

RECENT ACTIVITIES OF ASTRONOMICAL SOCIETY *MAGELLANIC CLOUD*

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Abstract. Recent activities of the astronomical society "Magellanic Cloud" from the town of Prokuplje are presented. The Society obtained recently 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 transit of the extrasolar planet of the star HD 189733 in Vulpecula. Also, the members of the Society made a lot of good photos of various cosmic objects and events.

1. HISTORY

The astronomical society *Magellanic Cloud* was founded in 2001 in the town Prokuplje, see Pejović N. et al. 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 helped a lot in founding and building of the Astronomical Station of the Astronomical Observatory in Belgrade (AOB) at the mountain Vidojevica (ASV) near the town 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 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. For more details of the history of building ASV see Mijačlović, 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. Many young people from Prokuplje attended these events. During one of these manifestations, the light in the center of Prokuplje was switched off by the order of the municipal authorities to better see the 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 exists, the members collected a considerable amount of good quality astronomical equipment. The Society has or uses the following equipment:

1. Newtonian telescope of the aperture 23cm/f 180cm.
2. Newtonian telescope of the aperture 18cm/f 140cm.
3. Celestron C5 telescope of the aperture 12.7 cm/f 120cm
4. Equinox 120ED APO 120mm f/7.5 fluorite apochromatic refractor. This 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 and it is easy to handle due to the precision of computerized GOTO system. This mount was purchased in 2009 together with Equinox 120ED APO refractor.
6. Computerized auto-guiding system with the supplementary guiding telescope of the aperture 90mm. The 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 eyepieces, filters and a fine library of astronomical books suitable for advanced amateurs. All equipment is purchased by Žarko Mijačlović.

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 of astronomy and education of young people and general public. Another important activity was the involvement in the building of ASV. Of course, we often were observing the stars through our Newtonian telescopes and occasionally made some photos. The obtained photos were not of so good quality because of the problems with the mounts. We also measured the atmospheric conditions in Toplica region and the microclimate conditions at the mountain Vidojevica where ASV was supposed to be built, see Mijačlović, Valjarević, Simonović, 2006.

Since we obtained the new equipment in 2009, began the new era in the activities of the Society. Most of the activities consisted of making photos of various celestial objects. Using the computerized astrograph based on the refractor Equinox 120ED APO with precise guiding system in the short period we made a number of nice photos of deep sky objects, planets and Moon, comets, double stars, transits of Venus 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, the Sun and sunspots, details on the Moon; comets 17P (Holmes) and C2007 F1 (Loneos)
4. Special celestial events: eclipses of Sun and Moon, transit of Venus.
5. Double stars. The most prominent example is double-double ϵ Lyrae where the instrument resolution of $2.2''$ was achieved.
6. Transit of the extrasolar planet of the star HD 189733 in Vulpecula. To 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.

Some 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 were 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 the public domain software DeepSkyStacker. Firstly we tried with stacking photos with $30''$ exposure, but we obtained much better final photos with series of photos of $5'$ exposure.

4. CONCLUSION

The new equipment allowed us to make very good astrophotos in the past three years. 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 future plans include obtaining of a good astronomical camera, some good astrograph (of the aperture 30-40cm), and building our own small observatory. We are close to achieving the latter goal, as the district authorities in Prokuplje are willing to give us a location at mountain Vidojevica that is very suitable for astronomical observations.

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