

RAMBo: the “Radar Astrofilo Meteorico Bolognese”

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Radio meteors are usually investigated by professional radars. Amateur astronomers cannot have transmitters, so usually they can only listen to sounds generated by a radio tuned to a TV or military transmitter. Until recently, this kind of observation has not produced good data. The experience of “RAMBo” (Radar Astrofilo Meteorico Bolognese) shows which data can be extracted from an amateur meteor scatter observatory and the results which can be achieved.

1 Introduction

RAMBo is a homemade, low cost project born in Bologna (Italy). Its goal is the observation and the automatic recording of meteor activity.

Like other European observatories, also RAMBo uses a military radar transmitter that is continuously on air in VHF at great power: it is located in Graves, near Dijon, in France. It is built for satellites and for aircraft position control.

The RAMBo receiving set up is composed of a Yagi directive antenna (10 elements) pointed in azimuth in the direction of the transmitter (300°), and in declination about 25 degrees above the horizon. Its polarization is vertical.

Given the characteristics of the antenna (high directivity), the area of the sky that is investigated consists of a twenty per thirty square degrees area, above the Alps, roughly vertically on the Matterhorn.

The receiver is a Yaesu 897 tuned in SSB (Single Side Band) about 1000 Hz below the Graves carrier.

Sound analysis and data recording are both made with Arduino, the well-known low cost microprocessor of the “Internet of Things” (IoT) through a program written by us.

- For every meteor echo we record:
- Progressive event number;
- Hourly number;
- Date and time (UT);
- Echo length (milliseconds);
- Echo amplitude (millivolts);
- A number proportional to the rise time.

For each echo RAMBo realizes a data string CSV type (common delimited values) containing the six above listed informations. Every night at 18 U.T. Arduino sends the file via the web to a cloud site, so that it can be analyzed at home.

After three years of trials and improving we arrived at the sixth version. Now the results are good and reliable. Who need to know more about us, can visit our website:

www.ramboms.com where you can find the project history, see our data, and get to know our amateur team.

2 Reports from RAMBo

Normal activity for 23-30/5/2016:

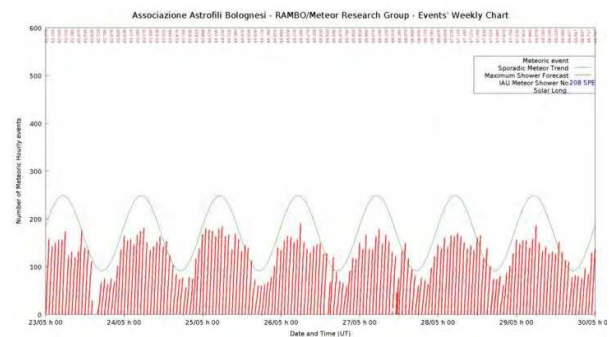


Figure 1 – “Rambo” hourly rate (HR) for 23-30/5/2016.

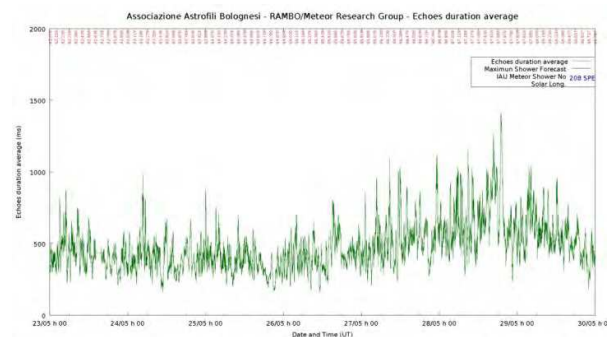


Figure 2 – “Rambo” average echo duration for 23-30/5/2016.

Activity for 30/5–6/6/2016:

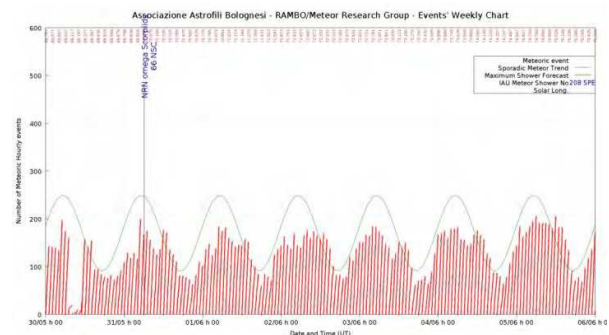


Figure 3 – “Rambo” hourly rate (HR) for 30/5–6/6/2016.

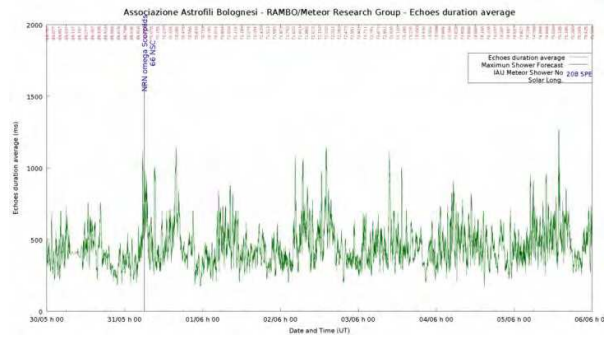


Figure 4 – “Rambo” average echo duration for 30/5–6/6/2016.

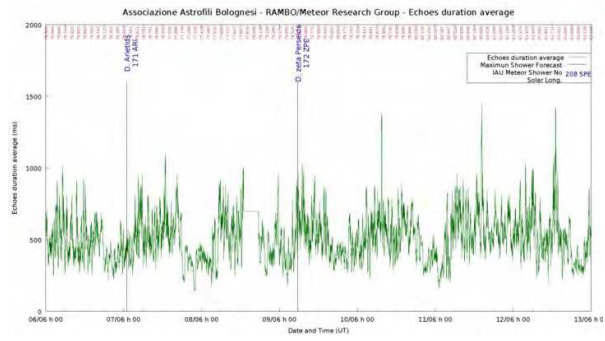


Figure 6 – “Rambo” average echo duration for 7–13/6/2016.

Comparing the hourly rate profile with the mass activity in the echoes duration average profile, it is possible to see a faint evidence of the Omega Scorpionids activity, just at the awaited time.

Normal activity for 7-13 June 2016:

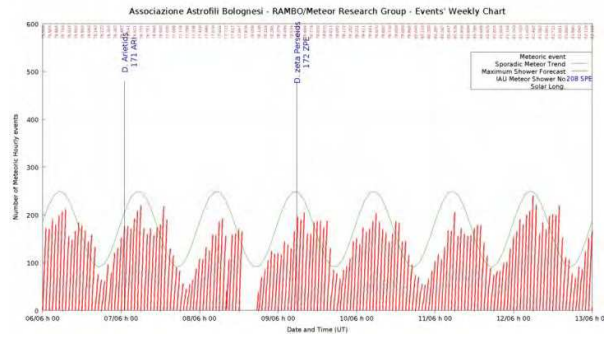


Figure 5 – “Rambo” hourly rate (HR) for 7–13/6/2016.