

RECENT ACTIVITIES OF ASTRONOMICAL SOCIETY *MAGELLANIC CLOUDS*

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Abstract. Recent activities of the Astronomical Society "Magellanic Clouds" from the town of Prokuplje are presented. The Society obtained last year new equipment, including an apochromatic refractor of the aperture of 12 cm, Sky-Watcher NEQ6 PRO SynScan computerized equatorial mount, guiding system and additional accessories. Many astronomical events were observed since then, including the transition of the extrasolar planet of the star HD 189733 in Vulpecula. Also, the members of the Society made a lot of fine photos of various cosmic objects and events.

1. HISTORY

The Astronomical Society *Magellanic Clouds* was founded in 2001 in the town of Prokuplje. The founders were the professors of the Faculty of Mathematics in Belgrade Žarko Mijajlović, Stevo Šegan, Nadežda Pejović and students at that time from Prokuplje, Aleksandar Valjarević and Aleksandar Simonović. From the beginning, the Society organized in Prokuplje many public lectures on astronomy and mathematics. The lecturers were delivered by prominent Serbian astronomers and mathematicians. They were mainly researchers of the Astronomical Observatory in Belgrade, Milan Dimitrijević, Zoran Knežević and Slobodan Ninković and professors of the Faculty of mathematics in Belgrade, Jelena Milogradov-Turin, Nadežda Pejović, Stevo Šegan, Olga Atanacković, Aleksandar Lipkovski and Žarko Mijajlović.

The Society also much helped in founding and building of the Astronomical Station of the Astronomical Observatory in Belgrade (AOB) at the mountain Vidojevica (ASV) near the town of Prokuplje, particularly in the period 2001–2004. For example, the members of the Society during their excursions, looking for a good place for their small observatory, found a site at the mountain of Vidojevica which at first glance seemed extraordinarily good for astronomical observations. During the next visit Professor Stevo Šegan said that it should be used for professional astronomical

activities. We suggested this idea to professor Milan Dimitrijevic, at that time the AOB Director, who gladly accepted it. Now there is ASV. For more details of the history of building ASV see [Mija]lović, 2006].

The Society was also involved in including a subject covering astronomy in an experimental class in the Gymnasium of Prokuplje. It should be mentioned that this class was founded mainly due to the efforts of Professor Nadežda Pejović. Professor Milan Dimitrijević during one of his visits to Prokuplje donated 1000 books to the Public Library in Prokuplje. The Society also organized in Prokuplje several public star watchings and sky events with astronomical telescopes. These gatherings were attended by many young people from Prokuplje. During one of these manifestations, the light in the Center of Prokuplje was lit off by the order of the municipal authorities to make chance for a better seeing of stars. As far as we know, this was the unique action of some authorities in Serbia against light pollution.

2. ASTRONOMICAL EQUIPMENT

During the decade in which the Society existed, the members collected a considerable amount of the worthy astronomical equipment. The Society has or uses the following apparatus and equipment:

1. Newtonian telescope of the aperture 23cm/f 180cm.
2. Newtonian telescope of the aperture 18cm/f 140cm.
3. Celestron C5 of the aperture 127 mm/f 1200mm
4. Equinox 120ED APO 120mm f/7.5 fluorite apochromatic refractor. This fine refractor has multi-coated objective lens with dual-speed Crayford focuser. This telescope was obtained in 2009 with many additional equipment including flattener.
5. Sky-Watcher NEQ6 PRO SynScan (EQ6 PRO). This extra heavy duty mount has a load capacity of 25kg. This mount has the superior equatorial control and the ease of a precision computerized GOTO system. This mount is purchased in 2009 together with Equinox 120ED APO refractor.
6. Computerized auto-guiding system with the supplementary guiding telescope of the aperture 90mm. Our auto-guiding system also includes Opticstar PL-130M COOLAIR air-cooled, 1.3 mega-pixel monochrome video camera that connects to the computer's USB 2.0 port and can stream and store full resolution video at 12 frames per second (20fps @ 640x480). It is light sensitive, has no infra-red filter and it is also suitable for planetary, lunar and solar astrophotography.
7. Canon ESO 50D and Canon EOS 450D, photo cameras that we used for astrophotography.

We have also several sets of fine eyepieces, filters and a fine library of astronomical books suitable for advanced amateurs. All equipment is purchased from the private funds and the main donator is Žarko Mijajlović, or the equipment belongs to him.

3. ACTIVITIES

In the section *History* we have already described the first activities of the Society. As we see, the great part of these activities was devoted to the popularization and teaching of astronomy for young people and general public. Another important activity was the involvement in the building of ASV. Of course, we often were watching the stars through our Newtonian telescopes and occasionally made some photos. The obtained photos were not of so a good quality due to not precise work of the mounts. We also measured the atmospheric conditions in Toplica region and the microclimate conditions at the mountain of Vidojevica where ASV was supposed to be built, see [Mijačlović, Valjarević, Simonović, 2006].

Since we obtained the new equipment in 2009, the new era in the activities of the Society started. Most of the activities were devoted to making photos of various celestial objects. Using the computerized astrograph based on the refractor Equinox 120ED APO with precise guiding system we were able in a short period to make a number of fine photos of deep sky objects, planets and Moon, comets, double stars, transition of Venus over the Sun and wide field photos. Some examples include:

1. Messier objects: M1 (Crab Nebula) M31 (Great Galaxy in Andromeda), M27 (Dumbell Nebula), M13 (Hercules globular cluster), M33 (Triangulum galaxy), M42 (Orion Nebula), M45 (Pleiades surrounded by nebula),
2. NGC objects: NGC 6888 (Crescent Nebula), NGC 6946 and NGC 6939, NGC 6960 (Veil Nebula), NGC 7000 (North America)
3. Objects in the Solar system: All planets except Mercury, Sun and sunspots, details on Moon; comets 17P (Holmes), C2007 F1 (Loneos)
4. Special celestial events: eclipses of Sun and Moon, transition of Venus over Sun.
5. Double stars. The most prominent example is double-double ϵ Lyra where the instrument resolution of $2.2''$ was achieved.
6. Transition of the extrasolar planet of the star HD 189733 in Vulpecula. By our knowledge we were the first astronomers in any country of former Yugoslavia, including professionals, who succeeded in measuring this event. Our achievement was recognized by several institutions, including one astronomical society from Croatia.

Some examples of these photos are given in the appendix. All of these photos are produced by the refractor Equinox 120ED APO and Canon EOS 50D photo camera. For deep sky objects, the exposures are between 2h and 3h (obtained by stacking 25 to 35 photos with $5'$ exposure each).

In making these photographs we used the stacking method mainly based on a rather good software *DeepSkyStacker* in public domain. Firstly we tried with stacking photos with $30''$ exposure, but we obtained much better final photos with series of photos of $5'$ exposure. A detailed explanation of our techniques would require a separate article, therefore we will omit it here.

4. CONCLUSION

The new and good equipment allowed us to make very good astrophotos in the last three summers. Compared to professional instruments our equipment is very modest. In spite of this we have succeeded in obtaining results and astrophotos comparable to the results and photos obtained elsewhere in the world with similar or even better equipment.

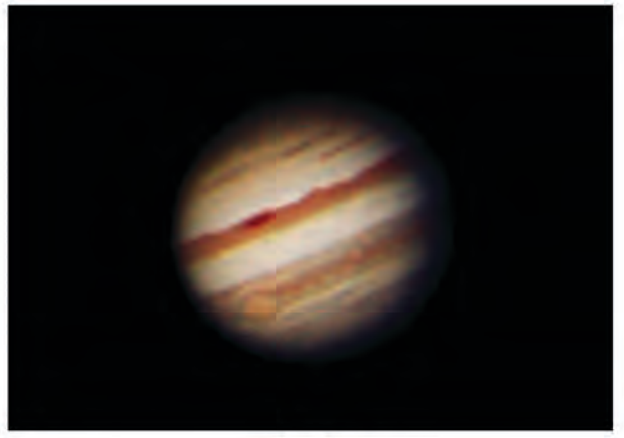
Our further plans include obtaining a good astronomical camera, some good astrophotograph (of the aperture 30-30cm), and building our own small observatory. We are close to the last goal, as the district authorities in Prokuplje are willing to give us a site on Vidojevica, very suitable for astronomical observations.

References

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M1 Crab Nebula



Jupiter



M45 Pleiades



M31 Great Galaxy in Andromeda



NGC 6960 Veil Nebula



M17 Swan Nebula



M33 Triangulum Galaxy



NGC 6946 and NGC 6939