

# LITERARY GEOGRAPHIES

## Hidden Geographies and Digital Humanities: Analysing and Visualising the Literary Corpus of Humphrey Llwyd

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### Abstract:

Digital technologies are rapidly altering the approaches used to analyse and visualise the content of early texts. This is especially evident in the growth and popularity of digital and spatial humanities projects exploring the geographies of historical and literary sources. Despite twenty first century advances, this research has so far been limited by the common isolation and separation of different mediums of text which often form associated components of an overall narrative. This paper challenges this separation by offering a combined analysis and re-examination of the written and cartographic corpus of the Welsh antiquary, Humphrey Llwyd (c.1527-1568). Llwyd's outputs are re-evaluated via an innovative fusion of previously disparate avenues of investigation commonly employed across the digital humanities, literary geography, the history of cartography and Geographic Information Systems (GIS). The analyses reveal that Llwyd's written and visual chorography of early Britain and Wales contain hitherto 'hidden' geographies that Llwyd drew upon and divulges previously unknown connections between his different forms of chorography. The paper concludes with a recommendation that we think outside of our

core skill-set and re-imagine our approach to textual research to provide a more complete and connected view of the layers of geography in early cultural texts.

**Keywords:** Humphrey Llwyd; GIS; digital humanities; place names; history of cartography; early modern.

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## Introduction

The digital has altered how we approach the analysis of early texts. Especially pertinent for those interested in literary geography, twenty first century advances in Historical Geographic Information Systems (HGIS), Named Entity Recognition (NER) of toponyms in historic source materials, and the overlap of many scholarly projects and subject areas in the spatial and digital humanities as ‘deep mapping’ (Bodenhamer et al. 2010; 2013; 2015), has led to numerous avenues for analysing geography in texts. Despite this, different forms of early text (and the mechanisms for analysing them) are commonly treated in isolation rather than as associated components of the overall narrative. This is especially true of early writers whose outputs often included varied modes of cultural text, such as the written and the cartographic, but which are seldom comprehensively assessed as a whole. Here it is proposed that by borrowing approaches and techniques from a combination of traditional practices and recent digital advances, we can work towards a mixed-method approach for researching, in combination, both written and visual texts.

The methodology implemented here is derived from a fusion of techniques borrowed from genres as diverse as the digital humanities, literary geography, the history of cartography and Geographic Information Systems (GIS), and allows, for the first time, a comparative toponym-centred analysis and re-interpretation of early cultural texts in written and visual form. This paper exemplifies the merits of this approach through the consideration of two forms of Renaissance chorography penned by the Welsh antiquary Humphrey Llwyd of Denbigh (c.1527-1568): the historiography, commonly used as a record of early people, place and space, and ‘modern’ cartography, the practice of visually representing and communicating cultural and spatial information.

## The Case Study of Humphrey Llwyd

Humphrey Llwyd was a celebrated scholar, antiquary and politician who moved in some of the key European intellectual circles of the sixteenth century. Through his travels in Europe Llwyd made many acquaintances, most markedly establishing a friendship with the geographer and cartographer, Abraham Ortelius (1527-1598), the compiler of the *Theatrum Orbis Terrarum*.

Inspired by classical and contemporary chorographic records of Britain, Llwyd documented his accumulated knowledge through text and cartography, '[uniting] the fashionable accomplishments of the age' (Parry 1824: 305). The first of his manuscripts to be considered is *Cronica Walliae a Rege Cadwalader ad Annum 1294* (Llwyd 1559), a translation of an earlier Medieval text (*the Chronical of Caradoc*) that outlines the lives of early Welsh history and nobility. The second written text, *Commentarioli Britannicae descriptionis fragmentum* (Llwyd 1572), penned almost ten years later, and subsequently translated into English as *Fragmentum, The Breviary of Britain* (Llwyd (trans. Thomas Twyne) 1573), is a distillation of earlier texts in which Llwyd seeks to right the wrongs of previous chroniclers such as Gerald of Wales, Montgomery, Boece and Buchanan. As Schwyzer explains (2011a: 4), Llwyd constructed a narrative in which 'Wales was... [Britain's] origin and essence', the true magnitude of which might only be revealed via a thorough examination of its geography. The *Breviary* is doubtless best known as the first recorded use of the term 'British Empire', directly establishing Llwyd (and Wales) in the colonial arena and even suggesting him as an early toponymist (Henry 1972; Armitage 1997; Schwyzer 2011a).

Exploration of Llwyd's work by historians of English literature and Welsh history scholars has led to a several pieces of research, translation and analysis of his opera omnia (Parry 1824; Chotzen 1937; North 1937; Gruffydd 1968; Henry 1972; Schwyzer 2011a; Williams 2018), but the overwhelming focus has been on translation and the language contained in his written work, with only North (1937) and Schwyzer (2001; 2011a; 2011b) considering his use of geography in any detail.

The next of his accomplishments are three known maps, the *Angliae Regni florentissimi nova descriptio* (Figure 1), hence forth known as the *Angliae Regni* and extant at the British Library, the *Cambriae Typus* (Figure 2) extant at the National Library Wales, and a third map of England no longer extant. Neither of the extant maps is dated, but archival work suggests *Angliae Regni* is the older of the two, the map of Wales having been created close to the end of Llwyd's life (Llwyd 1568). The surviving maps have differing extents, the *Cambriae Typus* being known as the first mapped depiction of Wales as a solo entity, and *Angliae Regni* being a picture of England and Wales with partial outlines of Scotland and Ireland. Both appear in Ortelius' *Theatrum Orbis Terrarum* from 1573.

Thrower defines the role of maps in reflecting 'the state of cultural activity, as well as the perception of the world, in different periods' (2008: 1), and Llwyd's endeavours are no exception, cementing him firmly in the centre of the ongoing reconceptualization of mapmaking in sixteenth century Europe. Llwyd's travel in Europe, facilitated by his patron the twelfth Earl of Arundel, Henry Fitzalan, would have provided him the opportunity to peruse, inspect and obtain copies of existing maps. From these samples he could grasp the necessary skills to author a map, as well as witness the varying contexts in which cartography was employed.

Research into Llwyd's cartography has been fruitful but limited. North (1937), and later, Evans (1964), offer the only comprehensive critical analysis, focusing on the successive editions in Ortelius' *Theatrum*, their possible lineage and relationship with contemporary maps and mapmakers. Other publications such as van den Broecke (1998; 2011) centre on Ortelius and the versions of Llwyd's maps as a component to the *Theatrum* but offer no in-depth critique or analysis of the individual cartography. Llwyd's politics has



Figure 1. *Angliae Regni florentissimi nova descriptio*. (Maps.C.2.c.10., British Library).



Figure 2. *Cambriae Typus* (MAP 3612, National Library Wales).

also been a focal point of research but this has shown preference for his written work and tackles little in relation to his maps or the possible associations between his writing and cartography (Helgerson 1986; Schwyzer 2001; 2011a; Williams 2018). Only North (1937) suggests a link between the two forms of media, stating that Llwyd's writings were 'concerned with topography and history, and his maps [were] prepared to illustrate these matters rather than for geographical purposes' (7).

By its very nature, Llwyd's chorographic corpus informs us that geography was fundamental to his descriptions and close reading of the texts (in both written and visual form) furnishes the reader with an engaging history of people, space and place. There has however been limited systematic enquiry of the geographical content of Llwyd's work and the links between his textual and visual geographies remain neglected. Llwyd's picture of Britain, in written and cartographic form, therefore, presents an enticing and unrivalled geography of Britain, and particularly Wales, in the early modern, of which many questions remain. We must then consider how this dual-media approach of Llwyd's might be studied.

### **Turning to the Digital – Mixed-methods for Mixed Sources**

The fundamental basis of this research begins with the occurrence, identification and extraction of geography within Llwyd's texts. In the Digital Humanities, by considering reference to toponyms in written texts, research teams have used a variety of digital techniques and tools to burrow deep into genres as diverse as fiction, poetry and travelogues, early newspapers and medical reports (Lang 2014; Gregory et al. 2015a; Murrieta-Flores et al. 2015; Gregory and Donaldson 2016; Donaldson et al. 2017; Taylor et al. 2018a; Taylor et al. 2018b; Baker et al. 2019). Advancing from the close reading procedures of manually identifying geographic references within written texts, several projects have employed varying forms of distant reading and mixed-method approaches, to combine the more traditional qualitative forms of literary research with digital and quantitative mechanisms (Moretti 2013; Underwood 2017). GIS has been used to map and spatially analyse place-related data extracted from texts and even combined with computational linguistics and quantitative datasets in the form of Geographical Text Analysis (GTA) (Gregory and Hardie 2011; Gregory et al. 2014; Gregory et al. 2015b; Porter et al. 2015; Porter et al. 2018). Ranging from antiquity through to twenty-first century sources, researchers have applied these tools and techniques to consider geography as a communication method between author and reader and emphasise that 'history, literature, and spatial understanding inform and shed light on one another' (Murrieta-Flores and Howell 2017: 30).

Nevertheless, written texts have been the overarching focus of past and on-going research, and this is only one of several mediums through which early texts were authored. Another key source material, cartography, is replete with spatial information and is a fundamental record through which information was communicated in our past (and present). Historians of cartography, such as Harley (1987; 1988; 1989), Harley and Woodward (1987), Wood (1992) and Edney (1993; 1996), and publications like the *History of Cartography*, amongst others, first took us beyond generic map appraisal into a deeper,

post-structuralist analysis and deconstruction of the ‘second text’ of cartography (Harley 1989: 9) and taught us that, as with a written text, maps can be scrutinised for the varying discourses that underlie. This complex process necessitates reading behind the cartography to examine core aspects of the map and the map maker. This includes delving into a map’s purpose as well as a map maker’s personal life and connections.

Deciphering discourse and narrative in cartography has become ever more achievable through new digital approaches. These mixed-methods offer a new view on early cartography, opening new avenues of investigation and posing fresh questions not identified through more traditional mechanisms. Scholars willing to adopt digital and quantitative forms of cartographic analysis, in combination with the more traditional qualitative approaches, have enhanced our understanding of early maps and mapmaking processes and expedited further exploration of connections and lineage between maps and their makers (Tobler 1966; 1994; Symington et al. 2002; Jenny 2006; Lloyd and Lilley 2009; Lilley et al. 2009; Lilley and Porter 2013; Porter et al. 2019).

Part of this digital movement includes the study of toponyms on early maps and new mechanisms to extract and analyse this textual information. Most notably, the *Pelagios Commons* semantic annotation tool, *Recogito*, is a semi-automated facility for annotating place name information on historic maps (Simon et al. 2015) and links these with other sources through Linked Open Data, and *Strabo*, developed by the University of Southern California Spatial Informatics Laboratory, has also made great strides towards automation (Chiang and Knoblock 2014).<sup>1</sup> The merits, challenges and limitations of the semi-automation offered by such tools has been duly discussed (Simon et. al 2014). In summary, they lack the accuracy necessary for rigorous toponym research and still require the addition of significant manual labour. Standard forms of Optical Character Recognition (OCR) rely on structure (Chiang and Knoblock 2014; Vane 2019), and the disorderly nature of text contained on maps means that no cartographic-focused text recognition software presents an OCR quality even close to that achieved with written documents.

Advancing mixed-method research for written and cartographic texts (despite limitations) therefore offers a reconceptualisation of our past from cultural, historical and geographical viewpoints, and aids in a rethinking of the spatial interconnections that link these early sources with the material world (Barker et al. 2016a; Cooper et al. 2017). But this research has only gone so far. Until now the overwhelming focus has been on analysing written texts and cartographic outputs as separate entities (and fields) and few researchers have tackled a comprehensive dual comparison of early written and mapped sources from the same time period or author. The exceptions to this include Simon et al. (2015) and Barker et al. (2016b), who have looked at linking maps and written texts in classical scholarship and Ekman (2018) who assesses the written and cartographic in fantasy novels.<sup>2</sup> In essence, by focusing on a singular form of text we are limiting our research to an abridged account of the overall narrative.

It is proposed here that to truly re-evaluate and expand our understanding of the written and cartographic work of Humphrey Llwyd (and others), then, we must appropriate and amalgamate a selection of the aforementioned and currently disparate methods, techniques and tools, to link the text with the map and open up the connections between each. These include those approaches directly related to GTA in terms of

toponym identification, extraction and analysis using GIS, and others sourced from existing techniques in the study of map history. This fusion of approaches provide a valuable extension to GTA, firstly by aligning with the growing exploration of cultural texts through deep mapping (Bodenhamer et al. 2010; 2013; 2015), and secondly, by moving away from the treatment of maps and texts as separate entities and towards, in this instance, a more complete view of the geography in Llwyd's work.

The chosen suite of techniques is used here to re-address the historical importance of Llwyd's outputs in two ways. Firstly, to reappraise Llwyd's geography by mapping and investigating toponyms as detailed across two of Llwyd's written texts (the *Breviary* and *Cronica Walliae*) and his two extant maps (*Angliae Regni* and *Cambriae Typus*), and secondly, to comprehensively investigate the interrelationship between Llwyd's written and cartographic work. Lastly, from a methodological perspective, this paper provides an evaluation of the benefits of the mixed-method approaches outlined here to the fields of literary geography, history and the history of cartography.

### Collecting and Preparing Llwyd's Geography

An enquiry focused on uniting differing forms of early cultural text has various methodological challenges, not least that different mediums of text contain different types and forms of information. How these might be combined is a complex question, but in many written texts and cartography we find a key commonality – toponyms. To investigate the geography of Llwyd's written and cartographic works, a process of toponym identification was necessary.

*Recogito* was chosen to semi-automatically geo-parse the *Breviary* and *Cronica Walliae*. The software allows the user to import a digital copy of a text and using Named Entity Recognition (NER) and a suite of available gazetteers, searches the text and geotags recognised toponyms.<sup>3</sup> This semi-automated process should however be approached with caution. Geographic Information Retrieval (GIR) from written texts such as Llwyd's has numerous obstacles (Won et al. 2018) and this is particularly true for large-scale texts that incorporate many thousands or even millions of words. How we can extract toponym information from historical corpora without access to reliable and comprehensive gazetteers and how we deal with the difficulties of disambiguation, temporal amalgamation of boundaries, and toponym change (Butler et al. 2017; Won et al. 2018), is paramount. There were five key considerations highlighted by the Llwyd case study. Firstly, translation: the *Breviary* is an English translation of Llwyd's original Latin text (Twyne in 1573) and several of Twyne's interpretations of toponym are likely to differ from Llwyd's original intention. For instance, where Twyne's translation mentions 'Thames' (indicating the River Thames) it should refer to the 'River Thame' (Tama) in Oxfordshire and Staffordshire.

Secondly, in both written works there are several debatable toponyms: *Caer Lwytgoed* refers to Lichfield, not Lincoln; *Mediolanum* is *Whitchurch*, not *Lancaster*, depending on the context. Thirdly, a key consideration must be *what* to map. In some parts of the *Breviary*, Llwyd states his own ignorance of the geographical location of certain places, so choosing whether to map or not to map a toponym, the location of which Llwyd is unsure, must be decided: for *Vagniacum* (probably *Springfield*, Kent), Llwyd admits he

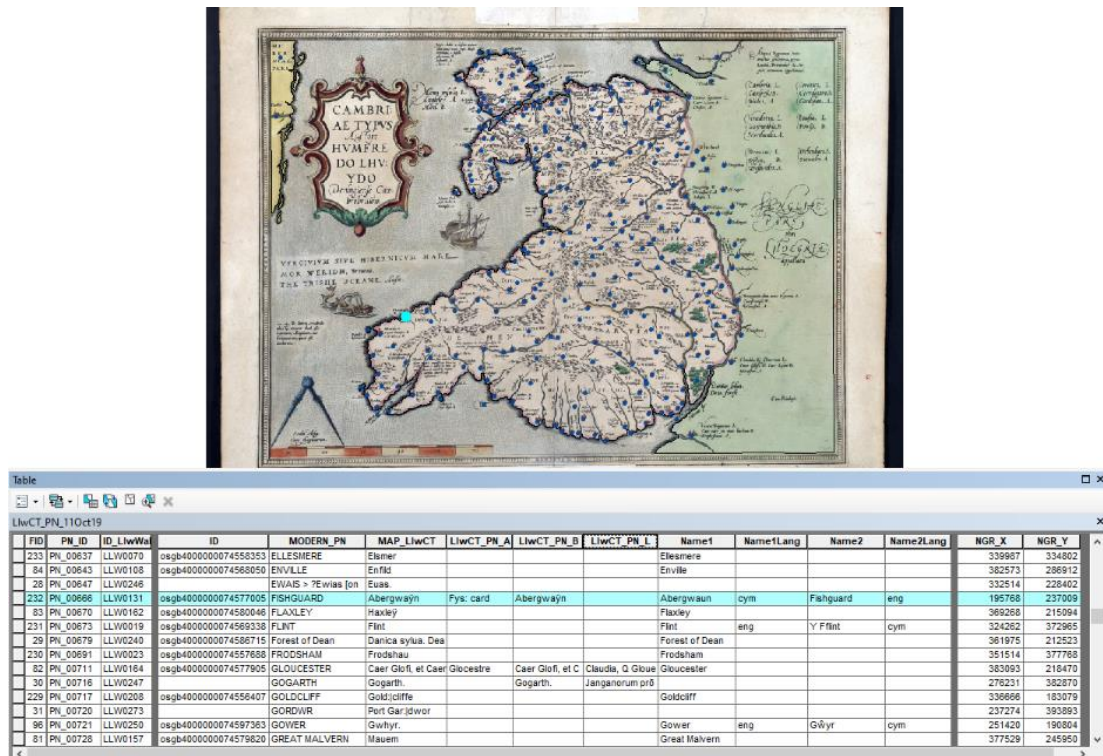


Figure 3. ArcMap database including the digitised version of the *Cambriae Typus* and associated attribute table with the place name Fishguard highlighted.

is ignorant of its whereabouts and Salinae is referred to by Ptolemy as a city of the Catuvellauni, but its location is unknown and Llwyd does not hazard a guess.

Fourthly, acknowledging the difficulties of *where* to map and untangling the disambiguation of toponyms is also essential. Rendering an early administrative boundary such as a country, county, county, historic kingdom or cantref (or indeed ‘Britain’), to a modern map outline is problematic (Gregory et al. 2013). How does one choose the ‘centre’ of such an area and assign coordinates to the toponym? Some examples from Llwyd’s writing include, the ‘centre’ of the Roman Empire as Rome, Arfon, a cantref in north wales, assigned the centre point Caernarfon, and Britain’s centre being given as the Whitendale Hanging Stones. Following *Recogito* the authors actioned a manual checking process of the toponyms identified by the software (including checks for disambiguation) and a manual identification and extraction of those toponyms not found by the *Recogito* gazetteers. Many of these were matched with those in an existing gazetteer compiled by the authors from previous historic map research projects and others matched through team knowledge.

Lastly, Llwyd is not always correct in his geographical analysis, so whether a map of his writing should show the correct geographical location or the location where Llwyd believed a place to be must be determined. By way of example, Pettuaria is in Brough-on-Humber, but Llwyd, in his distillation of earlier texts, thinks it refers to Peterborough. Llwyd also locates Yscaredic, land of Scordisci tribe, in Hungary even though their true historical territory was further south, centring on Belgrade. Similar cases are seen in the *Cronica Walliae* and were dealt with on a case by case basis. Combining *Recogito*’s semi-automated toponym identification process with manual identification which considers



situations as described above has allowed for a comprehensive gazetteer of toponyms (including associated coordinates) to be derived from Llwyd's written work.

For Llwyd's cartography, a semi-manual process was used to identify and digitise toponyms as point data in the project GIS (Figure 3). This step did not incorporate any of the aforementioned OCR-type text recognition products currently available for maps, the research team opting instead to use an automated matching process with the existing in-house gazetteer of early modern toponyms derived from early maps, Ordnance Survey (OS) data available through OS Open Names (© Ordnance Survey 2019) and manual toponym identification.<sup>4</sup> This painstaking process also incorporated several attributes for each point vector including coordinates (British National Grid (BNG)) and toponyms in their modern and historic forms of English, Welsh and Latin.

### A fresh view on Llwyd's writing

The toponyms derived from both forms of Llwyd's texts facilitate the analysis which follows. The first set of analyses focus on his written chorography, the *Breviary* and *Cronica Walliae*.

Producing the first literary map of Llwyd's written geographies challenges the perceived view that his sole focus was Britain and Wales and provides evidence of Llwyd's global interest (Figure 4). Llwyd was described by Parry as '...the first writer who extended, beyond the boundaries of his native land, an accurate knowledge of her history and antiquities' (Parry 1824: 308). Here we see the first charted evidence of his geographical and historical descriptions (and those who came before him) stretching from his home in Denbigh, north Wales, across Britain and Europe, through Africk [Africa] to 'the newfounde worlde' [the Americas] and even to the North Pole. Textually perambulating the known world, he uses place and space as a vehicle to discuss his thoughts on the origins, connections, movements and migration of populations and tribes, the changing rulers and the dynamic boundaries that were set apart (politically and sometimes physically based on natural or man-made features) during different times and spaces.

Both texts are divided into key sections, the *Breviary* set in seven distinct segments including Llwyd's introduction and descriptions of each division of Britain (in total containing 1558 place name mentions), and *Cronica Walliae* (containing 1154 place names) divided into eight parts centering on the changing historic rulers of Wales and a description of the country. Llwyd's resident knowledge of Britain and Wales allows him to embrace a unique treatment of geography as a means of narrating Welsh heritage and adopting place as the basis of his storytelling as well as challenging the geographical and historical knowledge of his predecessors.<sup>5</sup>

Counting the frequency with which toponyms occur in the texts and categorising these into 'types' of place name enables a second fresh articulation of the geography as set out through Llwyd's writing (categories assigned include region, country, river and settlement etc.). In the *Breviary*, twenty-one of these place-types are found in Britain and the remaining four elsewhere in Europe. Of the most frequently mentioned place-types, regions and countries predominate with 'Britain', unsurprisingly, the most frequently mentioned toponym (occurring 162 times). Natural boundaries also play a significant role

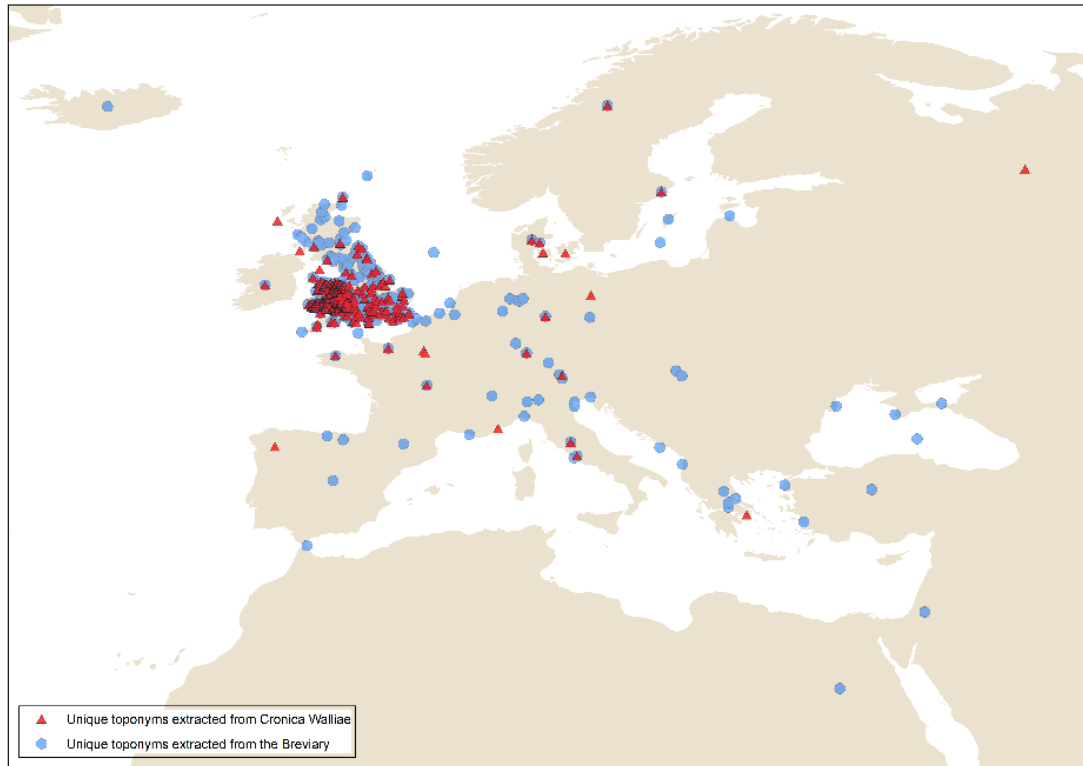


Figure 4. Llwyd's written world as seen through the *Breviary* (blue circle) and *Cronica Walliae* (red triangle). One instance of each toponym is shown (toponyms relating to the North Pole, the Americas and parts of Africa are not shown).

with five rivers mentioned, the 'River Severn' being the most frequent with twenty-four mentions. The 'City of London' (occurs twenty-six times) and 'Rome' (repeated twenty times) are the two most commonly occurring of the place-type 'settlement', both of which notably lie outside of Wales. The final categories to appear in the top frequency of place-type are the historic 'Kingdom of Mercia' (mentioned ten times) and the 'Irish Sea' (eleven times). His use of toponyms shows Llwyd's unsurprising focus on Britain but reiterates his clear association of Britain's and Wales' histories with other parts of Europe and beyond. Exemplified through his varying scales of geography (global, national and local), he places Wales and the Welsh people at the heart of great civilisations, including Britain and 'the *BRITISH* Empire'. In the *Breviary*, the greatest concern with geography is found in the 'Description of Wales' (42 per cent of all toponym occurrences) and 'The Description of England' (over 30 per cent of all toponym occurrences), as a Welshman these countries being a central and familiar focus for Llwyd and his contemporaries. In *Cronica Walliae* we witness a similar pattern of place-type and frequency but with the addition of some further place-types such as 'Battle site' and 'Principality' almost all of which are found in Europe. As with the *Breviary* the greatest use of toponyms is found in the 'Description of Wales' comprising 70 per cent of all place names but these differ in place-type introducing those such as 'Historic Boundary' (Kingdom, cantref, comote, hundred etc.) which is not seen in the *Breviary*.

Plotting Llwyd's toponyms also discloses previously unseen and 'hidden' geographies concealed within the *Breviary* and *Cronica Walliae*. The most marked of these is

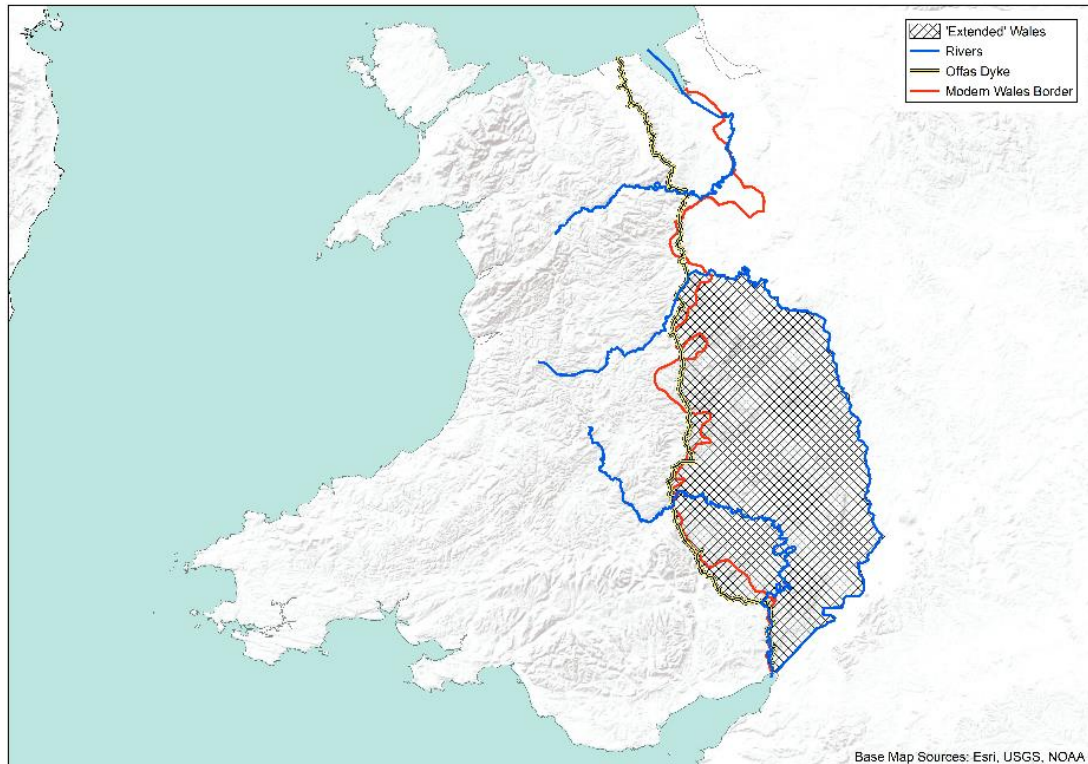


Figure 5: Quantifying Llwyd's extension of the England-Wales border as shown in the *Breviary*.

the extent, both conceptually and geographically, of Wales, his country of birth. First recorded in Schwyzer's (2001; 2011a; 2011b) reading of the *Breviary* and for the first time quantified here, Llwyd's astute use of natural boundaries in his written texts stretch the historic Welsh claim to territory east to meet the River Severn. Using GIS to quantify Llwyd's Wales provides the first mapped evidence from his written texts of this 'audacious cartographical land-grab' (Schwyzer 2001: 37) emphasising the importance with which he held natural topography over man-made features or contemporary political boundaries (as Monmouth and Harrison had before him). Quantifying this 'land-grab' we learn that Llwyd extends the Welsh border into Herefordshire, Worcestershire, Shropshire and Gloucestershire by up to 60km and by a total area of approximately 5471km<sup>2</sup>, adding almost one quarter of the land mass to 'modern' Wales (Figure 5). Llwyd is using geography to write about the Cambria he knows, the extent of the country, its associated boundaries and political claims of ownership (Schwyzer 2011a).

In the *Breviary*, the results of a kernel density calculation of toponym mentions computed in the GIS is also noteworthy, exhibiting a high density of toponym usage in north Wales near Llwyd's home in Denbighshire (Figure 6). The density calculation also exposes a different form of boundary (also present in *Cronica Walliae* but more prominent in the *Breviary*) that differs from his natural borders. A deep toponym frontier runs from west of the River Dee in the north, south to the mouth of the River Wye, dividing Wales from England and almost mirroring the man-made Offa's Dyke. In his text, Llwyd describes the purpose, extent and position of the man-made boundary but it is the older

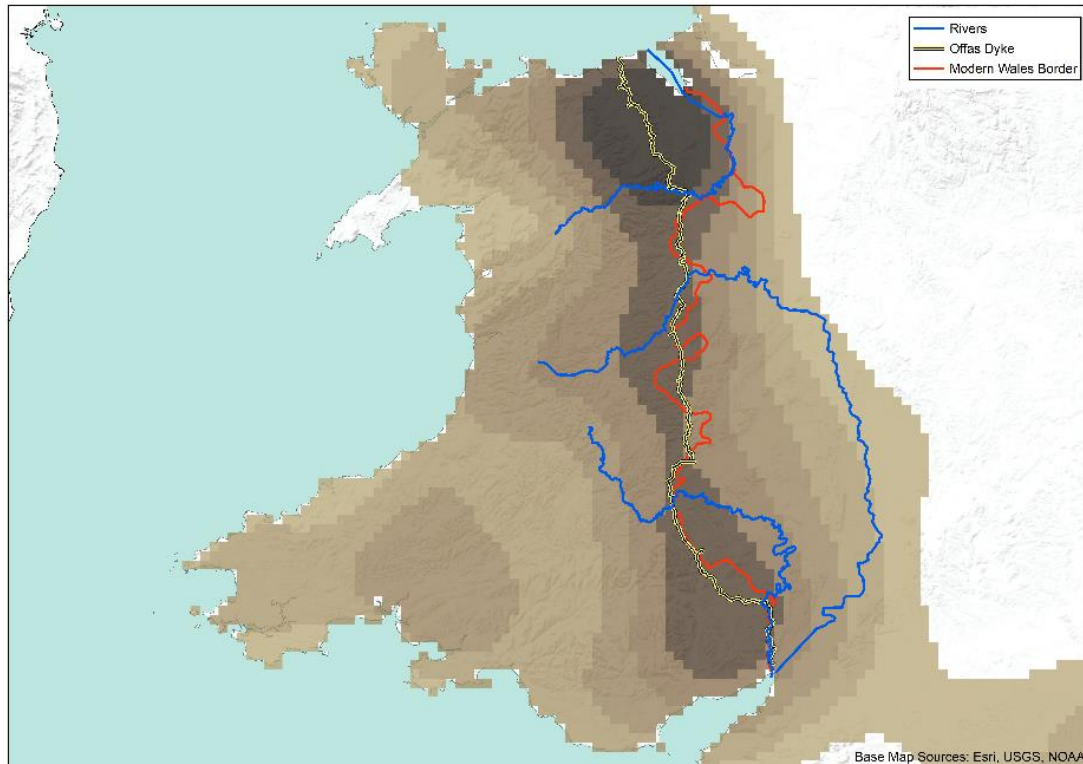


Figure 6. Kernel density of toponyms in the *Breiarium*'s 'the Description of Wales'.

Severn border on which he explicitly chooses to base Wales' extent. To explore this toponym boundary further, a 10km digital buffer was added around Offa's Dyke, and the toponyms lying within the buffer subjected to a close reading. This shows the majority of selected toponyms in the vicinity of the ditch do not relate directly to Offa or the dyke. These hidden geographies, revealed through this revised method of reading the text would have been unbeknown to the author and are likely a relic exposed through Llwyd's drawing on written work that came before – he was a clear proponent of the Severn border and yet his heavy concentration of toponyms in the vicinity of Offa's Dyke places a higher value on the eighth century man-made division than even Llwyd might have been aware. Through mapping and exploring the geography of his written texts in this way we can therefore expand on the story told through solely close reading his texts.

### Placing Llwyd's Cartography

For the second portion of analysis, Llwyd's extant cartography was considered through a mixed-method approach of toponym and place-type analysis (like that performed on his written texts) coupled with cartographic discourse analysis. It is immediately clear that Llwyd's maps are items of contrast, not least in their differing geographic extent (Figure 7, bottom, shows the density of toponyms on each map). An assessment of the toponyms, place-types and place distribution shows the *Cambriae Typus* furnishes the reader with a historic and geographic make-up of early Wales, extending the Welsh border, as his written texts do, while *Angliae Regni* presents a broader, more geographical image of England and

Wales. Extending on North (1937), who viewed the maps conceived as illustrations of Llwyd's written work rather than for geographical objectives, plotting the toponyms on a modern map outline reveals they exhibit a far more complex narrative than previously thought: the maps present a dichotomy between what Edney (1996: 64) calls 'the empiricist [western] conception of cartography' demonstrated by the *Angliae Regni*, and the more biographical narrative of Welsh history and nation observed through the *Cambriae Typus*.<sup>6</sup> This is evidence of Llwyd exercising his newly found 'mapmindedness' (Harvey 1993) and cartographic imagination (Smith 2008) through a clear manipulation of mapmaking for differing purposes. This mixed-method exploration of the geography within the maps aids in re-defining their individual focus, and, for the first time, suggests that the *Angliae Regni* and *Cambriae Typus*, although published simultaneously in Ortelius' *Theatrum*, were originally destined for different audiences in the intricate web of British and European social discourse and knowledge within which Llwyd moved.

We also witness through his maps the surviving legacy of Llwyd's interpretation and his personal understanding of the persuasive and pervasive 'power of maps' (Harley 1988) to not only reconstruct the past and 'place' civilisation, but to provide a lasting geographical template for future thinking. Llwyd's foresight on the legacy of his work was correct with the *Cambriae Typus* appearing for almost two centuries in various forms through Ortelius, Mercator and others. Conversely, his *Angliae Regni* was quickly replaced by Christopher Saxton's survey derived maps in the *Theatrum*, and the *Breviary* was rapidly superseded by the publication of Camden's *Britannia* (1586).

### Combining Llwyd's written and visual geographies

Lastly, and key to the methodology is the simultaneous consideration of both mediums of text.

Initial outputs show that in both written texts the geographical focus is centred on the descriptions of Wales (Figure 7, top). This is also true of the *Cambriae Typus* (Llwyd's map of Wales) (Figure 7, bottom right), but the *Angliae Regni's* geography (Llwyd's map of England and Wales) (Figure 7, bottom left) differs substantially from the other three texts with a more prominent focus on parts of the midlands, eastern and southern portions of Britain. The *Angliae Regni's* very nature immediately conveys such a measured, predictable and contemporary depiction of England and Wales (or as its full title suggests, an 'anatomy' of the country), that one might naturally associate it (as North (1937) did) with the *Breviary's* narrative in which Llwyd perambulates the geography of England and Wales. This relationship was investigated further by plotting the co-occurring toponyms extracted from the *Breviary* and *Angliae Regni*: however, the two texts exhibit only a 30 per cent place name match, the majority of which relate to settlements, regions or human constructions. Comparing the toponyms on *Angliae Regni* with those extracted from the earlier *Cronica Walliae* text shows even fewer common toponyms with a percentage match of only 16 per cent, most of which are settlements, and resulting in the lowest toponym match across all comparisons. The geography of the *Angliae Regni* therefore indicates the map has slightly more resemblance to the *Breviary* than the earlier *Cronica Walliae* but also reaffirms that it is unlikely the map was created as a direct accompaniment to either of Llwyd's written texts.

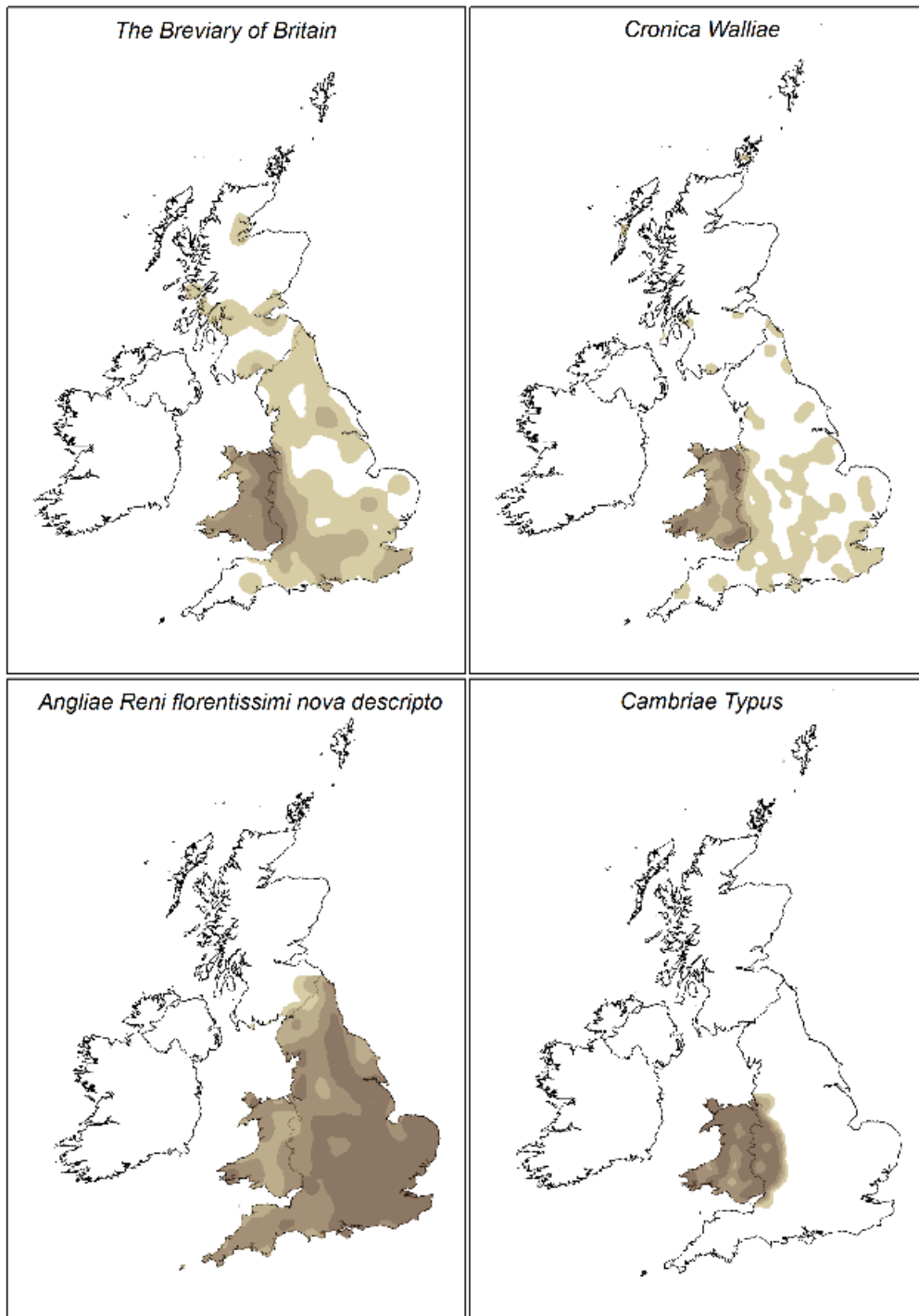


Figure 7. Figure illustrates an overview of toponym spread and extent through a density calculation for all four texts.

Toponyms identified on the two written texts were subsequently compared with those extracted from the *Cambriae Typus* (Llwyd's map of Wales). It was found that 32 per cent of toponyms matched with the *Breviary* (only 2 per cent more than the matches with the *Angliae Regni*), of which 74 per cent are unsurprisingly located within modern Wales.

Differing from the *Angliae Regni* comparison, the matches are not solely settlements, other place-types such as historic kingdoms and boundaries are also abundant. There are also other geographic commonalities: Herefordshire, Worcestershire, Shropshire and Gloucestershire all lie within the extent of the *Cambriae Typus* and the ‘Description of Wales’ in the *Breviary* and *Cronica Walliae* emphasising the importance in which Llwyd held this extended Welsh territory. There is, though, only a 22 per cent toponym match between *Cambriae Typus* and the *Cronica Walliae* text. As with the *Breviary*, the matches are largely settlements (67 per cent) with 17 per cent being historic boundaries such as cantrefi and commotes which do not appear in the *Breviary* or on the *Angliae Regni*.<sup>7</sup>

Comparing the common toponyms across the two written texts shows the greatest match (41 per cent), confirming *Cronica Walliae* and the *Breviary* to be more similar to one another than either are to the Llwyd’s maps. This is most likely because Llwyd was focusing on the history of Wales and drawing on some of the same writers in both. All percentage toponym matches are summarised in Table 1.

% toponym match	<i>Cronica Walliae</i>	The <i>Breviary</i>	<i>Angliae Regni</i>	<i>Cambriae Typus</i>
<i>Cronica Walliae</i>	-	41	16	22
The <i>Breviary</i>	41	-	30	32
<i>Angliae Regni</i>	16	30	-	15
<i>Cambriae Typus</i>	22	32	15	-

Table 1. Percentage toponym match across all four texts.

Comparing the *Breviary* simultaneously with both of Llwyd’s maps (Figure 8, top) the three sources are found to have only forty-seven unique toponyms in common (94 per cent of which are settlements), although overall, the percentage toponym match for both maps and the *Breviary* is similar (approximately one-third of all toponyms). Due to the geographical focus of the *Cambriae Typus*, the extent of this analysis was restricted to Llwyd’s Wales.

Statistically, based on toponym mentions, neither map is more alike the *Breviary* than the other, however, the *Angliae Regni* contains many more toponyms. The fundamental differences are, as already noted, in place-type - the *Angliae Regni* is largely made up of settlements and almost a quarter of the toponyms on the *Cambriae Typus* reference historic boundaries. The density calculations show the north, south-east and south-west of Wales with the greatest concentration of places across all three texts. There is, however, no geographic pattern of note, and other than Llwyd’s personal knowledge of north Wales, we can only speculate the reasons for higher densities elsewhere being related to places he knew and visited, or notable historical persons, places and events. The extension of Welsh territory east to the River Severn is again evident, but the toponym density along Offa’s Dyke, so clearly visible in the *Breviary*’s geography, is lost.

Comparing next the *Cronica Walliae* with both of Llwyd’s maps shows that, due to the high incidence of settlements on the *Angliae Regni*, this is again the most common place-type that survives the comparison. An almost identical density to the *Breviary* and map

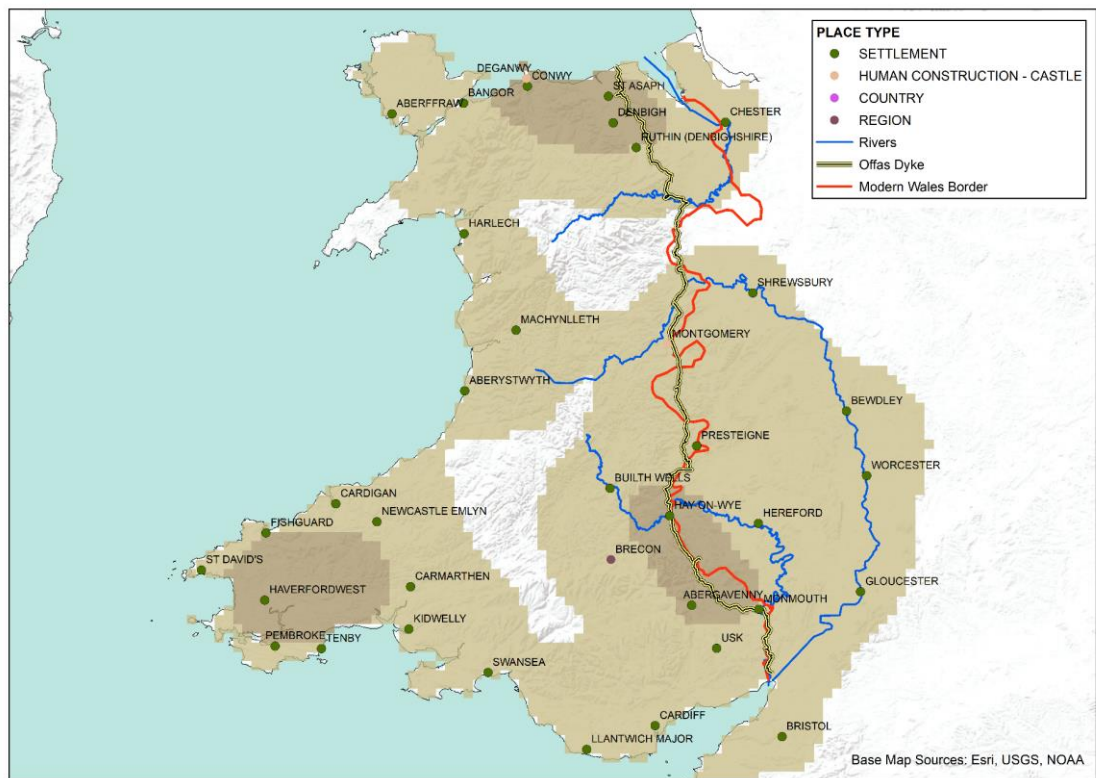
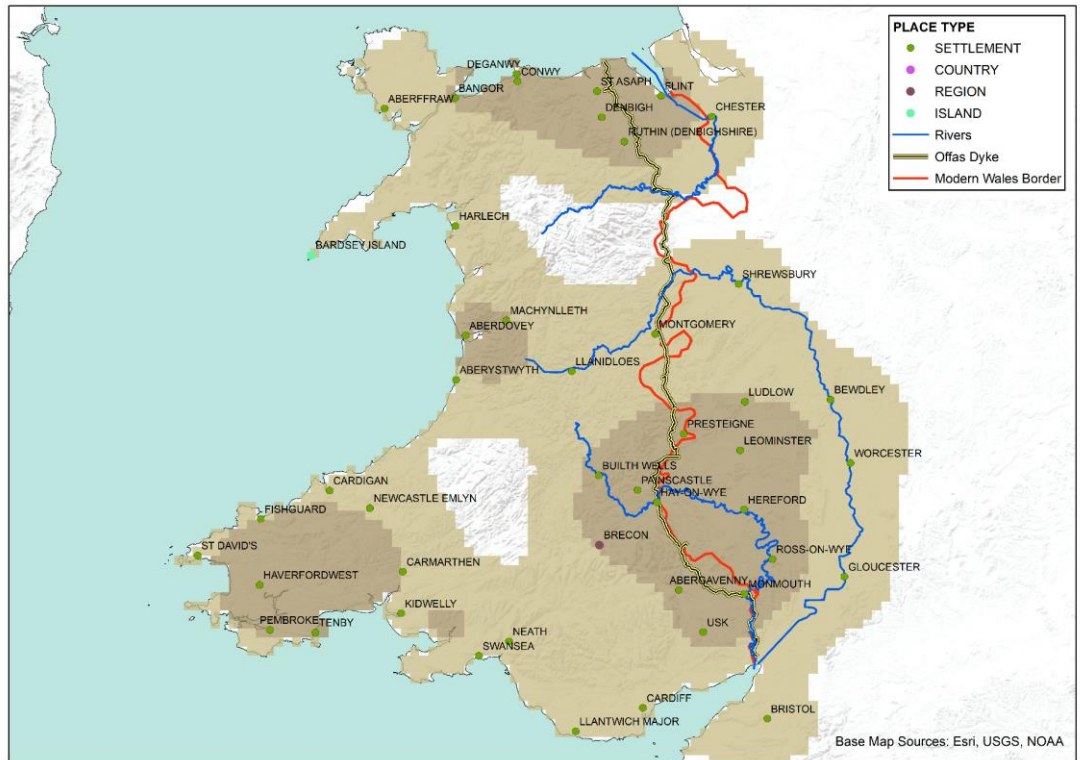


Figure 8. The common toponyms and place-types found on three texts (the *Breviary*, *Angliae Regni* and *Cambriae Typus*) overlaid with density calculation (top); a complete comparative digital output of the common toponyms and place-types found on all four texts and overlaid with a toponym density calculation (bottom).



comparison is observed. In both cases, by combining three sources (one map and two written texts) at any one time we also lose many of the patterns of interest related to territory and borders which further supports the hypothesis that the focus, purpose and possibly the source of the information for at least one of the texts is different.

The toponyms common to the previous comparisons (the *Breviary* with the maps; *Cronica Walliae* with the maps) reveal a core geography in all Llwyd's texts. To investigate this body of geography further, all four sources were compared simultaneously resulting in thirty-eight common toponyms (Figure 8, bottom).

These common toponyms might be considered a 'core' Llwydian geography, mostly made up of settlements from Wales' past and Llwyd's present and reiterates the little overlap with at least one of the texts. This Llwydian geography extends west to reference Ireland and is focused within the pattern seen in many of the earlier comparisons (Denbighshire, south east Wales around Monmouthshire and Glamorgan and in the south west in Pembrokeshire), extending Wales east to the River Severn. 'Hot spots' of toponym density visible on the complete comparative digital output, are also less compelling than some of the patterns noted when each text is analysed as a solo entity or a comparison made between pairs of Llwyd's texts. The toponyms are such that they might have been sourced from any existing list of toponyms or even by an outsider with only a general knowledge of Wales. Rather than a revealing illustration of a core landscape of past events or notable locations that shaped Wales and Britain in Llwyd's narrative, they could be more correctly explained as further clarification that one or more of the texts is far removed in terms of its source material or purpose.

This full corpus analysis reiterates the necessity for mixed-method approaches such as those outlined here in revealing truths and falsehoods (and further questions!) that may not be determined from close reading or when a text is analysed in isolation. Nevertheless, out of all four sources, the percentage toponym match is strongest between the two written texts, and this highlights the fact that the maps are most likely not directly related to one another or intended as an accompaniment to Llwyd's written texts. To further explore this will require further archival research and analysis of the maps.

## Conclusions

Building on the work of researchers in the different genres and areas of scholarship ranging from geography to the history of cartography and digital humanities, this paper offers a first illustration of how rethinking, re-evaluating and combining aspects of existing techniques, methods and tools can garner new information from two distinct forms of cultural text. Further automation of certain processes is needed, especially in the retrieval of textual information of historic maps, but this is not the main aim of this methodology. Rather it is to illustrate the importance of looking beyond our own research field for methods and strategies that might be combined to further our research and knowledge.

Reimagining how we study cultural texts and embracing mixed-methods (digital techniques alongside more traditional forms of research) establishes a new landscape of study that enables a fresh approach to questioning, seeing and experiencing the content of these sources. This case study example has shown that mixed-media source materials and

freshly united forms of analysis can reveal literary geographies of a differing nature to those previously witnessed. In essence, combining GTA with forms of analysis from map history takes meaningful steps toward a first complete view of one author's use of geography by 'mapping out' varying forms of cultural text for the first time since they were conceived, but also by drilling into the roots of an author's mixed-media approach to discover something more from his work outside of the traditional literature themed approaches.

Thinking outside of our area of scholarship and considering the tools used here has the capacity to drive forward historical and geographical research, methodologically and theoretically, by providing a more complete view of early geographical thinking. It affords us the ability to see things previously undetectable through more traditional techniques, divulge a new view on early geographies of place as well as a fresh perspective on the make-up and interconnections between varied forms of early cultural text.

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### Notes

<sup>1</sup> *Recogito* is an initiative of the Pelagios Network, developed under the leadership of the Austrian Institute of Technology, Exeter University and The Open University with funding from the Andrew W. Mellon Foundation; Strabo, University of Southern California Spatial Informatics Laboratory, <https://github.com/spatial-computing/strabo-text-recognition-deep-learning> [accessed: 12 May 2020].

<sup>2</sup> Lancaster University's Digging Early Colonial History project is researching the cultural texts that make up *Relaciones Geográficas* corpus.

<sup>3</sup> *Recogito*'s NER uses Stanford CoreNLP recognition engine.

<sup>4</sup> This also provides an OS ID for each toponym which was added to the database facilitating the connection of Llwyd's cartographic information with OS Linked Data.

<sup>5</sup> Throughout the *Breviary*, Llwyd promotes those he deems 'approved hystoriographers' such as Caesar, Diodorus Siculus, Tacitus and Ptolemy, further evidence of the greatness of the Britain and the Britons. Equally, he takes the opportunity to exclaim his disdain for early writings on the history of Britain and focuses on their ignorance and unawareness that the countries within Briton should not be historically compartmentalised (Schwyzer 2011a). He focuses on Polydore Virgil (*Anglica Historia*, 1534), 'the Italian' who 'was no historiographer' and 'whose workes... doth in all places nippe, and gyrde at the Britaynes', Hector Boece (*Scotorum Historia*, 1527), 'the Scot' and 'lying champion', and Bede 'the Englishman'.

<sup>6</sup> It should be noted that before inclusion in the *Theatrum*, Ortelius and his staff made numerous and unknown edits to maps, not only stylistically but also in terms of content. Readers of the *Theatrum* can therefore never be certain if they are reading the original version of the cartography or a heavily edited version of the original manuscript.

<sup>7</sup> A cantref is an early Welsh land division dating to the Medieval (plural, Cantrefi). Cantrefi were divided into smaller land areas named commotes. They were used for administration purposes in early Welsh law.

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