

**Climate in Motion: Science, Empire, and the Problem of Scale. By Deborah R. Coen. Chicago: The University of Chicago Press, 2018. 425pp.**

Deborah Coen's *Climate in Motion* argues that the modern concept of climate is a multi-scalar achievement. Drawing on an extensively researched and detailed history of climate science in the Habsburg Monarchy in the nineteenth and early twentieth centuries, Coen argues that the history of climate science is also a history of scaling. Rather than the singular or orderly climate found in many accounts of climate science in the United States or in British scientists' visions of the Indian climate, Habsburg climate science emphasized the continuing relevance and importance of local climate within a heterogeneous but interconnected whole. Coen suggests this distinctive characteristic had resonance with the structure of the Habsburg state, made up of a set of distinct kingdoms and principalities, and the natural variety in a region in which diverse local socio-economies were intimately tied to local climates and vegetation.

Habsburg scientists scaled their work in ways which made the particularities of place emblematic of the natural and social heterogeneity of the state. Coen argues that these scientists determinedly connected their science to interventions in matters of public concern, empire, and economic and political interest. Scaling was not only a scientific exploration, therefore, but a very human one too, "mediating between different ways of measuring the world" (p20) and debating the uncertainties of science in considering the social, economic, or political implications of their work. Scaling was also built through bodily labor and artistic imagination, perhaps no better demonstrated than in the case of Heinz Ficker's emotionally-charged diary of his travels through Turkestan.

*Climate in Motion* has three parts. The first explores the precursors to and development of mid-to-late nineteenth-century environmental science within the Habsburg Monarchy. It sets out the experience of empire throughout the territory of Austria-Hungary and the ways in which the imperial celebration of the diversity of local climates was significant for both scientific work and the mapping of territory. Meteorologist Karl Kreil's work is used as an example of this connection between local and global perspectives, in emphasizing the studies of individual places while constructing a synthesis which would form a unity in a heterogeneous way. As Coen suggests, this work of scaling was political in its pluralism and reflective of the empire's structure in its insistence on the relevance of localism while seeking a coordination of knowledge which would not be unipolar or authorized by a single calculative office.

The second part explores in more detail how scientists analyzed, mapped, and painted the empire to represent and inform this "Austrian Idea" of the diversity of the territory. Cartography presented a particular challenge in this regard, as maps (such as the 1887 atlas of Austria-Hungary) struggled both to convey the diversity of local detail and to remain relevant to the ideal of a connected territory. Cartographers needed to represent scale, and they did so through innovative techniques such as a greater use of color to display elevation and represent local variations as interdependent, making it possible for a more unified visual picture to emerge. Equally importantly, the development of dynamic climatology in Austria in the last two decades of the nineteenth century, through the work of scientists like Julius Hann and Alexander Supan, enabled the local climate to be significant in revealing and explaining a more interconnected global unity. The rapid expansion of observation stations, however, was not solely about creating datasets for a dynamic climatology, but was also a reassertion of the vitality through diversity of local climates for human concerns such as health or economic life in those places. While dynamic climatology enabled the word climate to be deployed on a more planetary scale, this did not displace the local scale. As Coen points out, the multi-scalar

notion of climate which had emerged by the early twentieth century enabled scientists to assert the global effects of local climatic disturbances.

This becomes particularly important for the final part of *Climate in Motion*, in which Coen draws out the social work of scaling in exploring examples of work related to forests, flowers, and travel. Plants could be influenced by the climate and could influence the climate, and Coen draws on, for example, the naturalist Anton Kerner's work to consider how changes in vegetation patterns could be scaled through dynamic climatology to provide evidence of the necessity and importance of local observations in tracking broader climatic changes. In a different example, forests provided the catalyst for a social scaling of scientific questions about forests and climate and about whether forestry legislation should be tightened. While many scientists recognized that deforestation would have to an impact on climate, the social scaling of these studies was contested through debates about the kinds of knowledges that were legitimate and the implications of such scaled knowledge for farmers and land owners. Austrian forestry law concluded both that deforestation influenced the climate and that the atmosphere was an unregulated and unlimited resource. Scaling, in this case, did not lead to stricter forestry legislation.

Throughout these parts and in the work of the various scientists under consideration, Coen maintains a clear focus on the work of scaling as scientific, social, and embodied and distinctive for the Habsburg Monarchy. It is interesting to ponder, however, whether this distinctiveness is primarily about the uniqueness of the empire or as much about the way histories of climate science in other places have typically been written. Coen challenges future historians of climate science to pay more attention to diverse and heterogeneous kinds of climate knowledges and the ways in which they are scaled and to resist singular, uniform accounts of a global climate "waiting to be discovered" (p272). This is crucial to Coen's hope that the lessons of scaling might be fruitfully applied to contemporary climate change debates and thus might further an understanding of how climate sciences have been scaled in particular ways, how they embody particular kinds of labors, and how they connect (or disconnect) multiple alternative local knowledges and are contested in their social scaling.

*Climate in Motion* is well-written, beautifully illustrated book, and I can highly recommend it not just to historians of the Habsburg Monarchy or the atmospheric sciences, but to anyone interested in exploring how the study of history can inform contemporary debates.

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