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Martin Davis

A Cartographic Analysis of Soviet Military City Plans



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Martin Davis

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Author

Dr. Martin Davis
Royal Geographical Society
(with IBG)
London, UK

Supervisors

Dr. Alexander J. Kent
Canterbury Christ Church University
Canterbury, UK

Prof. Peter Vujakovic
Canterbury Christ Church University
Canterbury, UK

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Supervisor's Foreword

On the cold and wet afternoon of Wednesday 17 November 2010, I delivered a talk with the somewhat ingenuous title of 'The Magic of Maps' as part of a departmental geography conference arranged for local secondary schools. The aim of the event was to inspire 16–18-year-olds to study geography at university. In the audience of my talk was Martin Davis, who had taken it upon himself to organise a group from his school to make the journey to Canterbury. My first slide presented a Soviet topographic map of the city and its surrounding area. I explained that the map, with its strangely familiar, yet distinctively foreign appearance, was produced as part of the USSR's secret global mapping endeavour—the details of which were only just beginning to emerge. As John Davies and I had started working on *The Red Atlas*, I was keen to point out that this was an exciting new topic with plenty of scope for cutting-edge research still to be done.

Something must have sparked an interest, because Martin enrolled on our Geography Honours degree course at Canterbury in the following September. Enthusiastic about all things cartographic from the start—and not forgetting his initial gaze on that Soviet map—Martin assessed the spatial accuracy of the Soviet city plans of Edinburgh, Cambridge and Chatham for his final-year dissertation project, which the programme's external examiner noted as 'an exceptional piece of work'. Subsequently, Martin's dissertation fought off strong competition to win the British Cartographic Society's first Ian Mumford Award for original research undertaken by students.

In due course, an opportunity arose in the department for a Ph.D./Instructor post, which Martin secured to further his studies on Soviet maps. He made valuable progress in learning Russian and translating Soviet map production manuals as they became publicly available for the first time. Martin also relished the opportunity to engage with current thinking on cartography and post-representation, for which the Soviet maps presented an ideal example to discuss.

The fieldwork associated with Martin's research was certainly memorable. I accompanied him on a trip to visit several archives in the Baltic States, where I had arranged accommodation in an isolated former Soviet sanatorium that also housed a former nuclear bunker complex underground. I am still not sure if Martin was

entirely grateful for that experience, even if it brought to life a sense of the era in which the Soviet maps had been made. That sense was also felt when we were faced with a robust denial of the maps' existence, coming from a rare breed of archivists for whom the Soviet era had not appeared to have ended.

Martin's thesis not only proves the opposite, but makes a substantial advance towards understanding the global military mapping project that was conducted in secrecy by the Soviet Union. As the first Ph.D. to be completed on this emerging and significant topic, it addresses some of the most fundamental questions and provides a solid foundation for future research. His analysis of Soviet map symbology makes an original contribution to knowledge that can inform current global mapping initiatives, while his examination of its implementation offers new appraisals of that curious nexus between a map and its specification documents.

This thesis therefore marks an important chapter in what has been termed 'the greatest cartographic story never told'. Thanks to Martin's perseverance in bringing his work to fruition and to the support of Canterbury Christ Church University, the telling of that story has made a huge step forward that could not have been foreseen on that November afternoon. The magic of maps, indeed.

Canterbury, UK
June 2021

Dr. Alexander J. Kent

Abstract

The collapse of the Soviet Union has seen the emergence of its unprecedentedly comprehensive global military mapping programme and the commercial availability of a vast number of detailed topographic maps and city plans at several scales. This thesis provides an in-depth examination of the series of over 2,000 large-scale city plans produced by the Military Topographic Directorate (Военное топографическое управление) of the General Staff between the end of the Second World War and the collapse of the USSR in 1991. After positioning the series in its historical context, the nature and content of the plans are examined in detail. Aspects of the post-structuralist deconstruction of texts, as advocated by Jacques Derrida, are fused with ideas from the emerging post-representational framework within cartography to form a pseudo-representational paradigm which acts as the theoretical framework through which the Soviet plans are analysed. This new perspective brings forth possibilities to utilise and apply the maps in new contexts, which this thesis facilitates by providing a systematic, empirical analysis of the plans' symbology at 1:10,000 and 1:25,000, using new translations of production manuals and a sample of the maps. This reveals new details of the most comprehensive, globally standardised topographic symbology ever produced, incorporating 630 graphical symbols in total, with 47.0% and 52.1% of these used in the sample of maps at both scales, respectively. Elements of the physical environment account for the largest components of the symbology, with 'Hydrography and Coasts' the largest feature class at 1:10,000 (84 symbols) and 'Vegetation and Soils' at 1:25,000 (66 symbols). A comparative analysis with the *OpenStreetMap* symbology indicates scope for Soviet mapping to be used as a valuable supplementary topographic resource in a variety of existing and future global mapping initiatives, including humanitarian crisis mapping. This leads to a conclusion that the relevance and value of Soviet military maps endures in modern applications, both as a source of data and as a means of overcoming contemporary cartographic challenges relating to symbology, design and the handling of large datasets.

Elements of the research presented in this thesis have been developed further in the following publications and conferences:

1. Davis, M. and Kent, A. J. (2016) Improving user access to Soviet military mapping: a guide for map libraries around the globe. 6th International Symposium on the History of Cartography, 13th–15th October 2016, Dubrovnik, Croatia.
2. Davis, M. (2017) Rethinking cold war cartography: destabilising the ontology of Soviet military city plans. 28th International Cartographic Conference, 2nd–7th July 2017, Washington, D.C., USA.
3. Davis, M. and Kent, A. J. (2017) Improving user access to Soviet military mapping: current issues in libraries and collections around the globe. *Journal of Map and Geography Libraries*, 13(2). pp. 246–260. doi.org/10.1080/15420353.2017.1300206
4. Davis, M. and Kent, A. J. (2018) Identifying metadata on Soviet military maps: an illustrated guide. In: Altić, M., Demhardt, I. and Vervust, S., eds. *Dissemination of Cartographic Knowledge*. New York: Springer. pp. 301–313. doi.org/10.1007/978-3-319-61515-8_17
5. Davis, M. and Kent, A.J. (2019) Analysing the Symbology of Soviet Military City Plans. 29th International Cartographic Conference, 15th–20th July 2019, Tokyo, Japan.
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7. Davis, M. and Kent, A.J. (2021) An analysis of the global symbology of Soviet military city plans. *The Cartographic Journal*, 58(4). doi.org/10.1080/00087041.2021.1958193
8. Davis, M. and Kent A.J. (2021) Soviet city plans and OpenStreetMap: a comparative analysis. 30th International Cartographic Conference, 14th–18th December 2021, Florence, Italy.

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This work was dependent on access to the collections of several institutions, to whom I am grateful for admitting me to their facilities and for their gracious cooperation with my requests for the retrieval of large quantities of materials. I would therefore like to thank the staff of the Maps Reading Room at the British Library (London, UK), the Geography and Map Division of the Library of Congress (Washington, D.C., USA), Latvijas Nacionālā Bibliotēka (Riga, Latvia), Maa-amet Eesti (Tallinn, Estonia), Eesti Rahvusraamatukogu (Tallinn, Estonia), Rahvusarhiiv (Tallinn, Estonia) and Kansalliskirjasto (Helsinki, Finland).

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The constant support of my family—Margaret, Greg and Emma—has been no less vital to my work than any academic support I have received and should not go unmentioned. Above all, I am grateful to God for leading me to all of the people above just at the right time, for providing me with opportunities I could never have previously imagined and for His sustenance and blessings throughout my time in Canterbury and beyond.

Introduction

Throughout the Cold War, the Military Topographic Directorate of the Soviet General Staff produced one of the largest series of topographic maps ever produced (Kent and Davies 2013). While the maps available to the general public of the Soviet Union have long had a reputation for deliberate distortion and ambiguity (Postnikov 2002), militaries east of the Iron Curtain were concurrently producing the very opposite; accurate and detailed maps, in total secrecy and in great quantities. From small-scale aeronautical charts to highly detailed plans of Soviet towns at 1:500 in addition to standardised topographic and city plan series covering virtually the entire globe, the cartographic output of the USSR was undoubtedly vast. The years following the collapse of the USSR in 1991 have seen many of these maps leave the concealment of military map depots and arrive in the stock rooms of commercial map retailers across the former Soviet Union and beyond. Today, the maps are found in dozens of public and private map collections around the globe, many of which are accessible and ready to be harnessed, both as a means of providing historical insight into their original context and as a source of topographic information in modern and future contexts.

Over 25 years after the dissolution of the USSR, it is perhaps surprising that this previously inaccessible global map series has not attracted the focus of more scholarly research, either within cartography or in a plethora of other fields in which these maps may find considerable use. The investigation into the maps mentioned by Collier et al. (1996) has not materialised, and it was not until 2005 that an initial general survey of the Soviet mapping programme appeared, in the first of a series of articles by John Davies (Davies 2005a; 2005b; 2006; 2010) in *Sheetlines*, the journal of the Charles Close Society for the Study of Ordnance Survey Maps. This was followed by further contributions by David Watt (2005) and John Cruickshank (2007; 2008; 2012) and a more panoptic perspective from Kent and Davies (2013). These articles, despite not incorporating detailed, systematic analyses, provide a valuable introduction to the Soviet mapping programme and offer an accurate impression of its scope and content, particularly in relation to Soviet mapping of the UK. A more detailed look at Soviet mapping has been provided by Davies and Kent in *The Red Atlas* (2017) which includes dozens of colour reproductions of the maps, continuing to increase their profile and foster a growth in interest around the world. Applications of the

Soviet data have been even scarcer, however, with Rondelli et al.'s (2013) use of 1:10,000 topographic sheets of Samarkand, Uzbekistan for archaeological purposes being a rare example. Soviet maps have proved particularly useful in areas without detailed indigenous mapping. Davies and Kent (2017: 134–137) cite examples of Soviet topographic sheets being utilised by the allied militaries in Afghanistan and Iraq, as well as by oil exploration and water resource management organisations.

A large proportion of the maps which are now found in libraries around the globe are from the series of Soviet Military City Plans produced between 1944 and 1991, mostly at 1:25,000 and 1:10,000, with a handful of others at 1:5,000, 1:15,000 and 1:20,000. This is likely to be because of their appeal to international collectors as the largest-scale Soviet maps of foreign territory available. In any context, the moment in which insight is gained into the perspective of another is always enlightening. The curiosity evoked by seeing a familiar place mapped in an unfamiliar way using an unfamiliar script no doubt explains widespread interest Soviet maps of other parts of the world; an inward-looking perspective from the outside can challenge the way in which we view geographical spaces that we, post-Cold War map readers, have long considered familiar. This thesis contends that the value of Soviet maps extends well beyond an initial curiosity; that Soviet mapping provides an untapped resource, the potential applications of which extend far outside the remit of cartography or Cold War history. By providing a systematic investigation into one aspect of Soviet mapping, military city plans, this thesis is conceived as a preliminary step into this field which will aid future users of these maps.

Standardised Mapping of the World

A programme of standardised mapping of the entire globe in the twentieth century was by no means a uniquely Soviet ambition. Some years before the advent of Stalin's cartographic endeavours, the German geomorphologist Albrecht Penck proposed a standardised 1:1,000,000 International Map of the World (IMW) at the 1891 International Geographical Congress in Switzerland (Pearson and Heffernan 2015: 58). Whereas topographic mapping had previously been the exclusive domain of National Mapping Organisations (NMOs) and military topographic organisations, Penck's proposal included a common specification of conventional signs, which would transcend national boundaries. His vision was for global coverage across 2200 sheets, which would boost trade, as well as aid navigation and administration. Rhind (2000: 298) suggests that a global standard for topographic mapping would also bring other benefits, such as the interoperability of data and a simplification of trans-national licencing agreements. Although a specification for the IMW was established within twenty-five years of Penck's initial proposal, disagreements between various NMOs regarding, among other issues, the use of metric units and the placement of the Prime Meridian, hindered progress (Pearson and Heffernan 2015: 59). By the time the project ended, a total of 750 sheets had been produced, although some of these deviated from the agreed specification (Rhind 2000: 299). In the end, the IMW's

lack of a centralised system of funding brought the project to a conclusion, never fulfilling Penck's initial ambition for global coverage.

Tsarist Russia had originally joined the IMW programme although, during the 1917 revolution, permanently withdrew (Pearson and Heffernan 2015: 63). While this was a major setback for the IMW, it gave the newly formed Soviet Union the freedom to create its own standardised mapping programme. With an established tradition of strong, centralised control and a willingness to direct significant resources to the programme, the Soviet mapping of the world was able to overcome the problems which were simultaneously hampering the general progress of the IMW. Not only did the Soviet Union succeed in creating a 1:1,000,000 map of virtually the whole globe, it also far exceeded the achievements of the IMW by producing series of maps at larger scales. Between the 1950s and 1970s, IMW mapping of the USSR was undertaken by the US military, which achieved almost complete coverage of its territory at 1:1,000,000. However, by the late 1980s, the USSR had completed full topographic coverage of its territory at 1:200,000, 1:100,000, 1:50,000 and 1:25,000 (Vereshchaka 2002). Among the other impressive cartographic achievements of the USSR is the series of over 2000 plans of cities outside the USSR. Including rich hydrographic detail, classified buildings and terrain, the city plan series alone would have been a major achievement. The scope and *raison d'être* of the city plan series are discussed in greater detail in Chaps. 1 and 2, although it is clear that the Soviet Union saw long-term strategic value in producing standardised city mapping across the world, most likely to facilitate future Soviet administration.

In the twenty-first century, this value continues to be apparent. Today's consumers of maps, often via web-based apps, expect seamless global coverage at multiple scales as a standard requirement, rather than an ideal. Today, mapping is very much global, rather than national. After the publication of a Web Map Server (WMS) interface implementation specification in 2000 (Open Geospatial Consortium 2000), several web maps offering global coverage emerged within five years, including *Esri ArcIMS*, *Google Maps* and *WikiMapia*. *OpenStreetMap*, founded in 2004, are unreservedly 'an international project, and [its] community spans the globe' (Ramm and Topf 2010: 315). Although the medium through which global maps are presented has changed, even since the end of the Cold War, the fundamental challenges of mapping the world remain the same. Organisational structures and resources need to be in place and, from a cartographic perspective, a suitable specification of conventional signs needs to be devised; versatile and comprehensive enough to be applied to any location on Earth. While these cartographic endeavours continue today, the successes and limitations of the pioneering Soviet mapping programme perhaps have the greatest to offer current and future mapping initiatives.

Objectives of the Research

The overall aim of this thesis is threefold: firstly to comprehensively set out the background and scope of the Soviet Military City Plan series in detail, secondly to

frame the series within an epistemological context within cartography and thirdly to understand the nature and application of its symbology through an empirical analysis, helping to facilitate future applications of the maps. This will be achieved by engaging with two principal objectives:

- **To examine the extent to which the symbology of Soviet military city plans was successfully implemented across a variety of socio-cultural and physical environments across the globe.**
- **To explore the extent to which the symbology of Soviet military city plans can inform and supplement the global, standardised symbology of *OpenStreetMap* (OSM); successfully transcending socio-cultural, political and physical boundaries.**

Before undertaking an empirical analysis of symbology, it is necessary to contextualise the Soviet military city plan series by placing it in its historical and institutional context. Chapter 1 addresses this theme, highlighting the persistent traits of Russian cartography that have been inherited by the city plan series and contribute to its nature and scope, particularly state control, secrecy and the pursuit of accuracy. This scope is explored in greater detail in Chap. 2, which explains the series in detail, incorporating the map production process, the content of map sheets and the stylistic development of the plans. In order to formulate a suitable approach to addressing the research objectives, Brian Harley's landmark text 'Deconstructing the Map' (1989) is used as the starting point for an exploration of deconstruction in the broader context of cartography in Chap. 3, drawing particularly on the work of the post-structuralist, Jacques Derrida. Aspects of Derrida's deconstruction of texts are fused with more recent post-representational assessments of cartography in order to form a pseudo-representational framework through which to view the Soviet mapping programme as a whole, conceptualising its enduring potential for application. Supported by this framework, the methodology of the empirical component of the thesis, outlined in Chaps. 4 and 5, pursues this potential in addressing the systematic analyses required by both research objectives, building on the methods used in previous studies of topographic maps. This results in a two-tiered classification for organising the Soviet military city plan symbology for analysis. Chapter 6 presents the findings of this analysis in relation to the themes of the research objectives and provides empirical evidence of the scope of the symbology, the relative importance given to different feature types and the variation of the implementation of the symbology across a sample of Soviet military city plans. A comparative analysis of this symbology with that of *OpenStreetMap* highlights the similarities and differences between these two disparate global mapping projects, providing the main basis of the discussion in Chap. 7 which, building on the theoretical framework identified in Chap. 3, explores the potential for Soviet maps to be applied in order to benefit existing and future global mapping initiatives. This investigation serves to highlight the enduring value and versatility of Soviet military mapping, both as a source of data and as a means of overcoming contemporary cartographic challenges relating to symbology, design and the handling of large datasets.

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Chapter 1

Russian and Soviet Cartography: A Concise History



Russia is a state that tends to conjure up a sense of mystery and unfamiliarity in Western imaginations; perhaps coloured by the secrecy that characterised the Soviet era, or the long history of tsarist absolutism that preceded it. Indeed it is possible to claim, with some validity, that the development of Russian culture and science has deviated, significantly at times, from the progressivist narrative of European enlightenment, innovation and global eminence. Russian cartography is not excluded from such perceptions, with a propensity for secrecy, censorship and even deliberate misinformation being exhibited during several stages of Russian cartographic history [38, 51]. This has plagued much research in the field, leading to a relative lack of literature on the subject, particularly in the English language, the extensive works of Leo Bagrow (1881–1957), Leonid Goldenberg (1920–1989) and latterly Alexey Postnikov (b. 1939) perhaps being the most notable exceptions to this. As in many states, cartography has been, and remains, a practical and effective means of claiming, defending and administering territory, the vastness of which has also fostered notions of identity at times and frequently reinforced the authority of a centralised state or sovereigns themselves.

Given that indigenous Russian cartography has continued in some form for over half a millennium, it is beyond the scope of this chapter to give a comprehensive account of the entire mapping output of Russia or the states which preceded it; nor is this necessary, given the substantial collections of cartographic inventories and specimens being restored and preserved in the Russian Federation today [34]. Instead, it proposes several maps, methods, individuals and organisations which have contributed most significantly to the development of Russian cartography as a whole; from the earliest cartographic references to ‘Russia’ until the collapse of the Soviet Union in 1991, providing a summary of literature in this field and highlighting traits which persist throughout. Although this is broadly organised by chronology, occasional departures from this are necessary to support the aims of the thesis.

1.1 The Origins of Cartography in Russia

1.1.1 *Maps for an Emerging State*

The inception of cartography in the area now known as Russia is somewhat difficult to define with precision, given that many early examples of Russian mapping have been lost [5]. Consequently, research in this area is based on a patchwork of surviving examples, together with various inventories and other documentation referring to lost maps [23, 38]. Virtually all of the known maps which use the term ‘Russia’ before the mid-sixteenth century are foreign-made, such as the Henry of Mainz map (c. 1110), the Hereford *Mappa Mundi* (1290) and various sixteenth century maps by Martin Waldseemüller and Gerardus Mercator, the latter two with strong Ptolemaic influences [4]. However, Goldenberg and Kivelson [23, 38] trace the use of Russian sources in many such foreign maps, including a 1525 map by the Italian cartographer Battista Agrese, who listed materials provided by the incumbent Russian envoy in Rome among his sources. Many other maps drew heavily on sources obtained by Western Europeans during visits to Moscow [4].

The first known map specifically of Muscovy dates from 1497 [23], although the degree of Russian involvement in its production is disputed [36]. However, if this is an early example of indigenous Russian cartography, it is unlikely that it represents the first case of mapping in the country. The earliest surviving reference to a map created inside Russian territory appears in a document regarding fishing rights in the Pererva River in 1483, suggesting very early legal applications of cartography [5]. In all likelihood, cartography elsewhere in the territory that would become the Soviet Union had similarly foreign origins. The first known map covering part of the Baltic was drawn by Arabian cartographer Idrisi and dates from 1154 [30].

The centralisation of states and the growth of mapping have a tendency to correlate with each other—with established evidence for a mutual dependency of the two in, for example, Japan and most Western European states [38]. In Russia, at the most basic level, maps presented vital information about terrain and rivers—of constant practical importance during the exploration and settlement of new territory [48]. The fifteenth century saw the Grand Prince of Moscow compile a cadastral census just as the centralised monarchy was being formed, likened by Postnikov to the Domesday Book in Britain. The census provided a good amount of geographical information which would be useful in future cartography (*ibid.*).

It was not until the mid-sixteenth century that a need for indigenous mapping slowly emerged in the growing Muscovite state, for ‘land description, defense, city-building and diplomatic uses’ [23], though mapping remained rare and unsystematic [37]. Map production grew further as the centralised Russian state expanded under Ivan IV (the Terrible) (1533–1584); the oldest known Russian manuscript map originates from this time (1536–1537) and depicts a basic plot of land near the village of Marinsk [23]. This is the only known indigenous sixteenth century Russian map still in existence [37], though copies of European maps and atlases were made at Ivan’s