

## **Earthquakes in the Region of East Anatolia According to the Georgian and Armenian Sources from the Late Antiquity up to the 19<sup>th</sup> Century**

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**Abstract:** *Catastrophic Natural Disasters have always played a key role in shaping human history. Territory covering Azerbaijan, Armenia, Georgia and the eastern part of Turkey is within the zone of high seismic activity. Analysis of the historical and instrumental seismological data shows, that strong earthquakes with magnitude up to 7.0-7.5 have occurred here. Georgian and Armenian written sources, over a long historical period, have preserved evidence of the earthquakes and other natural phenomena occurring in the region. Architectural monuments damaged by earthquakes also provide us with important data concerning the time and effects of past seismic events. The interdisciplinary project of the Georgian National Center of Manuscripts (Financial support: Shota Rustaveli Georgian National Science Foundation of Georgia) – Natural Disasters in the South Caucasus. Earthquakes and attending Natural Phenomena in Historical Sources from the Ancient Period up to the 19th century – started in 2017. Within the project historians and seismologists envisage culling information from various-language written sources about the historical earthquakes in the South Caucasus and the adjacent regions. In this paper the authors present preliminary results of a survey of the historical earthquakes available in Georgian and Armenian written sources, which occurred on the territory of East Anatolia region. In the future our project envisages to create a unified catalogue and an electronic data bank (Georgian-English) of the historical earthquakes which will cover South Caucasus as well as the Mediterranean area.*

**Keywords:** *Earthquake, Georgian and Armenian Written Sources, East Anatolia*

### **Geç Antik Çağdan 19. Yüzyıla Kadar Gürcü ve Ermeni Kaynaklarına Göre Doğu Anadolu Bölgesindeki Depremler**

**Öz:** *Doğal felaketler insanlık hayatında her zaman önemli rol oynamıştır. Azerbaycan, Ermenistan, Gürcistan ve Türkiyenin doğu kısmı sismik olarak aktif bölgedir. Tarihsel ve*

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*araçsal dönemdeki sismik verilerine göre zikr ettiğimiz rejyonda 7,0-7,5 büyüklüğe sahip olan depremler yaşanmış. Gürcü, Ermeni, Doğu ve Avrupalı yazılı kaynaklar kültürel mirasının maddi anıtları ile birlikte bölgedeki tarihi zelzelelerin izlerini ve bilgilerini korumuştur. Yazılı kaynaklarda güçlü bir deprem alanı ve onun sıklığı, tahribat ölçeği ve bunlara eşlik eden anormal doğal olayların hakkında ilginç gözlemlerle karşılaşyoruz. Bunun dışında, kaynaklar tabiat afetlerin sayesinde hayatını kaybedenlerin sayısı, rejyonda çevre yıkımı veya ekonomik çöküntü ile ilgili, siyasi ve demografik durumunun değişikliğe ve kitlesel göçmelerine neden olan yıkıcı sonuçlar meydana çıkarır. Gürcistan Ulusal El Yazmaları Merkezi Disiplinlerarası Projesi: “Güney Kafkasyada Meydana gelen Doğal Afetler: Tarihsel Depremler ve Eskiden XIX. Yüzyıla Kadar Görülen Doğal Olaylar “ Gürcistan El Yazmaları Milli Merkezi ve İlia Devlet Üniversitesinin tarafından gerçekleştirilmektedir. Söz konusu olan Proje Güney Kafkasya ve çevresindeki bölgelerde tarihi depremler hakkında bilgi edinmeyi – yazılı ve maddi izlerinin işaret eden materyallere dayanarak Güney Kafkasya bölgesindeki birleşik tarihi depremler kataloğu için malzemeler hazırlanması ve iki dilli (Gürcü-İngilizce) elektronik veri bankasının oluşturulmasını amaçlamaktadır. Makalemizde doğu Anadolu'da vuku bulan Tarihi depremlerle ilgili proje kapsamında elde ettiğimiz materyaller sunulmaktadır. Bu malzemeler Ermeni ve Gürcü tarihi kaynaklarında bahsedildiği Doğu Anadolu'daki az bilinen veya tamamen bilinmeyen zelzeleler hakkında bilgi vermektedir. Eski çağlardan XVIII. Yüzyıla kadar Erzurum ve Vani illerinde meydana gelen depremlere özel dikkat gösterilmektedir.*

**Anahtar Kelimeler:** Deprem, Gürcü ve Ermeni Yazılı Kaynakları, Doğu Anadolu

Catastrophic natural disasters have always played a key role in shaping human history. In many parts of the world, over the centuries, natural disasters caused destruction and devastation of developed economic regions and social infrastructure, not to mention a heavy toll in terms of the loss of human lives. Territory covering Azerbaijan, Armenia, Georgia and the eastern part of Turkey is within the zone of high seismic activity. Analysis of the historical and instrumental seismological data shows, that strong earthquakes with magnitude up to 7.0-7.5 and macroseismic intensity 9 (MSK scale) and Mag=7.0-7.5 have occurred here.

Historical sources, over a long chronological period, have preserved evidence of the earthquakes and other natural phenomena occurring in the region. Architectural monuments with anti-seismic protective elements [Figs. 1, 1-3; 2, 1-2] and damaged by earthquakes [Figs. 3, 1-4; 4, 1-2] as well as seismic archaeology also provide us with important data concerning the time and effects of past seismic events.

In written sources we come across interesting observations on the site of the strong earthquakes, as well as frequency and attending anomalous natural phenomena. As a rule, the written sources give indications of the destructive consequences which often caused ecological catastrophes in the region, as well as economic depression, change of the political and demographic picture and mass migration.

The interdisciplinary project of the Georgian National Center of Manuscripts – *Natural Disasters in the South Caucasus: Earthquakes and attending Natural Phenomena in Historical Sources from the Ancient Period up to the 19th century* – began in 2017 and it has been conducted by the Korneli Kekelidze Georgian National Center of Manuscripts and Ilia State University. With this project historians and seismologists envisage gathering information from various-language literary and historical sources about earthquakes in the South Caucasus and the adjacent seismic zones.

Most existing data on historical strong earthquakes are derived from the analysis of Georgian and Armenian written sources, among which Armenian historical and ecclesiastical texts include the largest share of information. They provide detailed descriptions of many natural disasters in Southern Caucasus (Georgia, Armenia, Azerbaijan), Iran, Turkey, Syria, Greece and Cyprus. With their abundance of detailed references to natural phenomena, these sources are of unique value. In fact, because the information is so rich, we have decided to refer here only to the historical earthquakes that occurred in East Anatolia, which is one of the active seismic zones on the territory of modern Turkey. Many destructive earthquakes have occurred there over the centuries. It is also where several ancient civilizations interacted. Unfortunately, strong earthquakes have destroyed most of these civilizations' cultural heritage, but the remains that we do have can be considered as a sort of "Byzantine Pompeii".<sup>1</sup> None of these locations has yet been thoroughly excavated and analyzed.

In this article the authors present preliminary results of a survey of the historical earthquakes mentioned in Armenian and Georgian sources which occurred on the territory of East Anatolia from the first centuries AD up to the 18<sup>th</sup> century.

Most of the earthquakes on the territory of East Anatolia affected area of Erzurum (Ancient Greek *Karanitis*, later *Theodosiopolis*; Armenian *Karin* or *Garin*; Georgian *Karnuqalaqi*; *Arzen*, *Erzen*) and Erzincan (Ancient Greek *Acilisene*, *Justinianopolis*; *Erez*) and nearby territories. The sites in Erzurum and Erzincan have been destroyed and rebuilt many times over the centuries so the researchers have been unable to retrieve architectural and archaeological data that might have helped determine past seismic events.

Information about the Anatolian earthquakes is dispersed in the Armenian and Georgian written sources: chronicles, colophons of manuscripts, diaries, inscriptions, etc. The most valuable are descriptions by contemporaries and eyewitnesses, who

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<sup>1</sup> E. Guidoboni, A. Comastri and G. Traina, *Catalogue of ancient earthquakes in the Mediterranean area up to the 10th century*, ING-SGA (Roma, 1994), 74.

give first-hand accounts of events, providing the exact date of the earthquake (in several cases mentioning the year, month, day and even the hour); exact place and toponym, degree of damage and destruction, number of victims, post-earthquake psychological distress and fear, natural phenomena connected with the earthquakes (solar and lunar eclipses, shooting stars, poisonous smoke and smell, landslide and avalanche, fires, floods, formation and disappearance of rivers and lakes etc.). Based on this information, the epicenter and distance can be calculated in some cases, as well as the sequence of tremors, their duration and strength, aftershocks, pre and post-earthquake natural events, frequency of the historical earthquakes on certain territories, etc.

Armenian primary and secondary sources provide especially abundant and valuable information about the earthquakes in the Eastern Anatolia region. Most of the authors are local Armenians. They provide eyewitness or contemporary accounts of historical events. We will demonstrate several examples how the earthquakes are described by the different authors:

**1045**, Erzincan, district of Ekegeats; Mattew of Edessa, 12<sup>th</sup> century Armenian historian from the city of Edessa, superior abbot of Karmir Vank', near the town of Kessoun, east of Marash:

... In the year of 494 [1045] of the Armenian era, the great wrath of God fell upon [all] creatures. For the Lord God looked upon his creations in anger and frightful, terrifying earthquake occurred. The entire universe shook, just as the words of the prophet put it: *He looks upon the earth and makes it tremble* [Psalms 114.7]. It was just in this manner that all creation was rocked. Many churches collapsed to their foundations in the district of Ekegeats, while the city called Eerznka completely collapsed. Men and women sank into the depths of the abyss, and in many districts sound of their cries, coming from the depths, could be heard for many days. It was summertime, and every day that year the earth shook.<sup>2</sup>

**1441**, Mountain of Mansut between the city of Khlat and Archesh; Colophon of the Armenian manuscript copied in 1441 in the city of Khlat (city in eastern *Turkey's Van Province*, located on the eastern shore of Lake *Van*):

In this year [1441] a big miracle happened. A mountain named Mansut, which is located between Khlat and Archesh suddenly exploded. It seemed as if a terrible thunderstorm shattered the world. Children and their parents were weeping and

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<sup>2</sup> Պատմութիւն Մատթէոսի Ուռնայեցոյ [Matteos Urhayetsi, *History*] (Jerusalem, 1869), 114; Matthew of Edessa's Chronicle, Translated by Robert Bedrosian (Long Branch, N.J., 2017), 37.

crying, because all of a sudden, a piece of ice, which was of the size of the city, smashed and broke into small pieces. Flames and smoke with terrible smell covered the place. The smoke caused illnesses among the children. Fierce fire melted stones. Big rocks were tossing into the sky. The city of Khlat was shaking all over. They saw this with their own eyes.<sup>3</sup>

**1584**, June 17, Erzincan. This earthquake is mentioned in several 17<sup>th</sup> century chronicles: Continuator of Samuel Anetsi; Anonymous chronicler from Sebastia, Grigor Kamakhetsi, Arakel of Tabriz (1590-1670), Anonymous chronicler:

June, 17, 1584, there was an earthquake in Erzinka, on the day of Lusavorich (St Illuminator), at 3 O'clock the earth trembled unexpectedly. The entire city was ruined. 15000 male and female died, the other 5000 people remained under the earth half dead. Some of them lost their lives, some of them survived, some of them became handicapped.<sup>4</sup>

**1646/48**, April 2, city of Van; 17<sup>th</sup> century Armenian historian Arakel Davrizhetsi or Arakel of Tabriz (1590-1670) and some other 17<sup>th</sup> century chroniclers: Continuator of Samuel Anetsi; Anonymous Chronicler; Anonymous from Van; Martiros Khalipa:

In 1646, April 2, at the night of the Great Friday and at the dawn of the Great Saturday, a terrible and powerful earthquake occurred in the city of Van and its county, and half of the city wall, many churches and mosques and numerous buildings collapsed and took many people under themselves and the churches of the monastery of Varaga turned into ruins, and other monasteries in the canton were also destroyed; the land, like a ship on the surface of the water, quaked for eight days, and then calmed down, so that it shook once every four, five and ten days; and so it remained

<sup>3</sup> Ժեղարի Հայերեն ձեռագրերի հիշատակարաններ, Կազմեց Լ. Ս. Խաչիկյան [*Colophons of 15<sup>th</sup> Century Armenian Manuscripts*, edited by L. S. Khachikian], Vol. 1 (Yerevan, 1955), 515-516; Տոմարի ինքնագրերի և ձեռագրերի ցանկում հիշատակված ձեռագրերի մասին (XIV-XV სს.), ձեռագրից հետո տարբեր, Մեսախա, Կոմենտարები և Մեմորանդումները [Colophones of the Armenian Manuscripts about Georgia (14<sup>th</sup> -15<sup>th</sup> cc.)], Translated from Armenian and edited by A. Abdaladze (Tbilisi, 1978), 62-63.

<sup>4</sup> Մամուլի Անեցիի և շարունակողներ ժամանակագրություն, աշխատասիրությամբ Կարեն Մարտիայանի [*Samuel Anetsi and Continuator's*, edited by K. Matevosian] (Yerevan, 2014), 321-322; Մանր ժամանակագրություններ, Կազմ. Վ. Ա. Հակոբյան [Anonymous Chronicler from Sebastia, in: *Minor Chronicles*, edited by V. A. Hakobian], I (Yerevan, 1951), 173; Մանր ժամանակագրություն, [Grigor Kamakhetsi Chronicle, in: *Minor Chronicles*, II (Yerevan, 1956), 268; Մանր ժամանակագրություններ, [Anonymous chronicler, in: *Minor Chronicles*, edited by V. A. Hakobian], II, 284; Պատմության Առաքել Վարդապետի Դավրիժեցու Ի տպարանի Սրբոյ Կաթողիկէ Էջմիածնի [Arakel Davrizhetsi, *Book of History*] (Vagharshapat, 1884), 488.

like this until June was over; and then the earth gained steadfastness by the grace of God.<sup>5</sup>

**1784**, Erzincan, The diary of the priest Ioane from Akaltsikhe (South of Georgia):

[1784] when the earthquake occurred in Erzincan, Pasha of Erzurum died with his big army. The earth was shaking for five days but no harm was caused [to Akhaltsikhe].<sup>6</sup>

Colophons (Armenian *Hishatakarans*) of Armenian manuscripts are primary sources for Erzincan earthquakes. Colophons are written by the individuals living at the time of the events they describe, who were apparently Armenians emigrated from Erzincan. The scribes give accounts of the frequent devastation caused by earthquakes, and other natural calamities.

To demonstrate how the colophons describe the earthquake events, we present here the example of the earthquake in 1482 at Erzincan. This earthquake is described by contemporary and later historians. All of them describe the destruction caused by the earthquake. The entire city and twenty surrounding villages were destroyed. Contemporary historians report 30 000 victims, but each author provides different estimate: 10 000, 20 000, or 30 000. In the colophon of the Gospel copied in 1483 in Ukhtik (Armenian *Ukhtik*, Georgian *Oltisi*; modern day town of Oltu and district of Erzurum Province in the Eastern Anatolia region), the scribe mentions, that the earthquake destroyed the city of Eznka and 20 villages around it. Death toll achieved 30 000 people.<sup>7</sup>

The information about the earthquake can be found in the colophons of other Armenian manuscripts, a few of which are written in a form of a poetic verse. Here are two examples of such verses describing the earthquake which occurred at Erzincan in 1482. The first verse – "Lamentation on the city of Erzincan, where the earthquake occurred and destroyed the entire city" was written by Mskin Eretsi Anushpaktsi an

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<sup>5</sup> Առաքել Դավրիժեցի [Arakel Davrizhetsi, *Book of History*], 498; Սամուէլ Անեցի եւ շարունակողներ Փամանակագրութիւն [Samuel Anetsi and Continuator], 338; Մանր Փամանակագրութիւն [Anonymous Chronicler, in: *Minor Chronicles*], II, 284; Մանր Փամանակագրութիւններ, [Anonymous from Van, in: *Minor Chronicles*], II, 412; Մանր Փամանակագրութիւն, [Martiros Khalipa Chronicle, in: *Minor Chronicles*], II, 483.

<sup>6</sup> Մ. Լոմսաձե, Գვიანი Միջին Միջին դարերի լատինացի օրագրից [Sh. Lomsadze, *From the History of Late Medieval Georgia. Chronicles from Akhaltsikhe*] (Tbilisi, 1979), 163.

<sup>7</sup> Ժէ դարի Հայերն ձերագրերի հիշատակարաններ [Colophons of 15<sup>th</sup> Century Armenian Manuscripts], Vol. 3 (Yerevan, 1967), 37; Տոմարի ինքնագրերի անգրքի ցանկի ընդհանուր նկարագրի մասին [Colophones of Armenian Manuscripts about Georgia (14<sup>th</sup> -15<sup>th</sup> cc)], 93-94.

eyewitness. Tragic events occurred in the city after the quake. All of Erzincan was swallowed up by the earth. Everything was destroyed. Many people died. A woman lost her only son. She was crying and praying to God to save him. After fifteen days of grievance, the boy was found unharmed and was reunited with his mother.<sup>8</sup>

A colophon about the same 1482 Erzincan earthquake was also written as a verse to the Armenian manuscript (Matenadaran - Mesrop Mashtots Institute-Museum of Ancient Manuscripts, Eerevan, Ms. 9271) by T'oros Mushetsi, who describes devastation and disastrous events occurring after the quake. The earthquake caused damage and destruction. The city wall fell off its foundation. About 10,000 people died, many of them, beautiful women. No one could escape this disaster.<sup>9</sup>

Among later Armenian historians and chroniclers, Amiras Erzinkatsi's 17<sup>th</sup> century chronicle is of unique value. He refers to strong earthquakes in his native town of Erzinka (an Armenian name of the town of Erzincan) and the surrounding territory. His chronicle even presents a list of earthquakes from the 11<sup>th</sup> century to mid-17<sup>th</sup> century in chronological order; their dates, the damage they caused, their strength, and their effects, including the death toll. Sixteen strong and weak earthquakes occurred in Erzincan in 1045, 1166, 1168, 1236, 1254, 1268, 1281, 1287, 1290, 1345, 1356, 1374, 1458, 1576, 1584, and 1666.<sup>10</sup> Seismologists think that the chronicle of Amiras Erzinkatsi is the earliest known attempt to collect reliable earthquake data from the Armenian sources.<sup>11</sup> Like Amiras Erzinkatsi, another 17<sup>th</sup> century Armenian historian, Arakel Davrizhetsi, gives a detailed and copious description of Erzincan earthquakes in his "Book of History". Arakel Davrizhetsi borrowed some information about earthquakes in Erzincan from Amiras Eerzinkatsi. And in fact, Arakel Davrizhetsi mentions all the earthquakes from Erzinkatsi's chronicle but adds three more: in 1269 at Erzincan, in 1441 and 1646/48 at Van.<sup>12</sup>

According to Armenian and Georgian written sources, strong earthquakes which caused great damage and casualties during the centuries in East Anatolia, are the following [Fig. 5]:

<sup>8</sup> Ժե դարի Հայերեն ձեռագրերի հիշատակարաններ [*Colophons of 15<sup>th</sup> Century Armenian Manuscripts*], Vol. 3, 21-22.

<sup>9</sup> Ժե դարի Հայերեն ձեռագրերի հիշատակարաններ [*Colophons of 15<sup>th</sup> Century Armenian Manuscripts*], Vol. 2, 95.

<sup>10</sup> Л. А. Ханларян, *Хроника Амираца Ерзынкаци* [L. A. Khanlarian, *Amiras Erzinkatsi Chronicle*], in: *Patma-Banasirakan Handes* (A journal published by the Armenian National Academy of Sciences), N 4, 1988, 188-208.

<sup>11</sup> A. Karakhanian, Ye. Abgaryan, Evidence of historical seismicity and volcanism in the Armenian Highland (from Armenian and other sources), in: *Annals of geophysics* (2004, №2/3), 796.

<sup>12</sup> Առաքել Դավրիժեց. [Arakel Davrizhetsi, *Book of History*], 479-502.

*Earthquakes in the Region of East Anatolia According to the Georgian and Armenian Sources from the Late Antiquity up to the 19<sup>th</sup> Century*

- 363 – Arshakavan (modern Dogubayazit);
- 461 - District of Apahunik (Modern Malazgirt, Muş Province)

*Erzurum and Erzincan:*

- 840
- 1011 (24 000 people died)
- 1045
- 1165/6 (12 000 people died)
- 1254, March 28 - October 11 (16 000 people died)
- 1268 (15 000 people died)
- 1287, May 6 (big death toll)
- 1289
- 1457, April 23 (12 000/32 000 people died)
- 1482 (the city of Erzincan with its 20 villages was destroyed, 18 000/30 000/32 000 people died)
- 1535
- 1576, November 5 (quake lasted for 4 months)
- 1584, June 17 (15 000 people died, 5 000 remained under the earth)
- 1668, August 7
- 1770
- 1784

*Environs of Lake Van:*

- 461
- 1275
- 1441
- 1646/48

In this article we discussed the strongest earthquakes, also some smaller earthquakes which occurred only on the territory of East Anatolia according to Georgian and Armenian sources. In the future our project envisages to create a unified catalogue and an electronic data bank (Georgian-English) of the historical earthquakes which will cover South Caucasus as well as the Mediterranean area. The results of the research will be available for researchers and the public at large.

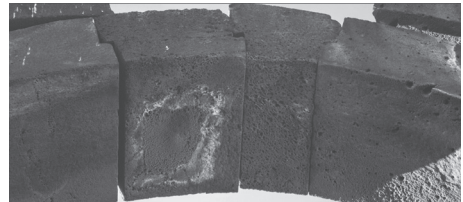
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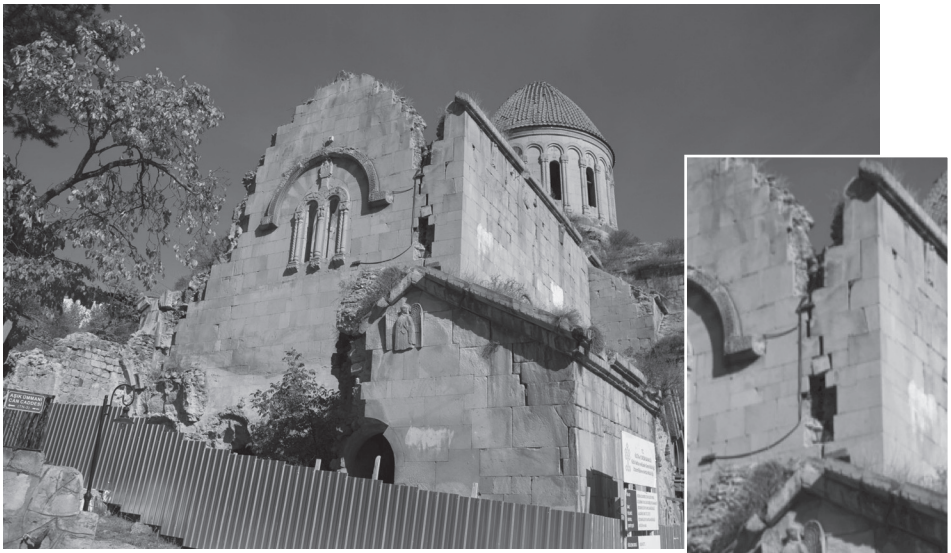
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**Fig. 1, 1-3.** Lower wall of the southern arm of the main temple of the Georgian monastery Khakhuli, located in Turkey's north-east in the village Bagbash in Erzurum Province, has an anti-seismic effect belt. Stones are cut in such way that they do not slip. Due to the use of such method the church is preserved in its original form. (photo G. Bagrationi)



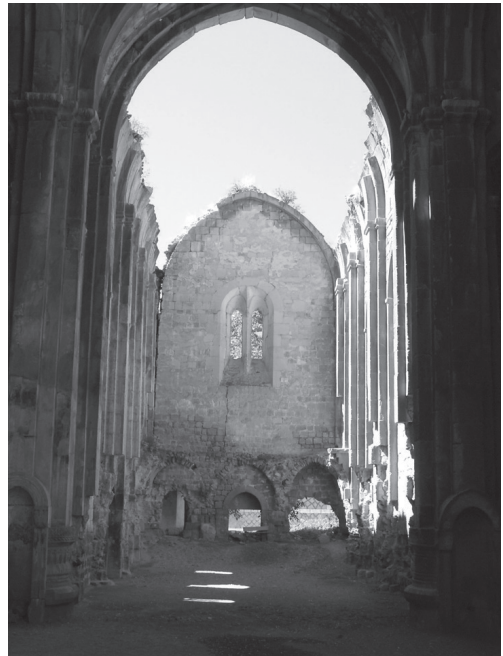
**Fig. 2, 1-2.** Builder of the Georgian Church Akori in Lore district (Armenia) faced the same problem. He used the same anti-seismic method to preserve the building. The stones are mounted with rectangular strips of arched beams so that their separation is much more complicated than that of the usual arch. (photo G. Bagrationi)



**Fig. 3, 1-2.** The Medieval Georgian monastery of Oshki (963-973), a major cultural heritage monument, is located in the village of Çamlıyamaç, north-east Turkey, Erzerum Province bordering Artvin. The temple is damaged and desperately needs restoration. Fortification and rehabilitation works will be carried out based on the document signed between Georgian and Turkish governments on May 23, 2017. (photo G. Bagrationi)



**Fig. 3, 3.** Oskhi Temple, interior: general view of the dome from West.



**Fig. 3, 4.** Oskhi Temple, interior: West crossarm; view from East.



**Fig. 4, 1-2.**Tortum Lake in Uzundere district formed after the earthquake in 1791 (photo G. Bagrationi)

