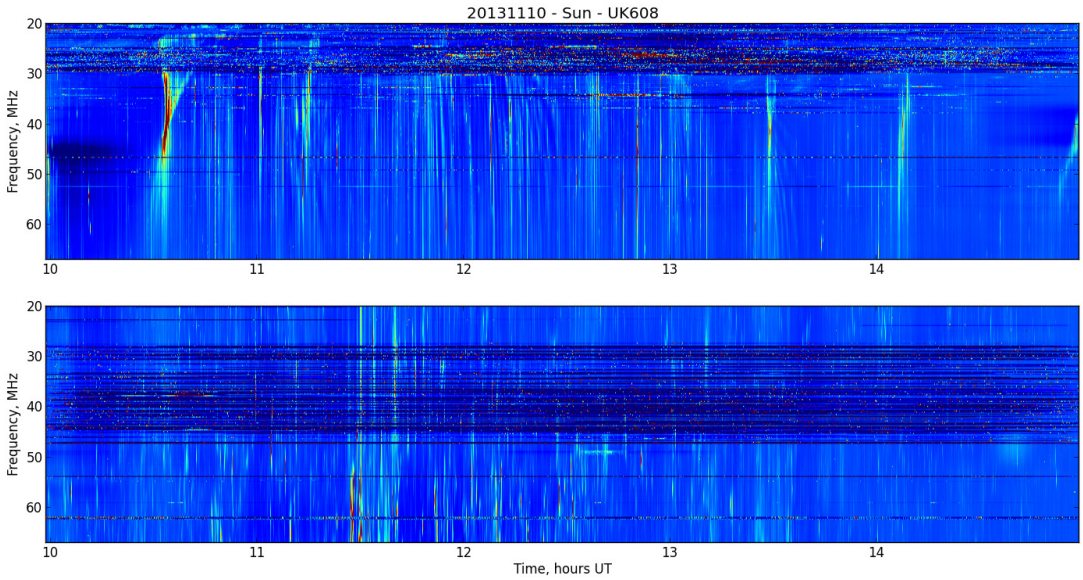

Figure 4: LOFAR node UK608 in Chilbolton (UK) showing circular polarized solar activity with positive and negative drift rates.

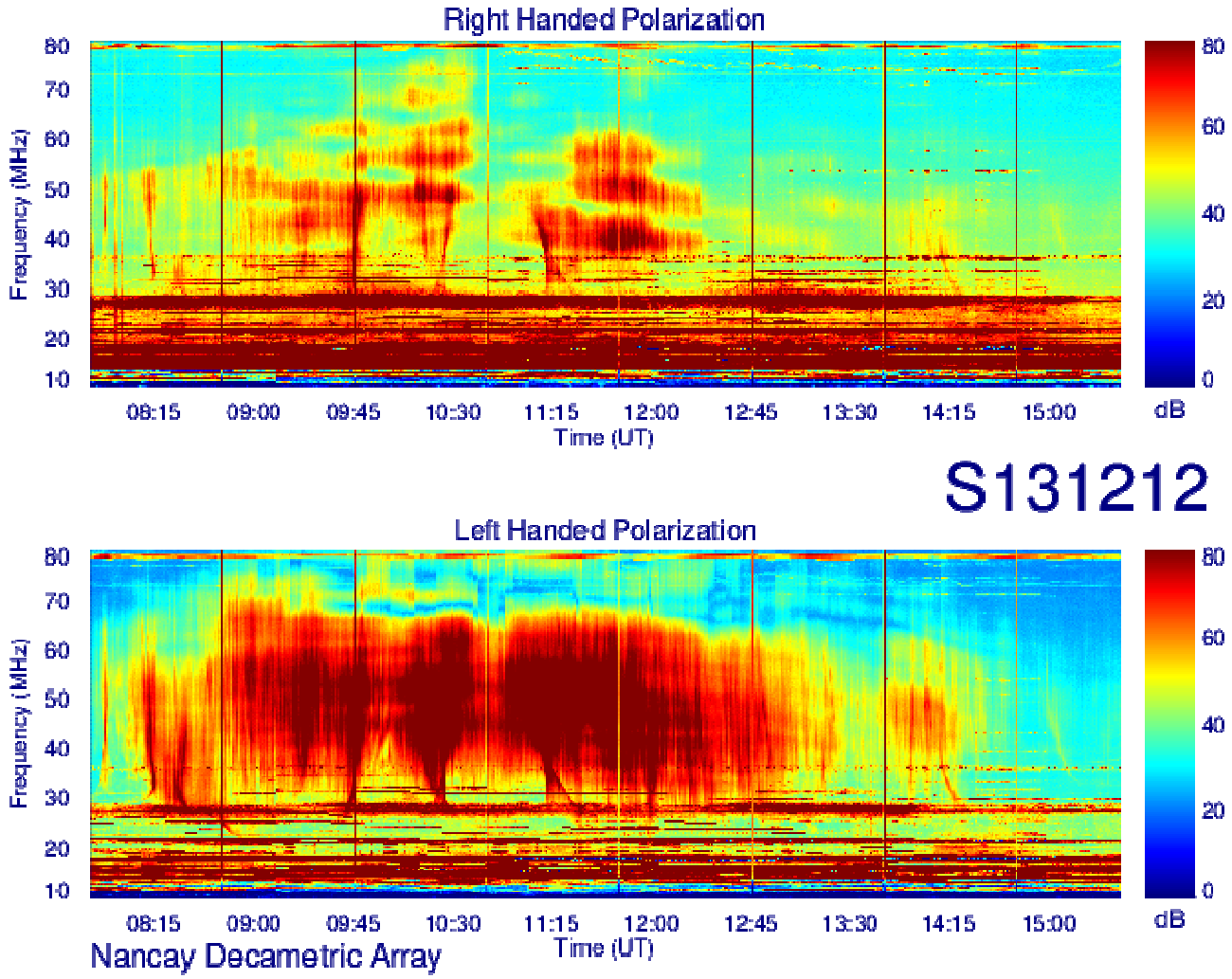

Figure 5: Both circular polarizations observed with the Nançay radio heliograph, France. Link to the plot was provided by Karl-Heinz Gansel, radioastronomie@dl6ebs.de

AOB:

- 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 Fachhochschule Nordwestschweiz (University of applied sciences FHNW) in Brugg/Windisch, Switzerland. Process control, user communication and scripts are conducted at institute for Astronomy, ETH Zurich.

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On the other hand if you think someone else might be interested in this kind of info, please let me know his/her email-address to be added to the data base.

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