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Mark Monmonier (Ed), *The History of Cartography, Volume 6. Cartography in the Twentieth Century*. 2 vols., Chicago, University of Chicago Press, 2015, 1,960 pages, US\$500 hardcover.

Volume Six of the *History of Cartography* series (HOC), *Cartography in the Twentieth Century* (CTC), is the culmination a massive endeavour and represents a milestone in the historical study of twentieth-century cartography. Like its predecessors, *CTC* assembles and unifies knowledge that was previously highly dispersed and difficult to access. The entries in this one million-word volume cover a vast range of topics, approaches and scales of interest; from an entry on map 'Folding Strategies', to the histories of national mapping agencies, biographies of individuals, and entries that record technical innovation or changes in use-context. It is richly illustrated, with a broad set of visual sources that ranges from 'notable' and exceptional maps to typical examples, together with photographs of technologies, production processes, and the contexts of map-use. The reproductions are beautiful, and these alone offer a fantastic pictorial survey of mapping in the last century.

Again, like its predecessors, this volume has also required a monumental effort to bring conceptual definition and structure to diverse material. The editors opted to move away from long-essays (as in the first three volumes of the series) in favour of an encyclopaedic format. Thus, in *CTC*, briefer entries are organised alphabetically; passing from technical accounts to critical perspectives (e.g. 'Dasymetric Map' to 'Decolonization and Independence'). To guide the reader through this alphabetic stew the entries are indexed using 'conceptual clusters', a first thematic parsing in the historical study of twentieth-century mapping practices. The reader is also provided with a justification for these clusters, and an account of the book's production. These last two are intellectually generous offerings that assist the reader in both practical and conceptual navigation. This openness reflects the spirit of the founding principles of the HOC; that the series should serve as 'rallying point for scholars' (Woodward, 1982, p. 13) and encourage debate. I'd like here to use this review as an opportunity to respond to the *CTC* as a rallying point, and to consider what this volume of the HOC project is urging historical geographers towards, and what it suggests remains to be done.

First note: *CTC* differs strongly from the volumes that have been published to date (Volumes One to Three). The character of Volume Six is strongly shaped by a very different cohort of contributors. As the editor Mark Monmonier highlights, writing a history of cartography in the twentieth century offered the

opportunity to garner the accounts of witnesses and participants (p. 1787). Thus, much of the volume is history as told by those who had achieved seniority in the field by the late-twentieth and early twenty-first century. Turning to these witnesses has clear benefits: much of what is discussed – especially in relation to technological and technical change – is knowledge that was previously only implicit within particular professional arenas, or hidden in grey literature. That choice makes *CTC* very useful as a ‘reference of first resort’ (p. 1789) for scholars who are interested in technical developments. It offers preliminary paths through histories of the development of cartographic software, the deployment of satellites and increasing database capacity. The entries on technical issues in drafting and printing (such as ‘Paper’; ‘Drawing Media’; ‘Reproduction of Maps by One-Off Processes’) are particularly important, as many organisations have considered these procedures too banal to merit room in the archives.

However, the relationship between those entries that are professional accounts of technological progress and those that conduct critical historical analysis is not an easy one. A brief look at the contributors’ biographies suggests that, of the 529 entries, only forty-one are written by those who identify primarily as historians (inc. historical geographers, art historians, etc.). A further fifty-three are written by those who have or had responsibility for map collections as curators or librarians, and six are written by academic scholars in other disciplines, such as architecture or media studies. The remaining 429 entries are written by those who – in one way or another – have taken a historical interest in their own professional field. Although the editors attempted to curb the tendencies of a ‘collective memoir’ (p. 1790) by warning the contributors against presentism and encouraging contextualisation, this attempt has met with mixed success. As a result, across different entries there is significant disagreement around the question of *how* to study mapping. On one hand, the volume contains concise, culturally and socially inflected syntheses by established and emerging historical scholars on their specialist topics (‘Road Mapping in Canada and the United States’; ‘Nation-State Formation and Cartography’). On the other hand, the reader regularly encounters expressions of suspicion towards what are broadly referred to as ‘post-modern’ concerns with cartography, truth and power (as, for example, p. 416; p. 1181).

Where *CTC* operates as a professional defence, particular topics become difficult to address. Two key areas of omission relate to war and to the economic history of cartography. War is, in fact, extensively and directly covered in several entries on military cartography. However, from 1945 onwards, roles, causes, and relationships are not as frequently made explicit. For example, entries that refer to military cartographic contexts (such as ‘Mapping by the US Intelligence Community’; ‘Military Mapping of Geographic Areas- South East Asia’) state that specific cartographic techniques were developed in response to the environmental, political and technological conditions of the war in Vietnam. However, in the entries *on* these techniques (such as ‘Trafficability’; ‘Orthophotography’) reference to Vietnam is either brief or absent: the names of research groups and individuals tend to eclipse the institutional history

of their military backers. The entry 'Topographic mapping by South Africa' mentions the extensive mapping of South West Africa carried out by the South African government in the 1960s (p. 1577). It does not mention that this mapping took place in the context of disputes over sovereignty and prolonged guerrilla action that later led to that country's independence as Namibia in the 1990s. Thus the reader who, in the first instance, approaches a technology or a project, is not necessarily pointed towards its military heritage. It is a shame that these links are not pursued more vigorously.

Parallel to the irregular contextualisation of military influences is the lack of economic context for mapping in the twentieth century. We are often told that mapping technologies and processes were 'expensive', 'relatively expensive', 'too expensive'; but cost comparisons and exact amounts are scarce, even in the entries on map publishers. The relationship between maps and profit is almost exclusively made explicit in contributions by "historians" (see 'Road Mapping'; 'Airline Map'; 'Mass Marketing of Maps'). Most of the "professional" contributors are more coy, preferring to highlight cartography's contribution to public service over its ROI (p. 1220; p. 1722). The entry 'Marketing Cartographic and Spatial Data' discusses maps as saleable products, but of course it doesn't address the role that maps subsequently played in structuring industrial activity in the private sector. As a result the reader is left to piece together that history from fragments that are sometimes contradictory. For example, the entry 'Geologic Maps' claims that most geological mapping in the second half of the twentieth-century was produced by national survey organisations (p. 526); yet the entry 'Geophysics and Cartography' cites a claim that 'at one point, more than half of all the computer cycles worldwide were employed in processing seismic reflection data for the oil and gas industry' (p. 534). It would have been illuminating to understand more about when and in what circumstances 'expensive' techniques for producing and visualising spatial data became attractive to private enterprise in the twentieth-century.

The Historiography of Cartography in the Twentieth Century?

And what, then, are we being called to? The historiography of cartography has been under discussion since at least the 1980s. Matthew Edney (Director of the HOC project) has made several recent evaluations ('Histories of Cartography' this volume; but also (2013; 2014). In these, Edney outlines a tension between 'internalist' histories of cartography, which reflect the values and interests of professional cartographers; and 'cultural/social histories of cartography', which are unable to explain how maps 'work', since they prioritise an analysis of the ideological over the epistemological and material.

Edney proposes 'processual' map history as a solution to this problem. 'Processual history' has the potential to reconcile these two groups by attending to both cultural context and the pragmatic factors that shape the form, circulation and performances of cartographic products (a position which shares many features with the practice-centred approach proposed by Kitchin et al. (2012)). In some respects the

volume seems to reach this compromise; however, the ‘internalist’ and ‘cultural/social’ camps sit side-by-side rather than being fully integrated. It would have been interesting to see a more muscular intervention on the *status quo*. Framed as they are in an encyclopaedic format, diverse points of view are somewhat flattened.

This sense of flatness, goes beyond perspectives on cartography, to the general socio-cultural values that structure *CTC*. The recruitment of non-English speaking scholars as contributors has generated chronological accounts of governmental cartography in China, the Soviet Union, and Latin America. However, these contributions have rarely impacted the value framework of the project. There are missed opportunities: for example, it is a great shame that the entry ‘Public Access to Cartographic Information’ treats only the USA.

Similarly, through offering more space to ‘memoir’ than to the perspectives of anthropologists, literary theorist, and political scientists (all of whom have shaped the recent historiography of twentieth-century cartography), the volume fails to provide the interdisciplinary centre of gravity that it might have. *CTC* situates ‘history’ around North America, and ‘re-professionalizes’ the history of cartography (see Kitchin and Dodge (2007) on Pickles (2004, p. 17. In this sense *CTC* is probably not a model for future historical scholarship, which is likely to follow the trend of the earlier volumes; in continuing to pursue a broader range of analytical tools, and in offering more diverse points of view.

In sum, one of the most pervasive, ubiquitous and powerful technologies in the twentieth-century is by-and-large still to be understood. *CTC* offers us one million words that form an indispensable starting point, and a great deal of grist for the task ahead. It is not the interpretative advance-guard that its predecessors were, but as a rich and detailed reference work it will be a much-consulted resource.