

Mapping Worlds? Excavating Cartographic Encounters in Plantation Ireland through GIS

Keith Lilley and Catherine Porter

*School of Geography, Archaeology and Palaeoecology
Queen's University Belfast*

ABSTRACT: This paper uses the analytical potential of Geographical Information Systems (GIS) to explore processes of map production and circulation in early-seventeenth-century Ireland. The paper focuses on a group of historic maps attributed to Josias Bodley, which were commissioned in 1609 by the English Crown to assist in the Plantation of Ulster. Through GIS and digitizing map-features, and in particular by quantifying map-distortion, it is possible to examine how these maps were made, and by whom. Statistical analyses of spatial data derived from the GIS are shown to provide a methodological basis for “excavating” historical geographies of Plantation map-making. These techniques, when combined with contemporary written sources, reveal further insight on the “cartographic encounters” taking place between surveyors and map-makers working in Ireland in the early 1600s, opening up the “mapping worlds” which linked Ireland and Britain through the networks and embodied practices of Bodley and his map-makers.

From his lodging on the Strand in London in March 1610, Sir Thomas Ridgeway, the first earl of Londonderry, wrote a letter to the earl of Salisbury, Robert Cecil, then the lord treasurer for England and the English Crown.¹ Referring to maps “newly bound in six several books,” Ridgeway’s letter marked the end of a long enterprise, begun some eighteen months earlier, of surveying and mapping the Irish lands newly taken for plantation; the escheated counties of Ulster. Ridgeway wrote that not only would Salisbury receive the finished maps in a few days’ time, but that he would also send him “six like books of his own which he extracted at the camp and at his own house.”² The maps were not entirely of Ridgeway’s making however, but were the work of a small group of men employed by the Crown in both Ulster and England to map the escheated counties, that is those lands confiscated by the English following the “flight of the earls” in 1607.³ To assist with the Plantation of Ulster, a commission was authorized by King James I in June 1609, and a key part of its remit was to survey and map escheated lands in counties Armagh, Tyrone, Londonderry, Fermanagh, and Cavan.⁴ Contemporary correspondence concerning the commission illuminates the working practices of surveyors and cartographers in the early seventeenth century, as well as highlighting their particular roles and agency within the broader context of British colonial statecraft in Ireland.

Some thirty years ago, Brian Harley observed that understanding historic maps required “a social history of cartography,” thinking, that is, about the cultural contexts and networks of map production and consumption.⁵ Doing so involves bringing maps and texts into dialogue with each other, something that is not always achievable in the history of cartography before ca.1700. Yet with the “newly bound” maps to which Ridgeway refers in 1610, not only does correspondence survive between those involved in their making, in the form of further letters, so too do the maps themselves. The group of maps, long known by modern scholars as the “Bodley maps of the escheated counties of Ulster”, formed part of the State Papers of Ireland, but in 1927

were separated and placed in the “maps and plans” class at The National Archive (TNA) at Kew.⁶ Numbered MPF 1/38-64, this group of twenty-eight maps of western parts of Ulster have been the subject of detailed scholarly scrutiny since the nineteenth century.⁷ Most recently the maps have received particular attention from two of Ireland’s leading historical geographers, John Andrews and Willie Smyth.⁸ Both have dedicated substantive research papers on the assemblage that comprises the TNA’s “Bodley maps”, evaluating not only the broader political contexts for the maps but also examining closely the contents of the maps themselves. This paper extends their work, in part drawing upon the contemporary historical accounts of the cartographers involved in making the Bodley maps, but in addition, and more specifically, through using map-digitization, Geographical Information Systems (GIS), and quantitative techniques to examine in detail one particular map within the Bodley group, the map of Loughinsholin (MPF 1/47). The results of these new analyses are presented here, and their significance evaluated for understanding the processes and practices of colonial cartographic production in early seventeenth century Ireland.

Cartographic encounters

The letter Ridgeway wrote to Cecil in March 1610 is an indication of the intersecting worlds of mapping and map-making that drew together Ireland and Britain in the reign of James I. Those whose lives shaped these “mapping worlds” have been traced out by Smyth.⁹ Connections and links between various state agents, and cartographers and cosmographers, of Tudor and Stuart Britain and Ireland, reveal intertwined networks across Europe and the Atlantic in the sixteenth and seventeenth centuries.¹⁰ With lines depicting “key actor networks”, and links between a host of related individuals, the complexity and intricacy of Smyth’s map of map-makers is also a map of “cartographic encounters.”¹¹ These encounters occurred in various locales of course, both urban and rural, inside and outside, and through various media, written, oral, visual, all of which molded the map-making process in subtle and often hidden ways.

Tracing these networks and encounters for the early seventeenth century is no easy task, despite the volume of surviving letters and reports from the period, as well as many of the maps referred to in them. In their work on the Bodley maps, both Smyth and Andrews combine detailed examination of the written sources and the map with a contextual approach to the history of cartography. Yet still, what has so far emerged is far from conclusive, for cartographers of this period usually reveal relatively little directly about the technical production of their maps. At the time the Bodley maps were made, map-making was by no means a standardized process.¹² While contemporary treatises existed on matters such as surveying and “plotting”, including one written by John Norden, *The Surveyors Dialogue* of 1607, not all maps of this period were produced through surveying and measurement on the ground, *in situ*. Some were, instead, produced by copying from the maps of others, sometimes at a distance away from the place depicted by the map.¹³ For example, this would appear to be the case for Norden’s own map of Ireland, of around 1610, which Andrews suggests was largely derived by Norden from earlier maps, including one of the whole island produced in London by Giovanni Boazio in 1599, as well as for maps by Richard Bartlett during the early years of the seventeenth century.¹⁴ While Boazio’s map was, by his own admission, “partly surveyed,” Bartlett’s were a product of first-hand experience in Ireland, a task that cost him his life in 1607.¹⁵ The processes of production for the Bodley maps, and the cartographic methods that were used to create them, is a similar conundrum.

The MPF 1/38-64 group of maps, named after Josias Bodley, were actually the product of many minds and hands.¹⁶ Some of those involved were based in London, and thus physically remote from the western parts of Ulster that the maps portrayed, while others involved were familiar with Ireland first-hand, through their personal and professional experience. Through treasury accounts of the period, something is known of those individuals involved, for payments

were made to a group of men and not just to Bodley himself.¹⁷ Others named were higher ranking government officials, including William Parsons, surveyor general in Ireland, and George Sexten, clerk of the Crown in Ulster.¹⁸ Then there were also four other men who, like Bodley, were paid for their work “surveying and plotting” and also “framing and drawing up the plots and descriptions,” one of whom was Thomas Raven, who later mapped parts of Ulster in detail. A John Rawson was also specifically paid to color the maps of the escheated counties.¹⁹ The map-making process was undertaken in Ulster as well as in Dublin and London, from summer 1609 through to spring 1610.²⁰ As such, rather than being the product of one hand, the maps bound in books submitted for Earl Salisbury’s perusal in March 1610 were multi-authored and the result of a protracted, interconnected process. The images of the escheated counties that the maps contained had political value and strategic purpose to the Crown of course, but as important to the English government were the bonds they forged between Britain and Ireland *through* the embodied practices of surveying and map-making *in*—and not just *of*—Ireland. The maps attributed to Josias Bodley thus suggest wider influences and networks—*cartographic encounters*—that stretched across and between Ulster and England during the early years of James I’s reign.

Unfolding the Bodley maps, metaphorically, reveals a complex web of social relations that wove England and Ulster more closely together at the time, yet recovering these past connections between the maps, as well as between the maps’ makers and the mapped, is not easy. Just looking at the Bodley maps themselves as a group, reveals certain idiosyncrasies that can be used to try to deduce the likely individuals who had an input into making them. For example, two adjoining maps, showing the Barony of Knockninny (MPF 1/38-39) at the western end of Lough Erne (county Fermanagh) use a plain blue for the water of the lough, whereas in the “the map of the Barony of Maghera Boy” (MPF 1/43), which shows an area nearby, the lake is shown by a distinctive zig-zag motif. This same zig-zag pattern appears again for bodies of water on a group of later maps, of London company lands in Ulster of 1622, including Londonderry and other new-founded towns, all drawn by one Thomas Raven, making it most likely that the Magheraboy map (MPF 1/43) of 1610 was also of his particular making.²¹

Further comparative inspection of the Bodley maps grouped as MPF 1/38-64 reveal certain similarities to a group of earlier Ulster maps (MPF 1/35-37), known to have been made by Richard Bartlett some eight years prior to those worked on by Bodley and Parsons.²² Andrews points out that the compiler of the published catalog of maps and plans in the TNA had indicated that the Bodley maps were associated with the earlier Bartlett maps by being enclosed in the letter of March 15 1610 from Ridgeway to Salisbury, and that this might suggest “that the two sets of maps were brought together . . . perhaps by Salisbury himself.”²³ Robert Cecil’s interest in maps is known from other sources and perhaps owed something to his own father’s cartographic work under Elizabeth I, in his capacity then as her lord treasurer.²⁴ The three Bartlett maps, each of 1602-3, comprise a “campaign map” of south east Ulster (MPF 1/36), a “generalle description” of Ulster (MPF 1/35), and a map of Donegal and Sligo Bay (MPF 1/37).²⁵ The first two maps were signed by Bartlett, but all three are of his making, and while each is drawn at a smaller scale than the later maps of the escheated counties, the second in particular covers the area that was surveyed and mapped under Bodley and Parsons in 1609–10. It seems likely, then, that the Bartlett maps had an influence on the maps of the escheated counties. One of the most striking similarities between the two sets of Ulster maps is the use of “blank” rectangular-shaped cartouches at the maps’ borders, as well as the shared color palette of whites, greens and mauves, for differentiating blocks of land, some of the boundaries of which were accentuated by the use of a broader colored band. This is the case with “the map of the barony of Loughinsholin” (TNA MPF 1/47), for example, where the mapped lands are distinguished and grouped using differing colors, a symbology that can be seen to geographically divide the barony into two constituent parts (Figure 1).



Figure 1. Map of 'parte of ye Baronie of Loghinisholin', No. 620, TNA MPF/47. (Reproduced by permission of The National Archive, Kew)

In TNA MPF 1/35-64, two sets of maps (Bartlett's and Bodley's) seem to share a common visual language, as if commissioned and presented to form a unifying vision. While there are some subtle variations between the maps within the Bodley group (MPF 1/38-64), for example in terms of their orientation and typography, the overall impression gained by viewing Bartlett's and Bodley's finished maps side-by-side, collectively, is one of consistency and coherence.²⁶ This consistency between the two sets would surely also have helped to add further weight to their perceived authenticity and veracity (at court in London) as maps of far-off lands, perhaps also reflecting Bartlett's continuing posthumous standing as a cartographer of repute whom Salisbury and the Crown held in particular regard? Examining such cartographic traits are important for it is through them that the Bodley maps may be traced to the processes and practices of their production and consumption, and their circulation within wider circuits of knowledge and colonial statecraft.

One further area of uncertainty about the making of the Bodley maps concerns how far the mapped lands and landholdings were derived from surveying work carried out in the landscapes of western Ulster. Rather than employing "rules of survey" as such, Andrews argues that surveyors on the ground engaged instead with "knowledgeable informants," whose role was to affirm what had been said at the inquisitions, so guiding surveyors locally and helping them in their task of identifying topographical features in the landscape, such as rivers, mountains,

bogs and woods.²⁷ Contemporary written accounts help reveal a process of information gathering at first-hand. Indeed, Josias Bodley himself reported in February 1610, in a letter written to Earl Salisbury, that “to have gone to work by the strict rules of survey would have asked long time, and drawn on deep charge,” so instead what they did was to “call unto us out of every barony such persons, as by their experience in the country, could give us the name and quality of every ballibo, quarter, tate, or other common measure in any precincts of the same, [particularly] how they butted, or mered interchangeably the one on the other.”²⁸ Bodley reported that with these “and other necessary helps, we contrived those maps.”²⁹ From these accounts (as well as from the maps themselves and associated written sources), Andrews deduced that the maps derived from inquisitions held at certain locales, where local inhabitants were summoned to describe the pattern of lands in the escheated counties.³⁰ Thus, while their cartographic “framework” was perhaps “stiffened by compass bearings” taken in the field, Andrews concluded that theirs was not “a true survey.”³¹ Nevertheless, it is worth noting that the 1609 survey was intended to correct earlier less accurate calculations made in 1608, and by Bodley’s own admission his own work in Ulster had “found many thousands of acres more for his majesty, than by any survey heretofore.”³² By this time, theodolites and plane tables, as well as chains for measuring and triangulation for calculating angles and bearings, were all part of the surveyors’ and cartographers’ *modus operandi*.³³ How far Bodley’s “contrived maps” were based upon surveying work undertaken locally in the landscape remains worthy of further consideration, for it remains to be seen to what extent ground-surveying formed a part of the process of map-making for Bodley and his team.

Landscape mappings

All the completed Bodley maps of the escheated counties of Ulster show a nested hierarchy of territorial divisions, the smallest units of land (townlands) being depicted as bounded areas, creating a mosaic of individually named and differently shaped parcels for all the baronies that were surveyed (see Figure 1). Within these townland units are symbols, the most common of which by far is a red dot. Townlands were not shown on Bartlett’s 1602-3 maps, though the larger units of land were distinguished. In fact, Bodley’s demarked townlands of 1610 is a feature seemingly unique to this group of maps, with parallels not easy to find, either in England or Ireland, at this period.³⁴ The mapping of the townlands, Andrews suggested, occurred through a process that relied largely on the oral testimony of those summoned to the commission’s inquisitions during late summer 1609, which began first in Armagh, on August 12, then proceeded in turn to Dungannon, Limavady, Derry, Lifford, Enniskillen, ending on September 25 in Cavan.³⁵ This peripatetic process thus circumnavigated the escheated lands, placing the surveyors, the informants and the commissioners within those mapped landscapes and territories that were committed to paper and ink early in 1610. At the same time, for those parties consulted and encountered by the surveyors in their journeys in and around western Ulster, this process also visibly defined the marked-out territories on the ground.

However the maps of the escheated counties were “contrived,” then, Bodley and the surveyors trod the ground in Ulster. The surveying process itself was an embodiment of the British colonial enterprise in Ulster, as government officials and surveyors alike traced out their maps, of the local landscape and its tenurial geographies, through physically being there. Bodley’s maps had an agency that was immediate and tangible to those brought within the scopic regime of the English cartographers. This was a much more visceral experience, of being seen to be mapped, than that say of Boazio and Norden whose map-making was at a (safe) distance. The social relations that unfolded through this process of surveying for Bodley’s maps have been discussed by Smyth, who remarks on the ways in which the surveyors translated an (Irish) oral landscape into a (colonial) written one, a process with close parallels to overseas cartographic

encounters that featured in other episodes of the British imperial expansion during the nineteenth and twentieth centuries.³⁶ As far as the recorded townland names are concerned, both Andrews and Smyth point particularly to the apparent precision in the nomenclature and toponyms used in landscape mapping by Bodley and his group.³⁷ Irish (Gaelic) placenames were recorded townland by townland across the mapped landscape; hence the Bodley maps provide one of the earliest extant *written* accounts of local toponyms of western Ulster and are an invaluable source for later cartographers and historians. However, the townland maps of 1609–1610 somewhat paradoxically perpetuated what otherwise might easily have become a lost landscape and history, something overwritten by the newcomers. Instead the pre-Plantation landscape of Ulster was immortalized by Bodley and the surveyors, as Smyth pointed out: “the stubborn townland unit endured in plantation ledgers, on the maps, in the rent-rolls and in the lives and minds of the people,” and so “the past was never fully eroded by conquest and plantations.”³⁸

The presence of named and mapped townlands on the Bodley maps offers scope for relating the historic landscape of Ulster just before the Plantation to the later landscape of the mapped counties. Using historic maps to explore landscape histories is a well-practiced approach of the kind stimulated by the work of English landscape historians such as W. G. Hoskins and M. W. Beresford. Identifying various landscape layers that constitute the modern landscape as a palimpsest, the Bodley maps might form one particular source of evidence for landscape change, providing a potential snapshot of a past landscape.³⁹ With their cartographic eccentricities and overt political purpose, early maps such as those of Bodley might be viewed suspiciously by those seeking to somehow map objectively a landscape’s historical evolution, yet the maps themselves were clearly intended to be accurate, establishing what was where and how much land there was, as Bodley himself made clear in his letter to Salisbury.⁴⁰ This was no trivial exercise, therefore, but rather a serious undertaking with important consequence, and Bodley’s maps should surely not be underestimated as cartographic endeavors. Nevertheless, some recent commentators on the maps have questioned their spatial and geographic accuracy – their “planimetric shortcomings” as Andrews put it – through identifying misplacement of certain mapped features such as rivers or names.⁴¹ The latest evaluation of the Bodley maps by Annaleigh Margey restates this view that, “if the baronial boundaries are examined, it becomes apparent that the neatness and exactness of their layout, betrays the fault of their survey, as it was unlikely that such consistent boundaries [of townlands] were in existence on the ground in the presence of rough terrain in Ulster.”⁴² These interpretations largely rely on looking for cases where the maps are wrong, but as Harley and others have stressed, all maps are cultural constructs.⁴³ So rather than making judgments on the maps as examples of either good or bad cartography it seems more productive to begin to use the disposition of the maps’ features to help understand *how* the maps were made.

In looking further at the cartographic methods used by Bodley and his team, two questions are fundamental: first, how far did the Bodley surveyors work from contemporary principles and practices of ground-survey in creating their maps, and, secondly, to what extent was the placement of the bounded and named townlands shown on the maps reliant on the words and gestures of local informants or measurement and computation in the field? To begin to disentangle the map-making process requires some assessment of how the maps represent the local landscapes they depict, particularly how they position (spatially) the places that are shown, such as named townlands and topographic features. There is an analytical process that enables this to be done, through comparing the geographical positioning of mapped features statistically, and using GIS as a means of quantifying the relationship between mapped landscapes. It is an approach that can yield new insights into the practices of early seventeenth century surveyors and cartographers working in Plantation Ireland.

Cartographic analyses

The idea that a measure of relative map distortion can be derived and quantified is not new. Waldo Tobler established in the 1960s a statistical method of analyzing historic maps to determine how far geographic information corresponds between maps of different provenance.⁴⁴ The same method can be used to explore cartographic variations within a map, allowing calculations to be made of differential map-distortion across a mapped area. With the application of GIS, and the availability of new computer software packages such as MapAnalyst, Tobler's techniques of statistical regression can be relatively quickly implemented and explored as a research tool.⁴⁵ In recent years a range of historic English maps have been analyzed quantitatively, exploring internal patterns of cartographic distortion (as has been done with the mid-fourteenth-century map of Britain known as the Gough Map), as well as comparing maps over time (as carried out for a group of eighteenth- and early-nineteenth-century maps of Essex in England).⁴⁶ It is an approach tried out elsewhere too, not least in Ireland. For example, John Andrews, Matthew Stout, and Helen MacMahon used 'the TRANSFORM function' of Arc/Info to calculate the root mean square (RMS) error for a series of maps of Ireland, including Speed's map of 1610 and Boazio's of 1599.⁴⁷ However, while the potential of Tobler's cartographic analysis for quantifying cartographic distortion is relatively easily implemented through using GIS and MapAnalyst, it needs some careful handling, both statistically as well as interpretatively.

All maps, of course, distort space, simply by rendering the spherical Earth into a flat surface, the map. With historic maps, such as those of Bodley and his surveyors of 1609-1610, quantifying relative distortion provides a way of looking "behind" the map, *excavating* it, as it were, to help establish whether ground survey was part of the map-making process.⁴⁸ Put simply, if Bodley had used survey methods such as triangulation, or taken field measurements with instruments; for certain areas of the lands covered, the expectation might be that these same surveyed areas would be evident through analyzing the map's geographical positioning of topographic features. If certain rivers or mountains were surveyed on the ground, for example, their distances ought to equate in some way with distances on the map. Andrews points out that the Bodley maps have no scale-bars drawn on them but that the maps were drawn to an approximate equivalent scale (he estimated) of around one and a quarter inches to one statute mile, or inch and half inches to one Irish mile.⁴⁹ Keeping the maps of the escheated counties at a comparable scale was something that seems to have been important for the map-makers, for instead of shrinking a larger barony to fit onto a single sheet of paper (a more cost-effective approach), two sheets of paper were used, enabling all the baronies both large and small to be more effectively compared. Quantifying cartographic accuracy is something to be explored further therefore, not to diminish the quality or importance of the Bodley, but rather as a means of better understanding the principles and practices underlying their production.

What can be gleaned, then, from analyzing cartographic distortion in the Bodley maps? As part of Andrews' thorough evaluation of the maps of the escheated counties, he employed – with particular novelty for the time – the analytical ideas set out by Tobler to assess the "agreement between escheated counties maps and one-inch Ordnance Survey maps."⁵⁰ Reproducing the results of these analyses as a table in his paper of 1974, Andrews said rather little about how this technique was deployed, apart from that "Professor Tobler has kindly explained his method and applied it to a number of maps" that Andrews had supplied. Even so, the values derived from Andrews' article provide a useful starting point for further analytical investigation. Of the twenty-eight examined, a small group of the maps show high degrees of agreement between themselves and the Ordnance Survey (OS) maps, pointing to a close correlation in the mapped information, and indicating therefore that some of the Bodley maps correspond cartographically

closely to the OS-mapped landscape. The maps in this “elite” group include those with a value of ninety percent and over (100 percent being complete agreement), namely maps numbered IX (90.2 percent), XI (90.2 percent), XVII (91.6 percent), XVIII (90.0 percent) and XXIII (91.0 percent), to which map III perhaps also ought to be added (89.9 percent).⁵¹ The shared higher values for certain nearby and adjoining maps (IX “Part of Dungannon” (MPF 1/45) and XI “Part of Loughinsholin” (MPF 1/47), and XVII “Tullygarvey” and XVIII “Clankee”, respectively), is perhaps significant, suggestive that these particular maps were where surveyors were able to get a closer spatial fix for local landmarks and their coordinates, and so produce maps with a higher degree of cartographic accuracy compared with others? After all, some of the results from Andrews’ analyses were much lower, down to 8 percent in the case of Part of Oneiland (MPF 1/61), while the majority of the maps score between 60 and 90 percent (seventeen out of the twenty-eight). This suggests that there is potentially something rather special, or at least significant, about the five maps at the top of Andrews’ table, though curiously he made little of this observation himself.

Such different figures might point to variations in working practices between those involved, with more expert surveyors working in certain baronies and less-skilled ones in others? Of course, the possibility has to be that particular kinds of ground may also have presented greater difficulties for surveying, and that while some baronies were relatively easy to survey, others were not. To consider this further one of the higher-scored barony maps – number XI “Part of Loughinsholin” (MPF 1/47) – is used here to look more in more detail at patterns of internal map distortion, to explore how far these techniques of cartographic analysis might yield some insights into the surveying practices involved in creating the map. This particular map, in common with many of the Bodley maps, has no particular stylistic characteristics to mark it out as especially different to the others. It has similar typography and symbology and shows an area west of Lough Neagh, in County Londonderry, around Maghera, encompassing the valley of the Moyola River as well as the eastern flanks of the Sperrin Mountains (Figure 2). To begin to explore the patterns of cartographic distortion shown by MPF 1/47 requires a number of stages, set out here, of digitization in a GIS, of data linkage, and of statistical analysis. The analyses themselves provide a basis for “excavating” how this particular map was made, in particular through relationships with the local landscape, and the possible ways Bodley’s surveyors engaged with it and those who provided information about the disposition of the adjoining townlands that appear on Map XI.

Excavating ‘Map XI: Part of Loughinsholin’ (MPF 1/47)

The core of Tobler’s method of cartographic analysis is the quantification of the correlation between mapped features. The Bodley maps, as already noted, largely consist of bounded areas, the named townlands. So, for the purpose of the analysis of Map XI, townlands provide the firmest basis for comparing geographic information between the 1610 map and the same area mapped later. For this more detailed cartographic analysis, rather than the one-inch scale OS maps used by Andrews and Tobler, the later maps chosen to compare Map XI with are the OS first edition six-inch scale sheets of the 1830s.⁵² Excavating Map XI itself requires starting with a high resolution digital image, in this case acquired from the TNA.⁵³ Once imported into ArcGIS, the raster image is georeferenced (note *not* georectified) so that the scanned map is the digital equivalent, in its dimensions, to the original manuscript map.⁵⁴ In addition; in the GIS, the entire content of Map XI is digitized as vectors, allowing coordinates to be derived from the scanned map to provide data needed for analyzing and comparing variations in map-distortion across the source maps.

Excavating Map XI in a GIS highlights the various map layers that together comprise it: its rivers, loughs, settlements, forests, and, of course, townlands (Figure 3).⁵⁵ For the statistical

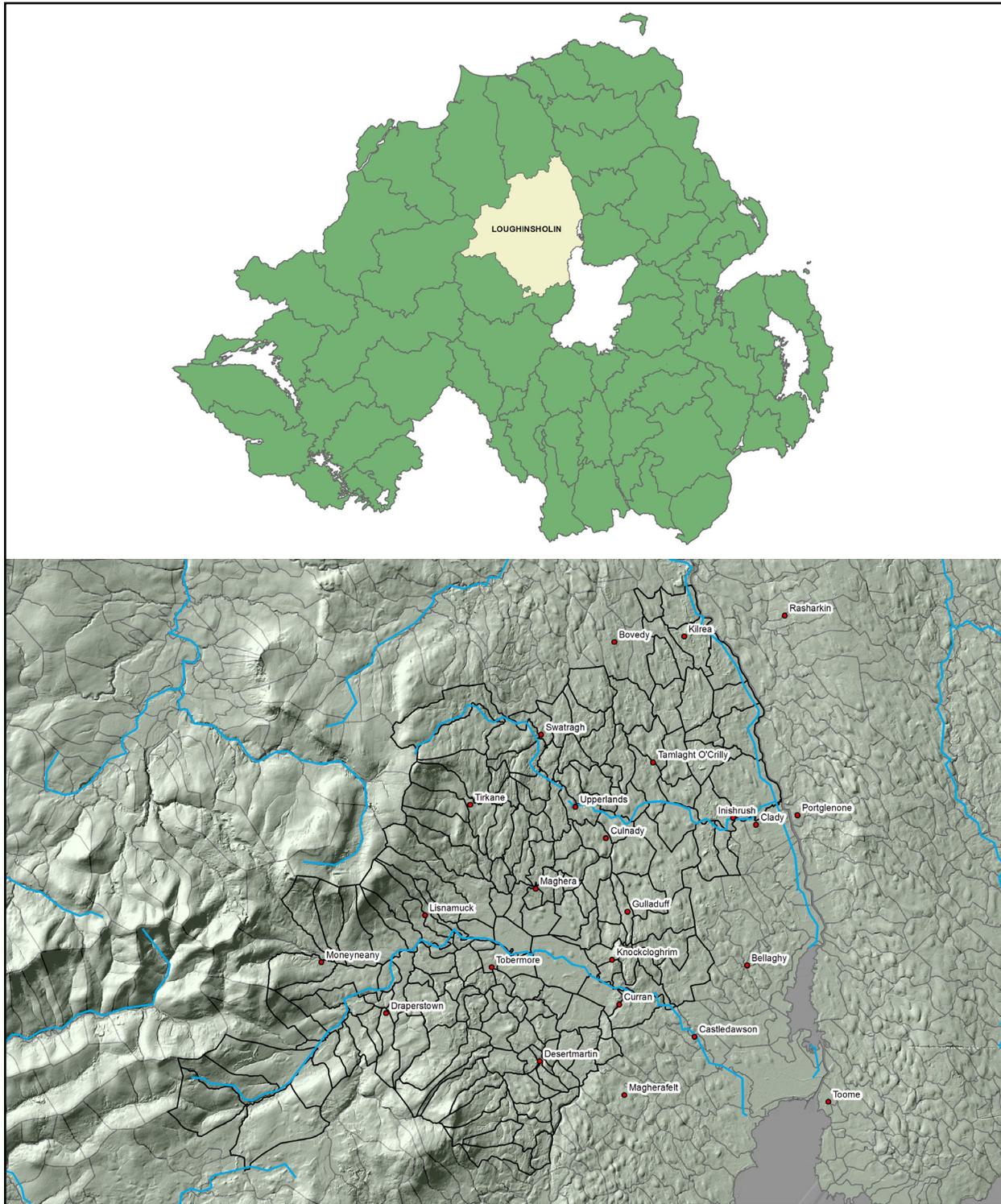


Figure 2. Top: the study area (named) within modern Northern Ireland. Bottom: the boundaries of townlands shown by MPF 1/47 but digitized from 1830s Ordnance Survey First Edition six-inch to one mile sheets (overlaid onto a relief model).

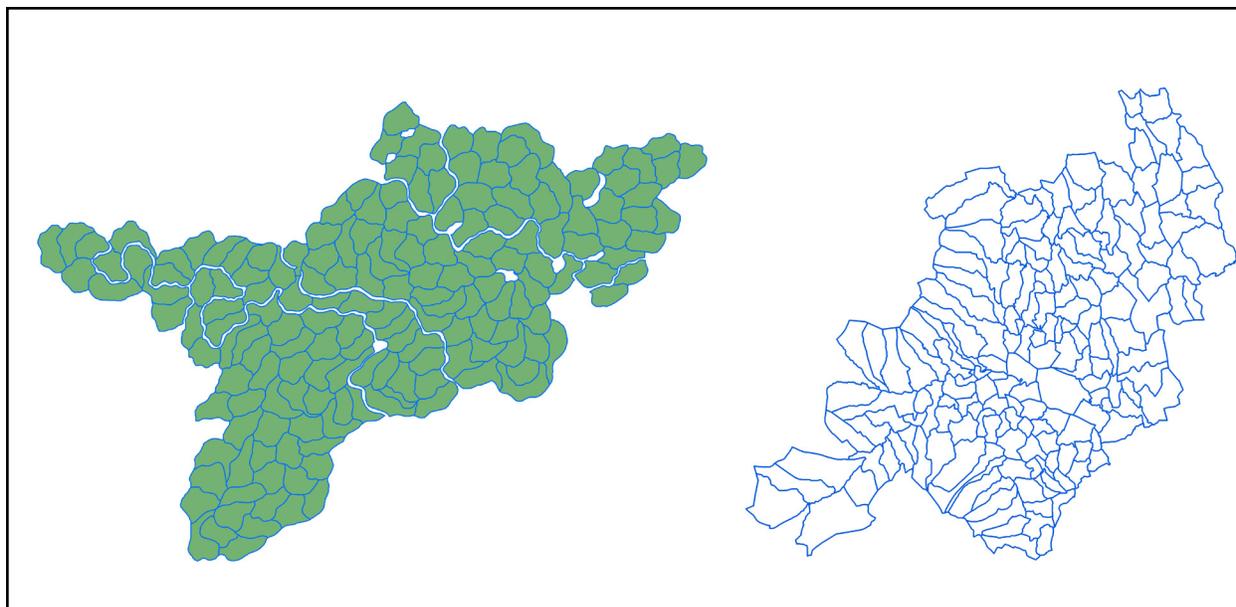


Figure 3. Left: the townlands in the barony of Loughinsholin from MPF 1/47 as digitised in ArcMap (left). Right: Loughinsholin digitised townlands as shown by the six-inch Ordnance Survey.

analysis, “point data” are preferred (rather than lines or polygons), as these provide discrete coordinate data which are more readily compared. The Bodley maps do contain “points” (a red dot) within each of the mapped townlands, but it is likely that these were not intended to indicate actual locations of settlements; not least because this area of west Ulster is characterized by a mix of dispersed and nucleated settlements.⁵⁶ For this reason, then, point coordinate data for Map XI were derived from the map’s townland boundaries, which were digitized to create a polygon shapefile, first and then, from these polygons, a center point was calculated using the centroid tool within ArcGIS.⁵⁷ This process yields map coordinates of centroids for each of the mapped townlands, a total of 173 in all. As well as creating the point layer in the GIS, each point shapefile is attributed with the townland name, as derived from the Bodley map. It is this identification that allows Bodley map townlands to then be matched with its Ordnance Survey Northern Ireland (OSNI) historic townland names (as shown on the six-inch OS), a process facilitated greatly by the results of the Northern Ireland Place-Name Project.⁵⁸ The match with the modern townland boundaries provides the structure that is necessary to create an attribute join within the GIS, completed first by deriving a coordinate centroid from each OS six-inch townland, and second, joining the OS townland table to the Bodley townland table with its centroid coordinates (Figure 4). Of the 173 townlands, 150 were name-matched and successfully joined, but 23 townlands cannot be matched, mainly where a townland named on the Bodley map no longer exists. Also, in some cases townland names and boundaries were divided into two or more new townlands, while others were amalgamated with adjacent townlands so losing their original identities.

It is the joining of these two sets of coordinate data into one shapefile that enables analysis of positional variations of mapped points and comparisons between the Bodley and OS townlands. The statistical method used for this is based upon correlating coordinate data from the two maps, using the relative distancing and spacing of common points to determine how closely the two historic maps “fit”, spatially, or “correlate”, statistically. To do this, different forms of regression analysis are used, each providing statistical outputs as well as (using MapAnalyst) visual outputs of variations in cartographic distortion, or veracity.⁵⁹

UniqueID	BodleyName	ModernName	X_Modern	Y_Modern	X_CM	Y_CM	X_M	Y_M
0	b: banachonie	Moneyconey	270805.60757	391182.578248	3.613046	24.864649	0.03613	0.248646
1	b: netallabrick	Tullybrick	273009.46759	389053.943641	4.916414	25.461087	0.049164	0.254611
2	b:wey	Moyard	269587.73954	389996.55797	6.133222	25.101177	0.061332	0.251012
3	b: chauan	Cavanreagh	272225.91122	392125.221743	5.34494	23.230878	0.053449	0.232309
4	b:nehounreogh	Owenreagh	274714.84974	390993.748466	7.490076	22.307959	0.074901	0.22308
4	Mollitagbie	none	274714.84974	390993.748466	7.490076	22.307959	0.074901	0.22308
5	(?)b:dounnaruarra	Dunmurry	275541.87846	399192.985581	8.674268	25.609302	0.086743	0.256093
5	B nehown biggie	none	275541.87846	399192.985581	8.674268	25.609302	0.086743	0.256093
6	banchran	Bancran Glebe	273886.27605	394187.225335	11.671221	24.049038	0.116712	0.24049
7	b: nellagah	Labby	275438.87161	392310.705422	10.774963	22.136873	0.10775	0.221369
7	tristernan	none	275438.87161	392310.705422	10.774963	22.136873	0.10775	0.221369
8	b:desart	Disert	276389.60926	392618.553297	11.2485	20.648782	0.112485	0.206488

Figure 4. The shapefile attribute table for the Bodley townlands. This table records the Bodley townland name ('BodleyName'), the equivalent Ordnance Survey townland name ('ModernName'), the 'Bodley Map Space' townland centre point coordinates in centimetres (X_CM and Y_CM) and the equivalent Ordnance Survey townland centre point coordinates (X_M, Y_M).

First, linear or standard regression can be used to assess, on an individual basis, the fit of eastings and northings data between the points derived from the two maps. These two sets of coordinate data are shown here as two scatter graphs, one for eastings and one for northings, the OS six-inch derived centroid coordinates being on the x axis and the equivalent Bodley-derived map coordinates on the Y axis (see Figure 5). From this, the eastings and northings graphs can both be seen to have a positive regression trend. However, the coefficient of determination (r^2) indicates that the eastings data on the Bodley map have a higher r^2 value than the northings (i.e., a value closer to unity), with values of 0.8056 and 0.6923, respectively. This illustrates, then, that the eastings for the Bodley map centroids fit better with the OS-derived coordinate data, revealing that the mapped positions of the townland centroids are placed with a greater degree of cartographic accuracy in longitude than they are in latitude. There are, however, some variations within the data set; *both* linear regression graphs show a number of outliers, above and below the trend line. Those points that lie furthest from the trendline are the townlands (on the Bodley map) that correlate least closely with the equivalent OS centroid coordinates. To further investigate these outliers, a programming code (written in "R") was applied to identify which of the townlands had highest impact on the overall r^2 .⁶⁰ What this reveals are two main groups of townlands, in the southern and the western part of the barony map, each effectively increasing map-distortion. For example, when the townland named Tullybrick is removed from the overall r^2 calculation, the r^2 value for northings rises from 0.6923 to 0.7170.

The results of the linear regression analyses help to begin to reveal internal differences in the mapping of the barony of Loughinsholin; spatial variations in cartographic distortion. To analyze these same point data further, a method of bidimensional regression is used, allowing *simultaneous* comparison of two sets of mapped points across two planes or spaces.⁶¹ As noted earlier, Andrews ran a similar calculation in the early 1970s resulting in a value of 90.2 percent (i.e., r^2 of 0.902) agreement for map XI. However, with the subsequent development of computational

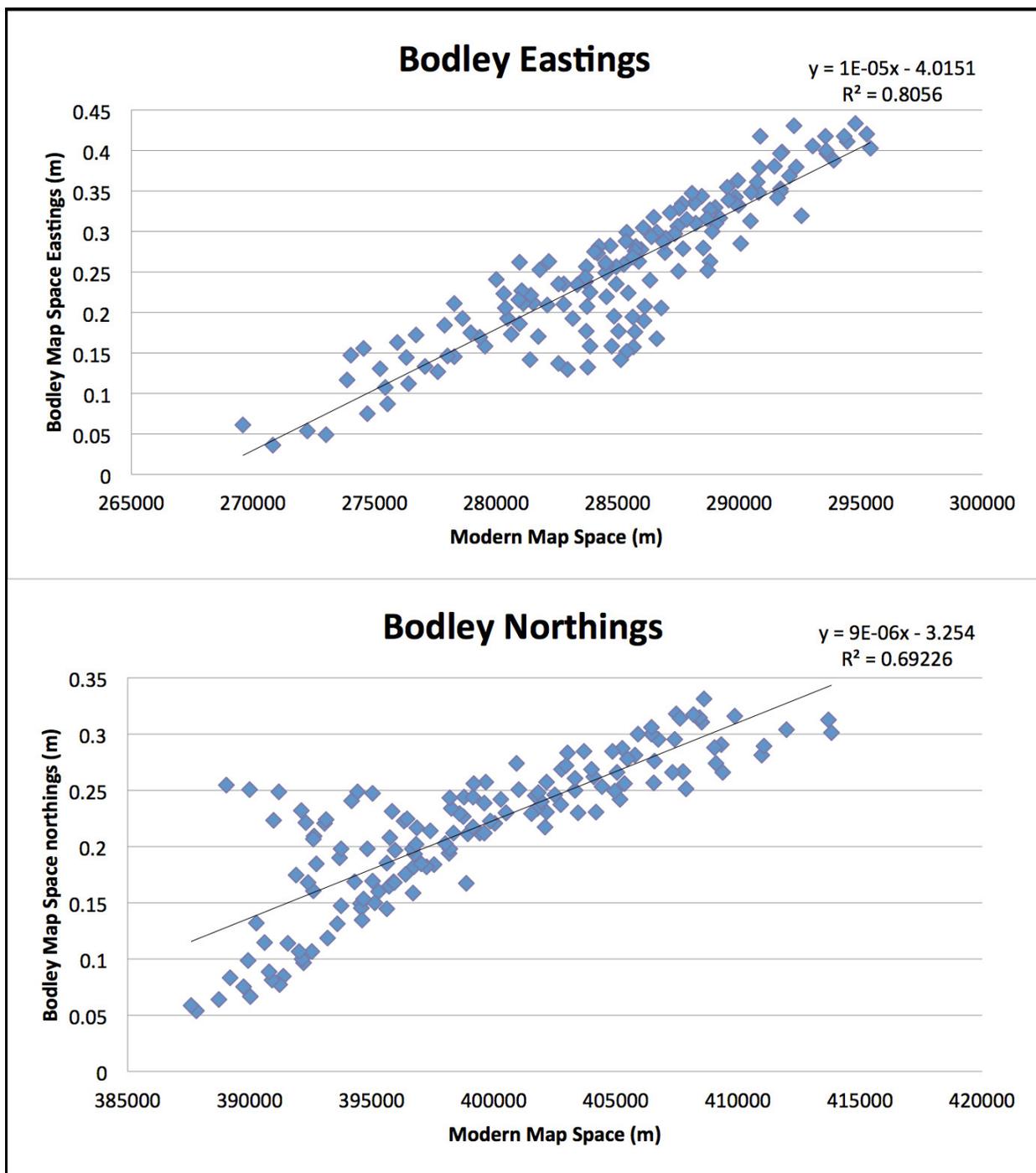


Figure 5. The Linear regression graphs derived from townland centroids digitized from MPF 1/47 (“Bodley Map Space”), plotted against townland centroids derived from First Edition Ordnance Survey six-inch sheets (“Modern Map Space”).

techniques and GIS technologies, it is possible to extend the analyses by comparing the positions of townland centroids derived from digitizing the Bodley and OS maps.⁶² With an r^2 value of 0.9213 (using a Euclidean calculation), the results of the bidimensional regression in fact indicate a stronger overall relationship between the Map XI and OS townland centroids than Andrews' figure. This result signifies a reasonable fit between the positioning of townlands on the Bodley map and the OS surveyors' townlands of the 1830s, and illustrates a stronger correlation than the linear regression results noted above.

Spatial variations in bidimensional regression values can provide deeper insights into the relative distortion across Map XI, for which purpose MapAnalyst software is particularly useful.⁶³ MapAnalyst uses an algorithm to calculate closeness of fit between two sets of spatial data, just as with the bidimensional regression technique, here based upon the centroid-derived coordinates for the Bodley and OS mapped townlands. One particular advantage of MapAnalyst is that it produces graphical, visual outputs of patterns of map distortion in the form of a "distortion grid". If the Bodley centroids and the OS centroid data were to agree completely, the resulting grid would be perfectly uniform. However, instead the grid is warped to varying degrees across Map XI, which indicates patterns of local disagreement between the two sets of coordinate data (Figure 6). A particularly noticeable distortion is evident around the map's edges, in particular along the western and the southern sections of the barony. It is these same two areas that were revealed in the outlier analysis, where (in relation to the OS maps) townland locations on the Bodley are positioned some distance from each other making the whole southern tip of Map XI stretched and distorted further southwards. The least distortion (conversely) lies in the north and east parts of the barony, and here the grid is most uniform in shape. A further exploration of these patterns is possible using directional displacement vectors, a related visual output in MapAnalyst, whereby the software draws a line from each of the Bodley townland centroids to their equivalent position on the OS six-inch maps (Figure 6). Here, the longer the vector, the more relative displacement exists between the two sets of map coordinates. In the southern part of the mapped barony, longer vectors reveal a pattern of displacement where again Bodley's townlands are located too far to the south and the west. Those parts of the map with the shortest vectors (that is least displacement) are to the north and east, around Maghera. Even so, within these broad patterns of greater and lesser displacement and distortion, there are some points that do not fit the trend. The townland of Drumlamph, in the east, for example, appears to be mapped further north than it ought to be, and likewise Dunmurry at the western tip. Neither of these townlands appears to follow the distortion trends evident in the patterns surrounding them.

The distortion grid and displacement vector outputs thus begin to reveal how Map XI has within it different degrees of distortion, where some parts of the map compress relative distances between centroids, and some parts exaggerate distances. These spatial variations might reflect the effect of local conditions, particularly topography, on map-making and surveying work, or potentially arise from the application of differing cartographic practices to survey and create the map. Here MapAnalyst has another advantage, for it allows further spatial analysis of the disposition of the mapped townlands through calculating differences in map scale as well as degrees of map rotation. Using this function of MapAnalyst shows, for example, that the overall scale of Map XI is 1:76,900 and that the map is rotated twenty-eight degrees clockwise (from True North) (Table 1).⁶⁴ This aggregated calculated scale is not absolute of course, but is derived from measuring between all the centroids of the townlands on Map XI. The same calculations can be performed for selected areas of the map too. This yields some interesting relative internal differences across the map in its scale and rotation. For example, Map XI splits the barony into two distinct bounded areas (indicated by a broad red-colored band), and if this same dividing line is used to compare townlands' centroids between the eastern portion and the west a clear

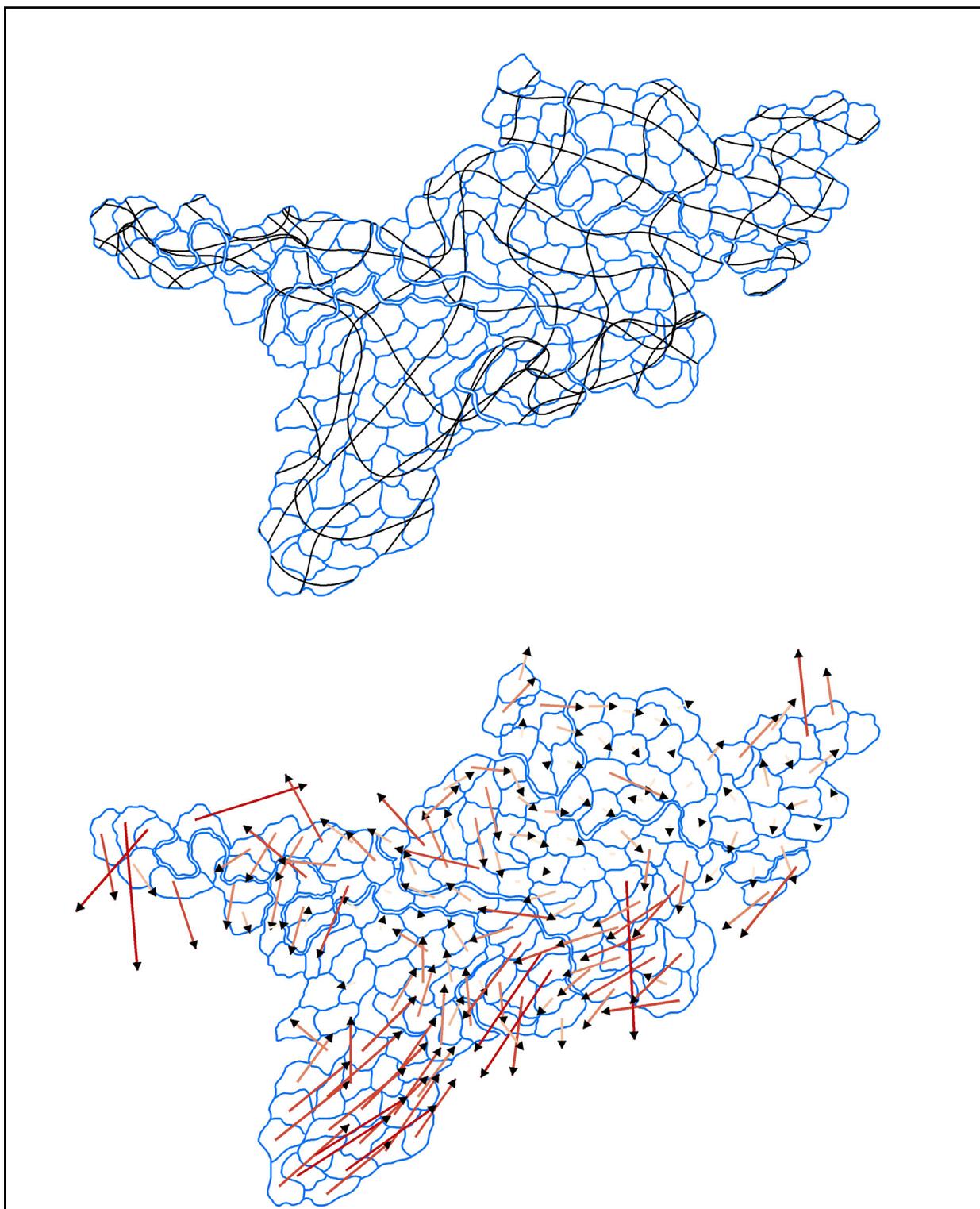


Figure 6. MapAnalyst generated 'distortion grid' (top) and directional displacement vectors (below) projected onto Loughinsholin townland boundaries as digitized from MPF 1/47.

Portion of Map (MPF) 1/47	r^2 value (affine)	r^2 value (Euclidean)	Scale Helmert (4 Parameters)	Degrees of map rotation
All Townlands in barony	0.92	0.92	1:76,900	28° cw
Townlands in northern half of map	0.94	0.94	1:87,000	22° cw
Townlands in southern half of map	0.82	0.82	1:75,000	40° cw
Townlands mapped as Churchlands	0.94	0.91	1:75,800	32° cw
Townlands on peripheral boundaries	0.94	0.94	1:76,400	31° cw
Townlands adjacent to rivers	0.94	0.94	1:83,300	26° cw
Townlands as 'Greater Proportions'	0.96	0.96	1:82,800	28° cw
Townlands as 'Smaller Proportions'	0.84	0.84	1:73,300	32° cw

Table 1. The bidimensional regression outputs derived from the comparison between MPF 1/47 townland centroids and OS six-inch townland centroids. 'All Townlands' represents the figures derived for all the townlands in the barony of Loughinsholin as shown by MPF 1/47. The other outputs given here derive from selections of townlands as described in column one. Rotation is in degrees (cw = clockwise).

difference in positional accuracy emerges, with an r^2 value of 0.94 overall for the northern part and 0.82 in the southern half. The scale in the northern portion is 1:87,000 while in the south it is 1:75,000, and between the two halves there is also a difference in map rotation of eighteen degrees. What this means is that not only do the two halves of Loughinsholin barony map appear cartographically (visually) distinct, but that they are also, in effect, each differently devised (planimetrically), raising the possibility that either they were surveyed and mapped separately, or that local conditions in each affected the map-making process differently.

Other variations in map scale and rotation for Map XI can be explored using alternative parameters, such as separating churchland townlands (a group colored green on the map) from the temporal,⁶⁵ or else looking at specific types of townlands, such as those situated along rivers, or situated on the periphery of the map. All reveal some subtle differences in scale and rotation (see Table 1). One further clear distinction made on the map itself is between townlands identified either as "greater" or "smaller proportions".⁶⁶ If these are compared in both scale, rotation and r^2 value, it is those in the former group that have the higher r^2 values, suggesting a closer fit between the mapped townland centroids in the "greater proportions", perhaps because they were more important at the time and required closer attention to surveying detail? Andrews had observed that townlands on the edges of the Bodley maps were "inaccurate both in shape and position of the boundary junctions along their periphery."⁶⁷ While this may well be the case with some of the maps, for Map XI, the statistical results suggest little difference between townlands at the edges of the barony and those on rivers, for example. Instead, one more significant factor affecting the positioning of townlands is altitude. This again can be quantified using the MapAnalyst outputs. Selecting those townlands located on ground above around 500 feet (150 meters), some of which are along the periphery of the mapped barony, reveals the lowest of the r^2 values of 0.88, a map-scale of 1:81,000, and map-rotation of thirty-nine degrees clockwise, close to the forty degrees noted for the townlands in the southern half of the barony as a whole. It seems then, that the elevation of a townland was an important factor affecting positional accuracy of Map XI.

"Excavating" Map XI using GIS and spatial analysis techniques begins to suggest certain localized patterns of variation in cartographic distortion across mapped townlands. It is possible to use regression techniques to dig a bit more deeply into these localized patterns, to provide a more subtle picture of geographic variations in the positional accuracy of the Bodley townland centroids across the map. This requires use of Moving Window Regression (MWR) to quantify the

local relationships between a mapped location and its neighboring points.⁶⁸ Here, the townland centroids derived from the Bodley and OS maps are analyzed simultaneously by means of a “moving window” across the study area. The MWR program, written as part of a previous collaboration, executes the calculations and provides a measured intercept, slope and coefficient of determination (r^2) defined by the nearest neighbor analysis.⁶⁹ From Map XI’s 150 locations digitized and matched with modern townland data, ten nearest neighbors were chosen for analysis. No immediate spatial pattern is distinguishable using the coefficient of determination (r^2) output calculated from MWR. However, when those centroids with r^2 values greater than or equal to 0.8 are selected, clusters of townlands emerge. One such spatial clustering of higher MWR r^2 values is evident to the north and east of Maghera, an area of lower lying ground within the barony. The clustering of higher MWR r^2 values here reflect a consistency in the map’s placing of townlands. Taking into account the results of the MapAnalyst outputs (above) for this same area, this clustering probably reflects a relatively higher degree of spatial accuracy across these particular mapped townlands. A second such cluster lies in the map’s southern part (Figure 7). The MWR r^2 values here again indicate a consistent pattern of townland centroids in this portion of the barony, but this time, similarly taking into account the previous bidimensional outputs, these particular townlands are consistently displaced. Evidently, by placing the (geographically) southwestern portion of the barony in a midwest (cartographic) location, Map XI in effect twists space along the western edge of the barony. The higher elevation of land in this area might again explain this; map-distortion being a symptom of problems encountered locally with surveying field-work (rather than map-drawing) through difficulties posed by fixing townlands in upland areas.

Using these different but complementary regression methods is helpful in revealing spatial clusters of townland centroids with similar r^2 values. Such patterns appear to relate to processes involved in the making of Map XI, particularly surveying the ground to establish the pattern of townlands, ascertaining how “they butted, or mered interchangeably the one on the other,” to quote Bodley himself. One further statistical procedure sheds further light on how far terrain affected the work that lay behind the making of Map XI. Ordinary Least Squares Regression (OLS) were used to test for possible relationships that exist between the length of directional displacement vectors (derived from the MapAnalyst calculations), the positional coefficients calculated between townland centroids (derived from the Bodley and OS maps), and local elevation (Figure 8). The OLS model does reveal a relationship between vector “length” and local “elevation”, as elevation increases so the positional accuracy of the placement of Bodley’s townlands (relative to modern coordinate data) *decreases*. Even so, these data were found to have non-stationary relationships. This means that while elevation is a strong predictor of length in some areas, it is not in others. At first these analytical results individually might appear to be somewhat inconclusive. However, taken together, what all these analyses show is that variations in map distortion have distinct spatial and statistical patterns that are meaningful; and that although these differences across Map XI may in part be due to differences in terrain, such as physical obstacles to survey, other factors were also playing a part, including local factors, perhaps cultural resistance to the surveyors and the commissioners on the ground. To explore this further requires relating our cartographic analyses to the cartographers themselves.

Connecting cartographers

As Bodley and the 1609 Commission’s surveyors were working in western Ulster, Thomas Phillips reported to the Corporation of the City of London on the prospects for Plantation.⁷⁰ Among the articles of his report Phillips referred to one particular area troublesome to the English: “The Barony of Loghanshelan.” This area was, he wrote, “Tyrone’s chiefest fastness and the very

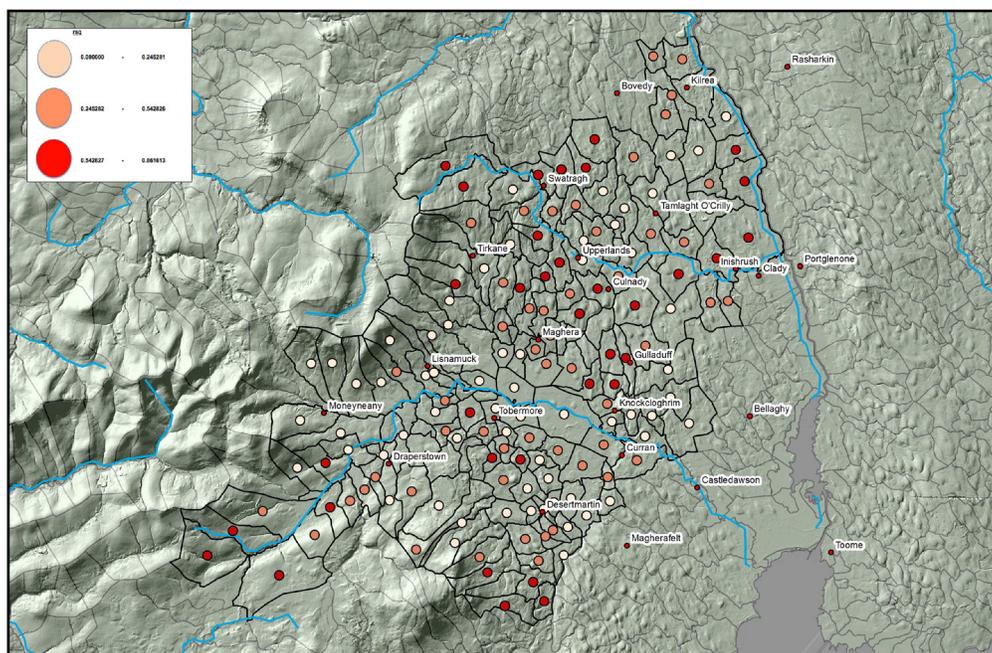


Figure 7. The coefficient of determination (r^2) values derived from the Moving Window Regression. The higher r^2 values (rsq in key) are shown in darker red

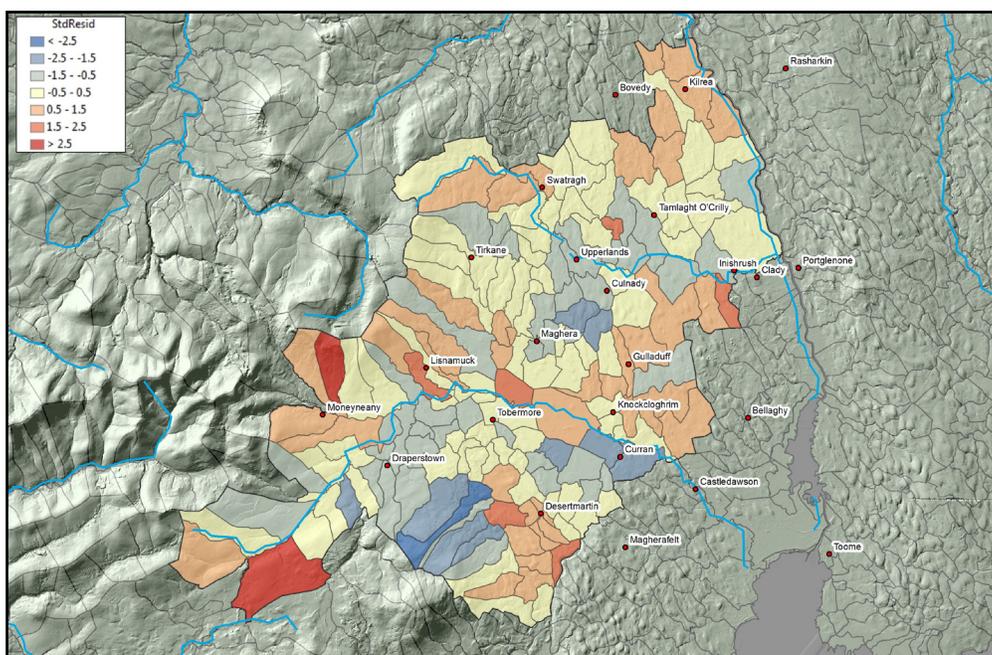


Figure 8. The Standard Residuals output derived from Ordinary Least Squares (OLS) regression on the variables Length, Modern X, Modern Y and Elevation. The model presented a 45% r^2 value and an AIC value of 453, lower than the AIC figures derived from the testing on other variations of variable relationships in this study. Elevation was found to have a positive correlation with directional displacement vector length indicating a relationship between the two variables. However, this relationship was deemed non-stationary indicating that the positive correlation was not true throughout the whole map as recognised by the strong (Red) and low (Blue) predictors in this figure.

Nursery of all rebellions in those parts and was therefore chiefly intended by his late Majesty to have been wholly planted with British which, if Londoners had done accordingly, they might have made of it as rich and strong a Country as any (of like in his Majesty's Dominions) whereas it is now in worse case and far more dangerous to the State than when they first undertook it."⁷¹ As a proposition for survey, then, Loughinsholin must have been a challenge for Bodley and his team, for not only did it present them with potential hostile assaults from local inhabitants; it was, it seems, an area of particular interest to the Crown. It was also an area through which the commissioners and surveyors had traversed as part of their circumnavigation of the escheated counties, for the party left Dungannon for Limavady on August 24 1609, having there completed the survey of Tyrone the day before.⁷² The journey to Limavady took the group three days having been slowed by the weather in the forest of Glenconkeyne, and on their arrival at Limavady they met with Phillips and with representatives from the City of London who had landed at Carrickfergus on August 22.⁷³

As the commissioners discussed Plantation matters with Phillips in Limavady, their recent experiences in Loughinsholin must have been foremost in their minds, not just because they had just traversed this "nursery of all rebellions" without incident, but because it had been there, in the forest of Glenconkeyne, that they had endured the most difficult local conditions. In fact, a letter of August 28, sent from Limavady by Sir John Davies, Irish Attorney General, to Earl Salisbury in London, reported that: "Their geography has had the speedier dispatch, inasmuch as here the county is but little, consisting only of three baronies, and as they had sent two surveyors before to perambulate the country and to prepare the business by gathering notes of the names, sites, and extents of the townlands. This they performed well and readily, being accompanied with but a slender guard."⁷⁴ The two surveyors are not named, though William Parsons was present at the inquisition in Limavady.⁷⁵ The surveyors' work as an advance party between Dungannon and Limavady would have taken them through the Barony of Loughinsholin, and the large forest of Glenconkeyne that at that time comprised much of this area.

With the weather and forest to contend with, the surveying work in Loughinsholin must have been particularly difficult, for example in determining bearings and distances, and even in terms of staying orientated. It is in this context that the results of the cartographic analyses of Map XI townlands must be judged. It may well explain the displacements of townlands noted in the western and southern parts of the barony, for example, and the way the map twists space along the higher western edges of Loughinsholin, an area that was also situated furthest from the route taken by Commission itself from Dungannon to Limavady (see Figure 2). In poor weather, such higher ground would not lend itself to calculating distances through triangulation, at a distance. Similarly, considering the speed of the survey, measurement on the ground is unlikely to have appealed in this upland part of the barony. Instead, however, there are indications that tighter surveying or mensuration methods were employed in the area around Maghera and the lower-lying parts of the barony where the party did cover the ground, literally, on its way to Limavady. Here it might be supposed that relatively easier conditions, along with a stronger local military presence (through forts), helped the surveyors to complete a ground survey. This then may explain why relatively less distorted patterns of townlands can be observed here on the Bodley map, both from the MapAnalyst outputs and the MWR r^2 values. While there is no certainty in all this, the historical evidence and the analytical results taken together would seem to suggest some degree of agreement here. Based on the analyses presented above, our conclusion differs from Andrews' view that "the escheated counties maps are no more correct than the kind of outline that can be produced from purely verbal data."⁷⁶ The closeness of fit observed between the Bodley and OS townlands would suggest otherwise, certainly for the northern and eastern parts of Loughinsholin.

From the analyses of Map XI's townlands, then, there are strong indications that inputs into the map's making came from those who had expertise in the task of land-surveying and map-making. Whether in this particular case it was the work of Josias Bodley himself, perhaps with William Parsons alongside, is not possible to confirm, though the likelihood is strong. Bodley had military experience, was familiar with Ulster, and was known to be a sound surveyor—he was commissioned again later, by James I, to complete a further survey of Ulster in 1614.⁷⁷ In his earlier years, Bodley had served previously in the Netherlands and had helped his elder brother, Thomas Bodley, provide William Cecil, Lord Burghley, with drawings of the siege of Nijmegen (in July 1591), Thomas writing then that “my brother hath bin with me... and can give yow the platform drawing by himself.”⁷⁸ Bearing in mind the apparent importance to the Crown of the area of Glenconkeyne and Loughinsholin, Josias Bodley would seem a most suitable tried and tested choice for the survey work here in August 1609. It is conceivable too that his continental experience equipped Josias with particular knowledge of, and expertise in, contemporary surveying practices.

Taking on board Andrews' analytical results as well as the confirmation of a high overall r^2 value for Map XI as described above, Bodley's presence may be reflected in the relatively precise execution of the survey of Loughinsholin, which would eventually yield a map that compares, in terms of cartographic accuracy of mapped features, so favorably across the escheated counties group of maps as a whole. It could be, though, that the internal differences in Map XI's positioning of townlands, between its northern and southern parts, owes something to differing surveying practices in these areas, possibly attributable to the activities of different surveyors in each. To take this further would require similar systematic cartographic analyses of other “Bodley maps”; comparing them as a group, and linking the results of these analyses with a stylistic study of the maps and individual surveyors and cartographers known through contemporary correspondence. As well as comparative analyses across the Bodley group of maps, and indeed with other contemporary maps and surveys of Ulster, there is scope to explore the temporal relationships between the OS mapped townlands of the 1830s, and those Bodley mapped two hundred years earlier. For example, the longevity of townland boundaries might well be a factor in generating higher r^2 values in some parts of the barony than others, particularly in lower lying areas where continuity of boundaries might be more likely.⁷⁹ Assessing this further, requires a local landscape study, of the kind currently being carried out in the area of Maghera.⁸⁰ In the meantime, detailed study of Map XI's “distortion” exemplifies the potential of quantitative techniques for excavating cartographic encounters,” especially when combined with the qualitative approaches more often deployed in the history of cartography and historical geography.⁸¹

While there is no doubt that survey work, of both the cartographic and administrative kinds, was being undertaken in the escheated counties, *in situ*, by the commission of 1609; the process of map-making was by no means finalized there. After working in Ulster, the surveyors and commissioners had returned to Dublin by early October, and there, according to John Davies, they saw to “the making up of [the] inquisition in form of law, the drawing of the titles into cases, the engrossing, enrolling, and exemplification thereof, the absolute finishing of the maps, [together with] the limiting and setting forth of the parishes, precincts, and proportions, which must be done upon the maps.”⁸² How much of the drawing of the maps, fair copies and drafts, would have altered those initial surveys and field-sketches (no longer surviving), is difficult to estimate. However, taking a quantitative approach might, again, help here; for comparing versions of Plantation maps over time might reveal what kinds of cartographic changes were made in this period, as well as where and perhaps also by whom.⁸³ What is clear is that Map XI underwent a long process of production, spanning survey-work in Ulster and map-making in

Dublin as well as in London, from where Ridgeway had written to Salisbury in March 1610 to say that the Commissions' cartographic work was nearly done.

Lately, Plantation surveys and maps have received renewed interest among historical geographers and historians of cartography, but much of this continues to rake over contemporary correspondence and rely on largely descriptive interpretations of surviving examples of maps. In this, the Bodley maps of the escheated counties have tended to be viewed in evolutionary terms – fitted to a history of early-seventeenth-century cartographic development and landscape representation.⁸⁴ The aim of this paper has been to dig a little more deeply into the material map itself, to see what it may yield about the processes of its making and the worlds it constructed in Stuart Britain and Ireland. Rather than placing the Bodley maps within a particular stage in Plantation colonization therefore, and differentiating Plantation maps according to their primary function or context, such as military campaigns, or lot-allocation; the maps themselves, individually, form a useful focus for debate and discussion as a group of interconnected landscape-mappings with shared histories. Relating the maps to the landscapes they show is at the same time searching for their “silences and secrecy” and in this, GIS helps to excavate the Bodley maps through “deconstructing the map” both quantitatively as well as qualitatively.⁸⁵ Since “maps are transitory and fleeting, being contingent, relational and context-dependent,” and are “always remade every time they are engaged with,” the Bodley maps too are perpetually unfolding, forever mobile.⁸⁶ Excavating the Bodley maps through GIS produces yet further maps and mappings, and numerous interconnected “mapping worlds” emerge. Moving virtually backwards and forwards in time, as well as across spaces, we stage a series of cartographic encounters between the cartographers of early-seventeenth-century Britain and Ireland, and their counterparts today.

Acknowledgements

In preparing and researching this article, the authors wish to thank Professor Jerry Brotton and Dr Annaleigh Margey for early conversations about the Bodley maps. The research presented here was part-funded by a Department for Employment and Learning (NI) doctoral award held at Queen's University Belfast.

NOTES

- 1 Ridgeway was appointed treasurer and treasurer-at-wars in Ireland between 1606 and 1616, and was well-travelled before this having undertaken an expedition to the Azores at the age of 32: Robert Dunlop and Sean Kelsey, “Thomas Ridgeway, first earl of Londonderry (ca.1565-1632),” in *Oxford Dictionary of National Biography*, eds. H. C. G. Matthew and Brian Harrison (Oxford: Oxford University Press, 2004) (hereafter *ODNB*), <http://www.oxforddnb.com/view/article/23623> (accessed September 2 2013). On Cecil, see: Pauline Croft, “Robert Cecil, first earl of Salisbury (1563-1612),” in *ODNB*, <http://oxforddnb.com/view/article/4980> (accessed September 2 2013).
- 2 Letter from Ridgeway to Salisbury, 15 March 1610, SP 63/228/54, Calendar of State Papers for Ireland (hereafter CSPI) 1608–1610, 401–2.
- 3 For the political background and context, see: John McCavitt, “The Flight of the Earls, 1607,” *Irish Historical Studies* 29 (1994): 159–73.
- 4 F. W. Harris, “The Commission of 1609: Legal Aspects,” *Studia Hibernica* 20 (1980): 31–55; Theodore W. Moody, *The Londonderry Plantation, 1609-41* (Belfast: William Mullan, 1939), 23–40.
- 5 J. Brian Harley, “Meaning and Ambiguity in Tudor Cartography,” in *English Map-Making 1500-1650*, ed. Sarah Tyacke (London: British Library, 1983), 40.

- 6 The National Archive (hereafter TNA), MPF 1/38-64. See Public Record Office (PRO), *Maps and Plans in the Public Record Office, I, The British Isles, c.1410-1860* (London: PRO, 1967), 547-93.
- 7 William H. Hardinge, "On MS Mapped Townland Surveys in Ireland, of a Public Character, from their Introduction to 23rd October 1641," *Proceedings of the Royal Irish Academy* 8 (1864): 47-51.
- 8 John H. Andrews, "The Maps of the Escheated Counties of Ulster, 1609-10," *Proceedings of the Royal Irish Academy* 74C (1974): 133-70; William J. Smyth, *Map-Making, Landscapes and Memory: A Geography of Colonial and Early Modern Ireland, c.1530-1750* (Cork: Cork University Press, 2006), 21-102.
- 9 Smyth, *Map-Making*, 59-60.
- 10 See Miles Ogborn, *Global Lives: Britain and the World, 1550-1800* (Cambridge: Cambridge University Press, 2008); Robyn Adams, "Sixteenth-Century Intelligencers and their Maps," *Imago Mundi* 63, no. 2 (2011): 201-16; Annaleigh Margey, "Representing Colonial Landscapes: Early English Maps of Ulster and Virginia, 1580-1612," in *Reshaping Ireland: Colonization and its Consequences, 1550-1700, Essays presented to Nicholas Canny*, ed. Brian Mac Cuatha (Dublin: Four Courts Press, 2011), 61-81.
- 11 Smyth, *Map-Making*, 60; fig. 3.2.
- 12 John H. Andrews, *Maps in Those Days. Cartographic Methods before 1800* (Dublin: Four Courts Press, 2009); David A. Woodward, "English Cartography, 1650-1750: A Summary," in *The Compleat Plattmaker: Essays on Chart, Map, and Globe Making in England in the Seventeenth and Eighteenth Centuries*, ed. Norman J. W. Thrower (Los Angeles, California: UCLA Press, 1978), 159-93.
- 13 John Norden, *The Surveyors Dialogue* (London: Hugh Astley, 1607); John H. Andrews, "John Norden's Maps of Ireland," *Proceedings of the Royal Irish Academy* 100C (2000): 159-206.
- 14 Andrews, "Norden's Maps of Ireland," 174-90.
- 15 John H. Andrews, *The Queen's Last Map-Maker: Richard Bartlett in Ireland, 1600-3* (Dublin: Geography Publications, 2008), 58.
- 16 On Bodley, see John J. N. McGurk, "Bodley, Sir Josias (ca.1550-1617)," in *ODNB*, <http://www.oxforddnb.com/view/article/2757> (accessed August 27 2013).
- 17 Andrews, "Maps of the Escheated Counties", 142-43; citing TNA (PRO) A. O. 1/290/1088.
- 18 Sean Kelsey, "Parsons, Sir William, baronet (c.1570-1650)," in *ODNB*, <http://www.oxforddnb.com/view/article/21476> (accessed August 27 2013).
- 19 Andrews, "Maps of the Escheated Counties," 143.
- 20 On the chronology of the 1609 Commission and its map-making work, see: Harris, "The Commission of 1609," 31-3; 42-3.
- 21 For the "Survey of the Irish Plantations by Sir Thomas Phillips" (1622) and accompanying Thomas Raven maps see, HMSO, *Londonderry and the London Companies 1609-1629: Being a Survey and Other Documents Submitted by Sir Thomas Phillips* (Belfast: His Majesty's Stationery Office, 1928).
- 22 Andrews, *Queen's Last Map-Maker*, 33-6.
- 23 Andrews, "Maps of the Escheated Counties," 135, fn. 2.
- 24 On Cecil, see Croft, "Robert Cecil". On Lord Burghley's cartographic interests, see: Peter Barber, "England II: Monarchs, Ministers, and Maps, 1550-1625," in *Monarchs, Ministers and Maps: The Emergence of Cartography as a Tool of Government in Early Modern Europe*, ed. David Buisseret (Chicago, Illinois: Chicago University Press, 1992), 57-98.
- 25 Andrews, *Queen's Last Map-Maker*, 91-7; see also Margey, "Representing Plantation Landscapes: The Mapping of Ulster, c.1560-1640," in *Plantation Ireland: Settlement and*

- Material Culture, c.1550-c.1700*, eds. James Lyttleton and Colin Rynne (Dublin: Four Courts Press, 2009), 147.
- 26 Andrews, "Maps of the Escheated Counties," 161.
 - 27 *Ibid.*, 146-7; 158.
 - 28 Letter from Bodley to Salisbury, February 24 1610, SP 63/228/41, TNA; Letter from Ridgeway to Salisbury, March 15 1610, SP 63/228/54, CSPI 1608-1610, 392-3; cited by Andrews, "Maps of the Escheated Counties," 145; and Margey, "Representing Plantation Landscapes," 152.
 - 29 Letter from Ridgeway to Salisbury, March 15 1610, SP 63/228/54, CSPI, 1608-1610, 393.
 - 30 Andrews, "Maps of the Escheated Counties," 144-7; Harris, "The Commission of 1609," 31-42.
 - 31 Andrews, "Maps of the Escheated Counties," 158.
 - 32 Harris, "The Commission of 1609," 31; Letter from Ridgeway to Salisbury, March 15 1610, SP 63/228/54, CSPI 1608-1610, 393.
 - 33 Andrews, *Maps in Those Days*, 82-108; David Buisseret, "Monarchs, Ministers, and Maps in France before the Accession of Louis XIV," in *Monarchs, Ministers and Maps*, ed. Buisseret, 112.
 - 34 Counties but not parishes were more commonly shown by English seventeenth-century maps, for example see: Roger J. P. Kain and Catherine Delano Smith, *English Maps: A History* (London: British Library, 2000).
 - 35 Harris, "The Commission of 1609," 40.
 - 36 For example in India, see Matthew H. Edney, *Mapping an Empire: The Geographical Construction of British India, 1765-1843* (Chicago, Illinois: Chicago University Press, 1997), 309-16.
 - 37 Andrews, "Maps of the Escheated Counties," 153; Smyth, *Map-Making*, 71.
 - 38 Smyth, *Map-Making*, 86.
 - 39 See, for example: F. H. A. Aalen, Kevin Whelan and Matthew Stout, *Atlas of Irish Rural Landscape* (Toronto: University of Toronto Press, 2011).
 - 40 Letter from Bodley to Salisbury, February 24 1610, CPSI 1608-1610, 393.
 - 41 Andrews, "Maps of the Escheated Counties," 153.
 - 42 Margey, "Representing Plantation Landscapes," 152.
 - 43 Harley, "Maps, Knowledge and Power," in *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments*, eds. Denis Cosgrove and Stephen Daniels (Cambridge: Cambridge University Press, 1988), 277-312.
 - 44 Waldo R. Tobler, "Medieval Distortions: The Projections of Ancient Maps," *Annals of the Association of American Geographers* 56, no. 2 (1966): 351-60; A. Symington, Martin E. Charlton and Chris F. Brunson, "Using Bidimensional Regression to Explore Map Lineage," *Computers, Environment and Urban Systems* 26 (2002): 202-18.
 - 45 Bernhard Jenny, "MapAnalyst: A Digital Tool for the Analysis of the Planimetric Accuracy of Historic Maps," *e-Perimetron* 1 (2006): 239-45; Keith D. Lilley and Christopher D. Lloyd, "Mapping the Realm: A New Look at the Gough Map of Britain (c.1360)," *Imago Mundi* 61, no. 1 (2009): 1-28.
 - 46 Lilley and Lloyd, "Mapping the Realm;" Symington et al., "Using Bidimensional Regression."
 - 47 Andrews, *Shapes of Ireland. Maps and their makers 1564-1839* (Dublin, Geography Publications, 1997), 327-9.
 - 48 Our use of "excavation" and archaeological metaphors in this paper owes much to the ideas and work of Brian Harley, especially Harley, "Deconstructing the Map," in *Writing Worlds*.

- Discourse, Text and Metaphor in the Representation of Landscape*, eds. Trevor J. Barnes and James S. Duncan (London, Routledge, 1992), 231–47.
- 49 Andrews, “Maps of the Escheated Counties,” 153.
 - 50 *Ibid.*, 149.
 - 51 *Ibid.*, 149.
 - 52 The six-inch Ordnance Survey sheets were supplied as geo-rectified rasters through licensing arrangements with Land and Property Services of Northern Ireland. Cf. Andrews, “Maps of the Escheated Counties,” 148–9.
 - 53 Map of “parte of ye Baronie of Loghinisholin,” MPF 1/47, TNA, <http://discovery.nationalarchives.gov.uk/SearchUI/details?Uri=C3981991> (accessed September 2 2013).
 - 54 The historic map raster is “georeferenced” in the GIS by assigning its overall dimensions (usually measured in mm or cm), which is then used as the basis for deriving coordinates from the map. The map raster, however, is not “geo-rectified”, a process that in effect digitally stretches, or warps, the map to fit it to modern geospatial coordinate systems (e.g. latitude or longitude, or Irish National Grid).
 - 55 Features of the manuscript map are separately digitized within the GIS as layers, and collectively they form a cartographic “stratigraphy”: Lilley, “Mapping Truth? Spatial Technologies and the Medieval City: A Critical Cartography,” *PostClassical Archaeologies* 2 (2012): 210–24.
 - 56 Aalen et al., *Atlas of Irish Rural Landscape*; Andrews, “Maps of the Escheated Counties,” 161.
 - 57 ESRI 2013. ArcGIS, Release 10.1. Redlands, California: Environmental Systems Research Institute.
 - 58 Gregory Toner, *Place-Names of Northern Ireland. Volume Five: County Derry I, The Moyola Valley* (Belfast: Institute of Irish Studies, 1996).
 - 59 Christopher D. Lloyd and Keith D. Lilley, “Cartographic Veracity in Medieval Mapping: Analyzing Geographical Variation in the Gough Map of Great Britain,” *Annals of the Association of American Geographers* 99, no. 1 (2009): 27–48.
 - 60 The program routine used is available at <http://irelandmapped.org/>.
 - 61 Tobler, “Medieval Distortions,” 351–60.
 - 62 Andrews, “Maps of the Escheated Counties,” 149.
 - 63 Bernhard Jenny and Lorenz Hurni, “Studying Cartographic Heritage: Analysis and Visualisation of Geometric Distortions,” *Computers and Graphics* 35, no. 2 (2011): 402–11.
 - 64 1:80,000 equates to one and a quarter miles to one inch. 1:76,900 is, therefore, very close to the map scale that John Andrews had estimated for the Bodley maps as a whole: see Andrews, “Maps of the Escheated Counties,” 153.
 - 65 In his letter to Salisbury of February 24 1610, Bodley held “that those escheated countries should be so plotted that the known bounds of every country might be discerned by the eye, the church land distinguished from the temporal, and land already granted from that which is yet to be disposed of; the shares for the undertakers to be laid out with their apparent limits according to certain conceived proportions of different quantities, the goodness or badness of the soil; and the woods, rivers, or mountains, bogs and lochs, to be specified in their several places”; CPSI 1608–1609, 392–3.
 - 66 The map differentiated between “proportions” of different size, that is land-holdings assigned for Plantation.
 - 67 Andrews, “Maps of the Escheated Counties,” 150.
 - 68 On MWR see Christopher D. Lloyd, *Local Models for Spatial Analysis* (Boca Raton, Florida: CRC Press, 2006).
 - 69 Lilley and Lloyd, “Mapping the Realm.”

-
- 70 Harris, "The Commission of 1609," 34.
- 71 HMSO, *Londonderry and the London Companies*.
- 72 Harris, "The Commission of 1609," 46-7.
- 73 *Ibid.*, 47.
- 74 Letter from Davies to Salisbury, August 28 1609, SP 63/227/122, CSPI 1608-1610; Letter from Ridgeway to Salisbury, March 15 1610, SP 63/228/54, CSPI 1608-1610, 280.
- 75 Harris, "The Commission of 1609," 50.
- 76 Andrews, "Maps of the Escheated Counties," 150.
- 77 Margey, "Representing Plantation Landscapes," 156.
- 78 Adams, "Sixteenth-Century Intelligencers," 207; Letter from Thomas Bodley to Lord Burghley, October 11 1591, citing, SP/43/92, fol. 92r-93v, TNA.
- 79 A factor considered but not developed by Andrews, "Maps of the Escheated Counties," 148. Historically, marginal areas of land in Britain and Ireland typically had more mobile administrative geographies, or else did not have fixed boundaries due to communal sharing of resources, for example in uplands: see, Maurice W. Beresford, *History on the Ground: Six Studies in Maps and Landscapes* (London: Lutterworth Press, 1957), 25-62.
- 80 "Envision," The An Carn/Envision Project, <http://www.ancarn.org/269/projects/envision/> (accessed September 20 2013).
- 81 See Lilley and Lloyd, "Mapping the Realm;" Catherine Porter, "Quantifying Irish Cartographic Histories," *Imago Mundi* 65, no. 1 (2013): 135.
- 82 Harris, "The Commission of 1609," 42.
- 83 For example, comparing mapped features of the 1602-3 Bartlett maps (TNA 1/35-37) with those of the smaller-scale maps of the escheated counties, of 1610: namely, Hatfield House Library and Archives Cecil Maps 4/1, and British Library Cotton MS Augustus I.ii.44.
- 84 Margey, "Representing Plantation Landscapes," 140; 164.
- 85 Harley, "Silences and Secrecy: Exploring the Hidden Agenda of Cartography in Early Modern Europe," *Imago Mundi* 40 (1988): 57-76;-76; Harley, "Deconstructing the Map."
- 86 Rob Kitchin and Martin Dodge, "Rethinking Maps," *Progress in Human Geography*, 31, no. 3 (2007), 335.