THE NEOLITHIC SEQUENCE AT KHRAMI'S DIDI GORA (GEORGIA): NEW SOUTHERN PROFILE STRATIGRAPHY AND AN UPDATED RADIOCARBON FRAMEWORK

ხრამის დიდი გორის ნეოლითური სტრატიგრაფიული თანმიმდევრობის გადახედვა: სამხრეთული პროფილის ახალი მონაცემები და განახლებული რადიონახშირბადული ქრონოლოგიური ჩარჩო

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Abstract: This paper presents new results from the re-investigation of the Neolithic settlement of Khramis Didi Gora, located in the Kvemo Kartli plain of southern Georgia, within the cultural sphere of the Shomu-Shulaveri tradition. Originally excavated between 1972 and 1986, the site has recently been revisited to refine its stratigraphic sequence and chronological framework. The 2023 fieldwork focused on the southern profile of the old excavation trench, where systematic cleaning, documentation, and stratigraphic analysis were conducted. Layers were identified, recorded, and interpreted in accordance with the principles of archaeological stratigraphy, supported by the construction of a stratigraphic matrix.

A total of 30 bioarchaeological samples were collected, of which 10 were selected for radiocarbon (C14) dating. The analysis revealed a complex sequence of architectural and occupational phases, including mud-brick walls, plastered floor levels, burnt horizons, and hearth installations. The newly obtained radiocarbon dates allow the identification of multiple phases of settlement development, spanning the middle to late stages of the Shomu-Shulaveri Culture.

These results significantly refine the chronological placement of Khramis Didi Gora and demonstrate a gradual, multi-phase occupation pattern. The study also highlights the importance of revisiting legacy excavation data using modern analytical methods, contributing to a more nuanced understanding of Neolithic settlement dynamics in the South Caucasus.

Keywords: Stratigraphy, Neolithic, Radiocarbon Dating, Khramis Didi Gora, Shomu-Shulaveri Culture

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აბსტრაქტი: ნაშრომში წარმოდგენილია ახალი კვლევის შედეგები ხრამის დიდი გორის ნეოლითური ნამოსახლარიდან, რომელიც მდებარეობს ქვემო ქართლის ვაკეზე და მიეკუთვნება შომუ-შულავერის კულტურულ არეალს. ძეგლი თავდაპირველად 1972–1986 წლებში იქნა გათხრილი, ხოლო 2023 წელს განხორციელდა მისი ხელახალი კვლევა, რომლის მიზანი იყო სტრატიგრაფიული თანმიმდევრობის დაზუსტება და ქრონოლოგიური ჩარჩოს განახლება. კვლევა კონცენტრირდა ძველი თხრილის სამხრეთის პროფილზე, სადაც ჩატარდა გაწმენდითი სამუშაოები, ფენების დეტალური დოკუმენტაცია და სტრატიგრაფიული ანალიზი არქეოლოგიური სტრატიგრაფიის პრინციპებისა და სტრატიგრაფიული მატრიცის გამოყენებით.

საკვლევი პროცესის ფარგლებში აღებულ იქნა 30 ბიოარქეოლოგიური ნიმუში, რომელთაგან 10 შეირჩა რადიონახშირბადული (C14) დათარიღებისთვის. ანალიზმა გამოავლინა მრავალფენიანი სტრატიგრაფიული სურათი, რომელიც მოიცავს ალიზ აგურის კედლებს, თიხატკეპნილ იატაკებს, დამწვარ ფენებსა და კერებს. მიღებულმა ახალმა თარიღებმა შესაძლებელი გახადა დასახლების განვითარების რამდენიმე ფაზის გამოყოფა, რომლებიც შომუ-შულავერის კულტურის შუა და გვიან ეტაპებს მიეკუთვნება.

კვლევის შედეგები მნიშვნელოვნად აზუსტებს ხრამის დიდი გორის ქრონოლოგიურ ადგილს რეგიონულ კონტექსტში და ადასტურებს, რომ ნამოსახლარი ვითარდებოდა ეტაპობრივად, მრავალფაზიანი ოკუპაციის შედეგად. ამასთან, ნაშრომი წარმოაჩენს ძველი გათხრების მასალის თანამედროვე მეთოდებით გადახედვის მნიშვნელობას ნეოლითური საზოგადოების კვლევისათვის სამხრეთ კავკასიაში.

საკვანძო სიტყვები: სტრატიგრაფია, ნეოლითი, რადიონახშირბადული დათარიღება, ხრამის დიდი გორა, შომუ-შულავერის კულტურა.

Introduction: Khramis Didi Gora is a late Neolithic settlement mound located in the South Caucasus, within the middle Kura River Valley on the present-day territory of Georgia (Figure 1). The site lies on the Kvemo Kartli plain, a key area in the distribution zone of the so-called Shomu-Shulaveri Culture. Archaeological investigations at Khramis Didi Gora were initiated in 1972 under the direction of Dr. A. Javakhishvili, and subsequently continued between 1974 and 1986 under the leadership of Dr. T. Kiguradze. (Kiguradze, 1986). In 2023[1], a new phase of archaeological research was undertaken by M. Eloshvili, with particular emphasis on the radiocarbon analysis of the southern profile of the earlier excavation trench (Eloshvili, et al., 2027). The primary objectives of the new investigation were to clean and document the stratigraphic layers, collect samples for radiocarbon (C14) dating, and establish correlations with records from previous excavations (Figure 2).

[1] The research was undertaken within the funding of ASOR's Shepard Urgent Action Grants.

Figure 1 - Map showing Khramis Didi Gora, as well as the so-called Shulaveri and Arukhlo group settlements.

Between 1972 and 1986, the Kvemo Kartli Archaeological Expedition excavated a trench approximately 11 m in depth, covering an area of 600 m². T. Kiguradze identified nine distinct building horizons, which may be interpreted as successive phases of occupation. This stratified sequence reflects the nature of the settlement as an artificial mound (tell), formed through repeated cycles of construction, collapse, and rebuilding in earth-and-mud-brick architecture. (Kiguradze, 1986).

Radiocarbon (C^{14}) dates for the site were first obtained in the 1980s at Tbilisi State University (Kiguradze, 1986). Since then, the corpus of chronological data for the Shomu-Shulaveri Culture has expanded considerably. Recent investigations, in particular, have produced a new series of radiocarbon dates, substantially increasing both the size and resolution of the available dataset. Notably, nine[2] new Neolithic radiocarbon determinations have now been added to the three previously established dates (Table 2). This enhanced chronological framework allows greater flexibility in situating Khramis Didi Gora within the culture's developmental sequence.

[2] C14 analyses were dated at Vilnius Radiocarbon Lab.

Figure 2 - Photogrammetric image of the southern profile investigated in 2023.

Methodology: The previously excavated trench was cleared of vegetation, including grass and root systems. Upon closer inspection, the southern profile was identified as particularly informative regarding its stratigraphic configuration. Following the removal of approximately four decades of accumulated collapse deposits, the stratigraphy became clearly visible. During the cleaning and limited excavation, a range of diagnostically significant Neolithic materials was recovered (Eloshvili, et al., 2027). As the profile was systematically cleaned, levelled, and brushed, individual stratigraphic units were distinguished, defined, and assigned numerical designations.

Following the completion of cleaning operations, the southern profile was subdivided into two sectors: the south-western and south-eastern sections. Stratigraphic units within each sector were identified, systematically separated, recorded, and sampled for C14 analysis. Each unit was defined and assigned a numerical designation, and its interpretation was carried out in accordance with the principles of archaeological stratigraphy, supported by the construction of a stratigraphic matrix to establish the relationships between the layers. The elevation of each sample was measured using a levelling instrument. A minimum of two samples, typically bone and charcoal, were collected from each stratigraphic unit for radiocarbon dating.

Results and Discussion:

The study of the profile from the square excavated in the 20th century pursued several key objectives. Foremost among these was the reconstruction of the settlement's stratigraphic sequence and the creation of a reliable dataset to inform future excavations. A second major objective was the refinement of the site's chronological framework. As noted above, the site was initially dated in the 1980s; however, only two layers were assigned absolute dates at that time. During his investigations, T. Kiguradze identified nine construction horizons within the settlement sequence. Nevertheless, only the central portion of the site, specifically Layers V-VI, was subjected to absolute dating, leaving both the earliest and latest phases of occupation insufficiently understood.

Another important aim of the present expedition was to reintegrate Khramis Didi Gora into scholarly discourse and to re-emphasise its significance within the regional archaeological framework.

Following the cleaning of the previously excavated trench, the southern profile was selected for detailed study due to its particularly well-preserved and informative stratigraphy, as well as its status as the highest exposed section within the study area (6.40 m). Of the profile's total length of 30 m, a central segment measuring 17 m was chosen for systematic analysis (Figure 2). This segment was subsequently subdivided into two analytically defined sections: the south-western and south-eastern parts. Within both sections, stratigraphic units were identified, recorded, numbered, and sampled for further analysis (Table 1).

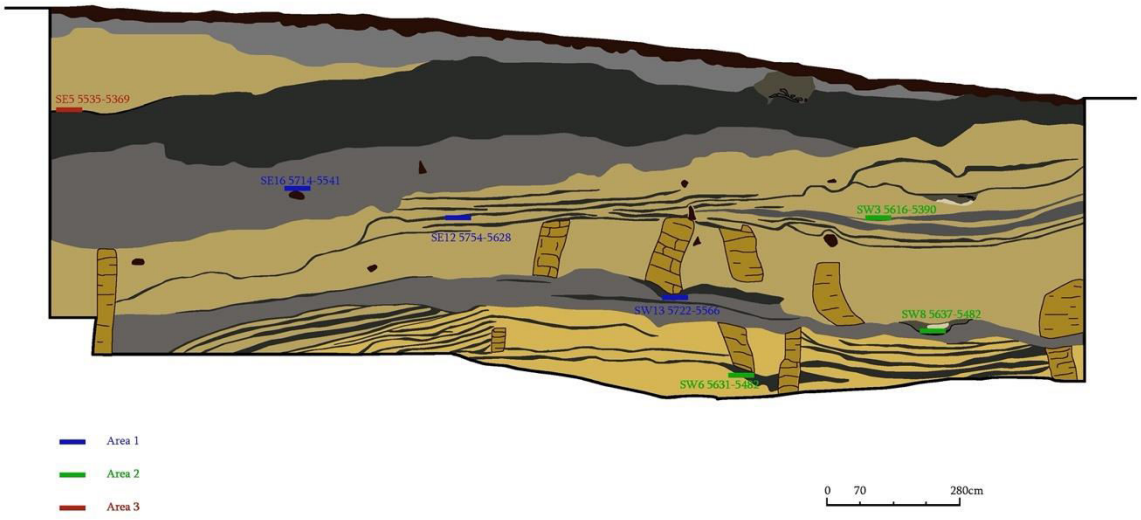

Figure 3 - Southern profile investigated in 2023 with the distribution of radiocarbon dates by areas. Blue indicates Area 1, green indicates Area 2, and red marks the probable latest floor level.

Description of the stratigraphic sequence of the southern profile					
South-Eastern part (height: 6.40 m)			South-Western Part (height: 5.60 m)		
Layer	Description	Measurements	Layer	Description	Measurements
SE-1	Top soil.	Thinnest 6 cm, thickest 9 cm	SW -1	Top Soil	Thinnest 7 cm, thickest 10 cm
SE-2	Grey Layer.	15 cm	SW-2	Burial	
SE-3	Ashy Layer.	36 cm	SW-3	Burnt, ashy layer	6 cm
SE-4	Clay Layer.	43 cm	SW-4	Mud-brick wall	59 cm
SE-5	Floor layer, clay plaster.	3 cm	SW-5	Mud-brick wall	1 m

SE-6	Burnt layer.	Thickest 12 cm, thinnest 3 cm	SW-6	Floor layer	5 cm
SE-7/SE10	Mud-brick wall.	1,43 cm	SW-7	Mud-brick wall	78 cm
SE-8	Burnt layer.	3 cm	SW-8	Hearth	24 cm
SE-9	Green layer.	17 cm, 20 cm, 25 cm	SW-9	Mud-brick wall	50 cm
SE-11	Mud-brick wall.	46 cm	SW-10	Floor layer between two mud-brick walls	10 cm
SE-12	Burnt layer.	4 cm	SW-11	Ashy, burnt layer	3 cm
SE-13	Mud-brick wall.	43 cm	SW-12	Mud-brick wall	47 cm
SE-14	Mud-brick wall	47 cm	SW-13	Floor layer	4 cm
SE-15	Burnt layer.	5 cm	SW-14	Mud-brick wall	34 cm
SE-16	Floor layer, clay plaster.	3 cm	SW-15	Clay layer	
			SW-16	Burnt layer	4 cm
			SW -17	Stone concentration in burnt layers of SW3	14 cm
			SW-18	Hearth on top of SW3	13 cm

Table 1 - Description of the stratigraphic sequence of the southern profile.

Description of the layers in the south-eastern section (height: 6.40 m):

SE14 represents a mud-brick wall, of which only a few courses are preserved. To its west, a clay-rich deposit is visible, likely corresponding to the collapsed remains of mud-brick architecture. Above this deposit, an upper floor level emerges, consisting of a compacted clay surface. The structure associated with SE14 appears to exhibit a slight curvature towards the east. A prominent crack is clearly visible, which indicates the separation between the wall and the adjacent stratigraphic layers. This feature may represent a small-scale storage unit or compartment.

SE7 and SE10 represent a single mudbrick wall that is relatively well preserved. Owing to an initial misinterpretation, these were assigned two separate context numbers, as it was thought that the feature was divided, similar to the situation observed with SW9-SW5 in the far western part of the profile. In reality, this wall is located at the extreme eastern end of the profile and survives to a notable height (1. 43 cm). It appears to form a semi-circular plan and is slightly inclined towards the west.

The floor levels associated with this structure are discernible to its west. In particular, the burnt layer SE8 is clearly distinguishable, whereas identifying the other layers is complicated by the collapse of mudbrick debris. Layer SE8 extends westward and was subsequently assigned the number SE12; however, these may represent a single layer and horizon, most likely a floor level. It is well attested that, within this cultural context, buildings were constructed on levelled floor surfaces; therefore, it is not surprising that this burnt floor may have extended across a broader courtyard area (Nishiaki & Guliyev, 2020).

A particularly noteworthy feature is SE9, a distinct green layer (Figure 4). Its colouration may result from prolonged water exposure or stagnation. Significantly, the material recovered during its cleaning exhibited traces of reddish oxidation, which may further support the hypothesis of standing water. The function and origin of this water accumulation, however, remain open questions. Comparable greenish deposits have been identified at the Gadachrili Gora, where analyses suggest they represent water-related residues (Ollivier, Fontugne, Hamon, Hatte, & Jalabadze, 2018).

Figure 4 - SE9: Green layer.

SE5 corresponds to the uppermost identified floor level, consisting of a compacted clay surface. It could not be securely associated with any specific architectural feature or wall (Figure 5).

Figure 5 - SE5: Probable latest compacted clay floor.

SE14 represents a mudbrick wall preserved only in a few courses. To its west, a clay-rich deposit, likely the collapsed remains of mudbrick, was identified, above which an upper floor level (a compacted clay surface) emerges. The SE14 structure appears to exhibit a slight curvature towards the east. A prominent

crack is also visible, likely indicating the separation between layers and the wall itself. This feature may represent a small-scale storage unit or compartment.

SE12 and SE13 together form a single construction level, in which SE12 represents a lower, ashy deposit interpreted as a probable floor surface. At the same time, SE13 corresponds to a mud-brick structure constructed directly above it. Comparable structural relationships have been identified in several instances across both sections of the profile.

Description of the stratigraphic sequence of the south-western section (height: 5.60 m).

The examination of the profile revealed several distinct and archaeologically significant sectors. Notably, the western portion of the section is characterised by a concentration of strongly burnt deposits, indicating episodes of intensive in situ burning or post-depositional thermal alteration. Within this area, architectural features related to mud-brick structures and associated floor surfaces are considerably more clearly defined. This enhanced visibility has allowed for a more precise identification and separation of multiple construction phases, contributing to a clearer understanding of the building sequence and development of occupation of the area.

The layout of the profile, together with the developmental history of the site's periphery, indicates traces of discrete episodes of construction and demolition of individual buildings. No evidence has been identified for a unified, site-wide construction horizon. Although several continuous depositional layers are present, which may plausibly be associated with the existence of shared open courtyard spaces, it can be argued that the settlement developed in a spatially segmented manner, rather than as a single, contemporaneously planned unit.

Figure 6 - SW8: Hearth feature.

This interpretation is further supported by the radiocarbon chronology, which divides this portion of the settlement into three main occupational clusters, reinforcing the notion of phased and spatially differentiated development across the site (see below).

In the southwestern section, at the lower western corner, probable structural remains have been identified. It is located between the mud-brick walls SW9 and SW5, where several floor levels are preserved, interspersed with broken mud-bricks. The lowest floor of this building/courtyard is not visible, as it lies within an unexcavated section.

Above this structure, another building was later constructed atop the ruins. Beneath the walls SW7 and SW12, the lower-level floor SW10 is clearly discernible and continued in use during the period of their construction (Figure 7). A probable hearth at SW8 likely belongs to this building (Figure 6). The structure is preserved to a certain height; above this level, the remains are largely collapsed, with mud bricks and stones mixed, making the precise layout indistinguishable.

Figure 7 - SW7, SW9, SW10: Two superimposed mudbrick walls with an intervening floor level.

Several burnt layers (SW11, SW3, SW16) overlie the building (SW12-SW7) and its associated remains and may represent components of an original floor surface of the upper building horizon. Given their extent, these deposits could plausibly correspond to courtyard floor levels. The burnt and ashy layers alternate with accumulations of stones and mud-bricks; however, no clear structural organisation can be discerned. A concentration of stones within SW17 may indicate the presence of a hearth.

At the upper boundary of the ashy and burnt sequence, within the collapsed mud-brick deposit SW15, a small feature comparable to SW8 is embedded, suggesting the possible presence of an additional hearth

(SW18). These deposits extend discontinuously into the eastern part of the profile, although no definitive association with any wall or architectural feature can be established.

SW4 represents a mud-brick wall, with several construction phases preserved. SW6 is a probable floor level underlying SW4, which is inclined; its function is difficult to determine at present and may be located in the unexcavated lower section. A similar correlation is observed between the SW12 mud-brick wall and the SW13 floor layer, suggesting that this wall stands on the burnt floor level. However, it remains uncertain whether it continued to be used during the occupation of this building.

As previously noted, during the 2023 archaeological campaign, a total of ten samples were collected for radiocarbon dating, complementing the three determinations obtained earlier under the direction of T. Kiguradze (Kiguradze, 1986). This expanded dataset has enabled a more refined understanding of the settlement's developmental trajectory and has provided a stronger empirical basis for discussing its broader chronological framework.

Name	Type	Radiocarbon date, BP	68.3% probability	95.4% probability	Median
SE12	Bone	6811 ± 38	5726-5665	5754-5628	5693
SW13	Bone	6739 ± 39	5709-5623	5722-5566	5653
SE16	Bone	6703 ± 38	5658-5566	5714-5541	5624
SEL1	Bone	6693 ± 44	5660-5561	5713-5526	5613
SW8	Bone	6655 ± 38	5626-5553	5637-5482	5580
SW6	Bone	6644 ± 40	5623-5539	5631-5482	5573
SW3	Bone	6549 ± 39	5552-5474	5616-5390	5513
SE5	Bone	6598 ± 38	5482-5381	5535-5369	5429
TB-301		6435±60	5475-5363	5516-5226	5404
Lj-3270		6520±70	5554-5382	5620-5331	5478
TB-322		6505±60	5527-5378	5614-5333	5451

Table 2 - Table presents the radiocarbon dates from the Khramis Didi Gora - (SE12, SW13, SE16, SEL1, SW8, SW6, SW3, SE5), new dates and old dates with new calibration (TB-301, Lj-3270, TB-322). C14 dates were generated at OxCal (Ramsey, 2009) (Reimer, et al., 2020).

The new radiocarbon dates have enabled a more refined understanding of the settlement's developmental phases. Based on these dates, three distinct areas can be identified (Figure 3). Area 1 represents the earliest occupational layers, with dates distributed as follows: SE12 (5754–5628 BC), SW13 (5722–5566 BC), SE16 (5714–5541 BC), and SEL1 (5713–5526 BC). Area 2 appears to represent a later phase of development and yielded the following dates: SW8 (5637–5482 BC), SW6 (5631–5482 BC), and SW3 (5616–5390 BC). The latest date is derived from layer SE5 (5535–5369 BC), corresponding to a segment of a compacted clay floor in the upper corner of the eastern part of the southern profile (Figure 8).

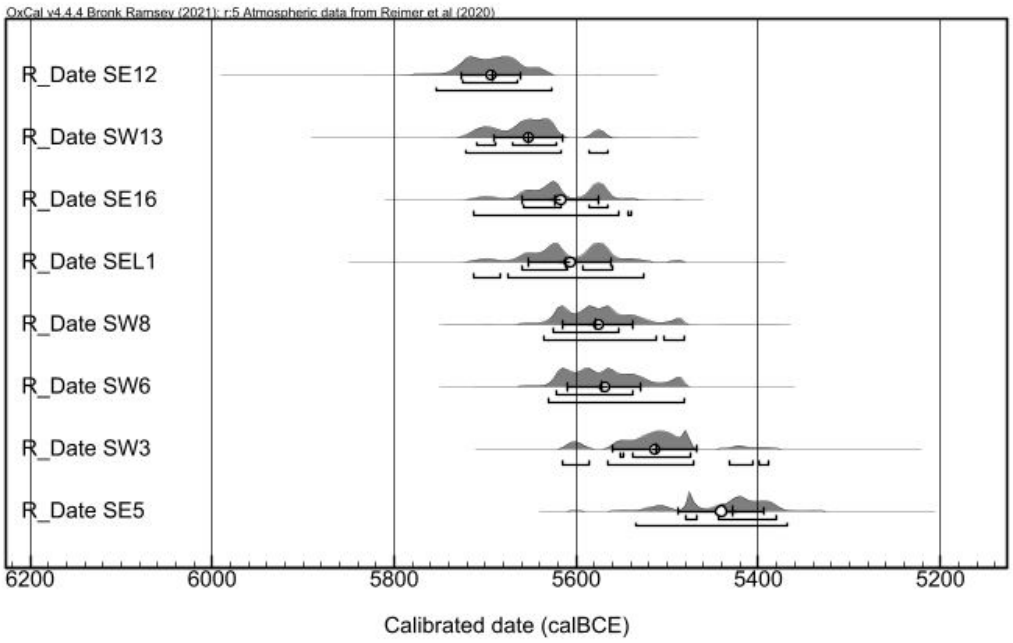

Figure 8 - Radiocarbon dates obtained during the 2023 archaeological campaign.

The distribution of these dates suggests that the settlement developed gradually, in stages, expanding incrementally over time. This sector of the mound is likely peripheral and may represent a relatively late phase of occupation; therefore, it should not be used as the sole basis for determining the chronology of the mound as a whole. A comprehensive chronological framework for the site requires additional radiocarbon determinations from multiple areas of the site to reconstruct a more complete picture of the settlement's development.

The new radiocarbon dates enable the integration of Khramis Didi Gora into the broader chronological framework of the Caucasian Neolithic. If we consider that the earliest dates, ranging approximately between 6000, 5900, 5800 BC, have been documented at several sites, such as Gadachrili Gora (Hamon, et al., 2016), Hacı Elamxanlı Tepe (Kadowaki, Miki, Shimogama, & Akashi, 2012), and Mentesh Tepe (Lyonnet, et al., 2015), among others, while the later phases fall around 5400-5300 BC (Nishiaki & Guliyev, 2020), it becomes evident that the occupation of the peripheral area of Khramis Didi Gora corresponds to the middle and late stages of the Shomu-Shulaveri Culture.

In terms of inter-site comparisons, several parallels can be observed. Area 1, which appears to represent the earliest phase within the peripheral occupation of the site, corresponds well with horizons IV (5730-5561, 5731-5635, 5722-5627, 5713-5564 BC) and III (5736-5626, 5714-5484 BC) at Aknashen (Badalyan & Harutyunyan, 2022) as well as with certain layers at Arukhlo (5722-5638, 5724-5639, 5728-5644, 5736-5645 BC) (Hansen & Mirtskhulava, 2012) and Mentesh Tepe (5726-5567, 5724-5630, 5726-5631, 5732-5636, 5741-5631, 5738-5638, 5771-5636, 5783-5637 BC) (Lyonnet, et al., 2015).

Area 2, in turn, corresponds to several dates from Horizon IV at Aknashen (5627-5483, 5616-5478, 5617-5480, 5611-5476, 5633-5480, 5619-5383 BC) (Badalyan & Harutyunyan, 2022) as well as to Level 11 (5610-5545 BC) and Level 12 (5625-5565, 5645-5570 BC) at Göytepe (Nishiaki & Guliyev, 2020). including the new chronological dates of Mashaveras Gora (5613-5480, 5607-5475, 5627-5485, 5627-5486, 5613-5480, 5616-5481 BC) (Abuladze, Jokhadze, & Zhvania, 2022). It is also worth noting that three

radiocarbon dates obtained in the 1980s (5516-5226, 5620-5331, 5614-5333 BC, newly calibrated; 5350 ± 210; 5568, 5410 ± 211 BC, older calibration, *Table 2*), which T. Kiguradze took from Levels V and VI (Kiguradze, 1986), may plausibly be attributed to the second area (Figure 9).

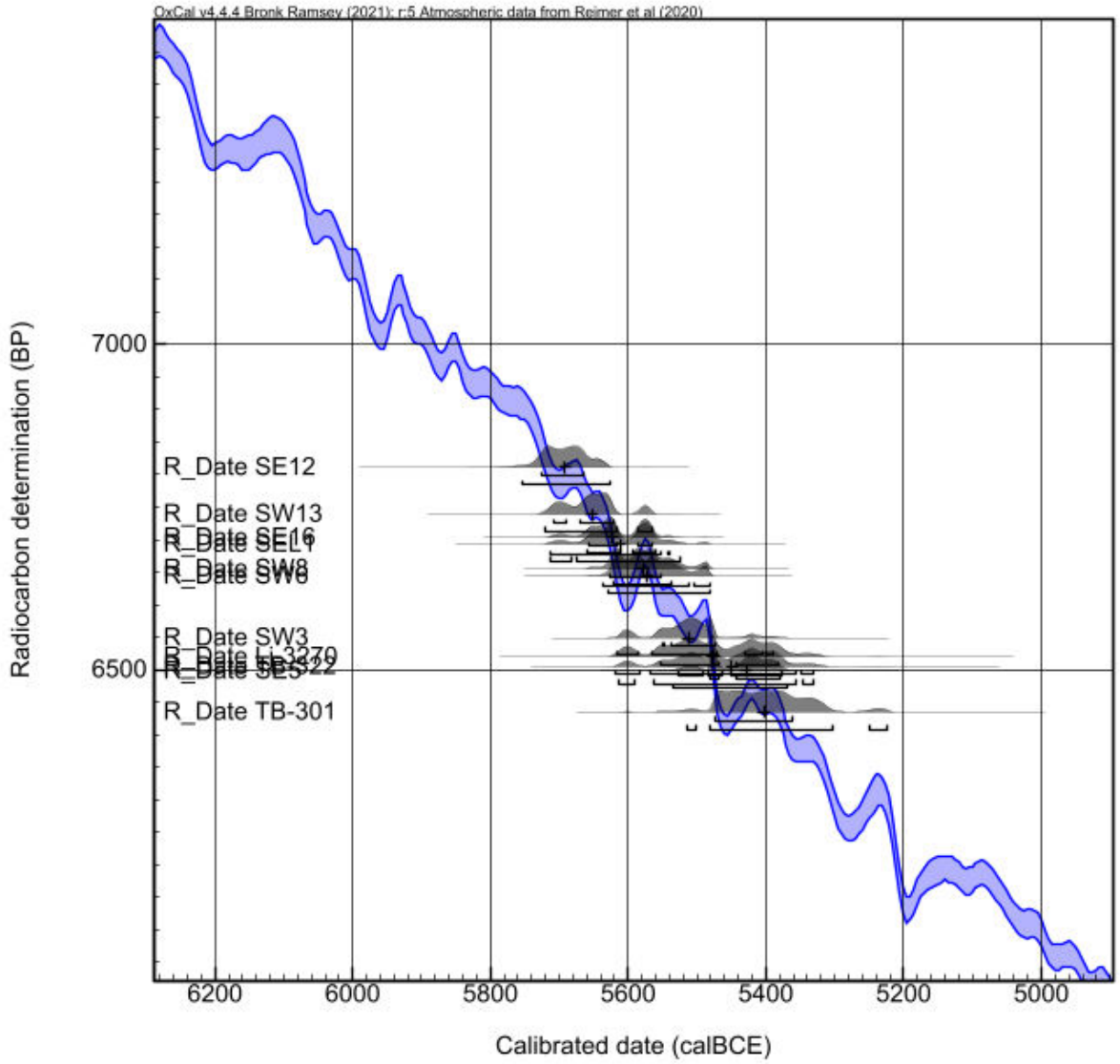

Figure 9 – Calibrated radiocarbon dates from the 2023 and 1980 excavations plotted against the IntCal calibration curve.

Finally, SE5, which appears to represent the uppermost and thus latest layer of the peripheral area, corresponds to levels 7 (5540-5490 BC) and 8 (5550-5500 BC) at Göytepe (Nishiaki & Guliyev, 2020).

Conclusion: The re-examination of the southern profile at Khramis Didi Gora has yielded important new insights into the site's stratigraphy and chronology. The integration of detailed stratigraphic analysis with new radiocarbon dates has enabled the reconstruction of a more refined sequence of occupation, revealing multiple construction phases and a dynamic pattern of settlement development.

The results suggest that the investigated area represents a peripheral zone of the mound, likely occupied during the middle and later stages of the Shomu-Shulaveri Culture. At the same time, the absence of a single, unified construction horizon and the presence of overlapping architectural remains indicate a gradual and non-linear development of the settlement.

Although the new dates significantly improve the chronological framework, they also highlight the need for further radiocarbon sampling across other areas of the site to establish a comprehensive timeline. Overall, this study underscores the value of re-evaluating earlier excavations and confirms the importance of Khramis Didi Gora in the broader context of Neolithic research in the South Caucasus.

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