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History

On the Possible Date of Adoption of Christianity as the State Religion in Georgia

Rolan I. Kiladze[*], Marina Sh. Gigolashvili[**], Giorgi T. Ramishvili[**], Vasili J. Kukhianidze[**]

* *Academy Member, E. Kharadze National Astrophysical Observatory of Georgia*
** *E. Kharadze National Astrophysical Observatory of Georgia*

ABSTRACT. In the Georgian chronicles it is stated that the adoption of Christianity in Georgia is connected with a miracle seen by King Mirian in the 4th century AD, when Mirian happened to be alone while hunting. Suddenly darkness fell and the Sun disappeared from the sky. After Mirian appealing to the god of Saint Nino from Cappadocia a miracle happened: the darkness suddenly disappeared and the Sun began shining. It is considered that Christianity was declared a state religion in Georgia after this incident of the fourth century.

In the thirties of the 20th century the eminent Georgian historian Ivane Javakhishvili asked astronomers to answer the question whether a total solar eclipse occurred in Georgia in the fourth century or not. However, astronomers failed to find any eclipse during the mentioned period.

We have investigated all solar eclipses (total, partial and annular) during the period of 290-365 AD and found that a total solar eclipse happened in Georgia only in 319 AD.

In addition, according to the Georgian Chronicle *Kartlis Tskhovreba*, 3 crosses from cypress were made on 1 May. According to Ioane Zosime, it was the third Sunday after Easter. One of these crosses was raised near the capital of Georgia, Mtskheta on 8 May. However, the year is not mentioned in these sources.

To determine the exact date of this event, the authors have investigated the data on all Easters during the probable period of the reign of King Mirian. The years when Easter had taken place on 17 April were chosen. Hence, the third Sunday after Easter falls on 1 May. Easter could happen on 17 April only in 298, 309 and 320 AD. Only the 320 Easter happened after a total solar eclipse.

We have found that the only total solar eclipse which was probably seen by King Mirian on Mt. Tkhoti, happened on the evening of 6 May, 319 AD. Hence, the crosses were made and raised in May 320 AD. *© 2007 Bull. Georg. Natl. Acad. Sci.*

Key words: *solar eclipse, Georgia, Christianity, Easter.*

At present it is considered that Christianity was declared the state religion in Georgia in *circa* 326 AD, during the reign of King Mirian and Queen Nana. In the Georgian Chronicle [1] it is stated that this event is connected with the adoption of Christianity by King Mirian. Once he was hunting somewhere between Mtskheta (the ancient capital of Georgia) and Khashuri, near Tkhoti mountain in dense woodland. It rapidly got dark and the Sun disappeared from the sky.

Mirian began to ask his traditional pagan gods, but to no avail. Then he addressed the god whom Nino from Cappadocia believed in (subsequently she became Saint Nino, a woman whose name is inseparably linked with the spread of Christianity in Georgia) and there was a miracle; the darkness suddenly disappeared and the Sun began shining in the sky again. Then Mirian turned to the East and thanked "Nino's god".

In the 1930s the Georgian historian Ivane Javakhishvili appealed to astronomers to answer the question whether a total solar eclipse happened in Georgia in the fourth century or not. Based on the famous *Canon der Finsternisse* of Oppolzer [2], in which the change in the length of the day with current time (the result of tidal friction) was taken into account incompletely, astronomers could not find any eclipse during the mentioned period. Thus it seemed that the question was resolved.

However, after detailed Tables and maps (Fig. 1) of solar and lunar eclipses had been published on the Web by Espenak [3], we have found out that a total solar eclipse did indeed occur in Georgia on 6 May 319 AD. Figure 1 shows part of the map of the solar eclipses in the years 301-320 AD.

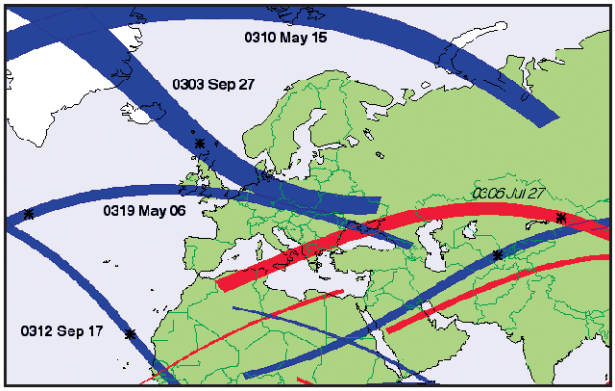

Fig. 1. Fragment of the map of the solar eclipses in 301-302 AD.

By calculating the circumstances of the eclipse with the use of Bessel's improved elements, we have found that Mount Tkhoti was on the central line of the eclipse. For the place where Mirian was hunting ($\lambda = 44.55°$; $\varphi = +41.99°$), the circumstances of the eclipse are as follows: the start of the partial eclipse was at $14^h58^m01^s$ Universal Time (UT); the second contact was at $15^h51^m57^s$ UT; the third contact was at $15^h53^m50^s$ UT; the maximal phase was 1.018. The moments of sunset are as follows: bottom edge - at $15^h59^m24^s$ UT, top edge - at $16^h02^m29^s$ UT.

The central line of the eclipse passed through the settlements of Tsageri, Ambrolauri, Tskhinvali and Mtskheta. The northern boundary passed through the Caucasus Range (Elbrus, Upper Baksan and Kazbek). The southern boundary passed through Lake Paliastomi, Abastumani, Aspindza, Dmanisi and Akhtala. From the east the strip of the complete eclipse was limited by a line from Gardabani to Sagarejo.

Hence, the eclipse happened in the evening, before sunset; the duration of the total phase was about 2 min. At the moment of the maximal phase the height of the Sun above horizon was only 0.8°. The sunset began 5.6 min later, after the end of the total phase (i.e., after the third contact).

We have investigated every solar eclipse (total, partial and annular) during the period 290-365 AD. In Table 1, the list of solar eclipses with a phase more than 0.8 for the period mentioned above is given for Mt. Tkhoti. In the columns of Table 1 we present the data of the year, the month and the day of the eclipse, the moments of the first and second contacts, the maximal phase and the third and fourth contacts (local time). In the last two columns the altitudes of the Sun above horizon (in degrees) at the moment of the maximal phase of an eclipse and the maximal phase (in %) are presented.

According to *Kartlis Tskhovreba* [1], 3 crosses from cypress were made on 1 May. According to Ioane Zosime [4], it was the third Sunday after Easter. One of these crosses was raised near the capital of Georgia, Mtskheta, on 8 May. However, the year is not mentioned in these sources.

From further investigation it will be clarified that the event studied by us occurred before the First Council of Nicaea (325 AD). Hence, the contemporary rules of calculation on Easter were not yet canonized. For this reason we have calculated the date of Easter by all possible methods.

To ascertain the exact date of this incident we investigated the data on all Easters during the probable period of the reign of King Mirian. With this period, the years when Easter took place on 17 April, have been chosen. Hence, the third Sunday after Easter fell on 1 May.

In Table 2, the data on Easters in the selected years are presented. In the first 3 columns the moments (year, month, day, hour and minute) of the first full moon after

Table 1

Circumstances of the eclipses (in local time)

Year	Mn	Day	1 cont.	2 cont.	Max. ph.	3 cont.	4 cont.	Altit.	Phase (%)
306	7	27	$7^h17^m34^s$	–	$8^h39^m49^s$	–	$10^h15^m05^s$	41.4°	83.2
319	5	6	$17^h57^m58^s$	$18^h51^m54^s$	$18^h52^m50^s$	$18^h53^m47^s$	–	0.9°	101.7
346	6	6	$6^h18^m52^s$	–	$7^h16^m42^s$	–	$8^h19^m44^s$	29.6°	99.3
348	10	9	$7^h40^m54^s$	–	$8^h45^m24^s$	–	$9^h54^m31^s$	25.7°	87.6
355	5	28	$5^h55^m51^s$	–	$6^h53^m35^s$	–	$7^h56^m47^s$	24.7°	87.3

Table 2

Data of the Easter days according to different sources

Years	Espenak		Lunar Cycle	G&M	Authors
298	13 Apr	23^h56^m	13 Apr	17 Apr	17 Apr
309	11 Apr	14^h15^m	12 Apr	17 Apr	17 Apr
315	6 Apr	11^h28^m	5 Apr	10 Apr	10 Apr
320	9 Apr	14^h01^m	10 Apr	10 Apr	**17 Apr**
326	4 Apr	4^h47^m	4 Apr	3 Apr	**10 Apr**
337	1 Apr	23^h23^m	2 Apr	3 Apr	3 Apr
343	27 Mar	19^h23^m	27 Mar	27 Mar	**3 Apr**
348	31 Mar	13^h13^m	1 Apr	3 Apr	3 Apr
354	25 Mar	10^h22^m	25 Mar	27 Mar	27 Mar
365	23 Mar	20^h14^m	24 Mar	27 Mar	27 Mar

the spring equinox, according to Espenak [3], are given; in the following columns the data on Easter, calculated by different methods, are given: by the ancient 19-year lunar cycle and approximate formulas of Gauss and Meeus [5-7]. In the last column of the Table Easter data are given, calculated by us with the use of the exact moments of full moon.

As is clear from Table 2, the 17 April Easter could only take place in the years 298, 309 and 320 AD. In Table 1, only two eclipses (306 and 319) are presented, which could happen before the years when Easter took place on 17 April. However, the eclipse of 306 can be excluded for two reasons: it was a partial eclipse (with a maximal phase of 82%) and happened early in the morning. But this incident happened to King Mirian in the evening [1].

In our opinion, the eclipse seen by King Mirian happened on the evening of 6 May, 319 AD. Later, in May 320 AD, cypress crosses were made and raised.

Thus, we have managed to answer the question raised 70 years ago by the Georgian historian Ivane Javakhishvili about the occurrence of a total solar eclipse in Georgia in the fourth century; such eclipse occurred only on 6 May 319 AD. Soon after this date, Christianity became the state religion of Georgia.

ისტორია

საქართველოში ქრისტიანობის სახელმწიფო რელიგიად გამოცხადების შესაძლო თარიღის შესახებ

რ. კილაძე*, მ. გიგოლაშვილი, გ. რამიშვილი**, ვ. კუხიანიძე****

** აკადემიის წევრი, ე. ხარაძის სახ. საქართველოს ეროვნული ასტროფიზიკური ობსერვატორია*
*** ე. ხარაძის სახ. საქართველოს ეროვნული ასტროფიზიკური ობსერვატორია*

ქართული ქრონიკების მიხედვით ცნობილია, რომ საქართველოში ქრისტიანობის სახელმწიფო რელიგიად აღიარება დაკავშირებულია სასწაულთან, რომელიც იხილა მეფე მირიანმა, როცა ნადირობისას იგი მარტო აღმოჩნდა. უეცრად გარშემო სიბნელე ჩამოწვა და ცაზე მზე გაქრა. მირიან მეფემ წმიდა ნინო კაპადოკიელის

ღმერთს შესთხოვა შემწეობა და სასწაული მოხდა, სიბნელე უეცრად გაიფანტა და მზე გამობრწყინდა. შესაბამისად, ითვლება, რომ საქართველოში ქრისტიანობა სახელმწიფო რელიგიად ამ მოვლენის შემდეგ, IV საუკუნეში გამოცხადდა.

XX საუკუნის 30-იან წლებში ცნობილმა ისტორიკოსმა ივანე ჯავახიშვილმა თხოვნით მიმართა ასტრონომებს, დაედგინათ, მოხდა თუ არა IV საუკუნეში მზის სრული დაბნელება საქართველოში. მაგრამ ასტრონომებმა ხსენებულ პერიოდში მზის სრული დაბნელება ვერ იპოვეს.

ჩვენ გამოვიკვლიეთ ყველანაირი მზის დაბნელება (სრული, ნაწილობრივი და რგოლისებური) ქრისტეშობიდან 290-365 წლებში და დავადგინეთ, რომ საქართველოში მზის სრულ დაბნელებას ადგილი ჰქონდა მხოლოდ ქრისტეშობიდან 319 წელს.

გარდა ამისა, „ქართლის ცხოვრების“ თანახმად, 1 მაისს კვიპაროსისგან გამოთლილი იყო 3 ჯვარი. იოანე ზოსიმეს მიხედვით, ეს მოხდა აღდგომის შემდეგ მესამე კვირა დღეს. ერთ-ერთი ჯვარი აღმართეს საქართველოს დედაქალაქის მცხეთის მახლობლად 8 მაისს. თუმცა ამ წყაროებში წელიწადი არ არის მითითებული.

აღნიშნული მოვლენის ზუსტი თარიღის განსასაზღვრავად ავტორებმა გამოიკვლიეს ყველა აღდგომის მონაცემები მირიანის მეფობის საჯარაუდო პერიოდში. შერჩეულ იქნა წლები, როდესაც აღდგომა 17 აპრილს ემთხვევა. შესაბამისად, აღდგომის შემდეგი მესამე კვირა 1 მაისს მოუწევდა.

აღდგომა 17 აპრილს მხოლოდ 298, 309 და 320 წლებში იყო. მათ შორის, მხოლოდ ქრისტეშობიდან 320 წელია მზის სრული დაბნელების შემდგომი პერიოდი. ჩვენ დავადგინეთ, რომ მზის ერთადერთი სრული დაბნელება, რომელიც შეიძლებოდა დაენახა თხოთის მთიდან მეფე მირიანს, იყო ქრისტეშობიდან 319 წელს, 6 მაისის საღამოს. შესაბამისად, ავტორთა მოსაზრებით, კვიპაროსიდან გამოთლილი ჯვარი აღმართეს ქრისტეშობიდან 320 წლის მაისში.

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