Croatian Meteor Network

Ongoing work 2017-2018

Damir Šegon, Denis Vida, Željko Andreić, Korado Korlević, Aleksandar Merlak, Patrik Kukić, Matej Butković, Renato Turčinov
Introduction

RMS - migration
Radiometer!
Infrasound?
Important stuff
Summary
RaspberryPi Meteor Station: from the idea 2016 ...

- New detection approach
- End-to-end capture/detect/process solution
- Opportunity for network expansion and educational activities

... and operative 2018

- Cameras working in Canada, France, Brazil and Croatia
- Macedonia, South Korea, China and Poland announced
- Migrating CMN stations from ADAPT (SkyPatrol and CAMS) to RMS
RaspberryPi Meteor Station: the CMN migration

- RMS working not only on Raspberry Pi
- PCI x878 chipset capture card tested on a Linux PC
- Should work on all other capture cards supported by Linux

- Complete IMX225/291 digital RMS solution camera+RPi available!
- See it live at poster session, presented by Denis Vida
Low Cost Radiometer

- First presented at IMC 2015, Mistelbach
- WGN paper on first results 2018

- Continuously monitoring from November 2017
- More than 40 of all-sky camera / radiometer fireballs paired up to date
Low Cost Radiometer

- A solution for dynamic pressure estimation, if trajectory is known

![Radiometer Pula light curve 20171231_011853_6](image)

- 4.5kPa
- 15kPa
- 41kPa
- 66kPa
Low Cost Radiometer

- It works, but how reliable and sensitive it is?

- Interference from 50 Hz harmonics light pollution and electronics noise coupling
- Clouds and other (un)natural sources changing illumination
Low Cost Radiometer

- It works, but how reliable and sensitive it is?

Nikon DSLR image, courtesy by Hrvoje Damjanović

ASI 174, Fujinon 2.7mm F1.8

20180812_213815UT
Low Cost Radiometer

- It works, but how reliable and sensitive it is?

- Opportunities for further hardware and software improvements
Low Cost Infrasound Sensor

- Infrasound: not necessarily a night event
- Balistic wave coverage: trajectory estimation from multi-site arrival time

Observed vs. calculated SH seismogram of the Siberian explosion of June 30, 1908, at Irkutsk.

A. BEN-MENAHEM

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Low Cost Infrasound Sensor

- To have a complete fireball network: cheap & plug’n’play!
- Sensor based on piezo microphone, 35mm diameter chosen
- Two designs under testing

**v00**: web based electronics (you do not want to see the PCB)

**v01**: own design (PCBs made in... )
Low Cost Infrasound Sensor

- Initial tests: where to find an infrasound source?

Lightning map over Istrian peninsula on 20180825_2111CET

Source: www.lightningmaps.org
Low Cost Infrasound Sensor

- Initial results: encouraging!

Spectrogram of thunder
20180825

Raw temporal signal
Low Cost Infrasound Sensor
- Initial results: encouraging!

Thunderclaps recording on 20180825
Important stuff: a meteorite dropper fireball

- Very well observed (http://fireball.imo.net/members/imo_view/event/2018/1336)
- Multiple search expeditions
- No findings…
- Rocks on the strewn field are all black!!!
Important stuff: rolling shutter correction

- Meteor centroid position shifted
- Mathematical solution found
- CMOS cameras with rolling shutter may be used for meteor astronomy

Kukić et al
Important stuff: meteor photometry

- Back down to the roots - photography
- Photometric mass from magnitude?
- Find the way to recalibrate data

Panchromatic: $-2^m5$
Human eye: $-2^m1$
CMOS (full): $-3^m6$
CMOS (VIS): $-2^m8$
EOS 10D: $-2^m7$

OR

Andreić et al

IMC 2018: Šegon et al – Croatian Meteor Network: ongoing work 2017-2018
Summary

- Migration to RMS: goal to be reached soon
- Radiometer operative: going to the next level
- Infrasound observations: investigating
- Rolling shutter correction allow the use of low cost CMOS board cameras
- Meteor photometry: making progress
Acknowledgements

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Thank you for your attention!

Questions?