

ACTIVITIES OF ASTRONOMICAL SOCIETY EUREKA IN PERIOD 2012 - 2014

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Abstract. Astronomical Society Eureka in Kruševac is successfully promoting Astronomy since 2010. Since then it has organized and successfully implemented a number of activities in and around the city of Kruševac in order to animate young people to engage in science and enabling the wider population to be familiar with the night sky. It has successfully implemented a number of projects. This paper briefly describes the results in the field of promotion of astronomy that members of Eureka achieved within the specified period, where the emphasis will be placed on the description of the project "Sky for all", IASC 2013, International Observe the Moon Night, activities in the field of informal education and about project for construction of the city's astronomical observatory called "Sky is (not) the limit".

INTRODUCTION

Astronomical Society Eureka was established on March 6th, 2010. The aim of the Society is to promote Astronomy and related sciences in Kruševac. Since the beginning Society started actively for the promotion of Astronomy. Society promoted Astronomy through the organization of:

- Observation of night sky on many locations in city (Hill Bagdala, Kosturnica Square, center of the city)
- Pop-science lecture events
- Participation in projects
- Organization of special astronomy events (Moon Eclipse, Solar Eclipse, Transit of Venuse)

AS Eureka regularly throughout the year organizes public observing events for the citizens of Kruševac. Location that is most commonly used for the organization is hill Bagdala, where are the best conditions for the organization of public observing events during the year, if we take into account light pollution. In addition

to these site observing events are often organized with the Kosturnica Square and from the city center. The most frequently organized observing events are about the Moon and planets because visitors are always interesting to observe these objects. Moon offers the possibility for visitors to use telescope and cameras on mobile phone to take photo of the Moon. In special situations observing events of deep sky objects are organized. During August members of Society always organize observing of Perseid meteor shower on Bagdala. In the period 2012-2014 Society has organized more than 15 observation events.

At the invitation of primary and secondary schools Society members always respond and organize the pop-science lectures for students. The most frequent topics of lectures are the Solar system, the Sun, Observational Astronomy and Telescopes. In the period 2012-2014, members of Eureka visited 10 schools in Kruševac where they held lectures for students.

Members regularly participate in international projects, especially in the International Observe the Moon Night and Great World Wide Star Count since 2010. Since 2014 AS Eureka participate at the event Night of Sidewalk astronomers. This year in two hours of observation more than 100 observers were in the city center. Members also participated in the 2013 IASC project of which will be further discussed in the sequel.

In the period 2012 - 2014 AS Eureka has actively started to engage in writing projects related to the promotion of Astronomy and Science. Eureka participated in several competitions organized by: Foundation Divac - Competition "Really important", Trag Foundation (formerly BCIF), calls of the Ministry of Youth and Sports, "Youth Rules". In this period members of Eureka successfully introduced and implemented the project "Sky for all" dedicated to the problem of light pollution, organized astronomy event at Science festival "Days of Eureka" in Kruševac, and started actively to engage in informal education in cooperation with the Society "Academy of National Development" from Belgrade where successfully organized a roundtable on the topic of informal education "Civil society organizations in the field of informal education" and presentation of program "Go for the Future" from Niš in Regional Chamber of Commerce in Kruševac.

For efforts and work on promoting science in 2013 and 2014, Society received the award on the occasion of the youth day of the City Administration Kruševac and the Office for Youth, reward MLADGRAD 2013 by the Ministry of Youth and Sport, Ministry of local government and association Citizens' Initiative for cooperation between youth and local government, and Prize for the Promotion of Science from the Website Kruševac online. From Serbian Physical Society Society got letter of thanks for help in the organization of the State contest in Physics for elementary schools in Kruševac in 2014.

Association organized and implemented activities about significant astronomical events such as: the transit of Venus on June 06th 2012, Occultation of Jupiter with the Moon on July 15th 2012, observing and recording comet PANSTARRS on March 17th 2013, and many other activities. Many of them had coverage by both local media and on national level.

The Association was regularly enrolled in scientific meetings in this period. Eureka had the opportunity to present itself at a conference in the city of Volos, Greece from August 2nd to 4th, at an international conference "e-Infrastructure for an Engaging Science Classroom" which had a large number of people engaged in the research, education and promotion of science, especially Astronomy. Members of the ASEureka participated in the conference with three papers: Sanja Jovanović and Zoran Tomić - "Teaching children about astronomy through the game", Zoran Tomić - "Work of AS Eureka on the promotion and popularization of astronomy in Kruševac" and Zoran Tomić, Gianluca Masi and Jovan Aleksić – "Application of the Internet in the promotion and popularization of Astronomy".

One of the major goals of the association members is to build city observatory that will serve to promote astronomy in Kruševac. Therefore, members of the association have written project "The sky is (not) the limit" which was sent to the competition of the International Astronomical Union - Office for Development and assessed as a high quality project. Project is currently on the list of 250 successful projects that the organization wants to assist in their implementation. Members of Eureka wrote another project for Observatory in Kruševac and in mid of December will get feedback about it.

For the first time AS Eureka with cooperation with AS "Plejade" from Tuzla, Bosnia and Hercegovina, realized project "EarthKam" in Kruševac.

In this paper will be described in more detail the implementation of projects in the period from 2012 to 2014, as follows: International observe the Moon night, Great World Wide Star Count, Transit of Venus 2012, Sky for all, IASC 2013, project Sky is (not) the limit for the construction of observatory in Kruševac, humanitarian event of astronomers in Kruševac, Be an Astronomer project, World Space Week 2014 and future plans for Society.

INTERNATIONAL OBSERVE THE MOON NIGHT

InOMN (International Observe the Moon Night) is an international project implemented since 2010 at the global level. The aim of the project is to motivate people to take a look to our nearest cosmic neighbor, the Moon. Every year an increasing number of public events are organized at the world level. Since 2010, Kruševac is one of the cities where these events are organized under the name "International Observe the Moon Night Kruševac" by the AS Eureka. By organizing popular lectures and public observing events at Kosturnica Square AS Eureka contributes to the realization of this project. The goal is to raise awareness about the importance of science and its promotion among young people, especially Astronomy.

In 2012, the project was implemented on 21st and 22nd September. The project was implemented in four locations in Serbia: Nis, Novi Sad, Bačka Palanka and Sremska Mitrovica. In Kruševac, the realization of the project began with a lecture on September 21st in the high school.

On 22nd September at the Kosturnica Square was held observing event. The observation began at 19 o'clock. Although it was planned to start half an hour later,

at Square at that time was a large number of observers, so that the observation started earlier. For the occasion two telescopes were used, reflector 150/750 and refractor 60/900. Observers had the opportunity to observe the Moon and some details on its surface. Operators of the telescopes were Miloš Stanković and Zoran Tomić. In addition to observing all who brought their cameras and mobile camera phones were able to make photos of the Moon. It is estimated that a total of 150 citizens attended event. The observation ended at 21:30.

In 2013, the project was carried out on 12th October for the fourth time. That year this was the only event in Serbia, and one of three in the former Yugoslavia. It is estimated that the activities attended about 250 citizens who have observed and photographed the Moon.

Like every year, this action is most visited by youngest citizens. The observation started at 20 o'clock and lasted up to 23 o'clock. Although the clouds interfere with observation in the first hour of event, a large number of visitors decided to wait and it was worth. Anyone who had a camera or mobile phone camera was able to photograph the Moon. All attendees who were photographing the Moon were asked to send their photographs to mail in order to publish them on the web site. Large number of photos arrived and were published.



Figure 1: Observing of the Moon at Kosturnica Square.

This event was organized by Zoran Tomić, Sanja Jovanović, Miloš Stanković, Aleksandar Ristić, Aleksandar Jovanović, Nikola Nedeljković, Barbara Nedeljković and Stefan Anđelković. This event was supported by astronomical section of High School, Office for Youth and medias in Kruševac.

In 2014, members of Eureka implemented the project on 12th September on hill Bagdala. The activity was carried out as part of the project "Be an Astronomer" which ends in November 2014.

TRANSIT OF VENUS 2012

Astronomical Society Eureka in cooperation with the astronomy section of High School in Kruševac organized observation of the transit of Venus on Bagdala. Apart from Kruševac, observation was held in eight towns in Serbia.

For observing of transit two refractor telescopes were used with a protective filter. Weather conditions allowed visitors to observe one part of the transit. During this time, the transit was observed by around 70 people. Regional Television Kruševac attended and recorded observation. This was one of the more massive the activities of associations in this period and the second most visited in Serbia about the transit of Venus.

PROJECT "SKY FOR ALL"

Project "Sky for all" is realized within the project "BeEverGreen" implemented by association "Treehouse" which is funded by the US Embassy in Serbia in the period from June to September 2013. The project aims to conduct a series of educational, promotional and participatory activities to motivate the youth and residents of Kruševac to actively participate in environmental initiatives, with emphasis on recycling.

"Sky for all" aims to create awareness among citizens, mostly among the younger population, about the importance of preserving the night sky, which is important not only for astronomy but also for the living beings. Within the project, the public observing events in the city were organized in order to point out the problem of reducing the number of objects that can be seen through telescope from the city because of light pollution. The intent of these events was to show to visitors how light pollution affects the reduction of the number of objects that can be observed at various locations. Therefore, the observations were carried out at locations:

- city center
- Kosturnica Square
- hill Bagdala
- river Rasina
- mountain Jastrebac
- Ribarska spa

Results of implementation of this project are that a total of 1000 observers attended events, awareness of the problem of light pollution was expanded, new equipment was obtained (CCD camera) and an initiative was launched to build in Kruševac an astronomical observatory. The results of the project and the initiative is written also in Vecernje Novosti national paper.

At the end of the project on December 3 presentation of results was organized in the White Hall of the Cultural Center Kruševac and also an exhibition of astrophotography and photos made during this project. The project was also presented at the ASTRO weekend event at the Youth Center in Belgrade from 27th until 29th December 2013, and at scientific symposium SDEV 2014 in Kruševac.

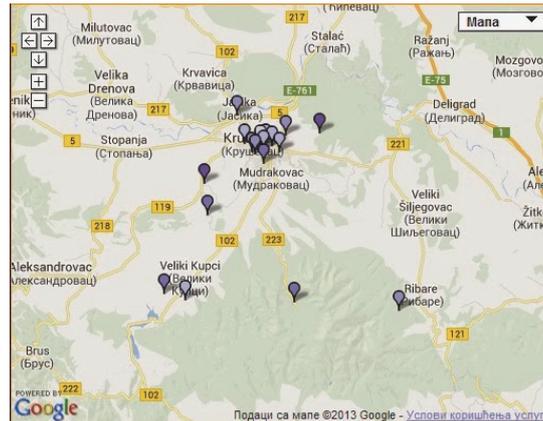


Figure 2: Map of light pollution in Kruševac for 2013.

One of the outcomes of the project is the map of light pollution. The aim is not only to show the level of pollution in Kruševac, but also to help in the search for a suitable site for the observatory, because of the associations active in raising funds for Observatory. In 2013 the survey was done with a record of 18 locations in the city and the following results were obtained: Center – 2, river Rasina – 3, Kosturnica Square – 3, Pioneer Park – 3, Miše Mitrovića Street – 3, Bagdala first part – 4, Bagdala second part – 4, Jasika – 4, Slobodište – 5, Tekije – 6, Lukavac – 6, Majdevo – 5, Jastrebac – 5, Ribarska spa – 4, Meševo – 5, Bivolje – 3, Dedina – 4 and Grkljan – 3. Results in 2014 are similar to this in 2013.

It can be seen that the situation is the best in Lukavcu and Tekije where the Milky Way can be seen, and even the Andromeda Galaxy and M13 star cluster with the naked eye. The worst situation is certainly in the city center.

Kruševac is the only city that in 2012 and 2013 took part in this global campaign, which aims to promote awareness of the problem of light pollution, but it is also a true example of a project for the promotion of Science. The activity will be continued in future.

IASC 2013

In the period from 22nd March to 26th April, the search for asteroids named IASC "International Asteroid Search Campaign" was realized. This campaign was carried out in the framework of the Global Month of Astronomy 2013. The right to

participate had students from high schools and colleges around the world. In 2013 total of 15 teams from around the world have jointly carried out research in the Solar System searching for asteroids. Two teams were from Serbia and from Kruševac.

Two teams were from Serbia. First team named "Serbian Asteroid Search Team" consisted of high school student from Kruševac and: Miloš Stanković, Neda Aleksandrov, Veljko Đorđević and Nikola Nedeljković, under the supervision of physicist teacher Nada Savić. The second team consisted of students from Mechanical School of Electrical Engineering Darko Jovanović and Nemanja Mijajlović, under the supervision of physicist teacher Nataša Ralić. In this period students received nine sets of photos of a certain part of the sky. They used Astrometrica software to analyze and detect potential or existing asteroids. Training and assistance throughout the duration of this project was provided by Zoran Tomić from AS Eureka.

At the end of the project teams successfully completed the project activities. First team, according to the latest report, confirmed NEO objects 1866 and 99942, while second team confirmed 2013 AU76 object.

This was the first participation of the young astronomers on this project and we hope that the next year will be even more participants from Serbia.

PROJECT "SKY IS (NOT) THE LIMIT"

The project made by members of AS Eureka, titled "Sky is (not) the limit" for the International Astronomical Union - Office of Development, is placed on their wishlist. The project includes activities designed to promote astronomy among students in elementary and secondary schools. Within the project, the largest part of the budget is for purchase of computerized telescope that could be used for further promotion of astronomy, and also to be part of future observatory. Series of activities for the promotion of astronomy are planned in project which would enable students to acquire knowledge in the application of telescopes, astrophotography and be involved in the implementation of many astronomical projects that are available via the Internet.

Also with this project is planned the acquisition of 15 telescopes for a primary school in Kruševac. The goal is for schools to obtain an instrument with which they will be able to realize the practical part of the course in Geography and Physics related to the Space. For schools that receive telescopes, and also for all interested students and citizens free training to work on these telescopes is planned.

The project is by IAU - Office of Development put on the wish list. The project is good enough and that is in line with the objectives of the organization to gain their support and help in raising funds for implementation. The project was launched on the website of this organization and is marked on the map.

In 2014 project is modified and resubmitted to the IAU. In mid-December, is expected results, whether the corrected version will get financial support for implementation, whose primary goal is to build astronomical observatory in Kruševac.

HUMANITARIAN EVENT OF EUREKA ASTRONOMERS

On Friday 23rd May astronomers organized a humanitarian event in Kruševac regarding the floods that occurred in Serbia in May that year. This action was supported by the Red Cross, IdejNet club and local Mensa in Kruševac. The goal was to animate the citizens and to collect donations to help the endangered population from floods.



Figure 3: During the humanitarian event.

During event visitors could observe Jupiter, Mars and Saturn with telescope from Eureka, and all visitors had to do was either to send SMS to 1003 number or to donate money to a special box that was provided by the Red Cross. The event started at 20:30 and ended at 23:30. Around 200 visitors supported this event, large number of SMS were sent, and 9.560 RSD was collected. The collected money was paid into the account of the Red Cross.

WORLD SPACE WEEK 2014 IN KRUŠEVAC

On the occasion of World Space Week, in the foyer of the White Hall of the Cultural Center of Kruševac AS Eureka organized an exhibition of astrophotography made by Miodrag Sekulić from AS "Alfa" in Niš called "Cosmic quest". The author made more than 20 astrophotographs for this exhibition of his work in the field of astrophotography. The exhibition was opened by the President of the Astrological Society "Alfa" from Niš and professor at the Nis Faculty of Sciences prof. dr Dragan Gajić. He did lecture titled "Did they really walk on the Moon?", in which he showed that the astronauts were actually on the Moon in 1969, and that the human has indeed set foot on another object in the Universe

except on Earth. The exhibition was closed by Jovan Aleksić, a member of the AS "RuđerBošković" with lecture "The discovery of Jupiter's satellites". The exhibition and the lectures were extremely popular and implemented within the project "Be an Astronomer".

ACTIVITIES IN THE FIELD OF INFORMAL EDUCATION

Informal education is increasingly gaining in importance. There are many activities organized for the purpose of acquiring new knowledge and upgrading of existing. Activities that AS Eureka conduct, and also organizations like Eureka fall into the category of informal education. With the start of the Internet knoweladge and information they have become more accessible, and thus opened a new channel and means for informal education. Therefore AS Eureka promote the concept of "Astronomy from the chair," which is about the application of the Internet in amateur astronomy. ASEureka in cooperation with other organizations is working on organizing numerous activities and projects in the field of informal education.

The first in a series of activities was in Belgrade. In the business center Ušće Eureka organized with Academy of the National Development a roundtable on informal education and civil society organizations in this field. The round table was held on January 29th and the event was attended by over 20 representatives from 11 organizations in this field.

The meeting was opened by Filip Čolaković, Chairman of the Board of the "Academy of the National Development". After introductory remarks, all organizations participating in the round table presented their activities and results. The aim of the next set of discussions on the topic of informal education was mutually networking and establishing better mutual cooperation. After the presentation a discussion was held about issues in the field of education. In the discussion, the main topic concerned students who leave the country after graduation, because we are the third country in the world that has the large number of students who want to leave the country after the end of studies, and at the top (share second place) by the brain drain from the country, according to World Economic Forum. After discussion, it was concluded that students should be allowed and enabled to go abroad to acquire the necessary knowledge and improve it, but the state needs to stay in touch with them and to share their knowledge and experience to assist in the improvement of conditions for the development of country. It was also concluded that such events should be held several times a year, all for the purpose of interconnection and exchange of experience in the field of education.

The second activity was carried out in May 06th at Regional Chamber of Commerce Kruševac. Presentation of program "Go for the future" was organized. The presentation was held by Mrs. Ljubica Maksimović. The goal of presentation was to show good example of program in informal education for the local community. The presentation was attended by about 40 businessmen, representatives of NGOs, local governments, institutions who support the economy and young people, educational institutions and young people from the territory of a Rasinski district.

PROJECT "BE AN ASTRONOMER"

"Be an Astronomer" is a youth project implemented by AS "Eureka" with the support of Resource Center "Educational Center - Kruševac" within program "Youth Rules" funded by the Ministry of Youth and Sport. The aim of this project is to promote astronomy as a science, hobby and one of the ways how youth can use their free time. Two telescopes 60/900 refractors are bought which will be used in future astronomical activities in the city. The telescopes are owned by the city of Kruševac. Third telescope is bought and donated to elementary school in the village Ribare. This telescope is a donation from AS "Eureka" and association "Youth for Ribare".

During the project the following activities were realized: public observing events in Kruševac (PerseidMeteorShower, observing of the Moon, Saturn, Jupiter), training of students and the study of the Sun's activity based on sunspots by 40 students from Kruševac, measuring light pollution and realization of World Space Week. The project ends in November and results of project will be presented.

FUTURE PLANS

Members of the AS Eureka will actively work to promote astronomy in Kruševac and Serbia and to enlarge number of members which will allow the association to achieve its goals. The plan is to put more emphasis on training of members for writing projects related to the promotion of science and to apply at national and international competitions. The plan is also to register the association, when the conditions are right, to expand opportunities for access to resources and fundings for projects. The main objective of the association will be realization of the project "The sky is (not) the limit" for the construction of astronomical observatory in Kruševac, which will create the infrastructure requirements for constant work of the association and expand cultural, educational and tourist attractions of the city of Kruševac.

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