

PRELIMINARY RESULTS OF THE OBSERVATIONS  
OF A METEOR SHOWER OF COMET C/2012 S1 (ISON) IN JANUARY 2014A.V. Golubaev<sup>1</sup>, I.S. Bryukhanov<sup>2</sup>, A. Tabolich<sup>2</sup>,  
V. Tabolich<sup>2</sup>, D. Akulich<sup>2</sup>, A. Kulakovskaya<sup>2</sup>,  
V.A. Mechinsky<sup>3</sup>, and I.M. Sergey<sup>4</sup><sup>1</sup>*Astronomical Institute of the Kharkiv V.N. Karazin National University,  
Sumska Str. 35, Kharkiv, 61022, Ukraine**E-mail: Alexandr\_sky@mail.ru*<sup>2</sup>*Republican Center of Technical Creativity, team "Astrobloknot", Minsk, Belarus*<sup>3</sup>*Astronomical club, Planetarium, Minsk, Belarus*<sup>4</sup>*team "Astrobloknot", Molodechno, Belarus*

Received May 22, 2014

**Abstract.** Dedicated researches on detection of possible meteoric activity in January 2014 connected with remains of comet C/2012 S1 (ISON) have been conducted. This work is based on the observational material obtained at different points of the Earth by means of 10 CCD cameras equipped with "Fish eye"-like lenses ("All-sky" camera) and FM radio observations. 43 meteor events were revealed by viewing 54 000 images from 10 to 17 January 2014. As a result of position measurements of CCD images, coordinates of the meteor radiant were found:  $\alpha_R = 156^\circ$ ,  $\delta_R = +38^\circ$ . During this period (January 08 to January 24, 2014) an increase in the meteor activity above the level of the sporadic meteor background has been confirmed by FM-radio observations in Molodechno (Belarus) and Jaén (Spain).

**Introduction.** Special researches on detection of possible meteoric activity in January 2014 connected with remains of comet C/2012 S1 (ISON) have been conducted. This work is based on the observational material received at various points of the Earth by means of 10 CCD cameras equipped with "Fish eye"-like lenses ("All-sky" camera) and FM radio observations. Exposures vary from 60 to 180 seconds for different CCD cameras. The interval between received images varies from 10 to 120 seconds (in the full Moon).

The special theoretical researches about the possibility of manifestation of the meteoric activity connected with the close arrangement to the Earth of the central point of the orbit of comet C/2012 S1 (ISON) were presented in [1]. Authors drew a conclusion that such meteoric activity is improbable. But we decided to check the existence or lack of the meteoric activity connected with comet C/2012 S1 (ISON) using the observations that were at our disposal. The special technique and the computer program described in [2] were applied to the calculation of the theoretical radiant of the meteor shower. The calculations are based on known elements of the heliocentric orbit of comet C/2012 S1 (ISON) published in the Minor Planet Electronic Circular (M.P.E.C. 2012-S63). We present observational conditions of possible meteoric activity:  $\alpha_R = 153^\circ$ ,  $\delta_R = +16.8^\circ$ . The maximum of the activity was expected on January 16.2, 2014 ( $\lambda_{\odot(2000.0)} = 295.7^\circ$ ). On the date of the estimated maximum

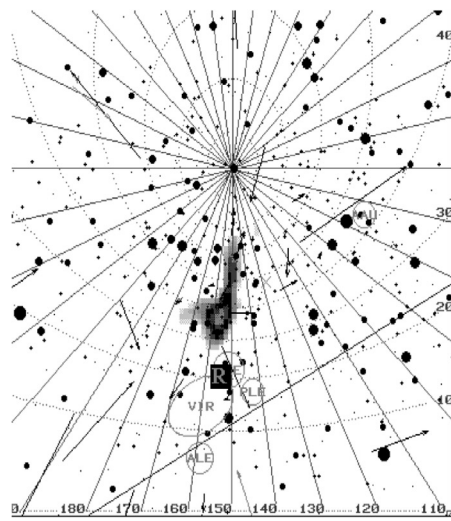


Fig. 1

Figure 1: Results of CCD observation in January, 2014 of the meteor shower of comet C/2012 S1 (ISON).  $R$  is the theoretical meteor shower radiant.

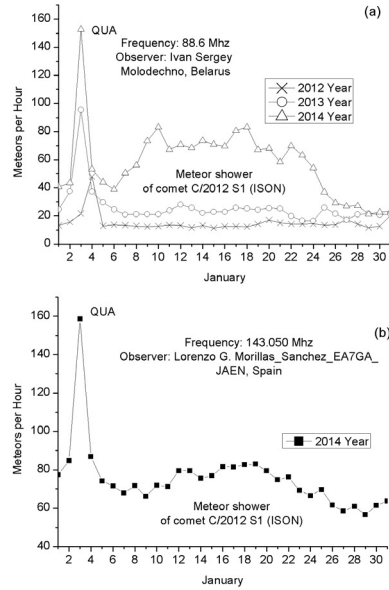


Fig. 2

Figure 2: Observations of the meteor background in the FM radio frequency range (a) (January, 2012, 2013 and 2014, 88.6 MHz) were carried out in Belarus; (b) (January, 2014, of 143.05 MHz) were carried out in Spain; QUA: Quadrantids meteor shower.

the Earth was at a distance of 0.02 a.u. to the closest point of the orbit of the comet when it was there in 74.7 days prior to the perihelion passage. On January 16 the closest point of the comet orbit post-perihelion was located at 0.4 a.u. from the Earth. Therefore, the meteoric activity connected with the remains of the comet is improbable after the perihelion passage.

**Results of CCD and FM radio detection of meteors.** 43 meteor events were revealed in viewing 54000 images from 10 till 17 January 2014. The radiants of the meteors were located in the constellations UMa, LMi, Leo, and Lyn. As a result of position measurements of the images and calculations employing the RADIANT-1.43 software (Rainer Arlt, [www.imo.net/software/radiant](http://www.imo.net/software/radiant)) coordinates of the meteor radiant were found to be (Figure 1):  $\alpha_R = 156^\circ$ ,  $\delta_R = +38^\circ$

The greatest number of meteors was observed during the period from 10 till 15 January 2014 as result of observations of two cameras located in the Special Astrophysical Observatory of the Russian Academy of Sciences (North Caucasus). The maximum number of meteors was recorded on 12 January in observations of the camera in La Palma. As the sky was strongly lit by the Moon (full Moon on 16 January 2014), unfortunately, it was not possible to get full-fledged observational material in the dates close to the expected maximum of meteoric activity.

Patrol observations of the meteor background in FM radio frequency range (88.6 MHz, Ivan M. Sergey) were carried out in Belarus (Figure 2a). An increase of the meteor activity relative to the level of the sporadic meteoric background was recorded during the period from January 08 to January 24 2014. During this period the increase of the meteor activity

relative to the level of a sporadic meteor background was confirmed by radio observations (143.05 MHz, Lorenzo G. Morillas\_Sanchez\_EA7GA) <http://www.rmob.org/index.php> in Spain (Figure 2b).

**Conclusions.** All photo observations used in the research are not basis. Therefore, elements of the orbits of the recorded meteoric bodies were not calculated. The good coherence of the temporal period and the area of meteoric activity with the theoretical prediction gives grounds to assume that meteoric bodies intrinsically connected to comet C/2012 S1 (ISON) were recorded. Meteor activity was the lowest and was shown in the form of the lack of the pronounced active radiant of the meteoric shower. Thus, the meteoric shower was observed as a surge in the activity of sporadic meteors relative to the usual level of the sporadic background. The coordinates of the radiant were found only thanks to the large statistical material collected at various observation points on the Earth. Possibly, weak meteor activity is explained by that the Earth passed through the peripheral part of the swarm of the dust particles that were thrown out by the comet C/2012 S1 (ISON). The results of the observations are being carefully checked now.

**Acknowledgments.** We thank William E. Smith and Evgeniya N. Baturina for the help with this work.

### References

1. Sekhar A. and Asher D.J., MNRAS, **437**, L71 (2014).
2. Neslušan L., Svoreň J., and Porubčan V., A&A, **331**, 411 (1998).

**Предварительные результаты наблюдений в январе 2014 года  
метеорного потока кометы C/2012 S1 (ISON)**

**А.В.Голубаев<sup>1</sup>, И.С.Брюханов<sup>2</sup>, А. Таболич<sup>2</sup>,  
В. Таболич<sup>2</sup>, Д. Акулич<sup>2</sup>, А. Кулаковская<sup>2</sup>,  
В.А. Мечинский<sup>3</sup> и И.М. Сергей<sup>4</sup>**

<sup>1</sup>*Астрономический институт Харьковского национального  
университета имени В.Н.Каразина, Сумская ул., 35*

*Харьков, 61022, Украина  
Alexandr\_sky@mail.ru*

<sup>2</sup>*Республиканский центр технического творчества,  
Проект «Астроблокнот», Минск, Беларусь*

<sup>3</sup>*Астрономический клуб, Планетарий, Минск, Беларусь*

<sup>4</sup>*Проект «Астроблокнот», Минск, Беларусь*

**Резюме.** Проведены специальные исследования по выявлению возможной метеорной активности в январе 2014 года, связанной с остатками кометы C/2012 S1 (ISON). Работа основана на наблюдательном материале, полученном в различных пунктах Земли, с помощью ПЗС-камер, оснащённых объективами типа "Рыбий глаз" и радионаблюдений в FM-диапазоне. При осмотре 54 000 изображений в период с 10 по 17 января 2014 года обнаружено 43 метеорных явления. В результате позиционных измерений изображений были получены координаты радианта метеорного потока  $\alpha_R = 156^\circ$ ,  $\delta_R = +38^\circ$ . В январе 2014 года в Беларуси (Молодечно) проведены патрульные наблюдения метеорного фона в FM-радиодиапазоне (частота 88.6 МГц). В период с 08 по 24 января 2014 года зафиксировано повышение метеорной активности относительно уровня спорадического метеорного фона. В этот же период повышение метеорной активности над уровнем спорадического метеорного фона подтверждается FM-радионаблюдениями в Испании (Jaén). Все используемые в исследовании видеонаблюдения не являются базисными, поэтому элементы орбит зафиксированных метеорных тел не вычислялись. Хорошее согласие периода времени и области метеорной активности с теоретическим предсказанием дает основания предположить о фиксации метеорных тел, генетически связанных с кометой C/2012 S1 (ISON). Метеорная активность была крайне низкой (но выше уровня спорадического метеорного фона) и проявилась в виде отсутствия ярко выраженного активного поточного радианта.