Georgian Palaeography Revisited: Dating Undated Manuscripts

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Abstract: The present article summarises the results of the first radiocarbon (or ^{14}C) analysis of Old Georgian manuscripts, undertaken in 2024–2025 on behalf of the DeLiCaTe project ("The Development of Literacy in the Caucasian Territories") at the Federal Institute of Technology (ETH) in Zurich, with support by Graz University Library and the Korneli Kekelidze Georgian National Centre of Manuscripts, Tbilisi. Samples from a total of 20 manuscripts of their collections, mostly of palimpsests and other undated manuscripts from the first millennium of our era, have yielded decisive insights into the early centuries of Georgian literacy, especially with respect to the distinction of *khanmeti* and *haemeti* layers: the analyses clearly show that this distinction was not chronologically determined but must have been regional or dialectal, thus supporting the view first expressed by Akaki Shanidze in 1923. Other important insights concern the transition period between *khanmetoba* and *haemetoba* on the one hand and the emergence of *sannarevi* forms; this can now be safely assigned to the 8th century. For the collective volume of Shatberdi, MS S-1141 of the National Centre of Manuscripts, the analyses have proven that a time span of more than 100 years must have passed between its two units (one in *asomtavruli* majuscules and one in *nuskhuri* minuscules).

Keywords: Georgian manuscripts, palimpsests, *khanmeti*, *haemeti*, *sannarevi*, Shatberdi collection, radiocarbon analysis, ^{14}C analysis

The detection of remnants of a psalter with *khanmeti* and *haemeti* forms in the lowest layer of the fragmentary palimpsest MSS Sin. georg. 84 and 90 in St Catherine's Monastery on Mt Sinai[1] has proven that the translation of the psalms had a much longer history in Georgian than what the bulk of manuscripts preserving it suggests, and that the redactor of Mzekala Shanidze's epochal edition of 1960, her father Akaki, was probably right in assuming that the chants of David "must have been translated if not in the 4th century, then at least in the 5th century".[2] Unfortunately, the newly found Sinai palimpsests are not dated explicitly, in a colophon or the like, so that their age can only roughly be guessed at by way of palaeographical features, especially the existence of *khanmeti* and *haemeti* forms in them; a disposition that they share, among others, with the famous Sinai Lectionary, today preserved in the University Library of Graz (MS 2058/1),[3] which is the only non-palimpsested manuscript with these features.

For a project that is devoted to the "Development of Literacy in the Caucasian Territories",[4] the fact that the oldest Georgian manuscript with an explicit dating is the so-called Sinai *Mravaltavi*, MS Sin. georg. 32-57-33 + NF 89 of 864 CE, and that none of those with *khanmeti* and/or *haemeti* features is dated, is mischievous indeed, given that it impedes more exact chronological assignments. This is all the more regrettable as the coexistence of *khanmeti* and *haemeti* forms in one and the same document leaves room for several interpretations, thus re-

[1] Gippert & Outtier 2021: 42–43.
[2] Akaki Shanidze, Preface (წინასიტყვაობა) to Mzekala Shanidze 1960, [009]: "ფსალმუნი ქართულად IV საუკუნეში თუ არა, V-ში მაინც უნდა იყოს ნათარგმნი".
[3] See Gippert 2025: 23–26 for details as to the collection and MS 2058/1.
[4] Project "DeLiCaTe", ERC grant agreement no. 101019006, running at the Centre for the Study of Manuscript Cultures, University Hamburg (2022–2027).

opening a discussion that was held by Ivane Javakhishvili and Akaki Shanidze more than a hundred years ago: do *khanmetoba* and *haemetoba* represent two chronologically distinct periods, the first one covering the 5th–6th and the latter, the 7th–8th centuries as Javakhishvili suggested?[5] Or are they indications of dialectal rather than chronological differences, as Shanidze argued?[6]

To overcome this debate, we have initiated in our project a first scientific approach to the dating of undated Georgian manuscripts, applying the so-called radiocarbon (or ^{14}C) analysis to them. In close cooperation with the University Library of Graz (hereafter: UBG) and the Korneli Kekelidze Georgian National Centre of Manuscripts (hereafter: NCM), we have chosen specimens from 20 manuscripts of their collections for being analysed at the Federal Institute of Technology (ETH) in Zurich,[7] including nearly all codices that are known to include *khanmeti* and/or *haemeti* forms.[8] In the following pages, I will present the results of these analyses and discuss their impact on Kartvelology.

1. The Graz collection

The collection of Georgian manuscripts in the University Library of Graz consists of seven items (MSS 2058/1–7), all from the inheritance of Hugo Schuchardt and probably all stemming from Mt Sinai, with one of them (MS 2058/6) consisting of three independent fragments and another one (MS 2058/4), of two different units produced by different scribes.[9] Specimens for a ^{14}C analysis were taken from all of these items in April–May 2024 at the Centre for the Study of Manuscript Cultures (hereafter: CSMC), University Hamburg, by the restaurator of UBG, Theresa Zammit Lupi.[10] The sample also included the only Armenian fragment of the collection (MS 2058/7).[11] Among the Georgian items, one is dated explicitly in the colophon of its scribe, Ioane Zosime; this is the first unit of MS 2058/4, written by him in the year 985 CE.[12] For two of the fragments (MS 2058/6B and 6C), the actual date can be determined implicitly, given that they have been identified as belonging to the manuscript Sin. georg. 35;[13] the colophon of this codex, which has been preserved as the back flyleaf of another Sinai codex, Sin. georg. 67, provides the year 907 CE.[14] The three "dated" items were nevertheless submitted to a ^{14}C analysis in order to check the reliability of both the assignment and the scientific method. The following summary of the results proceeds along the shelf-marks applied to the different items in the Graz collection.

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[5] Javakhishvili 1922–23: 367–368.
[6] Shanidze 1923: 359–361.
[7] The ^{14}C analysis of manuscripts requires a minimal piece (*c.* 5–10 mg) each of the writing support, in our case, parchment; the necessary specimens were kindly provided by the restaurators of UBG and NCM. For the background and methodological implications of radiocarbon dating see Hajdas *et al*. 2021.
[8] From the NCM collections, no analysis was possible yet for the palimpsests A-737 (1), H-1445 (2), Svan-4 and Svan-23 (3); they will hopefully be treated in a next round.
[9] See Gippert forthcoming for a survey.
[10] See https://www.csmc.uni-hamburg.de/25360848/image-31-large-15697e4e3fdcbd7986364517daefa63ba06b3ac5.jpg for Zammit Lupi's work at the CSMC (2 May 2024). All URLs quoted in the present article were last accessed on 29 December, 2025.
[11] In a former description, this was treated as MS 2058/6D (Kern, Marold & Zotter 2023 s.n. 2058).
[12] See Gippert forthcoming: 29–30 for details.
[13] See Gippert forthcoming: 31–34 for details.
[14] For details see 1.7 below.

1.1 Graz, UBG, MS 2058/1

For the famous Sinai Lectionary, still described as no. 9 of the collection of St Catherine's Monastery in 1888 in the catalogue of Aleksandre Tsagareli,[15] Akaki Shanidze argued for a dating before the second half of the 7th century on the basis of its palaeographical appearance and its linguistic similarity with the inscriptions of Bolnisi, Mtskheta, and Tskisi.[16] Bernard Outtier, who detected one additional folio of the Lectionary in Paris, proposed the beginning of the 7th century,[17] probably based upon Shanidze's views. Considering the existence of *haemeti* forms in the codex,[18] a dating to the 7th–8th century was envisaged in comparison with "pure" *khanmeti* manuscripts,[19] in agreement with Javakhishvili's periodisation. These proposals must now be given up: according to the ^{14}C analysis undertaken in 2024,[20] the manuscript can be dated to the 5th–6th centuries instead. The result is illustrated in Fig. 1, with indication of the radiocarbon date (in red, 1553 ± 21 BP),[21] the calibration curve for the period in question (in blue) and the calibrated date range (in grey, 433–574 calCE, with a major peak at 545 calCE and two minor peaks at 440 and 480 calCE).[22]

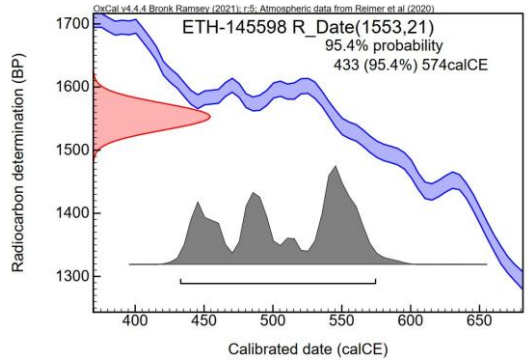

Fig. 1: Result of ^{14}C analysis of Graz, UBG, 2058/1

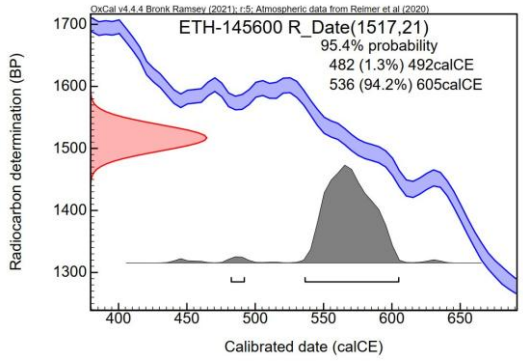

Fig. 2: Result of ^{14}C analysis of Graz, UBG, 2058/2

[15] Tsagareli 1888: 199–200; for a thorough codicological description see Zammit Lupi 2023. See https://titus.uni-frankfurt.de/texte/etcs/cauc/ageo/xanmeti/grlekt/grlek.htm for an online edition of the complete codex with colour images kindly provided by UBG.

[16] Shanidze (1944: 021): "რაც შეეხება ენობრივ მოვლენებს, ამ მხრივ კი ხანმეტი ლექციონარი უეჭველად ბოლნის-მცხეთა-წყისის წარწერების გვერდით დგას. ამიტომ შეუძლებელია მისი გადაწერის დრო VII საუკუნეს გადმოვაცილოთ"; (ib. 027): "По языковым данным, памятник выявляет ближайшее сродство с надписями Болнисскаго храма (нач. VII в.), а по палеографическим признакам он мог появиться не позднее второй половины VII века".

[17] Outtier (1972: 399): "début du VII^{e} s."

[18] The codex comprises the following seven *haemeti* forms: ჰეხილოთ "you will see (him)" (Mk. 16:7; Mt. 24:33; vs *khanmeti* ხეხილოთ in Mt. 28:7); ჰიცვლობთ "you exchange with each other" (Lk. 24:17); შეჰიძრნენ "they will be moved" (Mt. 24:29); ჰიტყებდენ "they will mourn" (Mt. 24:30); მიჰეხების "he approaches" (Lk. 12:33), ჰიყოს "it will be" (Lk. 12:34, vs ხიყოს in Mt. 24:35).

[19] Gippert, Sarjveladze & Kajaia 2007: xxvi; Gippert forthcoming: 25.

[20] The specimen for the analysis was taken from fol. 1 of MS 2058/1 (ETH no. 145598). A second specimen was taken from a small strip that was inserted into the binding; this turned out to be of paper, not parchment, dated to the 16th–17th centuries CE, so without any internal relation to the codex.

[21] The radiocarbon date ("BP" = "before present") indicates the time that elapsed between the death of the animal yielding the parchment sheet and the year 1950, assuming a linear decay in its skin of the radioactive carbon isotope ^{14}C and its ratio to the ^{12}C / ^{13}C isotopes.

[22] The calibrated year range ("calCE") indicates time spans that meet the given radiocarbon concentration accounting for deviations from the linear decay of ^{14}C that were caused by changing atmospheric influences, detected via external dating methods such as dendrochronology and displayed in a curve based on known-age samples. See Hajdas et al. 2021: 5–10 for details as to the calibration curves and the precision of calendar ages to be achieved.

1.2 Graz, UBG, MS 2058/2

In contrast to the Sinai Lectionary, which is thus likely to be the oldest non-palimpsested Georgian manuscript that has been preserved, MS 2058/2 of Graz University Library is a palimpsest, with a Georgian psalter written in *asomtavruli* majuscules[23] above an Armenian undertext. Even though the latter was heavily erased, its contents have been established with certainty; it is a so-called "Divining Gospel", comprising the Gospel of John combined with oracles.[24] For this codex, several datings have been proposed. Aleksandre Tsagareli, who described it when it was still on Mt Sinai, assumed the Georgian upper text to belong to the 8th–9th centuries "on the basis of its palaeographical traits";[25] taking this dating as a basis, Jacobus Dashian, who had been asked by Hugo Schuchardt to analyse the Armenian undertext,[26] arrived at the "6th–7th, if not even the 5th century" for the manuscript, which thus represented for him "a monument from the first period of the emergence of Armenian literacy".[27] In a second description, Hamazasp Oskian came to the less optimistic conclusion "that the Armenian text was not written much earlier than the Georgian, probably in the 8th–9th centuries".[28] The 8th century was also envisaged by Bernard Outtier, who was the first to determine the "divining" genre of the sentences accompanying the Gospel in the Armenian undertext.[29] The results of our radiocarbon analysis now clearly endorse the estimation by Jacobus Dashian: with the calibrated dating of the parchment between 482 and 605 calCE and a clear peak at 565 calCE (see Fig. 2),[30] the Armenian layer of the codex can confidently be assigned to the second half or the 6th century, thus being one of the oldest specimens of written Armenian known so far.[31] For the Georgian overtext, this simply means a *terminus post quem*, and we are left with the usual palaeographical indications: given that it is written in majuscules but contains no *khanmeti* or *haemeti* forms, it can reasonably be assigned to the 9th–10th centuries, in accordance with Akaki Shanidze's view.[32]

[23] See https://titus.uni-frankfurt.de/texte/etcs/cauc/ageo/at/psgraz/psgra.htm for an online edition (based upon Imnaishvili 2004: 70–220) with colour images kindly provided by UBG.

[24] See Renhart 2015 and 2022 for details.

[25] Tsagareli (1888: 196, no 2): "На основаніи палеографическихъ признаковъ Псалтырь эту слѣдуетъ отнести къ VIII–IX в.". Mzekala Shanidze, who included the psalter text as "E" in her edition, provided no dating of her own (1960: 021–022).

[26] See Renhart 2015: 43 for the correspondence between Schuchardt and Dashian.

[27] Dashian (1898: 4b): "Եթէ ստուգիւ վրացերէնը Ը–Ժ դարերէն է, կրկնագիրը պէտք է որ գոնէ Չ–Է դարերէն ըլլայ, կրնայ մինչեւ նաեւ Ե դարուն ըլլալ, ուստի նոյն իսկ հայ մատենագրութեան ծագման առաջին ժամանակներէն... յիշատակարան մը".

[28] Oskian (1976: 312): "կը միտիմ եզրակացնելու որ հայերէն բնագիրը վրացերէն շատ յառաջ գրուած չէ : Հաւանօրնէ գրուած պիտի ըլլալ Ը՞–Ժ՞ դարերու մէջ". Oskian's description is by no means a reprint ("Nachdruck") of Dashian's as stated by Renhart (2015: 43 n. 8) but his own work; correspondingly, Renhart's quotation (ib.) is not from Dashian's description as indicated but from Oskian's.

[29] Outtier (1993: 182): "La couche inférieure est en arménien et pourrait remonter au VIIIe siècle".

[30] For the analysis, fol. 274 was chosen.

[31] In parallel to the radiocarbon analysis of the Georgian samples, a set of undated Armenian manuscripts (palimpsests and others) of the Matenadaran, Yerevan, were analysed, too; only one of them reveals an earlier date. The results of this investigation will be published soon.

[32] Shanidze (1929: 344): "მე კი მგონია, რომ იგია დაახლოვებით მეათე საუკუნის პირველი ნახევრისა". Unfortunately, the scribe's colophon on fols 258v–259r mentions neither a place nor a location (see Gippert forthcoming: 2.).

1.3 Graz, UBG, MS 2058/3

The small codex comprising the Georgian version of the Life of St Simeon the Holy Fool (Symeon Salos; *BHG* 1677, *CPG* 7883), written in a bold *nuskhuri* minuscule,[33] is defective at the end, breaking off within the colophon of the scribe, a certain Teodore of Tskudeli (Ṭḳudeli), on the badly damaged fol. 172r (Fig. 3). This page may have contained an indication of the time and place introduced by დაიწერა "it was written", of which the first four letters have remained at the bottom, followed by ლოცვა ყავთ "pray (for us)" in the last line; however, Aleksandre Tsagareli, who mentions the colophon in his description[34] and may still have seen the folio complete (at least he provides the first two lines as რომელმან ჴელ-ჰყო ამისი შექმნაჲ, of which only რ̃ნ ჴ and შექმნ have survived), does not provide a date. On the backside of the folio (Fig. 4), we see the remnants of the colophon of the binder, Ioane Zosime, of which Tsagareli also noted some more elements than are visible today ("შეიმოსა წმიდა ესე წიგნი... სინა წმიდასა ჴელითა იოვანე ფ̃დ-ცოდვილისათა, ბრძანებითა დეკანოზისა სინა წმიდისა.... წელსა ხფპე (981 ი.), ქ̃კს სა (981 ი.)"; at least the latter dating ("chronicon 201") has been preserved, which yields 981 CE as the year in which Ioane Zosime bound the codex. Ioane Zosime's hand is also discernible on the scrap remaining of one more folio (fol. *173) between the colophon and the pastedown; distributed over three lines, we here see a large letter დ, the sequence და and another instance of ლოცვა ყაცთ (ლც̃ყთ; Fig. 4).

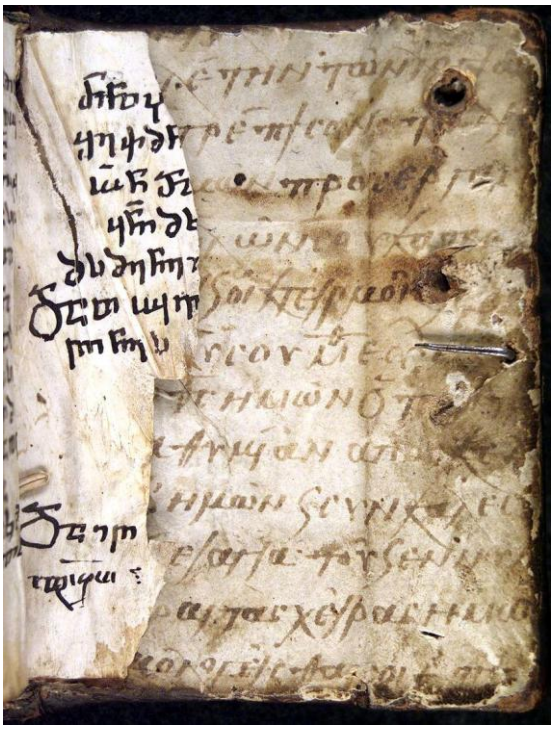

Fig. 3: Graz, UBG, 2058/3, end of scribe's colophon on fol. 172r and Greek pastedown

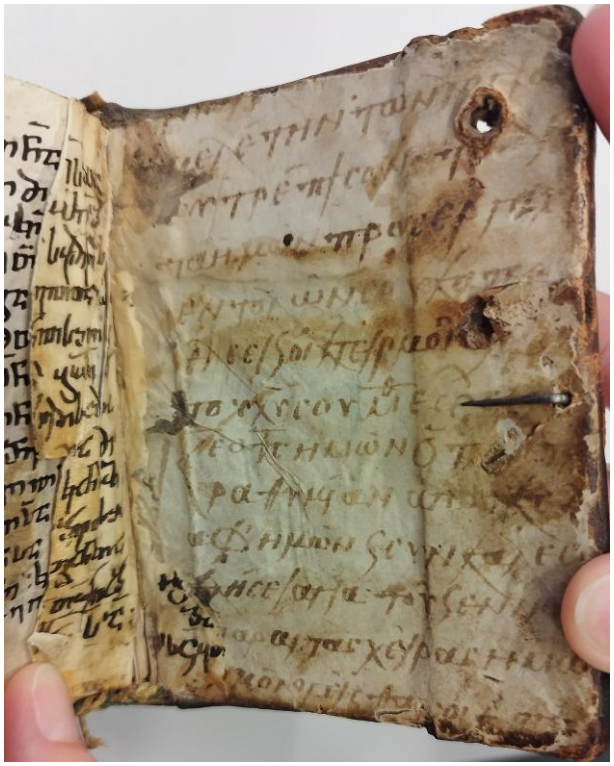

Fig. 4: Graz, UBG, 2058/3, beginning of binder's colophon on fol. 172v and Greek pastedown

[33] See https://titus.uni-frankfurt.de/texte/etcs/cauc/ageo/tmin/symsal/symsa.htm for an online edition (based upon Imnaishvili 2004: 228–258) with colour images kindly provided by UBG. See Renhart & Zammit Lupi forthcoming for a thorough codicological analysis of the codex.

[34] Tsagareli 1888: 226, no. 69.

It has hitherto remained unnoticed that the remainder of fol. *173 has been preserved as a fragment in another collection in Europe, namely, as MS Georgian 8 in the Mingana Collection of the Cadbury Research Library (formerly Selly Oak) in Birmingham, which also hosts Ioane Zosime's colophon of MS Graz, UBG, 2058/1 (as MS Georgian 7).[35] Mingana's MS Georgian 8 was described by Gérard Garitte, who attributed it to Ioane Zosime, styled it the "end of a colophon" and provided a complete transcript of the 15 lines of its recto (Fig. 5) and the eight lines of its verso, plus the Arabic note at the bottom (Fig. 6).[36] In his transcript, the first characters of the last three lines of Mingana Georgian 8 are only reconstructed, as "⸤და⸥", "[და]", and "[ლცყთ]", thus exactly matching the remnants we see in the Graz codex. In Garitte's transcript, the three lines in question run:

> ⸤და⸥ა თქ(უე)ნდა ქ(რისტემა)ნ შეგ(ინდ)ვ(ე)ნ
> [და] შეგ(ი)წყ(ა)ლ(ე)ნინ ყ(ოველ)ნი ა(მე)ნ ⁘
> [ლცყთ] ჩ(უე)ნ თ(ჳ)ს წ(მიდა)ნო ლ(ო)ც(ვა) ყ(ავ)თ ა(მე)ნ ⁘

This colophon must be later than that on fol. 172v, given that Ioane Zosime himself refers to his "second" binding here: შეიმოსა მეორედ წ(მიდა)ჲ ესე წიგი [*sic*] სინა წ(მიდა)ს, with მეორედ "a second time" being added over the first line of fol. *173v (Fig. 6). As the first colophon is dated 981 CE, this binding cannot have been much later, because Ioane Zosime must have died before the end of the 10th century.

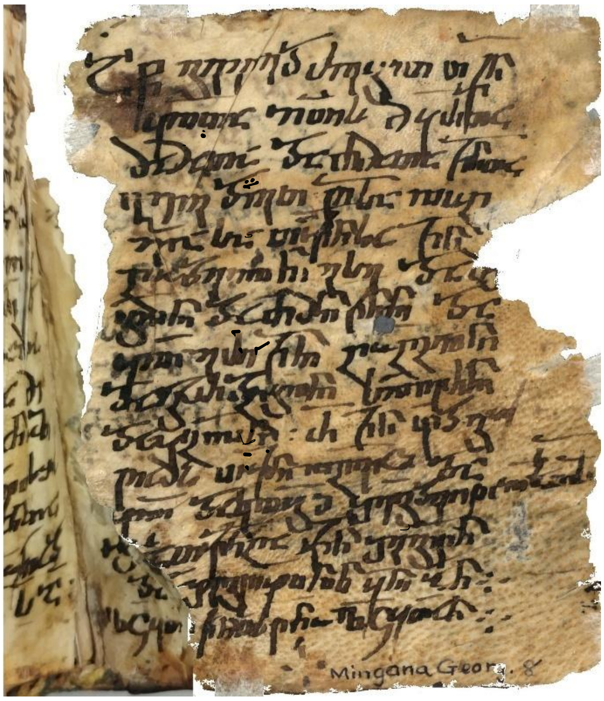

Fig. 5: Birmingham, Cadbury Research Library, Mingana collection, Georgian 8, recto, with Graz, UBG, 2058/3, fol. *173 inserted: Ioane Zosime's additional colophon, beginning

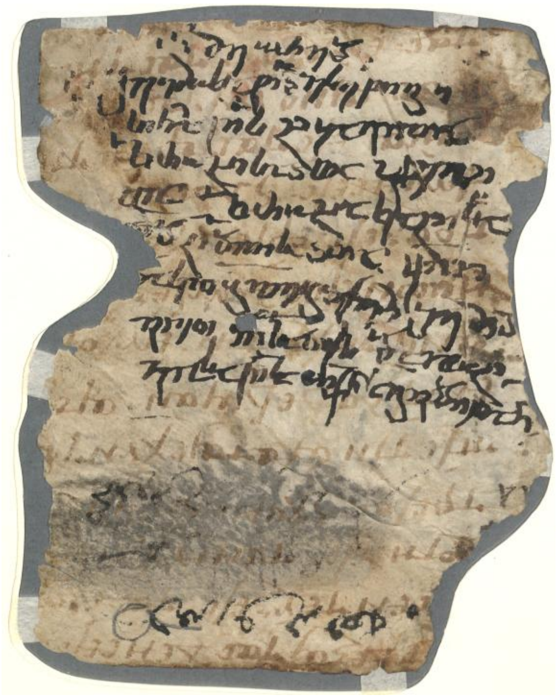

Fig. 6: Birmingham, Cadbury Research Library, Mingana collection, Georgian 8, verso: Ioane Zosime's additional colophon, end, and Arabic note at the bottom

[35] See Gippert forthcoming: 1.

[36] Garitte 1960: 258–259: "Fin d'un colophon [...] Le scribe ne se nomme pas [...] mais l'écriture et les formules employées indiquent, sans aucun doute possible, que l'auteur du colophon est Jean Zosime [...]. Nous n'avons pu identifier le manuscrit dont provient ce feuillet". The identification is corroborated by the fact that Ioane Zosime refers to himself as "ზროხაკაცი", i.e. "cow-man" in it (verso, l. 4); the same self-designation, probably reflecting his use of cow-skin for binding, also appears in his colophon of the Sinai *Mravaltavi* (MS Sin. georg. 32-57-33, fol. 274v; see Gippert 2015: 102 with n. 6 and 2016: 64 with n. 48).

The assumption that the Mingana fragment is the missing part of fol. *173 of MS 2058/3 is further corroborated by the fact that it is a palimpsest, with an undertext in Greek majuscules, of a similar hand like that of the Greek pastedown of the Graz codex. Garitte, who could only make out the three words δέξαι τὰς δεήσεις on the verso of Mingana Georgian 8 (Fig. 8), supposed this to be a "liturgical" text;[37] indeed, it can be identified with a text that appears in the Greek Euchologion edited by Jacques Goar as the eighth prayer of the *Laudes*. The passage in question here runs: **πρόσ**δεξαι τὰς δεήσεις ἡμῶν, **τὰς** ἐντεύξεις, τὰς ἐξομολογήσεις, τὰς νυκτερινὰς **λ**ατρείας· καὶ χάρισαι ἡμῖν ὁ Θεός...[38] The elements πρό[σ], τὰ[ς] and [λ], highlighted in the passage, are clearly discernible in the UV image of fol. *173v of MS 2058/3 (Fig. 7). The beginning of the same prayer is preserved on the Greek pastedown (lines 8–13; Figs 3 and 4), reading Κύριε ὁ Θεὸς ἡμῶν, ὁ τὴν τοῦ ὕπνου ῥαθυμίαν ἀποσκεδάσας ἀφ' ἡμῶν, καὶ συγκαλέσας ἡμᾶς κλήσει ἁγίᾳ, τοῦ καὶ ἐν νυκτὶ ἐπᾶραι τὰς χεῖρας ἡμῶν, καὶ ἐξομολογεῖσθαί σοι ἐπὶ τὰ, with only four words (κρίματα τῆς δικαιοσύνης σου), i.e. one line missing before the continuation on Mingana Georgian 8. The text on the upper half of the pastedown has not yet been identified.[39]

Fig. 7: Graz, UBG, 2058/3, fols *173v and pastedown, inverted, UV image

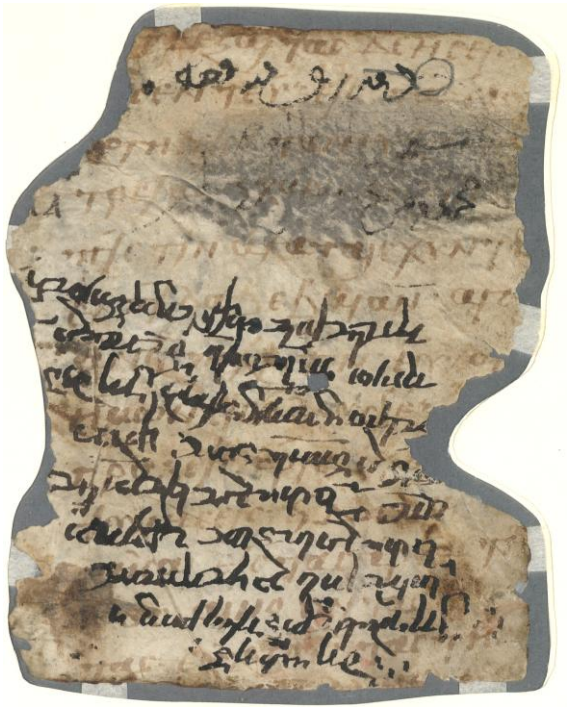

Fig. 8: Birmingham, Cadbury Research Library, Mingana collection, Georgian 8, verso, inverted

All in all, it is likely that the present binding of Graz, MS 2058/3 is still Ioane Zosime's second binding: as a pastedown for the back cover but also for his additional colophon, he used a fragment of a Greek euchologion manuscript, which he palimpsested. There are two more traces of Ioane Zosime's work in the codex: in the fold between fols 8v and 9r, there is a parchment stripe with Georgian (*nuskhuri*) letters inserted as a binding aid, possibly written in Ioane Zosime's own hand, which can be made out to read ადვსებისა კ(ჳ)რ(იაკე)სა

[37] Garitte (1960: 259): "l'écriture sous-jacente est une petite onciale grecque tardive, accentuée ; le texte grec semble être liturgique".
[38] Goar 1647: 51, ll. 4–6 / 1730: 41, ll. 4–6; see also Parenti & Velkovska 1995, 71–72 (morning prayer no. 77).
[39] My thanks are due to Sandro Tskhvedadze who supported me searching for this text.

ცოსკ(არს)ა ა, (Fig. 9); and as a pastedown for the front cover, he used a Christian Palestinian Aramaic fragment, which contains part of the 11th catechesis of Cyril of Jerusalem (Fig. 10).[40]

As was stated above, for the dating of the original codex, Ioane Zosime's bindings can only provide a *terminus ante quem*. The radiocarbon analysis undertaken now[41] clearly confirms this, with a calibrated date range between 772 and 891 calCE and peaks at 785, 845 and 885 calCE (Fig. 11); an early range indeed for a manuscript written in *nuskhuri* minuscules. For the Greek pastedown (and the palimpsest folio containing Ioane Zosime's second colophon) as well as the pastedown with Christian Palestinian Aramaic text, individual datings would be required; for them too, Ioane Zosime's second binding provides a *terminus ante quem*.

Fig. 9: Graz, UBG, 2058/3, binding aid between fols 8v and 9r.

Fig. 10: Graz, UBG, 2058/3, front pastedown, UV image

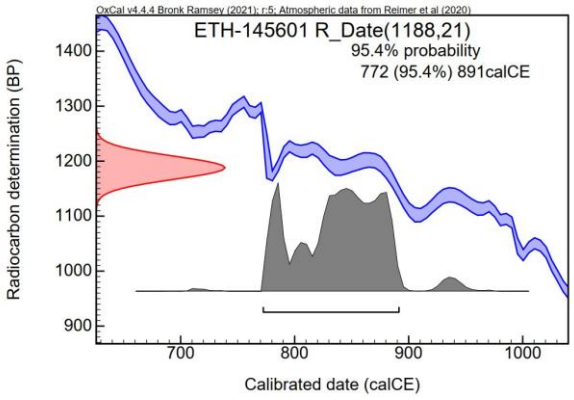

Fig. 11: Result of ^{14}C analysis of Graz, UBG, 2058/3

1.4 Graz, UBG, MS 2058/4

Manuscript no. 4 of the Graz collection consists of two units, one containing the Liturgy of James and the other, the *Missa praesanctificatorum* by Gregory the Great, both written in *asomtavruli* majuscules. The scribe of the first unit (fols 1–95) is clearly Ioane Zosime, who provided a colophon dated to the year 985 (fols 94v–95r). The second unit was also written by

[40] Identified by Christa Müller-Kessler, e-mail of 4 August 2025; see Renhart & Zammit Lupi forthcoming: 7.1–2 for further details.

[41] The specimen was taken from fol. 2 of the codex.

a person named John (იოვ̃ნე), whose colophon is undated though (fol. 110v); it reads: ქ̃ე შ̃ე კ̃ე ამის ჳიგნისა მომგებელი და იოვ̃ნე მჩრეკ̃ლი ფ̃დ ცოდვილი.[42] Comparing the hands of the two units,[43] we can exclude that they were written by the same person;[44] the commissioner named Ḳviriḳe (or Ḳirile: კ̃ე) who is mentioned in the second colophon is unidentified. We have therefore applied a radiocarbon analysis to both units separately;[45] they do reveal a difference which, however, is not spectacular with respect to the dating arrived at: the radiocarbon dates are 1156 and 1122 BP (each ± 21), thus suggesting a difference of 34 years between the two units with a chronological priority of the second one. In contrast to this, the calibrated date ranges are harder to account for. For both units, they end around 980 (975 / 990) calCE, which would match Ioane Zosime's dating by and large (see Figs 12 and 13). What is astonishing in the result is the extreme extension of the time range for the first specimen, which extends from 773 to 975 calCE with the last peak at 940 calCE; we must take into account here that the parchment was not necessarily used immediately after its production (which is the event reflected by the radiocarbon analysis) and that the Sinaitic environment may have had special conditions influencing the calibration.

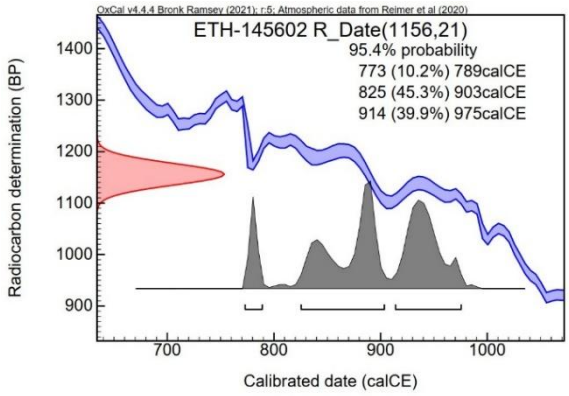

Fig. 12: Result of ^{14}C analysis of Graz, UBG, 2058/4a

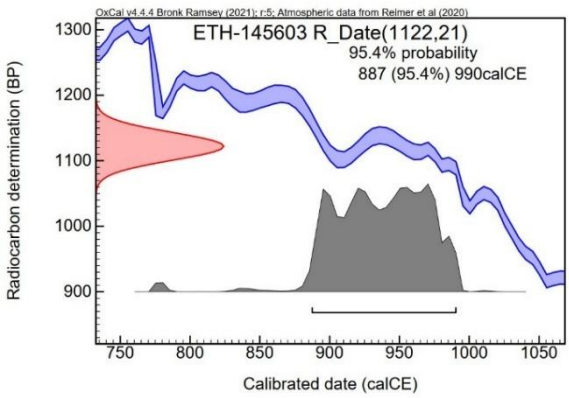

Fig. 13: Result of ^{14}C analysis of Graz, UBG, 2058/4b

1.5 Graz, UBG, MS 2058/5

MS 2058/5, the only scroll in the Graz collection, contains the Liturgy attributed to John Chrysostom (*CPG* 4686); it is written in a *nuskhuri* minuscule with large *asomtavruli* initials[46] but includes no colophon. Aleksandre Tsagareli, who provided the first description, regarded it as a "monument of the 11th–12th centuries"[47] while Michael Tarchnišvili argued for the 10th–

[42] The reading provided by Tsagareli (1888: 210, no. 31) is incorrect. A second note appearing below the colophon, also beginning with ქ̃ე შ̃ე, remains for most parts illegible even with multispectral imaging.
[43] See https://titus.uni-frankfurt.de/texte/etca/cauc/ageo/liturg/litjak/litja.htm for an online edition (based upon Imnaishvili 2004: 265–294) with colour images kindly provided by UBG.
[44] Pace Tsagareli (1888: 210, no. 31, referring to the second colophon): "Писецъ *Іоаннъ*, вѣроятно тотъ самый, который написалъ на *Синаѣ* такъ много книгъ въ X в"; see also Tarchnišvili (1950: IV): "indoles enim scriptionis et orthographia omnino discedunt ab iis quas exhibet liturgia S. Iacobi".
[45] From fol. 89 for the first unit (2058/4a), fol. 110 for the second unit (2058/4b).
[46] See https://titus.uni-frankfurt.de/texte/etcs/cauc/ageo/johchrys/chryslit/chrys.htm for an online edition (based upon Imnaishvili 2004: 300–313) with colour images kindly provided by UBG.
[47] Tsagareli (1888: 209, no. 29): "памятникъ XI–XII в.".

11th centuries on the basis of palaeographical and textual features.[48] Tsagareli's estimation is now confirmed by the radiocarbon analysis, which offers a calibrated date range between 1041 and 1210 calCE with two major peaks at 1050 and 1160 calCE (Fig. 14).

1.6 Graz, UBG, MS 2058/6A

The first of the three fragments kept under the shelf mark MS 2058/6, containing John 15:8–19 written in *asomtavruli* characters, has been identified as belonging to the Gospel lectionary Sin. georg. 63, which was described as no. 13 in Tsagareli's catalogue;[49] according to the latter, this is a manuscript "not later than the 10th century".[50] This vague assumption is again confirmed by the radiocarbon analysis, which yields a radiocarbon date of 1253 (± 21) BP and the long timespan between 675 and 871 calCE as the calibrated date range, with a major peak at 720 calCE (Fig. 15). As the manuscript includes no *khanmeti* or *haemeti* features, thus pointing to a later time, the minor peaks at 800 and 820 calCE must also be taken into account.

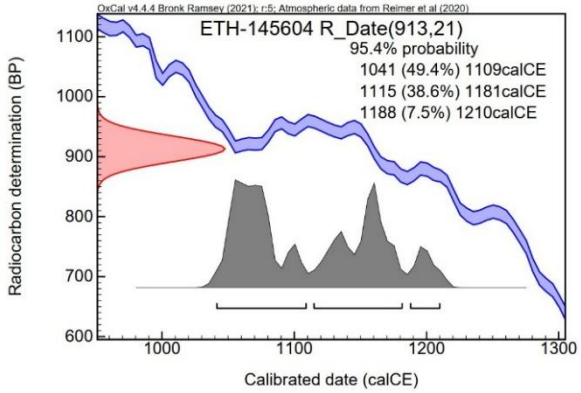

Fig. 14: Result of ^{14}C analysis of Graz, UBG, 2058/5

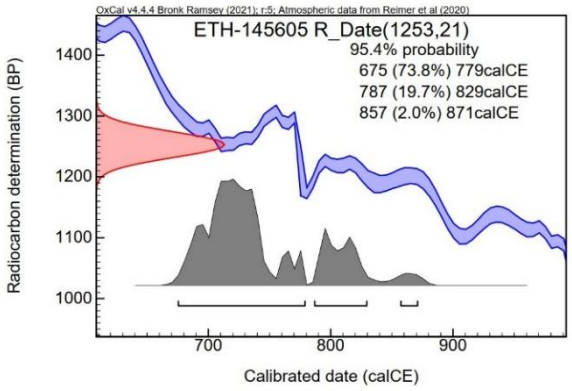

Fig. 15: Result of ^{14}C analysis of Graz, UBG, 2058/6A

1.7 Graz, UBG, MS 2058/6B and 2058/6C

Although written by different hands, the two single-folio fragments containing parts of the Epistles of St Antony[51] and other ascetic matter[52] have both been shown to belong to the same codex of St Catherine's Monastery, Sin. georg. 35.[53] In his catalogue, Aleksandre Tsagareli dated this "interesting collective volume" to the 10th–11th centuries;[54] Akaki Shanidze preferred a dating to the early 12th century,[55] whereas Gérard Garitte proposed the 10th century.[56] In 1978,

[48] Tarchnišvili (1950: III): "consideratis tum indole paleographica rotuli tum statu evolutionis liturgiae quem exhibet, videtur exarata esse saec. X–XI".
[49] Tsagareli 1888: 204; for the identification see Shanidze 1929: 349–350.
[50] Tsagareli (1888: 204, no. 13): "рукопись эта не позже X в."
[51] The Graz fragment was included in the edition by Gérard Garitte (1955: 41–43); see https://titus.fkidg1.uni-frankfurt.de/texte/etcs/cauc/ageo/ascetica/antepist/antep.htm for an online edition based on it.
[52] See https://titus.fkidg1.uni-frankfurt.de/texte/etcs/cauc/ageo/tmin/2058C/2058c.htm for an online edition (based upon Imnaishvili 2004: 320–322) with colour images kindly provided by UBG.
[53] See Gippert forthcoming: 31–34 for details.
[54] Tsagareli (1888: 232–233, no. 80): "интересный сборникъ X–XI в."
[55] Shanidze (1929: 353): "მე კი მგონია, რომ თამამად შეიძლება მისი მეთორმეტე საუკუნის დასაწყისში გადმოწერა".
[56] Garitte 1956: 97.

Manana Dvali and Lali Jghamaia detected the colophons of Sin. georg. 35 on the back flyleaf of another manuscript of the monastery, Sin. georg. 67 (Fig. 16); according to these colophons, Sin. georg. 35 was written in the Lavra of St Sabas as early as 907 (Fig. 17) and bound by Ioane Zosime on Mt Sinai in 973 (Fig. 18).[57]

In spite of the different hands, the radiocarbon analyses of the two fragments 2058/6B and 6C yielded nearly equal results, with radiocarbon dates of 1198 and 1190 BP (± 21) and calibrated dates ranging between 774 and 885 calCE (6B) and 773 and 890 calCE (6C). Both ranges are also fairly close to the date provided by the scribe's colophon (907 CE), at least with their last peaks at 885 and 880 calCE. Taking this together with the result of the analysis of MS 2058/4a (see 1.4 above), we may conclude that the actual dates of manuscripts from Mt Sinai (or Palestine) can be assumed to be 20 years later than the end of the time range of the calibrated radiocarbon datings; a conclusion that needs be verified with further specimens.

Fig. 16: Sin. georg. 67, fol. 330v (right, turned by 90°) and back flyleaf (left)

[57] Dvali & Jghamaia 1978: 74–75. The transcript of the binder's colophon given there is misleading: the chronicon ("პა" = 81) does not relate to the Georgian date ("ხფოზ" = 6577 ~ 973) but to the Greek date, which is lost with the margin of the leaf, as is the Georgian chronicon date; what has remained of lines 8–11 of the colophon is წელთა ქართვე<ლთასა> | ხფოზ და ქრ(ონი)კ(ონ)<სა ***> | და ბერძ(უ)ლად წე<ლთა ****> | ქრ(ონი)კ(ო)ნი იყო : პა : (a correct transcript is found in Marr 1940: 170). The Greek year indicated cannot have been the Byzantine *annus mundi* (6480–81) but only the year of the Alexandrian era, which would have been 6465 for 973; this would coincide with a 81st chronicon assuming a cycle of 532 years as in the Georgian tradition. The Georgian chronicon itself would have been 193 ("რჟგ"). This proposal agrees with several other "double" datings preserved in manuscripts of the Sinai collection.

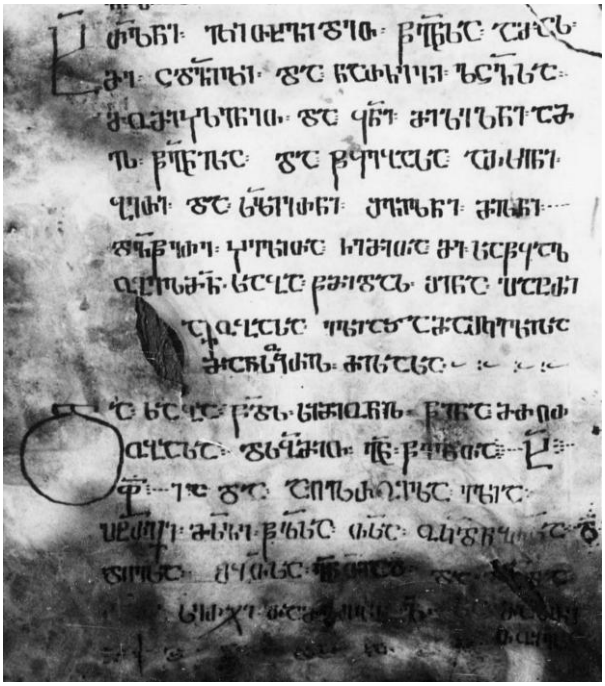

Fig. 17: Sin. georg. 67, back flyleaf, first column: scribe's colophon of Sin. georg. 35 (excerpt)

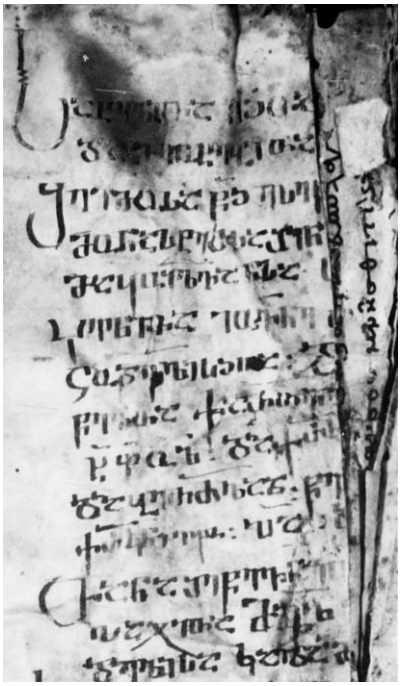

Fig. 18: Sin. georg. 67, back flyleaf, second column: binder's colophon of Sin. georg. 35 (excerpt)

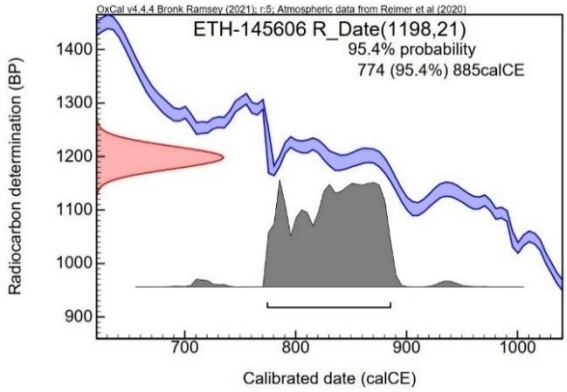

Fig. 19: Result of ^{14}C analysis of Graz, UBG, 2058/6B

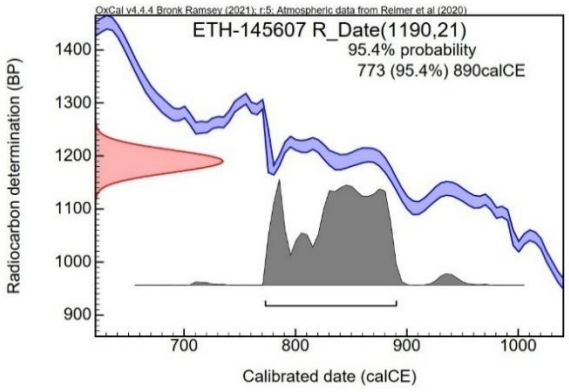

Fig. 20: Result of ^{14}C analysis of Graz, UBG, 2058/6C

1.8 Graz, UBG, 2058/7

For the only Armenian fragment of the Schuchardt collection in Graz, consisting of three quarters of a folio that was obviously once used as a flyleaf and contained Mt. 8:28–32 and 9:2–6,[58] the radiocarbon dating is 1146 ± 21 BP and the calibrated date ranges from 773–979 calCE, with major peaks at 890 and 940 calCE.

[58] Not "Marcus II 10ff." as indicated in (Kern, Marold & Zotter 2023 s.n. 2058).

2. The NCM collections

From the manuscript collections of the NCM, a total of 13 specimens were chosen for a first radiocarbon analysis; they comprised 11 specimens of palimpsests with *khanmeti* and/or *haemeti* features and two from the *ḳrebuli* ('collective volume') of Shatberdi (S-1141). The datings achieved range from the 5th to the 11th century, with no chronological difference between *khanmeti* and *haemeti* manuscripts discernible; nevertheless, there are a few astonishing aspects. In the following Sections, I will discuss the results codex by codex, proceeding from the oldest to the youngest.

2.1 NCM, H-999

From the 26 lower layer units of this palimpsested codex,[59] two have been analysed because they contain *khanmeti* features; these are unit (1), comprising fols 85–87 and 140–145 with remnants of a lectionary in their lower text, and unit (2) with fragments from the Four Gospels on fols 121–123, 128–131, 135, 136, 138, 139, 153, and 154. From H-999 (1), a specimen was taken from fol. 87, and from H-999 (2), from fol. 135. In the ^{14}C analysis, the specimen from H-999 (2) turned out to be the oldest one in the NCM sample, exceeding even the age of the Sinai Lectionary, with a radiocarbon date of 1620 ± 23 BP and a calibrated date range between 411 and 538 calCE, and with three peaks at 425, 465, and 525 calCE (Fig. 21). In contrast, H-999 (1) is considerably younger, with a radiocarbon date of 1367 ± 23 BP and a calibrated date range between 609 and 759 calCE, and with but one peak at 660 calCE (Fig. 22); this is an important result for a lectionary of the Jerusalem rite covering both Old and New Testament lections.[60]

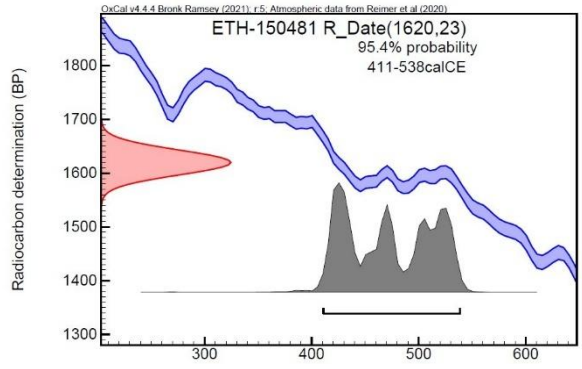

Fig. 21: Result of ^{14}C analysis of NCM, H-999 (2)

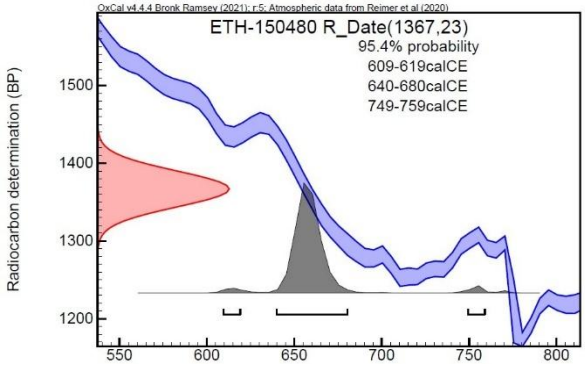

Fig. 22: Result of ^{14}C analysis of NCM, H-999 (1)

2.2 NCM, Q-333 and H-1329

With a total of 104 (7 + 97) folios plus one fragment,[61] the two palimpsest codices are the only representatives of a *haemeti* lectionary that have been preserved; they are generally assumed to stem from the same original manuscript.[62] This assumption, which is corroborated by some

[59] Described in Kajaia *et al*. 2017: 72–97, with specimens ib. 388–436.
[60] See Kvirkvelia forthcoming: 4.2.4 as to the content of the lectionary. Instead of "Wisdom of Solomon 9:1–4" (Kajaia *et al*. 2017: 72 n. 4) read Proverbs 9:1–4.
[61] Described in Kajaia *et al*. 2017: 100 and 214–215, with specimens ib. 442–443 and 654–655.
[62] See Shanidze 1923: 354 with n. 3; Kajaia et al. 2017: 215.

transitions from a folio of one codex to a folio of the other one within a given verse or even word,[63] seems not to be supported by the radiocarbon analysis, which has yielded two clearly distinct datings for the specimens taken,[64] with that of Q-333 anteceding that of H-1329 by more than 150 years and no overlap in the calibrated time ranges (1464 ± 23 BP corresponding to 569–645 calCE, with two peaks at 600 and 630 calCE, vs 1295 ± 23 BP corresponding to 664–774 calCE, with two major peaks at 680 and 770 calCE; see Figs 23 and 24), This astonishing result needs further validation, best to be undertaken in form of a second sampling.

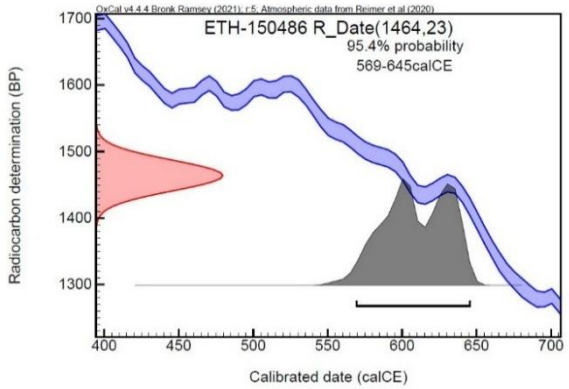

Fig. 23: Result of ^{14}C analysis of NCM, Q-333

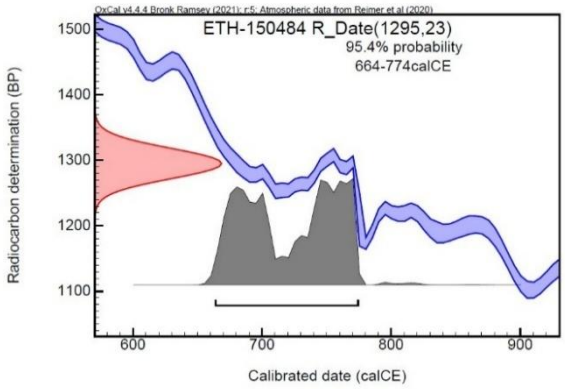

Fig. 24: Result of ^{14}C analysis of NCM, H-1329

2.3 NCM, A-89 and A-844

In a similar way as Q-333 and H-1329, the palimpsest codex A-89 (443 folios)[65] and the first of the three units with *khanmeti* features of A-844 (107 folios)[66] are regarded as remnants of one and the same original,[67] a manuscript containing the Four Gospels; here, too, there are clear transitions from one to the other codex within a given verse or word.[68] Again, the radiocarbon results are not exactly the same, but they show a minor difference: whereas A-844 (1) is dated to 1400 ± 23 BP corresponding to 605–662 calCE (Fig. 25), A-89 is dated to 1340 ± 23 BP corresponding to 648–774 calCE (Fig. 26),[69] thus sharing an overlap between 648 and 662 calCE, exactly at the major peaks of both ranges (660 / 650 calCE).

Of the two other units of A-844 with *khanmeti* features, A-844 (2) with its 59 folios containing remnants of the book of Isaiah[70] fits into the same time frame as A-89 and A-844 (1), with a radiocarbon dating of 1417 ± 23 BP (corresponding to 601–657 calCE, with two major peaks at 615 and 645 calCE; Fig. 27). For the third unit, A-844 (3) with its Gospel fragments (8 folios),[71] a slightly later dating has been achieved, interestingly coinciding with that of H-1329

[63] E.g., from H-1329, fol. 10v to Q-333, fol. 3b within the *haemeti* word form მაჰცეს in Mt. 14:11; see Kvirkvelia forthcoming (b): Table VI.
[64] From fol. 3 of Q-333 and fol. 24 of H-1329.
[65] Described in Kajaia *et al*. 2017: 20–21, with a specimen ib. 292–293.
[66] Described in Kajaia *et al*. 2017: 43–44, with a specimen ib. 334–335.
[67] Kajaia *et al*. 2017: 21 and 44. Both manuscripts are treated together in the edition by Lamara Kajaia (1984).
[68] E.g., from A-844, fol. 92r to A-89, fol. 16r within კურთხეულთა in Mt. 7:17.
[69] The specimens were taken from fol. 55 of A-89 and fol. 48 of A-844 (1).
[70] Described in Kajaia *et al*. 2017: 45, with a specimen ib. 336–337. In the lower layer of A-844 (2), about 20 further passages from Isaiah have been identified in the course of the DeLiCaTe project; see the poster at https://doi.org/10.25592/uhhfdm.16955. The specimen was taken from fol. 39.
[71] Described in Kajaia *et al*. 2017: 46, with a specimen ib. 338–339. The lower layer of A-844 (3) has been determined in the DeLiCaTe project as being part of a Gospel lectionary with lections for Maundy Thursday (Jo.

(1295 ± 23 BP, corresponding to 664–774 calCE, with major peaks at 680, 700, 750 and 770 calCE; Fig. 28).

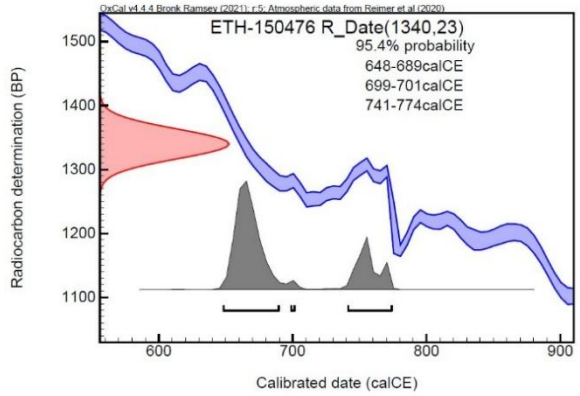

Fig. 25: Result of ^{14}C analysis of NCM, A-89

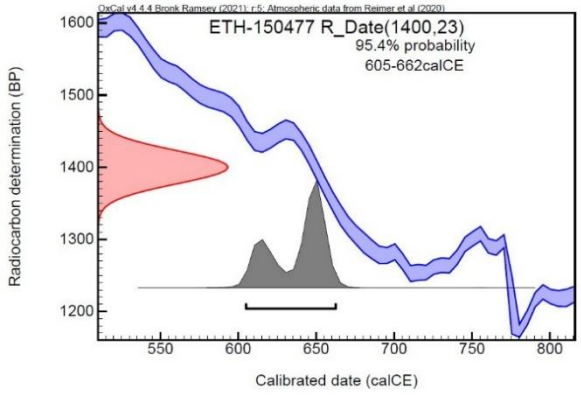

Fig. 26: Result of ^{14}C analysis of NCM, A-844 (1)

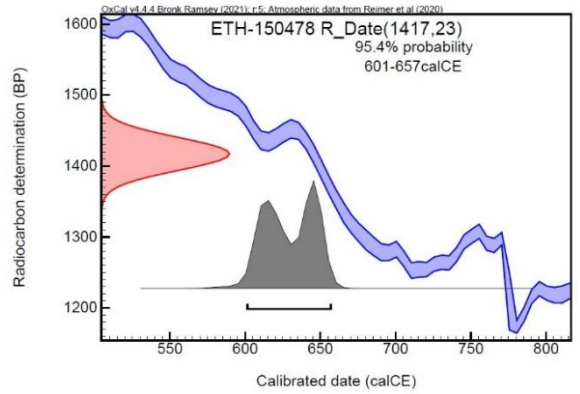

Fig. 27: Result of ^{14}C analysis of NCM, A-844 (2)

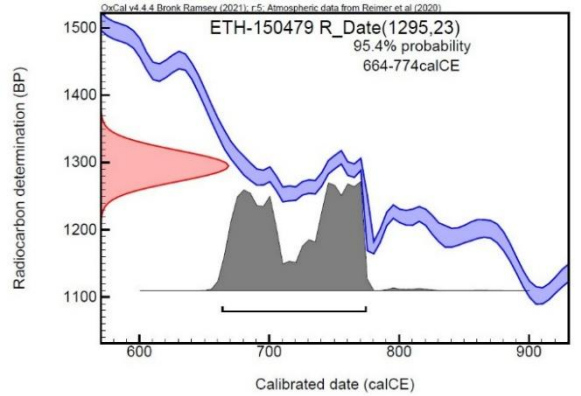

Fig. 28: Result of ^{14}C analysis of NCM, A-844 (3)

2.4 NCM, H-1442

The radiocarbon dating of A-844 (3) and H-1329 (1295 BP, 664–774 calCE; Fig. 29) is shared by one more palimpsest with *khanmeti* features, namely, the first unit of H-1442 consisting of fols 13 and 14 with a passage from the beginning of Gospel of Mark in its undertext.[72] The second *khanmeti* unit of the same codex is H-1442 (4), represented by fol. 25, which also contains a passage from the beginning of Mark;[73] it appears to be considerably later though, with a radiocarbon date of 1236 ± 23 BP and a calibrated time span of 684–880 calCE, with peaks at 715, 795, and 820 calCE (Fig. 30). As there is no clear overlap between the two datings, the assumption that the two fragments do not stem from the same original seems corroborated. Of the other ten palimpsest units of H-1442, none carries *khanmeti* or *haemeti* features.

17:20 – 18:1; Mk. 14:41–42; Mt. 26:36–51 and 26:71 – 27:2; Jo. 18:28–31). The specimen was taken from fol. 151.

[72] Described in Kajaia *et al*. 2017: 120, with a specimen ib. 482–483; the identified passage is Mk. 1:45 – 2:3. The specimen was taken from fol. 14.

[73] Described in Kajaia *et al*. 2017: 123, with a specimen ib. 488–489; the identified passage is Mk. 1:24–27.

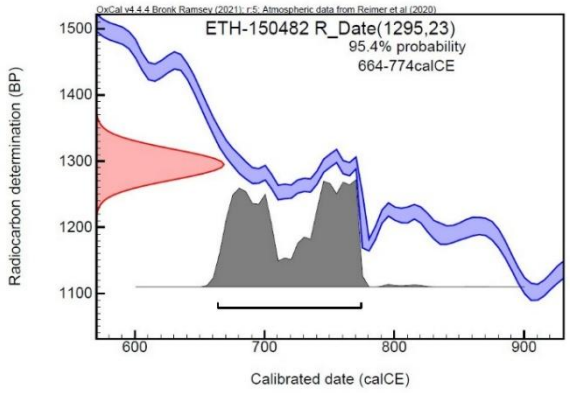

Fig. 29: Result of ^{14}C analysis of NCM, H-1442 (1)

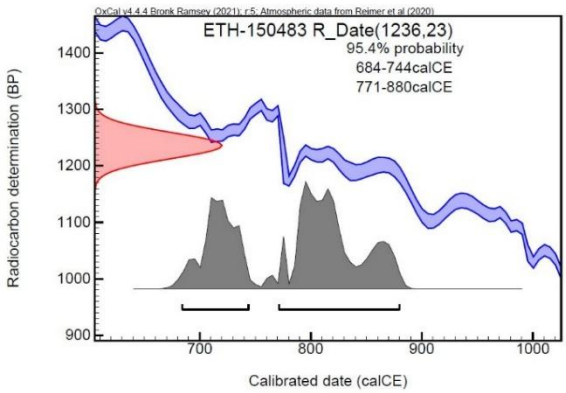

Fig. 30: Result of ^{14}C analysis of NCM, H-1442 (4)

2.5 NCM, S-3902 (1)

With its radiocarbon dating of 1236 ± 23 BP, H-1442 (4) appears to be posterior not only to H-1442 (1) but also to the Graz fragment MS 2058/6A (1253 ± 21 BP, see 1.6 above), which reveals no *khanmeti* or *haemeti* features; this seems to indicate a transitional period during which *khanmeti* manuscripts were still produced alongside *sannarevi* manuscripts. As a crucial witness to this we may regard the palimpsested *khanmeti mravaltavi* in S-3902 (1), which contains *sannarevi* forms such as დასწერს "he writes (down)" (instead of დახწერს; fol. 7vb, l. 14), მისწერა "he wrote" instead of მიხწერა (l. 10), and დასწერ "write!" instead of დახწერ (l. 19).[74] With a radiocarbon date of 1268 ± 23 BP and a calibrated time range btween 670 and 820 calCE including major peaks at 705 and 730 calCE,[75] it seems to indicate that the decline of *khanmetoba* began in the first half of the 8th century; differences in the application of the "new" *sannarevi* orthography may be due to local preferences. Determining the actual provenance of the manuscripts dealt with here is therefore a task of utmost urgence; it requires a different scientic approach based on the chemical analysis of inks[76] and, possibly, DNS analyses of the parchment material itself.

2.6 NCM, S-1141

The collective volume of Shatberdi, MS S-1141 of the NCM, contains no *khanmeti* or *haemeti* forms but is peculiar because it consists of two clearly differentiated units, one written in *asomtavruli* majuscules and one, in *nuskhuri* minuscules, with the latter succeeding the former on fol. 126. Two colophons at the end of the second unit, both written in the *nuskhuri* hand, provide the names of the translator of the last text of the collection (the Commentary on the Psalms by Theodoret of Cyrrhus), a certain Dachi, and of the scribe, Beray; both are not dated but the mention of King Bagrat (II) yields a time frame of between 937 and 994. The first unit ends with the section on the Byzantine emperors of the Chronicle attributed to St Hippolytus; as Fig. 32 shows, there are at least three different writing styles involved, first an *asomtavruli*

[74] See Gippert 2017: 911 and 926–927. Cf. Kvirkvelia (forthcoming b: 6.) for "contaminated" *haemeti* and *sannarevi* prefixes in forms like მაჳსცა in the palimpsest H-1329.
[75] The folio analysed was fol. 18.
[76] See Bosch & Kvirkvelia, this volume, as to first steps undertaken towards a database of inks used in Georgian manuscripts.

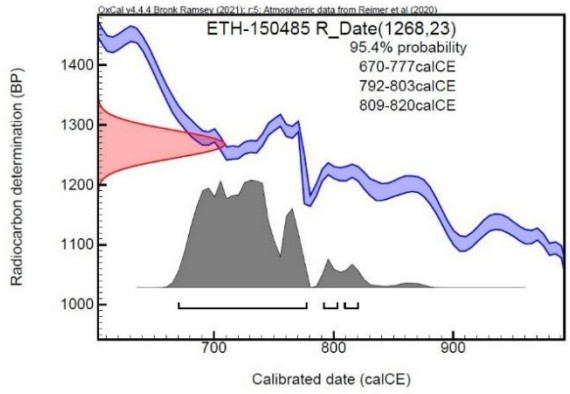

Fig. 31: Result of ^{14}C analysis of NCM, S-3902 (1)

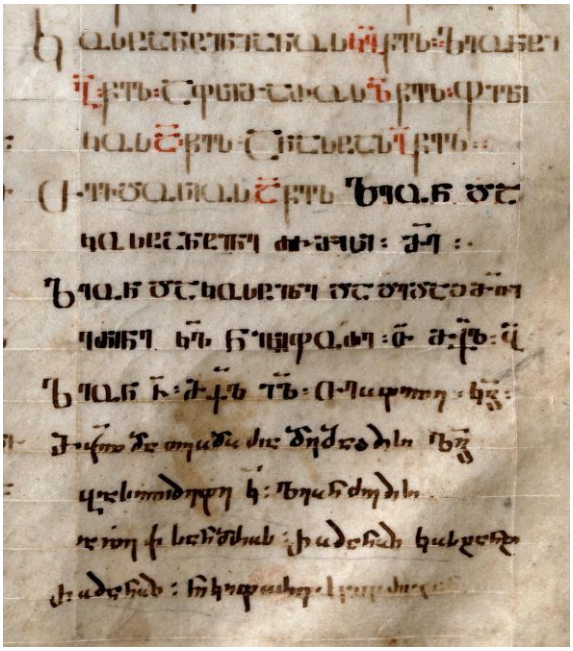

Fig. 32: S-1141, fol. 126rb, end of the Chronicle

hand using a brownish ink (with elements in red) that is likely to be the same for all preceding folios, then an *asomtavruli* hand writing with a blackish ink, and lastly, a *nuskhuri* hand also applying a blackish ink. The part written in the first style ends with emperor Theodosius (III Adramytinos), who reigned from 715–717 CE; the second part, with Michael (II the Amorian), 820–829; and the third, with John (I Tzimiskes), 969–976, thus providing a *terminus post quem* for the finalisation of the Chronicle. On the verso of the same page, the second unit begins with a text on the Benediction of Moses, one of a series of seven texts attributed, like the Chronicle, to Hippolytus (Romanus), and all written in the *nuskhuri* hand of the second unit. Regardless of whether or not the four-and-a-half last lines of the Chronicle were written by the same scribe as the *Hippolytica* following them, all this suggests that the two units belong to two different chronological strata. In order to reassess this, one specimen each from both units was submitted to a radiocarbon analysis (from fols 38 and 221). The result clearly supports the assumption of two strata, with the two ^{14}C datings differing by *c.* 100 years: for S-1141 (1), the *asomtavruli* unit, the radiocarbon date is 1190 ± 22 BP and the calibrated dates range from 772 to 892 calCE, with peaks at 785, 850 and 880 (Fig. 33); for S-1141 (2), the *nuskhuri* unit, we have received a radiocarbon date of 1093 ± 22 BP, with a calibrated date range between 892 and 1013 and two major peaks at 920 and 980 calCE (Fig. 34). The latter clearly matches the *terminus post quem* indicated by the mention of John Tzimiskes by the "third" hand in the Chronicle and of King Bagrat II in Beray's colophon. For the first one, the peak of 845 calCE seems to agree with the mention of Michael II; however, if the four lines after Theodosius III are a later addition, too, as suggested by the different ink, the first peak of 785 can also be taken into account. In any case, it remains remarkable that the part of fol. 126 which was left over when the first unit was finished was not only used for the continuation of the Chronicle but also, on its verso, for a completely different sequence of texts more than 100 years later, the only connecting link between the two parts being the alleged author of both the Chronicle and the texts following it, Hippolytus.

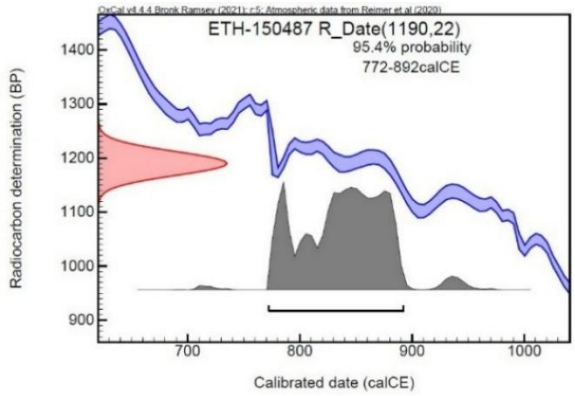

Fig. 33: Result of ^{14}C analysis of NCM, S-1141 (1)

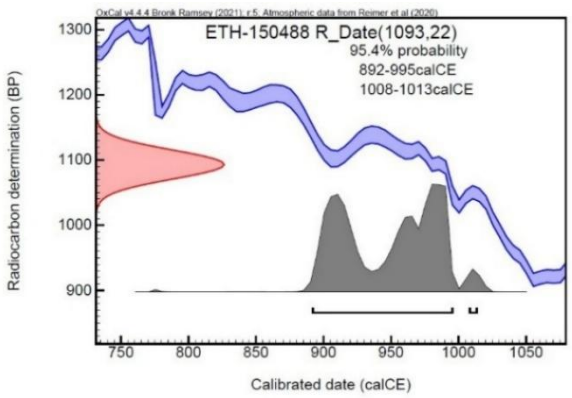

Fig. 34: Result of ^{14}C analysis of NCM, S-1141 (2)

3. Summary

As illustrated in Table I below, the results achieved by the radiocarbon analysis of the specimens from UBG and NCM cover a time span of more than 600 years. All manuscripts with *khanmeti* and *haemeti* features fall into the first five centuries (between 400 and 900), with no clearcut chronological distinction between them. As a transition period towards the *sannarevi* type, we may take the 8th century, with the first example of a *sannarevi* manuscript being the Graz fragment 2058/6A, stemming from Sin. georg. 63. The first example of a manuscript written all in *nuskhuri* minuscules is Graz MS 2058/3 with a dating that may be earlier than the *nuskhuri* colophon of the Sinai Mravaltavi dated 864 CE (Sin. georg. 32-57-33 + NF 89).

4. Outlook

It is clear that the results of the first campaign of radiocarbon dating whatsoever are not yet sufficient to clarify the development of Georgian literacy in the first millennium in all its facets. In order to proceed further, we not only have to verify seemingly contradictory datings such as those of NCM Q-333 and H-1329 (see 2.2 above) but also to widen our sample by including palimpsests with *khanmeti* and *haemeti* features of other collections such as those of Mt Sinai (e.g., Sin. georg. 84+90), Vienna (Austrian National Library, georg. 2), Iviron Monastery (Ivir. georg. 86), England (Oxford, Bodleian Libraries, MS Georg. C 1 = MS Heb. 2672; Cambridge, University Library, Taylor-Schechter MS 12,183 and 12,741; London, British Library, MS Or. 6581), and Makhachkala (Daghestan Scientific Centre of the Russian Academy of Sciences, Institute of History, Archeology and Ethnography, Fund of Oriental Manuscripts). A first step towards this has recently been undertaken by the National Archives of Georgia who sent specimens of two palimpsests together with one of the undated "Anbandidi" Gospels to Zurich; for this, we have just received the first result: with a radiocarbon date of 1181 ± 22 BP, a calibrated date range between 772 and 945 and peaks at 785, 840 and 885 calCE, the Gospel codex can safely be attributed to the 8th–9th centuries.

Considering that the amount of material needed for these analyses does not exceed 10 mg per specimen, the damage caused to the codices by the extraction of such specimens can be regarded as much lower than the gain of knowledge this can produce. Still in 2015, Erich Renhart wrote on behalf of Graz, UBG, 2058/2: "Es wurde verschiedentlich angeregt, eine C14-Untersuchung des Pergaments machen zu lassen, um die Datierung der Handschrift zu vergewissern. Dazu haben wir uns bis dato nicht entschließen können, zum einen wegen des

damit einhergehenden Materialverlustes, zum anderen wegen der Varianz der zu erwartenden Ergebnisse".[77] I am all the more grateful to him, Theresa Zammit Lupi and the staff of Graz University Library that they finally paved the way for us towards a thorough scientific analysis of ancient Georgian manuscripts, and to the members of the Korneli Kekelidze Georgian National Centre of Manuscripts and the National Archives of Georgia for joining these efforts. I do hope that the addressee of this volume will live on for many years to see as many results of this as possible.

Table I: Georgian manuscripts submitted to ^{14}C analyses (arranged by radiocarbon dates)

Shelf no.	ETH ID	^{14}C Date (BP)	calCE Date from	to	Major peak(s)[78]	Content	Type[79]
H-999 (2): fol. 135	150481	1620 ± 23	411	538	425, 465, 525	Gospels (Mt., Lk.)	X
2058/1: fol. 1	145598	1553 ± 21	433	574	440, 480, 545	Lectionary	X(H)
2058/2: fol. 274r	145600	1517 ± 21	482	605	565	*Arm. Divining Gospel*	—
Q-333: fol. 3	150486	1464 ± 23	569	645	600, 630	Gospels Lectionary	H(X)
A-844 (2): fol. 39	150478	1417 ± 23	601	657	615, 645	Isaiah	X
A-844 (1): fol. 48	150477	1400 ± 23	605	662	615, 655	Gospels	X
H-999 (1): fol. 87	150480	1367 ± 23	609	759	620	Lectionary (OT, Gospels)	X
A-89: fol. 55	150476	1340 ± 23	648	774	660, 755	Gospels	X
A-844 (3): fol. 151	150479	1295 ± 23	664	774	680, 755, 770	Gospels Lectionary	X
H-1442 (1): fol. 14	150482	1295 ± 23	664	774	680, 755, 770	Gospels	X
H-1329: fol. 24	150484	1295 ± 23	664	774	680, 755, 770	Gospels Lectionary	H(XA)
S-3902 (1): fol. 18	150485	1268 ± 23	670	820	705, 730	Mravaltavi	X(A)
2058/6A	145605	1253 ± 21	675	871	720, 800	Gospels	A
H-1442 (4): fol. 25	150483	1236 ± 23	684	880	715, 795, 820	Gospels	X
2058/6B	145606	1198 ± 21	774	885	785, 855, 885	Letters of Antony	A
2058/6C	145607	1190 ± 21	773	890	785, 845, 880	Ascetica	A
S-1141 (1): fol. 38	150487	1190 ± 22	772	892	785, 845, 880	Shatberdi, 1st unit	A
2058/3: fol. 2	145601	1188 ± 21	772	891	785, 845, 885	Hagiography	N
2058/4a: fol. 89v	145602	1156 ± 21	773	975	780, 890, 940	Liturgy of James	A
2058/7	145608	1146 ± 21	773	979	890, 940	*Arm. Gospel (Mt.)*	—
2058/4b: fol. 110v	145603	1122 ± 21	887	990	895, 920, 970	Missa praesanctificatorum	A
S-1141 (2): fol. 221	150488	1093 ± 22	892	1013	920, 980	Shatberdi, 2nd unit	N
2058/5 (scroll)	145604	913 ± 21	1041	1210	1050, 1160	Liturgy of Chrysostom	N

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[77] Renhart 2015: 45.
[78] Peaks that agree with external evidence are underlined.
[79] X = *khanmeti*, H = *haemeti*, A = *sannarevi-asomtavruli*, N = *sannarevi-nuskhuri*; brackets indicate secondary features.

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ქართული პალეოგრაფიის რევიზია: დაუთარიღებელი ხელნაწერების დათარიღება

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სტატიაში შეჯამებულია ძველი ქართული ხელნაწერების პირველი რადიონახშირბადული (C^{14}) ანალიზის შედეგები, რომელიც 2024–2025 წლებში ჩატარდა ციურიხის ფედერალურ ტექნოლოგიურ ინსტიტუტში (ETH) პროექტის „მწიგნობრობის განვითარება კავკასიის ტერიტორიებზე“ (DeLiCaTe) ფარგლებში, გრაცის უნივერსიტეტის ბიბლიოთეკისა და კორნელი კეკელიძის სახელობის საქართველოს ხელნაწერთა ეროვნული ცენტრის მხარდაჭერით. მათი კოლექციების 20 ხელნაწერიდან აღებულმა ნიმუშებმა, უმეტესად პალიმფსესტებიდან და, ასევე, ჩვენი წელთაღრიცხვის პირველი ათასწლეულის სხვა დაუთარიღებელი ხელნაწერებიდან, დამაჯერებელი შედეგები მოგვცა ქართული მწიგნობრობის განვითარების ადრეული საუკუნეების შესახებ, განსაკუთრებით ხანმეტობისა და ჰაემეტობის გამიჯვნის კუთხით.

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