Landscape Research

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/clar20

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To cite this article: Dennis Doxtater (2022): Land surveying in early medieval Norway: a St. Olav pilgrimage path as a means of creating an integrated Christian society in a Viking landscape?, Landscape Research, DOI: 10.1080/01426397.2022.2144630

To link to this article: https://doi.org/10.1080/01426397.2022.2144630

Published online: 21 Nov 2022.

LANDSCAPE RESEARCH
https://doi.org/10.1080/01426397.2022.2144630

Land surveying in early medieval Norway: a St. Olav pilgrimage path as a means of creating an integrated Christian society in a Viking landscape?

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ABSTRACT

The pilgrimage routes to St. Olav's crypt offered new cultural landscape experiences. Primary attention to Christian dogma and art as discursive text leaves a ritual transformation from a Viking landscape unexplored. Pilgrim mental maps and belief may have been structured by land surveyed patterns of churches on the route. This article will map points of one route, *Østerdalsleden*. Among the six churches on today's recreational route, four are replaced with the earliest in the community. A complex pattern of alignments integrating all six church locations are compared to patterns created by substituting random points within community test areas. The existing pattern does not randomly reproduce in 10 000 sets of eleven total route points, leaving the high probability that these churches were organised as a cultural concept of pilgrimage landscape.

KEYWORDS

Ritual landscape; medieval; land surveying; Norwegian pilgrimage

Formal concepts of landscape in early medieval Norway?

How does one create discourse about a possible cultural phenomenon that one cannot see, read about in medieval texts, or even experience anything similar in life today? We live in residential and urban worlds laid out by carpenters and land planners. Yet, despite the geometry of this work obvious to those of us in the design fields that create it, users remain largely unaware of much of the patterning that nonetheless influences our paths and perceptions daily. Even at small scales of religious practice in temples and churches, the logic of formal ritual oppositions is seldom consciously perceived and discussed as part of the experience, however powerful. The present work expanding the scale of ritual experience to the larger landscape has logically evolved from the anthropological study of such phenomena in small scale traditional settings. The only thing separating thinking theoretically about the two scales as a connected part of our cultural past is technically understanding early surveying and ceasing to think about larger scale preliterate geographies as something only capable of organisation by hegemonic, territorial control. One begins this narrative about medieval Scandinavia by first considering evidence of land surveying in traditional cultures elsewhere.

Long before Christianity was well established in Northern Europe, Romans had laid out large scale defensive towers across the German landscape in the third or fourth century. They placed twelve towers along a straight 80 km line over very diverse terrain (Söderman, 1989). The greatest deviation of any tower from this line along the Neckar River is two metres (deviation of

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about 0.016° at an average distance between towers of about 7000 metres; limit of unaided visual acuity is 0.017°). This technology, as remarkable as it may seem, turns out to be quite simple. The actual 'instrument' used by the Romans might have been threesomes of 'range poles' (Gallo, 2004, p. 14) aligned across the landscape (see also Dilke, 1971 for a larger overview). In prolonging a line, one of the (exterior) poles is moved to an aligned next position and so on. Given poles of 0.10 m in diameter, an accuracy of visual acuity or 0.017° can be achieved when the poles are spaced about 300 metres. Techniques of prolonging a long line in Roman Germany or as defined by Lekson (1999, p. 118) for his 700 km 'Chaco Meridian' in the Ancestral Puebloan Southwest, can also be used at similar accuracies to create one or more new aligned interim points between two pre-existent distant end points. Long lines of many points can be straightened by surveying threesomes sequentially back and forth along the entire length of the line (see Lewis, 2001).

Romans were likely not the only culture to be able to accurately survey large landscapes up north; what about Celtic societies as well as Viking and earlier Norse in Scandinavia? Here historians and archaeologists have been hesitant to put research resources into large-scale formal potential of landscape. It is not so much, perhaps, the assumption that prehistoric societies didn't have or couldn't master the technology to survey landscape, but rather that these long-term inhabitants had little need to use large-scale design to help organise religion and social order.

Recent mapping by the author in three 'large scale' cultures of the Americas—Ancestral Pueblo, Adena Mound Builders in Ohio, and Mesoamerica (Doxtater, 2021)—does not yet prove the use of ritually motivated land surveying but shows how pattern elements like alignments can indicate design despite a background of random geometry. While no land surveying tools have yet been uncovered by archaeologists investigating increasingly huge socio-religious landscapes by Lidar, there can be little doubt that the builders at Chaco Canyon, Newark (Hopewell in Ohio), or Tikal could quite accurately formalise elements of architecture and larger site planning, including astronomical association—and thus logically could apply these talents to much larger scales.

In the same vein, long before the medieval in the Old World, and even the Romans, it is also likely that geographically large preliterate cultures also depended upon formalised ritual landscapes to organise society. On Minoan Crete, for example, archaeologists are starting to read and cite such mapping, tested against random patterns. Doing so, they move away from the theory that the large palaces were primarily the expression of powerful individuals, to consider the possibility that these ritually important sites were formally interconnected through a framework structured by the locations of the highest mountains and prominent caves on the island (Doxtater, 2009). This paper offers a reversed idea about the relationship of monumental architecture to the natural landscape, i.e. that some buildings may more likely be positioned and oriented in relation to a largely *independent* set of patterns in a surveyed large-scale landscape, then positioned for more territorial reasons and then oriented singularly to some natural landscape feature (independent of or together with astronomy).

One of the most interesting tests of this idea may lie in the way new temples (churches) were positioned and oriented in an early medieval Scandinavian landscape which quite likely was still at least partially formalised by Norse belief. Virtually all Norwegian churches of any ancestry have brief folklore where spirits of the earth tear down at night what church builders erect during the day. Given the author's dissertation analysis of symbolic and ritual meanings in traditional Norwegian farms from the 12th–19th century (Doxtater, 1981), farmers clearly maintained Pre-Christian meanings in practice and settings for a long period, even through and beyond the liturgical changes of the Reformation—this in spite of using churches and being Christian all along. Images of these practices in Norway, even only a little more than a century ago, became vivid by learning to read 19th-century dialects from different valleys and fjords. The stories that were collected by folklorists at this time have little overlap with book-based Christian belief. Symbolism in these remote valleys even in the 19th century was still ethnographically unique and embedded in the local but ancient landscape. Travelling around these valleys in the 1970s

one could easily find log structures built in the 1200s—both dwelling and outbuildings—being used as they still stood in their 'correct' ritual location and orientation. I was always invited to inspect these buildings, often followed with a cup of coffee and *lefsa*.

The present research on a particular pattern of possible large-scale religiously motivated surveying in the 11th and 12th centuries, emerged from a much larger study of the location and orientation of *fylke* (county) stone churches in three areas of Scandinavia: Trondheimsjord, Storsjøn (Østersund) Sweden, and a group of churches on the northern portion of Sweden's Gotland island. This work in progress includes mapping geometries among prominent natural and known prehistoric ritual settings, such as '*tings*'. With these components identified in the larger landscape, the location and orientation of 56 churches were assumed to have been accomplished by a work group led by a crafts person with land surveying knowledge—not primarily by decisions coming from church hierarchy in distant places. Clearly, no technically proscribed Catholic procedure oriented these buildings. Some of the locations and *all* the church orientations can hypothetically be explained by discovering particular azimuths from the site as they reach out to other churches and prehistorically used locations.

However, unlike larger scale work in New World preliterate cultures and on Crete, the study of these individual churches in Scandinavia—despite the sophisticated design logic of landscape frameworks—only contained one extraordinarily long simple alignment of eight churches (including four built after the Reformation). While this existing pattern tests positively against random geometry, it says little about probabilities of more complex patterns.

In retrospect, it was not so much the need of a statistical probability that drove the present paper, but the lack of a compelling theory about why these methods appear to have been adopted across all three regions. Looking more closely at the timeline for these larger stone churches of all three areas, they postdate the introduction of Christianity in the 11th century by only a few decades. Very frequently, small wooden churches, often built on large farms, preceded the more 'organized' ones with collective overtones.

From Icelandic saga accounts two hundred years later—literally the sole basis of written early medieval history in Norway–the most dramatic narrative of 'Christianization' was the 1030 battle in upper Trondheimsfjord between farmers fighting beside prominent Viking chieftains, and a ragtag group of newly minted Christians who came over the passes from Storsjøn, following Olav Haraldsson, soon to be martyred as Saint Olav. The fact that Olav Haraldsson was killed at this time on the Stiklestad farm is accepted by many scholars, but little else, particularly about his ability to radically change the religious minds of Norse inhabitants in this ancient landscape. More interesting in this regard, though only somewhat better understood archaeologically and historically, are the pilgrimages that began after St. Olav's body was brought down by boat and temporarily buried on the riverbank in early Trondheim. Significantly, one can surmise that these pilgrims, many from other areas of Europe, were in fact much more Christianised than the valley and fjord folks that they stayed with on their way to worship St. Olav's bones.

So, what if the most important element of 'Christianization' was not getting people baptised and buried with the proper written/spoken words, but essentially remodelling or replacing a long-formalised Norse landscape, to integrate not just individuals in heaven, but valley and fjord communities in the real world of ritual practice and social exchange? The most important element in making this shift could have been groups of people participating in large-scale surveying of new and altered frameworks that stretched across the region, now ostensibly focussing on the cathedral being built in nascent Trondheim.

Østerdalsleden

A well-made website today extols the adventure of retracing a St. Olav's pilgrimage via one of seven plus routes to Trondheim from all directions land and sea (*pilegrimsleden.no*). While the

maps and stopping places of each are first sources for present purposes, given the lengths and topography of these 'paths' (*leden*), and of course the total lack of any map or written account of routes at the time, much of the intent of this information is for a current more recreational experience rather than any well understood re-creation of 11th and 12th century Catholic belief.

Why was such a surveying process, requiring considerable participation by farmers along these lines not recorded in written sources. This was particularly an issue for the author recently when studying the location and orientation of Norwegian immigrant churches in Minnesota during the latter part of the 19th century (Doxtater, 2017). Though all churhes made these decisions by a fully literate committee, and kept brief records of such, no specific discussion can be found about whether to locate the church most often on meridiain centre lines of townships of the new landscape grid—areas six miles square–or how then to orient the structure to one of the four cardinal directions ethnographically evident. In the medieval, very little, beyond church transactions and texts were defined on expensive parchment. There appears not to have been maps drawn of any church site or location or process of construction, if in fact these decisions were made by literate church officials. If decision makers wanted to record their process, it would have been technically much easier to make a map showing their design, than trying to describe the process in words. Again there were virtually no maps made in those days. To a large extent, built form, whether as architecture or formalised larger landscape *is* the record.

In the present project it was possible to find site points on each of the website paths that could be evaluated for large-scale formal patterns. All paths showed promise of lines that aligned with the largest gravefield in Norway, for example, or the most prominent mountain in the north of Trondheimsfjord. With the path through Østerdalen (east valley), however, a complex pattern emerged that would additionally lend itself to being tested against random phenomena. *Østerdalsleden* is the third longest land route and runs to the east of the more travelled path through Gudbrandsdalen from Oslo. *Østerdalsleden* is not much shorter than the highly symbolic path that emulates Olav Haraldsson's march from the Baltic through Storsjøn and over to the battle at Stiklestad in upper Trondheimsjord. The following are the site points of *Østerdalsleden* that at first inspection might have been prominent enough—especially churches–to have been surveyed by early pilgrimage teams (verbatim text from website; Figure 1 from Norwegian digital museum):

1. Oddheim: Contemporary official Trysil milestone put up to show that there are 379 kilometres left to Nidaros.
2. Plassen kirke: The oldest church built here in 1879 burned down 1904. Present church dedicated in 1907.
3. Nesvangen: Here starts the new marked *Østerdalsleden* that meets the pilgrim path from Trysil at Pilegrimssteinen in Rendalen. Pilgrims in the Middle Ages also met here. Close by, one finds the *Pilegrimskjaeret*, an important way marker for pilgrims to Nidaros.
4. Pilgrimstone: This two-meter-high stone is dated at 1040 and is one of the earliest pieces of evidence of pilgrimage in Østerdal. Etched is a cross and letters ML which can mean 'mid path'. Here met pilgrims from the east in Sweden who came from the south over Moravegen from Oslo.
5. Ytre Rendal: This is a timber cross church built in 1751.
6. Marker to Nidaros: By the gate to the museum of the author Jacob Breda Bull stands the contemporary administrative district's milestone saying that here it is 264 kilometres remaining to Nidaros.
7. Øvre Rendal: This is the only one of the churches that directly abuts the pilgrim path. The church here stood ready in 1759, dedicated in 1761. The church earlier was located at the Vangen farm by the Bull Museum, which was the priest's farm. But the oldest church we know of, stood up at the Nordset farm in the 1100s. A crucifix from that

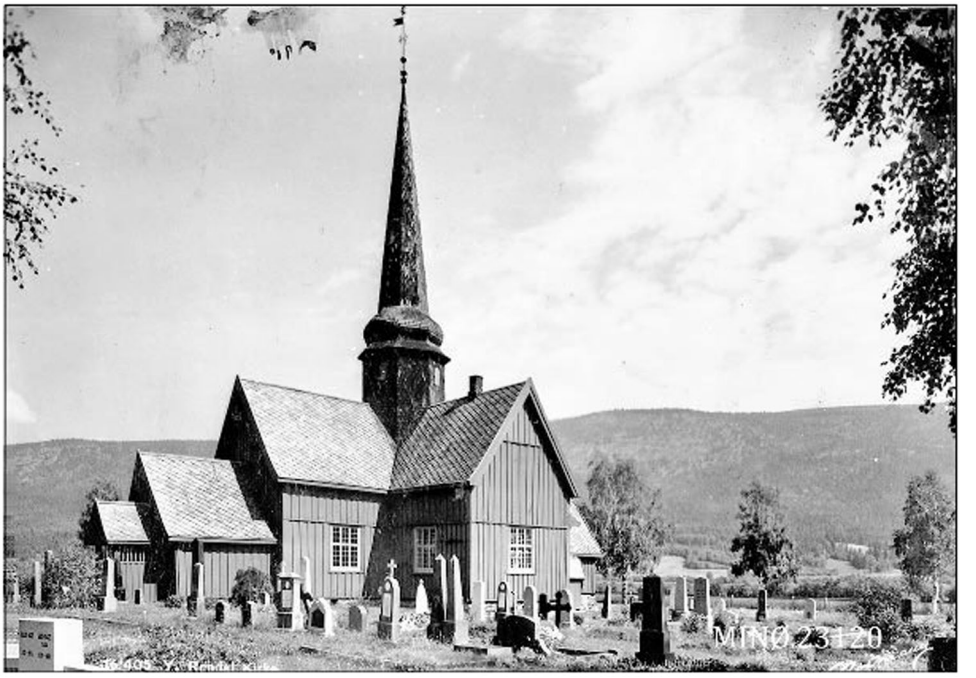

Figure 1. Ytre Rendal church (photo by Carl Gustav Normann, public domain from Anno Musea I Nord-Østerdalen digital museum).

church stands on the alter in the present Øvre Rendal church and sends greetings from the time when pilgrim traffic was large through the *bygda* (farm community).

8. Tydallen: The church in Tylldalen was dedicated in 1736 and should be the seventh in this valley bottom. The earlier churches stood placed up at the Olsberg farm. The first of them was possibly built around 1170. In the existing church one finds a copy of an Olav's statue now preserved at the Nasjonalmuseet in Copenhagen, one of the finest expressions of St. Olav from the Middle Ages. Originally it stood in Tylldalen's second church and is thought to have been made in the 1100s.
9. Tynset: The first church in Tynset was dedicated in 1211 to St. Thomas, St Laurentius and St. Margrete. The oldest church site is marked on the pilgrim path where it has a fine view of the later Tynset church below. This eight-sided timber church is from 1795.
10. Vingelen: Today's church is the third in Vingelen. The first stood at Persjorded farm and is thought to have been a single nave stave church (early wooden structure). This was apparently torn down right after church number two; a triadic form was finished in 1653. It in turn was torn down after today's structure was finished.
11. Olavsjølla: A spring at Vingelen has a history tied to St. Olav. There are about 50 Olav springs in Norway. The springs most often lie by old pilgrim paths and are strong water sources when they don't dry out. People believed these springs had power to bring good health. Sagas say that the old at Vingelen would drink water from this spring when they lay sick and knew that they soon would die. Today the spring is lost to agriculture. Below the old farm where it stood is a small well with information about its original source.
12. Singsås: No church still stands on this site that is one of the oldest religious places in Gauldalen, with its prehistoric grave mounds. There was a church here until 1884, then torn down and replaced by a church elsewhere. The site was in danger of becoming obscure fields when a reproduction of a very small stave church from another valley in

Norway was purchased for the site in 2011, reminding people that the first church here must have been something similar.

13. St. Olavsknippen: Cleavage in rock at this location is said in folklore to have been made by St. Olav in his battle with the little people or trolls who opposed being Christianised. Rocks in this location were the remains of the defeated trolls. The cleft became a source of folk power by saying prayers going to and from the mountain pastures during summer.
14. Øyvindtjønna: Place named after St. Edwin, king over Northumbria in 7th century. From tjønna one can see the journey's destination, Trondheim and the cathedral of Nidaros, soon to be reached. Archaeological sources say a chapel stood her in the Middle Ages, possibly torn down in the 17th century.
15. Nidaros: Work on the cathedral began in 1070 and continued until around 1300. Even if the church was strongly linked to St. Olav, it wasn't dedicated to him, but to the holy trinity.

The points on the website maps for these 15 sites of *Østerdaleden* were entered as latitude/longitude locations in custom software called 'Geopatterns' used to accurately define large scale geometric patterns and test against random phenomena, Figure 2. These techniques—fully up to National Oceanic Atmospheric Administration (US) standards–are explained in an archaeological conference proceeding on computer technology (Doxtater, 2007). Figure 2 shows the landscape path of *Østerdaleden* over valleys and hills as it passes by the 15 points. At this early stage in the analysis, one is looking only for simple alignments between three points. While these paths are seemingly the most direct way between southern start points and the cathedral of Nidaros, and part of the largest river in Norway (Glomma) is roughly parallel to the paths, they nonetheless clearly follow quite diverse local terrain. One expects that any accurate three-point alignments at this scale might well be coincidental. Among 15 points, we find four three-point alignments at or below the angular tolerance of 0.06°. Looking at the alignment Ytre Rendal—Pilgrimstone—Nesvangen, for example, the location of Pilgrimstone is about 17 metres off the precise line, some 70.147 km in length. The 0.06° number is the average of the interim point deviations taken from the two ends. The three other three-point alignments are more accurate, at less than or equal to 0.04°. In surveying exercises that emulated prehistoric technique, NOAA experts reported in Lekson's (1999) Chaco Canyon inquiry that accuracies could have been around 0.02°. The author's field experiences as well are around this number (Doxtater, 2003, 2002). These assume no magnification, even though producing large scale accuracy close to visual acuity of the naked eye, 0.17°.

Symbolically, the Ytre Rendal—Nesvangen alignment is not the most interesting of the four, even though at over 4 kilometres from Ytre-Rendal, the Pilgrimstone marker, possibly still in its original position, seems to suggest designed alignment. In this work one finds examples both accurate and symbolically suggestive, but in the end cannot be reasonably proven to be designed and may likely be random. At the Ytre Rendal partner church Øvre (upper) Rendal, exists a more accurate 0.04° alignment with it as interim point between the start point, Nesvangen, and end point, Nidaros. This line is 260.239 kilometres. Most symbolic is the large prehistoric mound right next to the standing church at Øvre Rendal. At thirty-plus metres in diameter, it indicates regional importance, perhaps right up through Viking time. A relationship of largest memorial mounds both exceeding 50 metres and adjacent to early medieval stone churches can be clearly seen in Google Earth at the Trondheimsfjord churches of Ørland and Alstadhaug,

The other two alignments, involving the Milestone to Nidaros and the standing Tynset church, though interestingly also uses Nidaros and Nesvangen as end points, must in the end be disqualified because the existence and location of these interim points on the path in the early medieval cannot be determined. Using the historical/archaeological website (*Kulturminnesøk.no*), it is logical to additionally eliminate Oddheim and Plassen, the standing churches at Tydallen

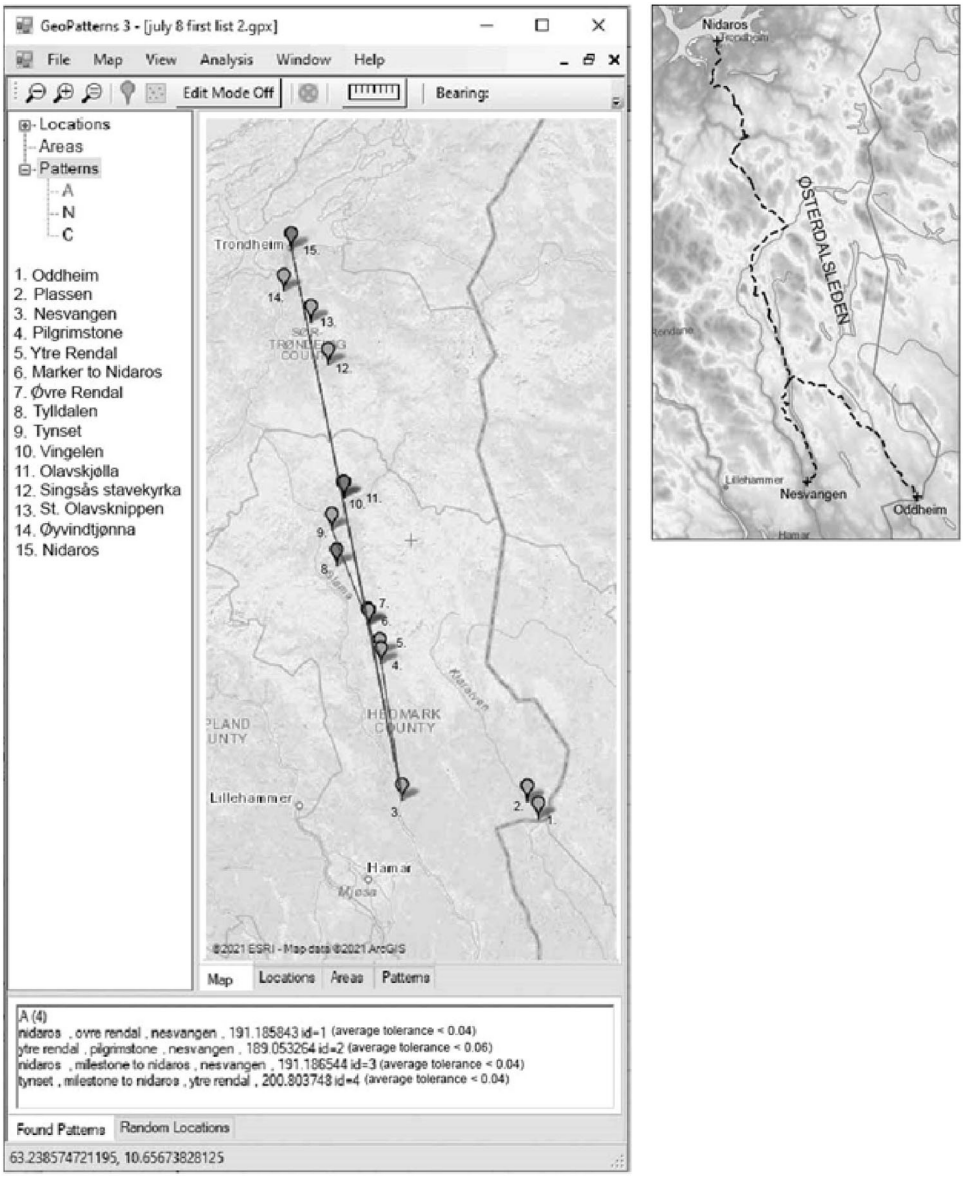

Figure 2. Fifteen most probable early medieval sites listed on the pilgrimage route for Østerdalen: search identifies four three-point alignments within an accuracy of 0.06° or less, as displayed in lower panel (see also summary list in Figure 6). Screenshot of author's software, left; map base from Norgeskart (Norwegian national digital mapping), right.

and Vingelen, and the nearby spring Olavsjølla. These five churches are too young and cannot be clearly associated with the pilgrim track, while neither the Milestone to Nidaros nor Olavsjølla are marked in the archaeological record. Thus, one is left with eight points on the path, but fortunately three early church locations can be found. Archaeological maps provide data points where local farmers and traditions say that earlier structures stood at Vingelen, Tydallen and Tynset. None of the churches exist today, nor have their sites been excavated. At Ytre Rendal, the earlier church is located archaeologically by folk information and surface surveys immediately adjacent to the north of the standing church, though its precise outline on the site has not been determined. The early church location at Øvre Rendal is less clear, but the record for this site ultimately states that it is likely that the earlier church stood on the same site.

An issue exists with Nesvangen. It is the start point of the main pilgrimage path as identified by the website map. But the pylon seen in the website and presently used in calculations is a contemporary interpretation of the historical pilgrimage importance of this geographical point where the Glomma—the longest in Norway– and Rena rivers merge. No archaeological identification of the historical assembly point (*Pilegrimskjaeret*) is mentioned in the brief web description of Nesvangen. Inclusion of Nesvangen in the analysis rests on the website's general historical definition as start point, its location at the intersection of two important rivers and the way it serves to fully integrate the complexity of multiple large-scale alignments with Nidaros.

Thus the final list of sites to be analysed is 11, all but Nesvangen and Øvre Rendal have data points in the archaeological record. Notably all determinations of very early church locations have very little historical data. Frequently in looking at the archaeology of these and other early churches in Norway, one finds citations of or direct text by Jan Brendalsmo (primarily 2006; he sent a copy to me). This encyclopaedic data is regarded by most as ultimate source. The archaeologically determined locations in the present exercise are shown in Figures 3 and 4.

Searching the revised list

With adjusted list of 11 final points on *Østerdalsleden*, one repeats the search for three-point alignments, staying within the accuracy range of 0.06°. A screen shot of the new search is reproduced in Figure 5. Counterintuitively, decreasing the list from 15 to 11 sites generates three additional three-point alignments, from four to seven. Beginning with the most symbolically interesting line of the first search, Nidaros—Øvre Rendal—Nesvangen, the older church location at Vingelen lies very accurately on this line, 0.01° (with Øvre Rendal and 0.05° with Nesvangen). This point in a contemporary farm courtyard was identified by the farmer who found bones from the early graveyard. It is not so much the precision of this point but the fact that this earlier church is now one of two, along with Øvre Rendal, that accurately align with the defined start and end points of *Østerdalsleden*.

The next most interesting pattern of the second search is the way the earlier church locations at Tynset and Tydallen form a very accurate three-point alignment (0.03°) to Nidaros, a second direct line to the pilgrim's goal. Tynset had long been a culturally and economically important *bygde*, as evident in part by the location of today's standing church built on the valley floor with its river related trading activity.

In addition to the four-point alignment and this three-point line accurately to Nidaros, one finds an additional three-point alignment connecting these two, reinforcing the importance of Tynset. Its earlier church location aligns right at or under 0.02° with the pair of Øvre and Ytre Rendal churches. Finally, completing the integration of all churches with the entire pilgrim path (except for the Singsås location), a three-point alignment continues, as it were, from Ytre Rendal, down through the Pilgrimstone marker, ending at the start point Nesvangen (0.06°). Figure 6 compares the number and accuracies of three-point alignments in the two searches. Were the earlier church locations nonetheless considered as part of the published trail of the *Østerdalsleden*? As seen in Figure 7, the path makes a prominent detour to connect directly to the prehistorically important site of an original stave church at Singsås. The primary interest to recreationalists lies in the small replica purchased and moved recently from another valley. While many larger and more materially authentic stave churches still stand on their original farms in Norway, the Singsås stop is the only chance for present day Østerdal pilgrims to admire one of these iconic structures, as much Viking longhouse and ship as Christian church.

Today's path also takes something of a detour at Vingelen, not because of any existing interpretation at the earlier Vingelen church location, or the St. Olav's spring nearby, but because of the museum located here. At Tydallen, today's path runs along the upper slope of the valley, ignoring the standing newer church below, in deference to the historical priests' farm and

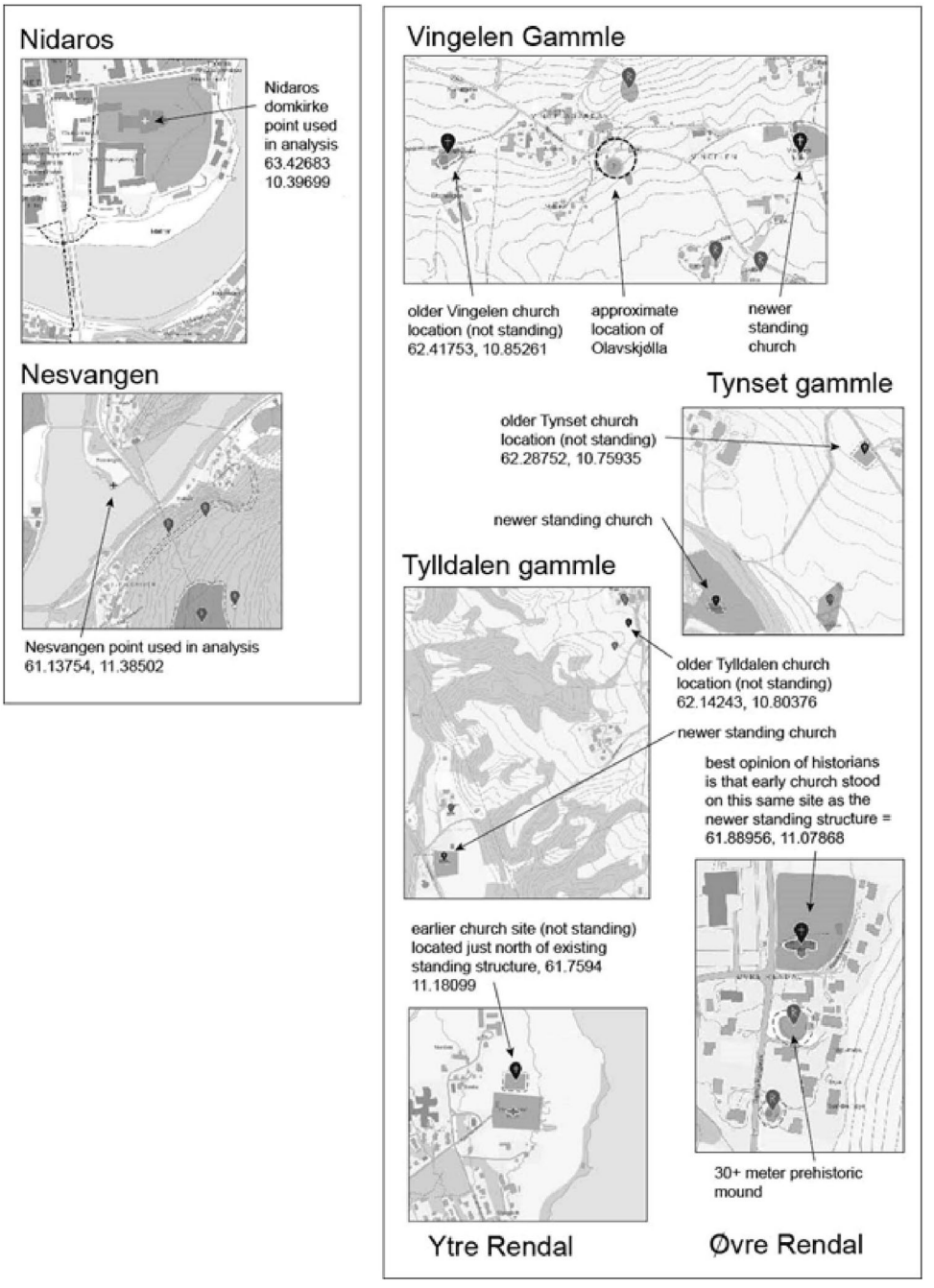

Figure 3. Site points taken from the archaeological records of Nidaros, Nesvangen, Vingelen gammle, Tynset gammle, Tylldalen gammle, and Ytre Rendal; record states that an older church probably stood on same site as existing Øvre Rendal. Base maps from Norgeskart.

location of earlier church, both associated during pilgrimage times. No such immediate connections exist in the path route at Tynset. It passes close to the earlier site, without comment, intent on dropping down to the active valley floor and its existing church. At Øvre Rendal, the route runs on the edge of the churchyard, and likely includes views and interpretation of the large memorial mound abutting the church to the south. This is not the case at Ytre Rendal, where

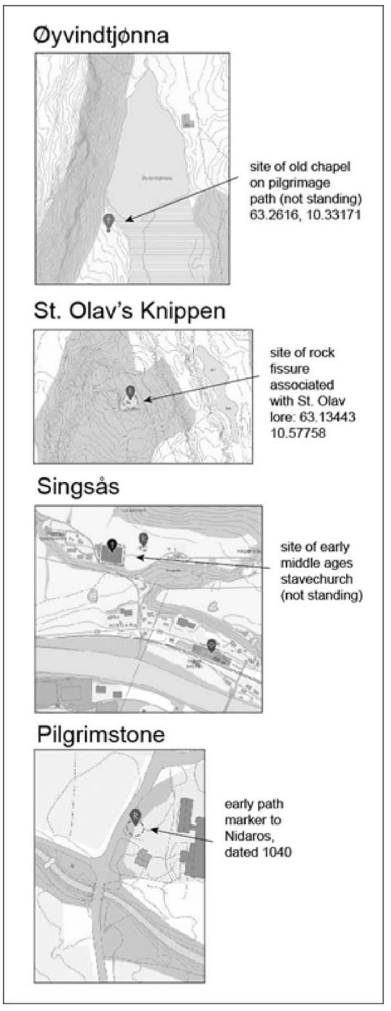

Figure 4. Sites taken from archaeological records of Øyvindtjønna, St.Olav's Kippen, Singsås, and Pilgrimstone (Åkresteinen). Base maps from Norgeskart.

the path passes over 300 metres from the church and its vacant, adjacent lot where the earlier church once stood. A short distance south of Ytre Rendal, the Pilgrimstone appears to be right on the original path.

No large-scale alignment research on this or any other St. Olav's pilgrimage path has yet to publish accurate maps of existing geometrical patterns among church locations. Unique as drawing these accurate maps of existing patterns is, it remains, where possible, to also test found patterns against random phenomena.

Testing the existing pattern against random geometry

Decades ago, when GIS and other computer application began to be used integrally with less immediately spatial geo data, archaeologists found IT experts to create hypothetical landscape settings within which locations of random points produced formal geometries, especially alignments, at a given accuracy (e.g. Williamson & Bellamy, 1983). This responded to assertions by amateurs that some historic or prehistoric patterns were designed, particularly the relatively short and poorly defined features of Ley Lines in the UK. Clearly, at many given scales, point

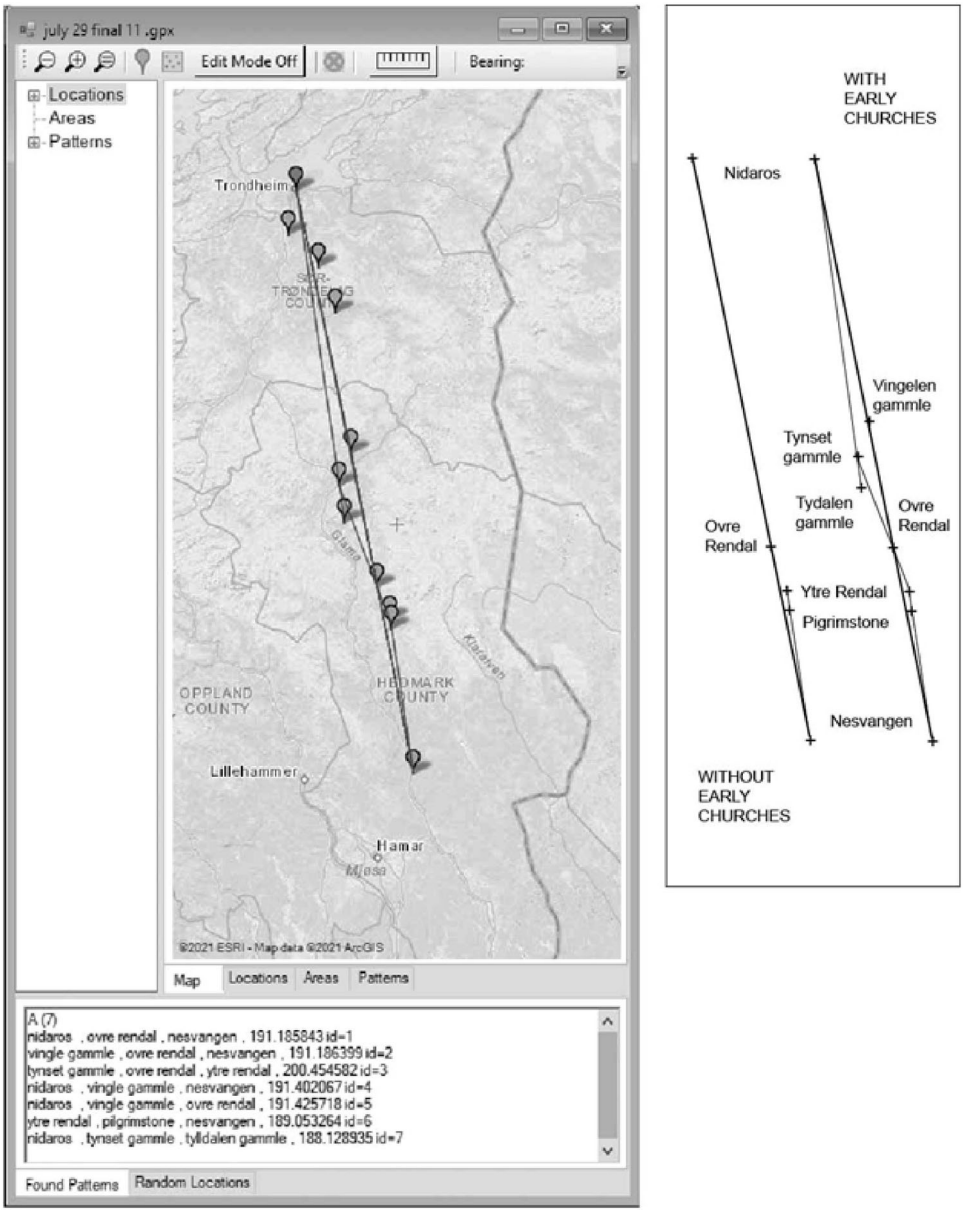

Figure 5. New search for three-point alignments at or under 0.06° using revised archaeologically determined points of early churches (see also summary list in Figure 6). Screenshot of author's software, left.

numbers, and accuracies, random points can generate seemingly designed formal geometry. One cannot find any example in archaeology, however, of such an exercise done integrally to a research process in large-scale landscape, where found formal patterns might receive additional definition of being 'artifacts' related to non-spatial archaeological data in context.

The fact that archaeologists and historians didn't consider some forty years ago, at least, is that even though points in the landscape often randomly create patterns on their own, this doesn't mean that traditional cultures, unaided as they were by GIS mapping and unaware of random spatial phenomena, didn't design *some* formal geometries to make effective their ritual practice. The problem, then, becomes much more complex and interesting as one attempts to

Three-point alignments of initial 15 Østerdal path sites

0.01 -- none
0.02 -- none
0.03 -- none
0.04 -- Nidaros - Øvre Rendal - Nesvangen
-- Nidaros - Milestone to Nidaros - Nesvangen
-- Tynset new church - Milestone to Nidaros - Nesvangen
0.05 -- none
0.06 -- Ytre Rendal - Pilgrimstone - Nesvangen
0.07 -- none
0.08 -- none
0.09 -- none
0.10 -- none
0.11 -- Olavskjølla - Øvre Rendal - Nesvangen
0.12 -- Olavskjølla - Milestone to Nidaros - Nesvangen

Eliminate 19th century churches and sites with indeterminate points (Vingelen, Tynset, and Tyldalen new churches, Milestone to Nidaros, and Olavskjølla):

0.04 -- Nidaros - Øvre Rendal - Nesvangen
0.06 -- Ytre Rendal - Pilgrimstone - Nesvangen

Recalculate alignments substituting accurate points of early churches at Vingelen, Tynset, and Tyldalen (two Rendal churches rebuilt on earlier site):

0.01 -- Nidaros - Vingelen Gm - Øvre Rendal
0.02 -- Tynset Gm - Øvre Rendal - Ytre Rendal
0.03 -- Nidaros - Vingelen Gm - Nesvangen
-- Nidaros - Tynset Gm - Tydalen Gm
0.04 -- Nidaros - Øvre Rendal - Nesvangen
0.05 -- Vingelen Gm - Øvre Rendal - Nesvangen
0.06 -- Ytre Rendal - Pilgrimstone - Nesvangen

0.07- 0.12 -- none

Figure 6. Comparison of three-point alignments in first and second searches.

differentiate designed from random patterns. Towards this end, software can be created (Doxtater, 2021, 2009, 2007) that seeks to find landscapes of patterned cultural points over which random points can be substituted to compare with the existing.

The most currently popular use of GIS by archaeologists does not attempt to map formal geometries but analyses visual territories or 'viewsheds' (see Mayan example in Doxtater, 2021). Socially, however, a viewshed is a largely non-symbolic form of influence, which could be used to study chimpanzees or other animals as well. The most powerful form of social space in societies that have lived in a landscape setting for long periods of time is ritual—at whatever experienced scale—distinguished from simple territoriality by its organisation of and practice within dense symbolism structured by formal geometry.

For the present work, GIS software was inadequate and a small firm in Seattle was found whose principal had a mathematics background. To date two versions of 'Geopatterns' work solely off the maths of great circle lines. This kind of graphic geo application is much simpler to

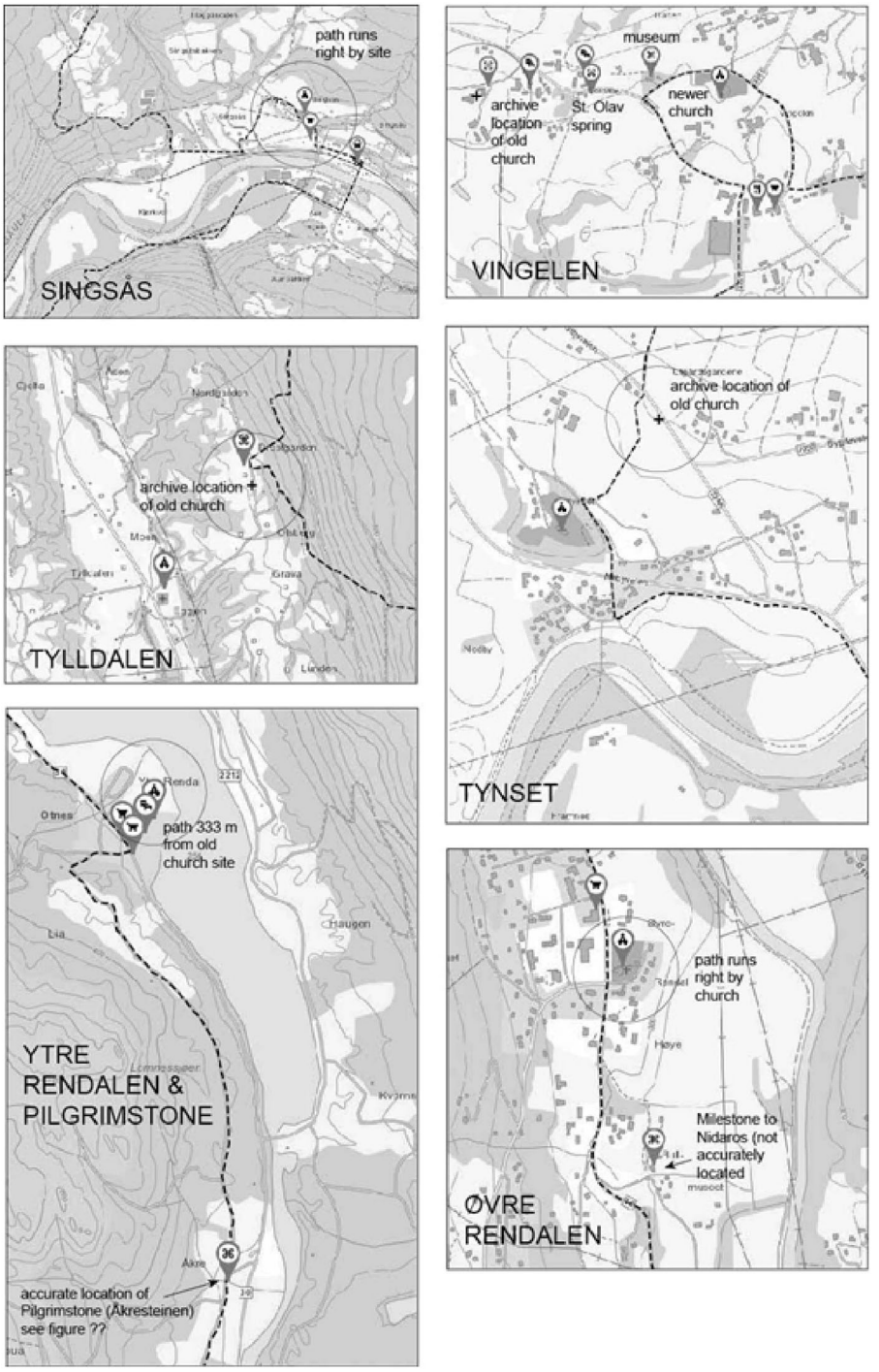

Figure 7. Relationship of adjusted locations from the archaeological record to the contemporary *Østerdalsleden*. Base maps from Norgeskart.

use in iterative processes of design analysis, i.e. trying aspects of many quite possibly random patterns quickly in the search for complexity and integration. The testing aspect of the software was the primary goal of the second iteration of the application.

In the present exercise one first chooses test areas of a logical size; within each a random point replaces the existing point that participates in the found patterns: a four-point-alignment (Nidaros, Vingelen gammle, Øvre Rendal and Nesvangen), the three-point alignment (Nidaros, Tydallen gammle and Tynset gammle), the three-point alignment (Tynset gammle, Øvre Rendal and Ytre Rendal), and the three-point alignment (Ytre Randal, Pilgrimstone and Nesvangen). Nidaros, Nesvangen and the two geographic points of Øyvindtjønna and St.Olav's Knippen are included as fixed features in all sets of eleven in the tests. Because all these points of the existing pattern involve churches except Pilgrimstone, the small stave church replica site of Singsås is added as a test site to create a total of seven. The test areas of each of these seven are shown in Figure 8.

Areas are chosen in which many alternative locations can be found to build a church (or set up a mileage marker). As the locations of the older churches at Tydallen and Tynslet demonstrate, they can be on land with some slope, though most of the test area can be used for crops or farm buildings—or churches. Of course, some minor portion of these test areas cannot be built on; they are either too steep or are part of a water course. Yet if a minority of random points falls on unbuildable ground, it logically doesn't negate the exercise. The buildable-unbuildable aspects of the existing landscape in these test areas have nothing to do with whether one built church point aligns with other built points many kilometres away. No site in the existing landscape has formal characteristics that might have influenced location in this regard. Thus, one can logically assume that for any random point in the test area, some different topography also without any formal (large scale) characteristics can be imagined that would have permitted the functional (non-ritualistic) building at that point.

While several of the previously published tests against randomness simply compare numbers of three-point alignments at different accuracies in large scale landscapes with large numbers of sites, three look at more complex patterns with greater implications of symbolic ritual. One is the relationship of Great Kivas in Chaco Canyon to a large-scale meridian and its coincidental cardinal paring of two mountains at the North, a second is the way a cluster of three or four-point alignments run through the largest pyramid as the focus of the huge Mesoamerican site of Tikal, and finally, and most integrated into likely ritual practices is the way the principal ceremonial sites on Minoan Crete ('palaces') are located *and* oriented to the most prominent mountains and caves on the island (Doxtater, 2021, 2009).

The pattern among the five early churches of *Østerdalsleden* is much more complex than simple alignments or non-integrated numbers of such. First, the four-point alignment Nidaros-Vinkelen gammle-Øvre Rendal-Nesvangen doesn't just stand by itself but connects with three three-point alignments in more complex ways. The alignment of Tydallen gammle—Tynset gammle with Nidaros is simple, though when we consider Nesvangen as well, the other two three-point alignments are more integrative. This is particularly true with Tynset gammle—Øvre Rendal—Ytre Rendal which connects three churches and both longer lines up to Nidaros. The Ytre-Rendal—Pilgrimstone—Nesvangen line connects the base of the Tynset three-pointer to Ytre-Rendal, as well as the base of the four-pointer Nidaros—Nesvangen.

As the patterns become more complex, modelling them for testing is challenging. The software is set up to make lists of all three-point alignments and then looks for combinations keeping track of an order of search and use of sites. In the present exercise one begins with a three-point alignment 'A', and since the four-point alignment has four three-pointers, one can add a second three pointer with two of the points overlapping, 'A + A(2)'. This finds two of the four three-point alignments in the Nidaros—Nesvangen foursome. Experimenting with adding an 'A' with (3) points overlapping, actually adding this twice [A + A(2)+A(3)+A(3)] correctly searches the existing 11 sites finding the two additional others in Nidaros - Nesvangen. Adding to the mix now becomes more trial and error, given the exponential character of even relatively simple design patterns. What finally finds the *existing* total pattern is the preceding string plus three

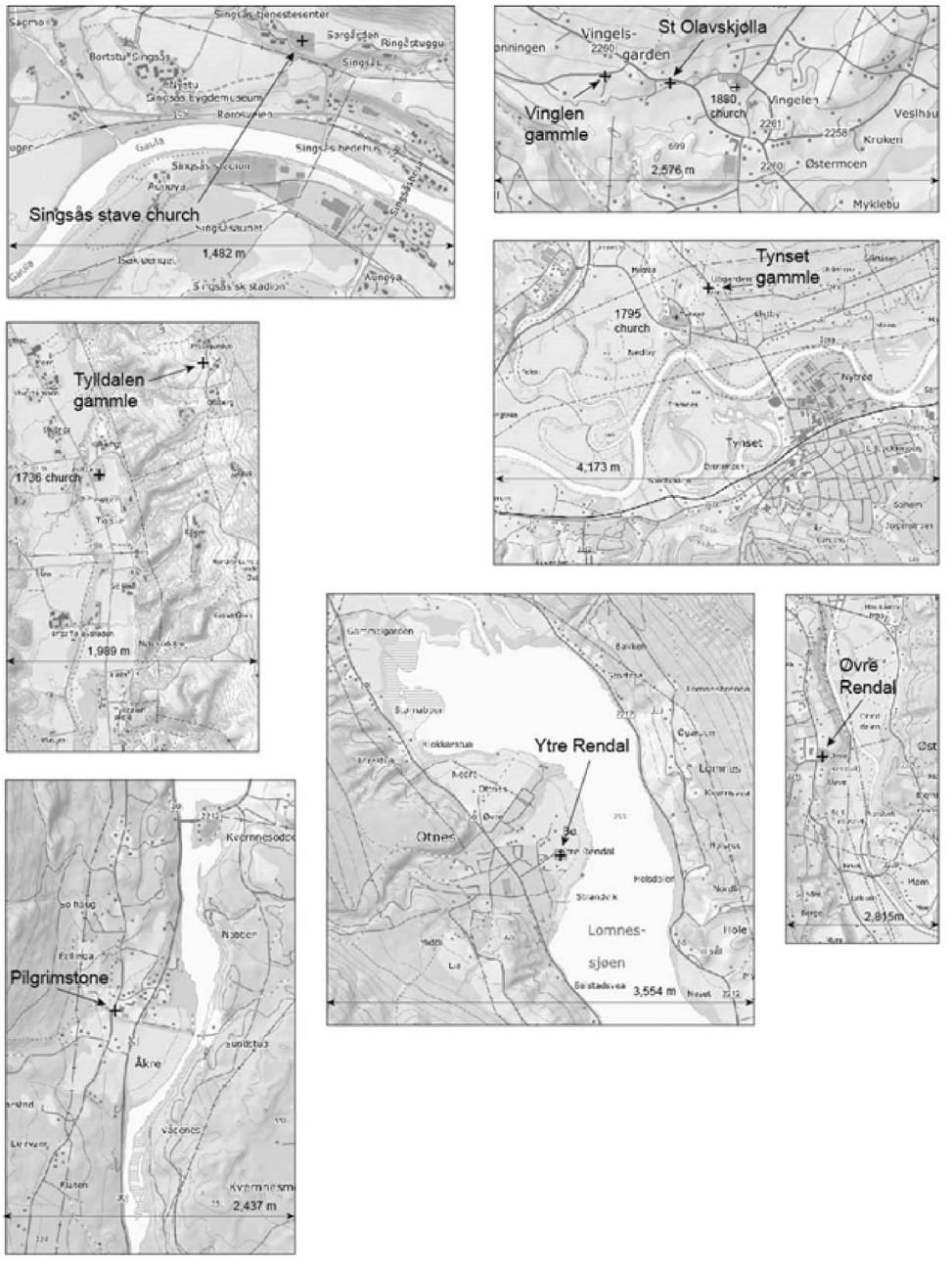

Figure 8. Test areas around seven existing pilgrimage points that are to be replaced by random ones; for the six existing churches, travel distances for parishioners are roughly less than two kilometres; while some portions of the areas are unbuildable due to slope or water feature, most of a test area has farms and logically could be places for alternative church location. Base maps from Norgeskart.

more elements: [A + A(2)+A(3)+A(3)+A(1)+A(1)+A(3)]. The successful search using this model is shown in the screenshot as Figure 9.

Next, seven rectangular test areas are drawn on the software screen emulating the test areas of Figure 8. Test areas are drawn from screenshots of Norgeskart digital maps imported to Illustrator images. These images are to one side of the screen as the digital maps (either World Topo or Bing Satellite) with Geopatterns on the other side allowing the test area to be drawn at

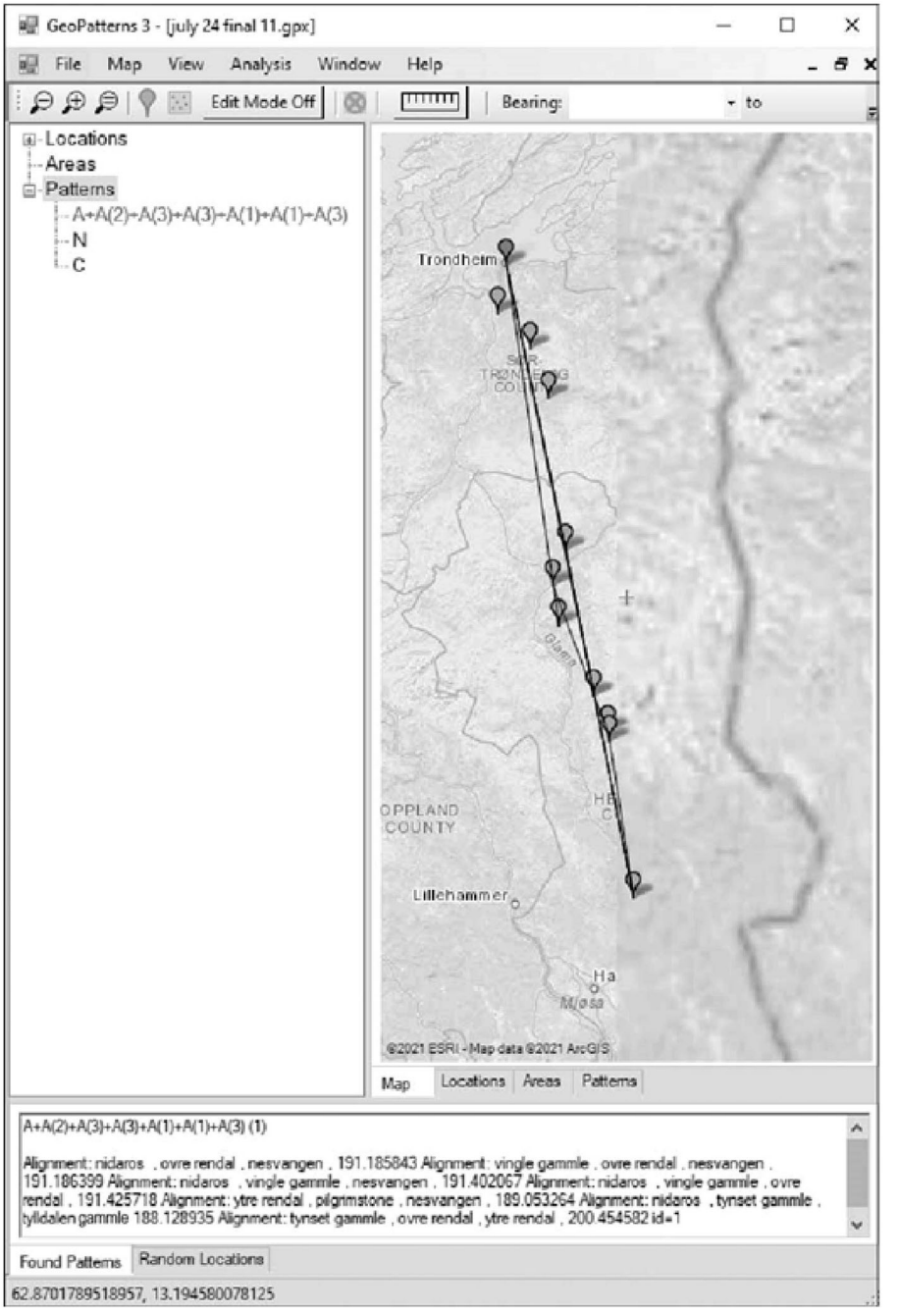

Figure 9. Result that finds search string at or under 0.06° exactly modelling existing complex pattern of a four-point alignment and three integrating additional three-point alignments (individual patterns described in text). Screenshot of author's software.

an appropriate scale. When test areas are turned on, each test set of eleven inserts one random point in each area. The seven existing points in the test areas are turned off, leaving four 'fixed' existing points of the path turned on during each iteration (Nidaros, Nesvangen, Øyvindtjønna and St. Olav's Knippen). One initially sets the 'run' at 10, then 100 and then 1000 sets, each with four fixed and seven random locations. The accuracy is set to be 0.06° or better.

(a)

```
ALL LOCATIONS (4)

nideros 63.42684 , 10.39699
nesvangen 61.13754 , 11.38502
st olavs knippen 63.13438 , 10.57357
oyvindfjonna 63.26025 , 10.33264

Test Areas:

vingelen NW: 62.423388 , 10.840416 SE: 62.410153 , 10.889168
singsas NW: 62.960881 , 10.704031 SE: 62.951593 , 10.733557
tynset NW: 62.292117 , 10.722485 SE: 62.264857 , 10.802994
tyldalen NW: 62.147346 , 10.776043 SE: 62.116329 , 10.814495
ovre rendal NW: 61.911806 , 11.063919 SE: 61.863921 , 11.114388
ytre rendal NW: 61.779134 , 11.143055 SE: 61.745999 , 11.210690
pilgrimstone NW: 61.737084 , 11.172191 SE: 61.706150 , 11.218414

Random Sets: 1000

Patterns Investigated (1):

A+A(2)+A(3)+A(3)+A(1)+A(1)+A(3) (1)

1: set287  (4th run of 1,000 sets)

Alignment: singsas(62.95937 , 10.72210) , ytre rendal(61.77218 , 11.16255) , pilgrimstone(61.73675 , 11.17506) , 189.551524
Alignment: singsas(62.95937 , 10.72210) , ytre rendal(61.77218 , 11.16255) , nesvangen , 189.602083
Alignment: ytre rendal(61.77218 , 11.16255) , pilgrimstone(61.73675 , 11.17506) , nesvangen , 189.562773
Alignment: singsas(62.95937 , 10.72210) , pilgrimstone(61.73675 , 11.17506) , nesvangen , 189.593131
Alignment: nideros , vingelen(62.42030 , 10.87150) , pilgrimstone(61.73675 , 11.17506) , 191.907727
Alignment: st olavs knippen , vingelen(62.42030 , 10.87150) , ovre rendal(61.90364 , 11.07817) , 190.687583
Alignment: nideros , vingelen(62.42030 , 10.87150) , ytre rendal(61.77218 , 11.16255) , 191.965243 id=1

OPTIONS

MajorAxis = 6378137
MinorAxis = 6356752.3141
BisectTolerance = 0.06
AlignmentTolerance = 0.06
NinetyTolerance = 0.06
CardinalTolerance = 0.06
EqualAnglesTolerance = 0.06
IntersectTolerance = 0.06
BisectAngle = 1
EqualAnglesAngle = 1
BisectRatio = 33
CardinalLatitude = True
DistanceUnits = Kilometers
BisectRestriction = None
AlignmentRestriction = None
PatternLimit = 1000
RandomAll = False
IncludeAllFixedLocations = True
RandomSets = 1000
DisplayReportAfterAnalysis = True
InitialLatitude = 36.06
InitialLongitude = -107.97
MapProvider = ArcGIS_World_Topo_Map
DistanceUnitsAbbrev = km
```

(b)

```
7th run of 1,000 sets

1: set855
Alignment: singsas(62.95584 , 10.70609) , ytre rendal(61.76475 , 11.16221) , nesvangen , 189.795697
Alignment: singsas(62.95584 , 10.70609) , ytre rendal(61.76475 , 11.16221) , pilgrimstone(61.71832 , 11.17913) , 189.827979
Alignment: ytre rendal(61.76475 , 11.16221) , pilgrimstone(61.71832 , 11.17913) , nesvangen , 189.762629
Alignment: singsas(62.95584 , 10.70609) , pilgrimstone(61.71832 , 11.17913) , nesvangen , 189.777628
Alignment: st olavs knippen , vingelen(62.41810 , 10.88806) , pilgrimstone(61.71832 , 11.17913) , 191.201393
Alignment: nideros , ovre rendal(61.90491 , 11.10051) , ytre rendal(61.76475 , 11.16221) , 191.735637
Alignment: st olavs knippen , vingelen(62.41810 , 10.88806) , ytre rendal(61.76475 , 11.16221) , 191.240642 id=1

8th run of 1,000 sets

1: set311
Alignment: nideros , vingelen(62.41741 , 10.87475) , pilgrimstone(61.72336 , 11.18737) , 192.015401
Alignment: nideros , vingelen(62.41741 , 10.87475) , ytre rendal(61.75758 , 11.17237) , 192.016804
Alignment: nideros , ytre rendal(61.75758 , 11.17237) , pilgrimstone(61.72336 , 11.18737) , 191.746901
Alignment: vingelen(62.41741 , 10.87475) , ytre rendal(61.75758 , 11.17237) , pilgrimstone(61.72336 , 11.18737) , 191.779930
Alignment: nideros , tynset(62.28175 , 10.75928) , tyldalen(62.13538 , 10.80306) , 188.017234
Alignment: nideros , ovre rendal(61.86433 , 11.08986) , nesvangen , 191.169060
Alignment: tynset(62.28175 , 10.75928) , ovre rendal(61.86433 , 11.08986) , ytre rendal(61.75758 , 11.17237) , 200.176781 id=1

no matches in runs 1K, 2K, 3K, 5K, 6K, 9K, 10K
```

Figure 10. Ten test batches of 1000 random sets each; three matches are found: one in the 4th (3287), one in the 7th (6855), and 8th (7311).

The existing complex pattern is not found in the first 1000 sets. Not until set number 3287 does the first match occur. Continuing in batches of 1000, the second match happens at 6855, and a third at 7311, as shown in Figure 10. On examining the three matches more carefully,

none exactly replicate the existing. The four-pointer of the first is an extension north of the Nesvangen, Pilgrimstone, Yter Rendal, alignment up to a Singsås point, the three latter being random within their respective test areas. The existing three-pointer between these three southern sites is off considerably from the existing Singsås location. The second match is very similar using the same four-point alignment. The final match number 7311 comes somewhat closer to the existing with its four-pointer of Nidaros, Vingelen, Ytre Rendal and Pilgrimstone (again the three latter are random points). Its three-pointers pick up the two existing: Nidaros—Tynset—Tydallen (two random), and Nidaros—Øvre Rendal (one random)—Nesvangen.

The odds of builders locating their six early churches to accurately align with each other—considering *only* local travel distance to the congregation, site topography, or political importance of the farm where it is located—appears to be infinitesimally minute. If the large-scale pattern is taken as wholly random, six congregations would have to choose a site and construct a church a very large number of times to achieve this geometry by chance.

How and why did they do it?

The most obvious answer is to provide greater spiritual power, a symbolic meaning of aligments not dissimilar to Muslim orientation to Mecca during prayers, but here focussing on Nidaros as political/religious centre. The third random test match has greater involvement of Nidaros than the first two, particularly as it aligns Nidaros with Vingelen (and close by Olavsjølla) in its four-pointer with Ytre Rendal and Pilgrimstone. Most significant, however, is the fact that this multiple alignment of the third random match does *not* include the long start-finish line from Nesvangen to Nidaros via Øvre Rendal, although this three-pointer does exist independently.

Given the prehistoric importance of Øvre Rendal with its monumental mound, the inclusion of it and Vingelen in the existing start-finish line from Nesvangen to Nidaros has greatest symbolic intent. This might well be the first line laid out as shown in Figure 11. If true, then would it mean that the location of at least one of the four aligned points is coincidental? Even if likely that Vingelen was added after the long line was laid out, and that the adjacent St. Olav's spring was just a coincidental one of 50, the question of the first two end points of the alignment remains. The two most culturally symbolic points were Nidaros and Øvre Rendal suggesting that the Nesvangen natural feature was discovered as surveyors prolonged the line south.

Assumptions here, however, must be scrutinised. Hypothetically, earlier formal landscapes existed in Scandinavia, generated according to the idea of 'intension' rather than 'extension' as argued in Doxtater (2009). Thinking of Nidaros as the initial focal point of an alignment is pure 'extension' where power flows from centre to periphery. What if, however, the most powerful point was considered Nesvangen at the southern fork of the country's largest river? Might we dare think in this case that the location of Nidaros was positioned by this and some other large-scale line from the periphery? Such a line does exist from the start point of the northernmost St.Olav's path at a remote church built in the shadow of the highest mountain in the fjord, Heimdalhaugen (the formal power of this mountain is mapped in Doxtater, 2022).

Perhaps St. Olav's remains had not yet been entombed in a newly built or under construction Nidaros cathedral when the earliest pilgrimage lines were laid out. Within a year or so of St.Olav's death and burial in a sandy river bank, his body was temporarily moved to what archaeologists now believe to have been Olav Haraldsson's St. Clement's Church, also on the river peninsula a few hundred metres north of the eventual Nidaros structure. The length of time he remained here until a place was ready in the cathedral is uncertain. Years certainly, given the completion of Nidaros decades after his death. Historians do not know where in the new cathedral the sacred St.Olav point was, since his sarcophagus was removed during the Reformation to a place some distance north of Trondheim. In this same vein, the location of the returned

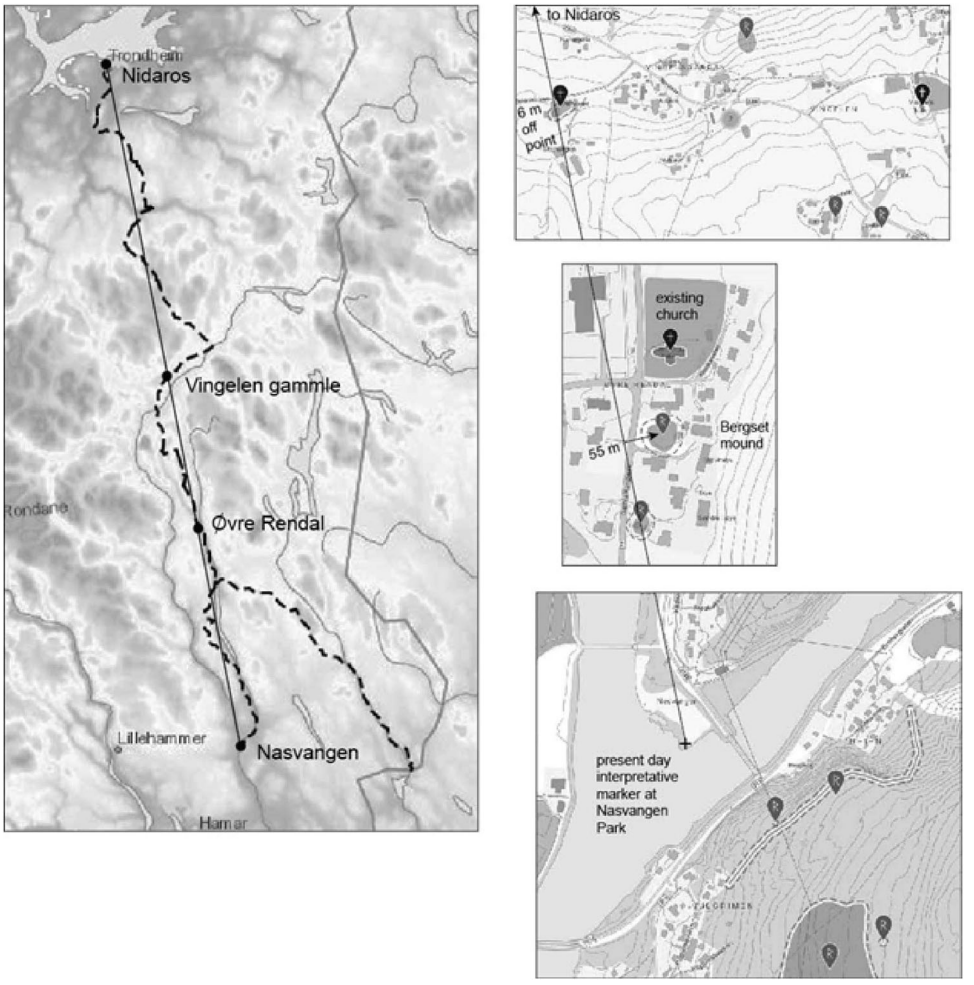

Figure 11. Hypothetical first three-point survey alignment between Nesvangen and Nidaros, with an interim point at prehistoric focal point of Øvre Rendal. Nidaros might have been the least fixed cultural point of the three at the time of early pilgrimage, and could have been partially located by a prolonged line from the first two in the south. Early church at Vingelen might have been added to the alignment later. Map bases from Norgeskart.

remains in Nidaros today are also unknown—assumed, however, to be buried somewhere within.

The logical second survey line from Tydallen through Tynset to Nidaros, not only speaks of a now established point for St. Olav's grave, but the political, economic importance of Tynset at the southern end of an alignment which might have been prolonged south to the neighbouring church built subsequently at Tydallen, Figure 12. Closely associated with this second move could have been a survey from Tynset on the new, second Nidaros axis over to the original focal point on the long Nesvangen—Nidaros line, Øvre Rendal. The prolongation of the line to create the paired church of Ytre Rendal (not unlike Tynset's expansion to Tylldalen) establishes the three-point alignment as ritual artefact.

Also in Figure 13, the final act of integration of the five *Østerdalsleden* churches came from connecting Ytre Rendal down to the Nesvangen start point. If Nesvangen was not just a convenient gathering place in the landscape, but symbolic of spiritual power flowing as the longest river, then why measure the distance to Nidaros from the Pilgrimstone location? After all, the surveyed complex had possibly already been completely laid out. Perhaps it wasn't so

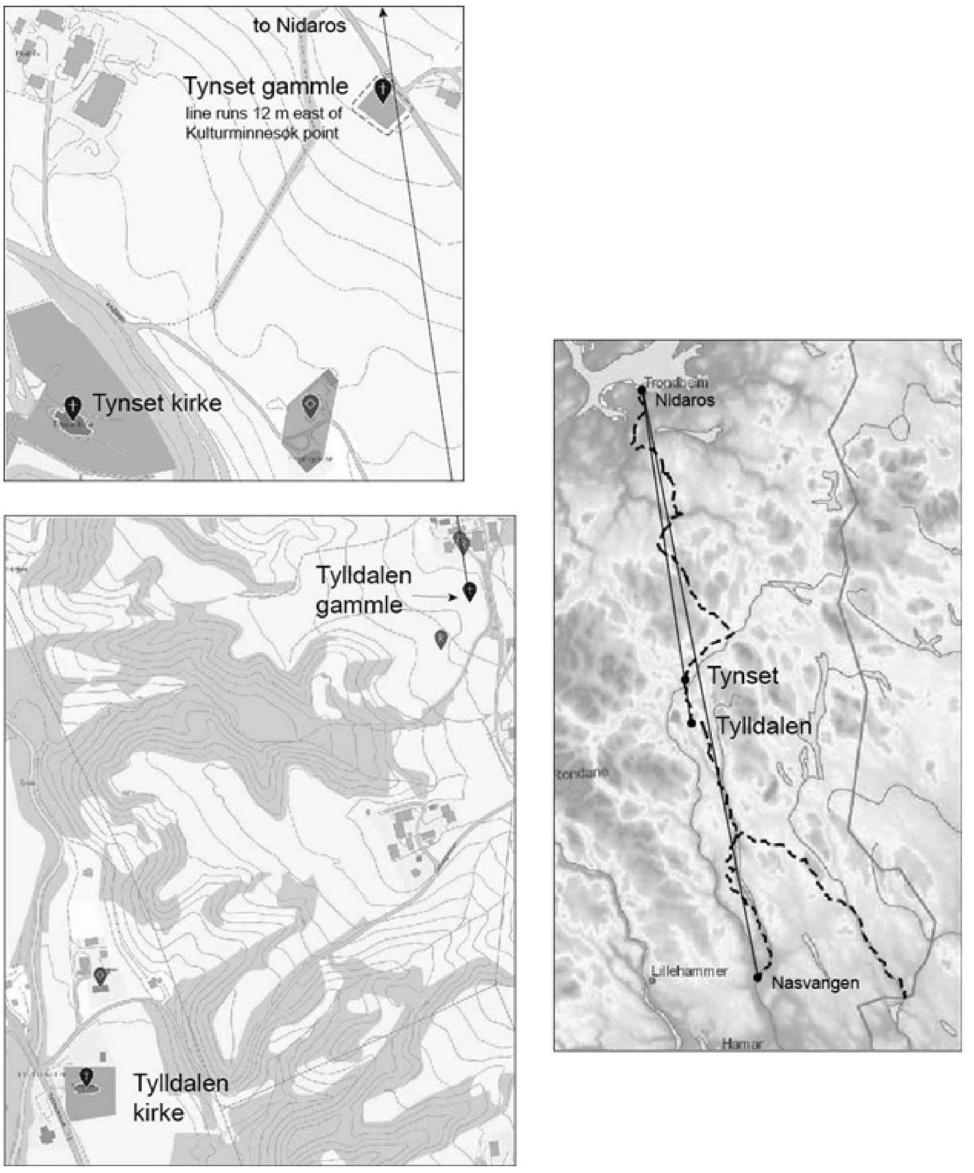

Figure 12. Hypothetical second three-point alignment surveyed during the height of the pilgrimages: with a Nidaros point established, a line from there to the growing cultural point of Tynset could have then been prolonged south to the annex-like church at Tylldalen. Map bases from Norgeskart.

much the distance that was important, but socio-religious fact that a new church at Ytre Rendal was now integrated into the pilgrimage related 'system' via points north and especially its social relations with its paired partner and location of Øvre Rendal. Yet it wasn't aligned with the start point of Nesvangen. Thus a line to Nesvangen might have been especially surveyed to provide proof of Ytre Rendal's final integration into the pattern. An indication of this meaning could be read into the location of the marker only a few kilometres south of the church, along with possible political influence by the farm at Åkre (the marker is called Åkresteinen in the archaeological record). Evidence of an earlier pilgrimage formalities in this area can be seen in Doxtater (2022).

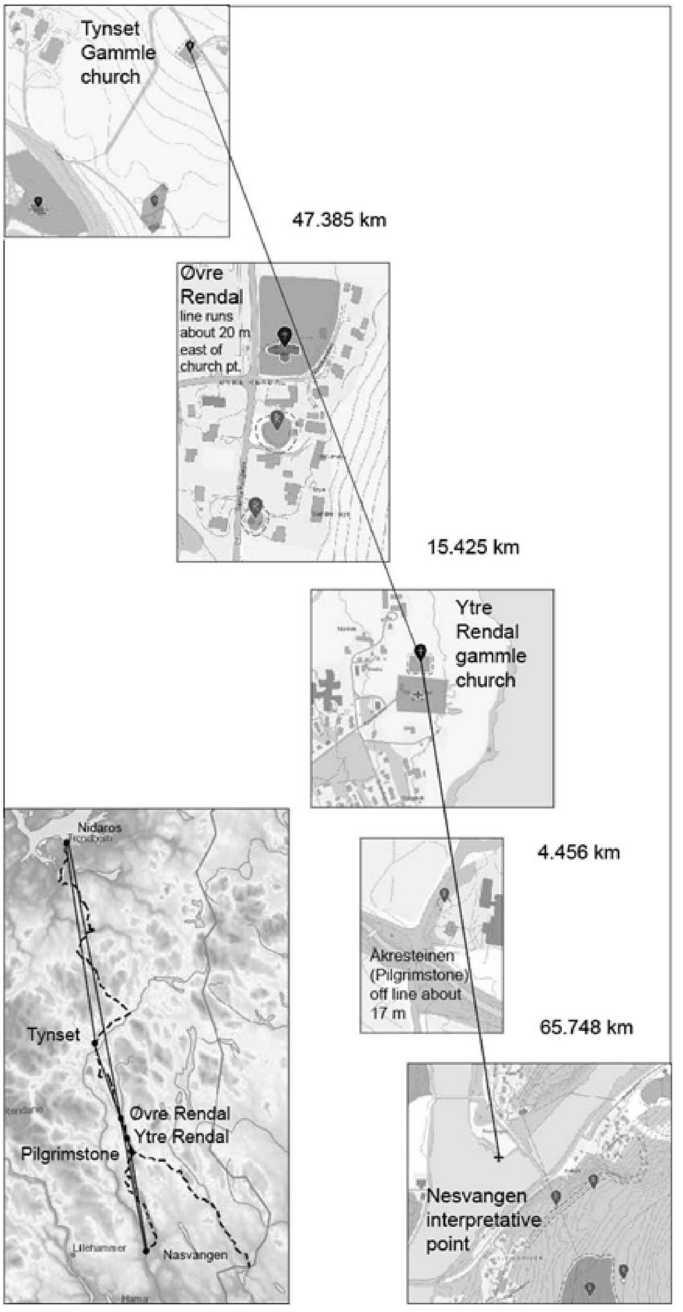

Figure 13. Hypothetical third three-point alignment beginning with Tynset - Øvre Rendal and prolonging to the partner church at Ytre Rendal; and the fourth three-point alignment beginning with a line from Ytre Rendal to Nesvangen, placing the interim point of Pilgrimstone at Åkre. Map bases from Norgeskart.

The smoking gun

As probabilistically remarkable as these test results are, one understandably has difficulty relating accompanying accuracies between sites at the long alignment distances in question. This is particularly true because none of the old aligned site points exhibit any architectural feature whose orientation might be useful in this regard. While locations of much later, standing churches

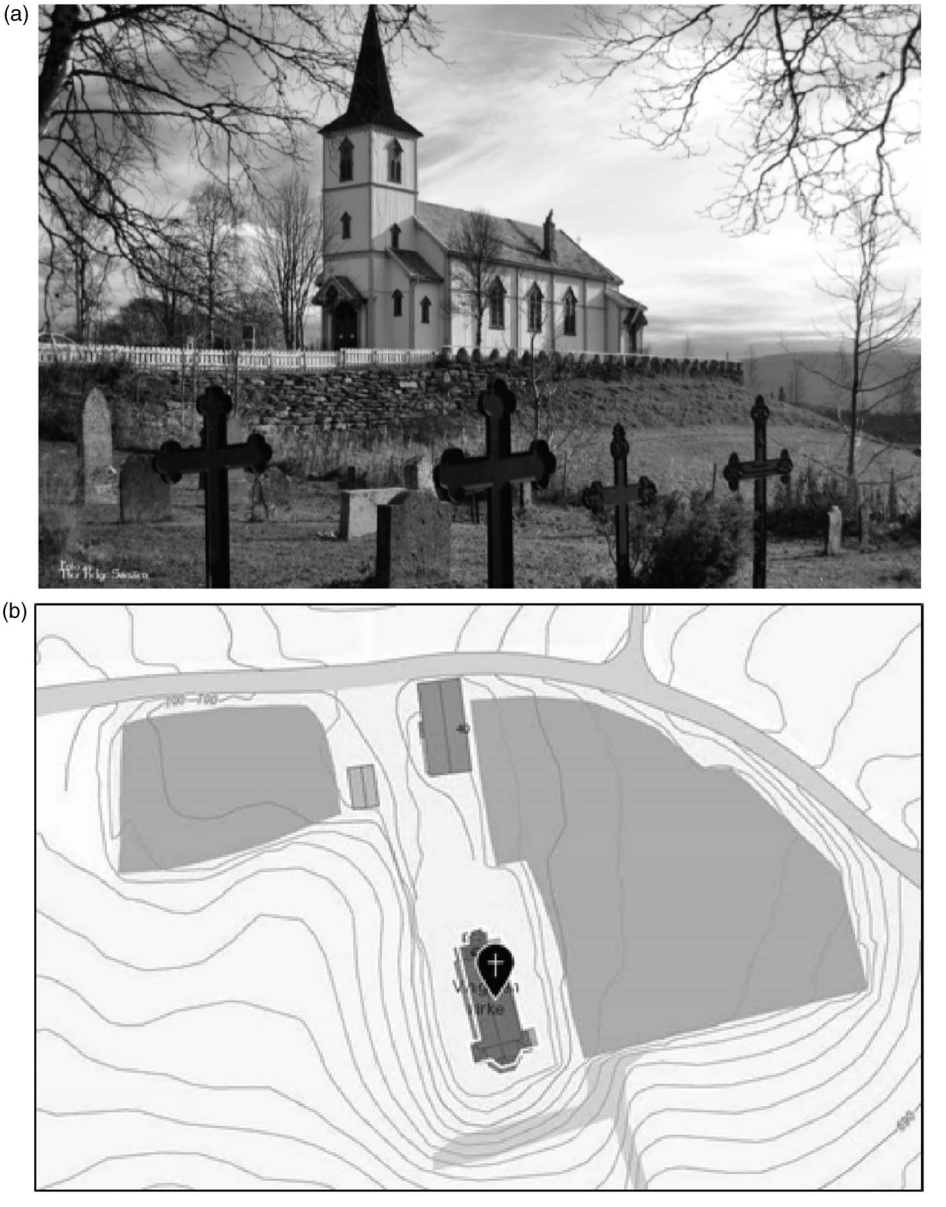

Figure 14. Vingelen site photo (*Wikipedia CC BY-SA 4.0)*: photo by Thor Helge Sømåen) and topographic map of 1880 church at Vinkelen (base map from Norgeskart); the fact that the church is located on obvious fill about three metres above the larger graveyard to the east (which itself is on fill), producing a strong site axis perpendicular to the natural slope of the area, provides clear evidence that some symbolic meaning of church orientation was foremost in local craftsmen's minds. No existing site topography caused this 'exceptional' orientation.

mostly built in the last two or three hundred years were excluded from the analysis, the orientation of the1880s timber church at Vingelen eventually demanded measurement in the context of the large-scale patterns being evaluated. In the description of the structure in Norway's *Kirkesøk* website, its north-south orientation is noted as being '*usedvanlig*' (exceptional). Yet nothing is said about the way this orientation works in relation to the original site topography, seen in photo and plan of Figure 14. The generally east-west orientations of at least the 56 early middle ages stone churches shown in Figure 15 would have required much less grading fill to more

TRONDHEIMSFJORD	STORSJÖN	NORTHERN GOTLAND
320.5 Summer Solstice rise	320.5 Summer Solstice rise	320.5 Summer Solstice rise
282 Hustad		286 Martebo
279.5 Dolm Hitra		285 Bogé
279 Maere		285 Hangvar
275 Alstadhaug		280.5 Fole
275 Snåusa		278.5 Othem
273 Tingvoll		275 Fårö
271.5 Naeroy		273 Fleringe
270.5 Lade		271.5 Halla
270 Equinox	270 Equinox	270 Equinox
268.5 Byneset	267 Mattmar	267 Stenkyrka
268 Nideros	266 Hallen	267 Rute
265 Skaun	258 Lockne	265.5 Visby Domkyrka
265 Vår Frue	254 Offerdal	265 Hellvi
263.5 Vaernes	254 Norderö	264 Hejnum
261 Logtun	251.5 Näs	263.5 Lummelunda
258 Ranem	247 Rödön	261.5 Larbro
256.5 Ørland	244 Myssjö	261 Halll
252 Oppdal	243.5 Sunne	259.5 Väskinde
251 Stiklestad	243.5 Åre	258 Lokrume
248 Gløshaug	240.5 Hackås	257.5 Tingstäde
244 Selbu	239.5 Froso	252.5 Bunge
243.5 Sakshaug	235 Brunflo	
	231 Hammerdal	
	228 Oviken	
223.5 Winter Solstice rise	223.5 Winter Solstice rise	223.5 Winter Solstice rise

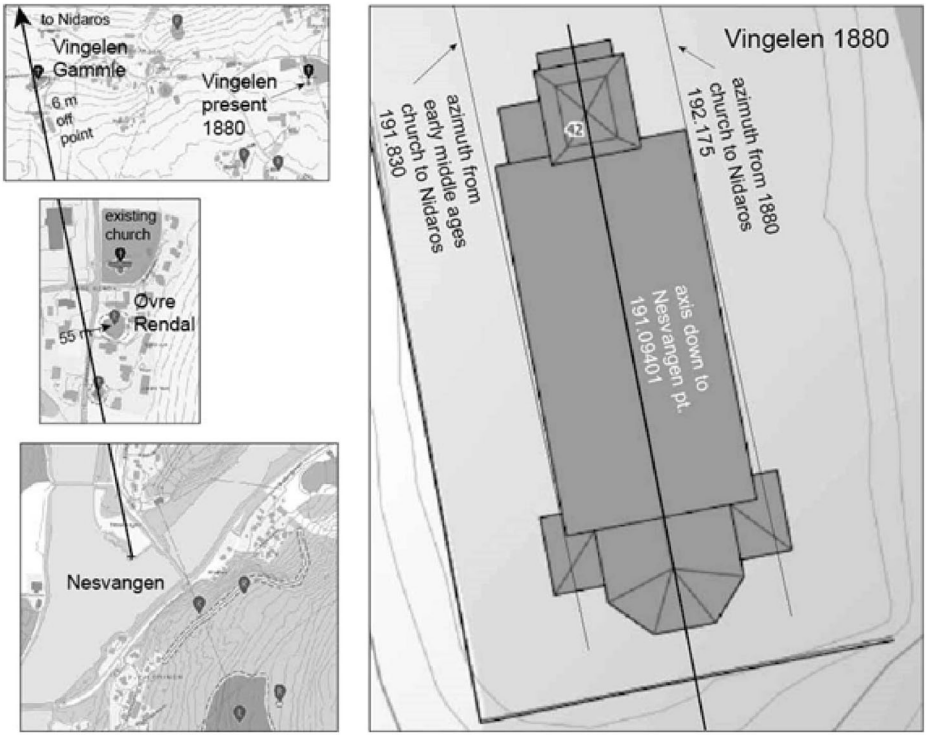

Figure 15. Comparison of church orientation at Vingelen (192°) with orientations of 56 early medieval churches in larger Scandinavian study listed to the left; below, comparison of azimuth of four-point alignment from Nidaros to Nesvangen (191.83° from early Vinkelen church) with orientation axis of 1880s church about 191.1° (plus or minus one half a degree). Map bases from Norgeskart.

comfortably sit parallel rathern than perpendicular to the slope of the site. Clearly the Vingelen church is not the case where historians and archaeologists will make assumptions of existing site topography as cause for church orientation. The view of the valley is probably scenic from the

site point behind the altar, although the entering or seated congregation cannot see it during services. Is there some historic feature in the distance that the church points too but is not part of the formal ritual use of the church?

When one measures the orientation of the 1880s Vinkelen church as drawn in Norwegian state digital maps, its 192° (whole degrees within ½°) is exceptional to say the least. The closest church of the 56 in the larger study, Oviken in Storsjøn, is 228°, some 36° more easterly [it is true that there may be such variants in the larger list of newer churches in Norway]. What then are the additional odds that this particular 1880s church–with its historical roots in the earlier Vinkelen church and the St. Olav Spring community–coincidentally parallels the four-pointer from Nidaros to Nesvangen via Øvre Rendal, and otherwise points within a degree to Nidaros (as noted in Figure 15). In spite of being designed by a known architect of the time, it seems not improbable that local church folk knew not only of the large-scale pattern tradition from pilgrimage times, but that the orientation of the earlier church was also known and emulated rather precisely in the new structure.

Final remarks

Returning to the medieval 'system' of Østerdal churches, most theoretically important is the distinction between ritual and text, discussed some time ago in Doxtater (1984). Such needs to be articulated whenever text based culture, i.e. Christianity, is introduced into a (preliterate) society where religion is firmly embedded into a ritual landscape. Fundamentally, these Viking becoming Christians may not have wanted to 'textualize' their landscape practices. This idea in Scandinavia is outlined in the first chapter of Doxtater (1994) where one can consider two cultural levels of meaning as early churches are inserted into the existing village landscape of Skåne (Southern Sweden). These churches were not formally integrated into the egalitarian villages, as distinct from the way Spaniards located their churches in central plazas in Latin American towns and villages. The collectivity of the Swedisn village was expressed by encircling farm houses; agricultural areas outside were worked cooperatively. Ritual practice made this 'non-discursive' landscape culture work. In distinction, the 'discursive' church structure was located outside of the village ring of farm houses. This practical opposition became a hierarchical, text based vehicle for social accommodation with new territorial national church/state realities.

Having completed studies of the other pilgrimage paths at this time, it appears that these newly mapped landscapes at 'close' range are beginning to bring the above ideas in to sharper focus. More than anything, the Norse who built these pilgrimage 'systems' of landscape experience seemed not to have been in agreement whether a church crypt with St. Olav's bones should be the most important spiritual location to worship the saint. Perhaps the Østerdalsleden began with Nesvangen and Øvre Rendal and could have helped locate Nidaros at a time somewhat later than other paths, particularly Gudbrandsdalsleden. With the close mapping of this adjacent path to the west, one finds the enigmatic Singsås that has zero integration with Østerdalsleden, becomes an iimportant element in this larger system. Most surprizing, perhaps, is the discovery in the analysis of a precisely schematically positioned early church located between Øvre Rendal and Ytre Rendal. No ruins exist at this farm that might have spoken of its early sacrality; neither pilgrimage website includes it. Yet a folktale about the later establishment of Ytre Rendal tells of the timbers from the torn down 'ghost' church being thrown into the river to indicate the location of Ytre Rendal where they wash ashore.

The present article on what may be the most Nidaros focussed pilgrim path will introduce subsequent close mapping of the other paths in a volume including the analyses of many of the larger parish stone churces around Trondheimsfjord. Most of these are said to be pilgrim stops, particularly to those following the route of Olav's 'army' from Selånger on the Baltic through Storsjøn and over the mountains to Trondheimsfjord. Not unexpectedly, the idea and process of

doing close mapping at large scale is difficult for Norwegian archaeeologists and historians, primarily because of assumption of territorial kinds of landscapes in the prehistoric, and the focus on church architecture as text.

Just as interesting should be the study of modern pilgrims as they may or may not use this mapping knowledge to augment their experience. First pilgrims, of course, had no maps at all, probably only verbal discussions about which route to choose. The most travelled coastal route would have been easiest to imagine. But aside from added religious experience from sacred points along the way, could simply knowing how one stop connected to another in the surveyed system—especially since these cannot be seen from each other—help cognise the overall experience? Contempory pilgrims will have an abundance of maps via their cell phones or print depending on coverage. But they will be participating in blogs adding unknown content to the spatial structure. Will new meaning collectivise into more purely symbolic, social and quasi-religious content or more simply collect individual impressions of what is also a scenic landscape?

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributor

Dennis Doxtater is Professor Emeritus, presently marketing a volume that includes all St. Olav pilgrimage paths including one that retraces St. Olav's route from the Swedish Baltic over the mountains to Trondheimsfjord. This work includes analyses of stone parish church orientation and layout that also may have integrated land-surveyed azimuths from other churches and most prominent prehistoric sites. A new paper being completed maps the alignment of medieval churches with the enigmatic Bulverket platform in the large lake in northern Gotland; azimuths are also used in analysing the design of orientations and layouts of these churches. All mapping work includes where possible tests of existing maps against comparative random points. A short volume on the patterns of church location and orientation among Norwegian immigrants in Minnesota just after the grid had been laid out in the second half of the 19th century on the prairie landscape remains to be published. Recent work has suggested knowledge of medieval formal landscapes in Norway still existed in emigrant's minds as they created a new Nordic landscape in America.

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