Progress on radioastronomy in Munich (DE)

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Introduction

• The start of the EurAstro radioastronomy project in Munich coincided with the decision, taken about three years ago, by the BRAMS of the Belgian Institute of Spatial Aeronomy to build a net of radio stations for radio observations of meteor showers. This paper presents a review of the development and the results of the EurAstro radioastronomy project.

The EurAstro Radiostation (EARS)

- The work of the EurAstro radiostation (EARS) is based on the principle of the passive radar.
- In its first version the EARS used the BRAMS beacon (2) installed near Dourbes (BE), irradiating a radio signal at the frequency of 49.90 MHz, however no radio echo of meteorites was recorded.
- The EARS second version comprised a delta loop antenna Delta 2e50 from Antennepkw tuned at 49,90 MHz oriented towards the BRAMS beacon and the integration of the sw SpecLab v26 b10 sw downloaded from the homepage of BRAMS. It worked correctly and faint echoes of meteorites were recorded. The results were presented at the Jenam 2011 in Saint Petersburg.
- The third EARS version adopted of the 143.050 MHz, several KW strong radio beacon of the radar GRAVES near Dijon (FR), about 400 Km from Munich, which is specifically designed for detecting meteorites and satellites, and a vertical, omni-directional antenna J-Pole 144 tuned at 143,049 MHz, USB mode.
- The fourth EARS version (cf. Fig. 1) consisted in the installation of an antenna Yagi VHF MHF4e/144 from Antennepkw, Azimut bandwith 62°, tuned at 143,049 MHz, USB mode directed to Dijon in order to eliminate external radio perturbations. Presently, both the J-Pole 144 and the Yagi VHF MHF4e/144 are used for the radio observations.



Fig. 1: fourth EARS version – at the top of the middle mast the delta loop antenna Delta 2e50 and at the base of the mast the Yagi VHF MHF4e/144 horizontally oriented towards Dijon, at the base of the right mast the J-Pole 144 vertical antenna.

Radio observations – results



Fig. 2: EARS third version – three recorded underdenses meteor echoes (right side), a radio perturbation of unknown origin (left side), horizontal radio reflections by planes



Fig. 3: EARS third version - spectacular recorded overdense meteor echo



Phoenicids

Because of the last year request by the IMO (IMO_INFO 2-12) to perform observations "by all methods" of the Phoenicids (PHO, Active: Nov. 28 – Dec. 9; Maximum: Dec. 6, 10h00m U.T.) a shower poorly known, the fourth EARS version was activated on 05-06/12/2012 (cf. Fig. 4) for collecting possible Phoenicids radio echoes. However, because at that dates and time the radian of the shower was too far below the horizon and clearly out of the range of the radar GRAVES and Munich, the recorded radio

echoes probably did not belonged to Phoenicids.

eta-Aquarids (ETA) - eta-Lyrids (ELY)



This year on 06 – 09/05/2013 radio echoes from η -Aquarids (ETA; Active: April 19 - May 28; Maximum: May 6) and η -Lyrids (ELY; Active: May 3-14; Maximum: May 8) were recorded.

Solar observations



Fig. 6: recorded radio perturbation linked to the solar event III/2 Fast Drift Burst at on 27/11/2012 at 143,090 MHz



In its fifth version the EARS further comprises a Yagi VHF MHF4e/144 tuned at 143,049 MHz, USB mode and another Yagi antenna self manufactured by the Radiosociety tuned at 350,00 MHZ mounted at the extremities of a telescope polar mounting (cf. Fig. 7) so as to allow them to point directly the Sun and follows its apparent movement on the sky.



The radio observations are in progress. As expected, the horizontal radio reflections by planes disappeared from the recorded images with both the antennae. Surprisingly, at 143,090 MHz, radio echoes from underdenses and overdenses were still recorded with some radio perturbations coming from the Sun. At 350,00 MHz no radio perturbations coming from the Sun has yet been recorded.

Conclusion / Acknowledgement

- Now that the EARS in its fifth version is fully operative, I am looking forward for possible radio observation made in collaboration with other organisations and I am willing to accept suggestions in order to ameliorate and extend the observations of the EARS.
- I express my gratitude to Mr.Ulrich Oswald of the EPO Radiosociety for the support in the upgrading of the EARS.