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BOOK

Cyclones and earthquakes:
The Jesuits, prediction, trade, and Spanish dominion in Cuba and the Philippines, 1850-1898

By Aitor Anduaga
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Placing science within the context of nineteenth century Spanish imperialism in the Philippines and Cuba, Aitor Anduaga's *Cyclones and earthquakes: The Jesuits, prediction, trade, and Spanish dominion in Cuba and the Philippines, 1850-1898*, explores the entanglement of scientific knowledge production with contiguous elements of interacting state, military, religious, and merchant institutions in and across Spanish colonial domains. Historicizing the geophysical sciences, Anduaga demonstrates how meteorological and seismological practices and methods rooted in Western empirical traditions were utilized, developed, and enriched in "peripheral" distant territories. Such historical processes resulted to the establishment of scientific agencies and the emergence of modern ways and techniques of preventive science, such as cyclone prediction, flood warning systems, and earthquake-resistant building construction.

At the forefront of scientific activities were the Jesuits and the network of institutions they established and managed which propelled the study and research of natural phenomena in local environments. Anduaga devotes a significant portion of his discussion to the work and achievement of Federico Faura S.J. based in Manila and Benito Viñes from Havana, two of the most well-known figures in the history of hurricane and cyclone forecasting in the world. By charting their research trajectories and analyzing the methods and results of their observation, Anduaga reveals intellectual influences and institutional connections that reflect a multidirectional movement and transfer of ideas across continents.

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Likewise, Anduaga emphasizes the important role of state and military agencies, such as the Spanish Navy and their own traditional methods in hydrography and maritime navigation and defense and their use of logbooks in shipping operations. Such knowledges were crucial in providing the initial groundwork and data for further study and analysis in observatories. At the same time, Anduaga also recognizes private interests in advancing scientific research, noting the monetary support of wealthy individuals and merchant entities eager to protect their businesses from potential environmental hazards. These networks link the pursuit of science with imperial and commercial interests and show how scientific institutions operated to serve military and economic goals.

Throughout the book, scientific knowledge is constituted as a product of complex relations, mechanisms, and procedures from disparate social elements and structures. In exploring such relations transcending institutional, political, and geographical limits and boundaries, Anduaga problematizes the notion of "global knowledge" as explored and articulated by other historians of science. He defines it as "a form of knowledge that moves between and beyond multiple territories and connects institutions and individuals scattered throughout the world; and on the other hand, as the investigation of phenomena and trends manifested on a trans-continenal scale" (xxii). For Anduaga, "global knowledge" should not be simplified by the binary local/global framing but must be considered as "unstable", constituted more by the contact and interaction of moving social forces rather than inseparably made by and linked to local contingencies.

Anduaga proposes, instead, that we look into the production of scientific knowledge within local, imperial, and global frames to capture the mutability and flexibility that informs the creation of "global knowledge", and to recognize competing interests and realities that make possible the advancement of knowledge in particular areas of science. Through a framework that explores institutions and expertise in various levels of interaction and without strict regard for colonial and geographical boundaries, we could arrive at a fuller reality behind particular historical processes and circumstances that reflect the entanglement of processes and institutions, the meeting of voices and vocabularies, and the changing definitions and ways resulting from such complexities.

Well-written and rigorously documented, Anduaga's work is a significant achievement in the study of scientific institutions in colonial environments. In perusing a wealth of archival documents including diaries, personal correspondences, scientific publications, institutional reports, orders, circulars, and ship logbooks, he provides a dynamic and complex historical narrative of knowledge production and the organizations and individuals behind it. It is a groundbreaking work that must be complemented by research exploring subjects

that Anduaga did not pursue. The challenge now is to excavate the ordinary Filipinos and Cubans from this nineteenth century world described by Anduaga, where they only existed as employees in the meteorological service (53).

If cyclones and earthquakes were viewed and considered as important subjects to be studied and analyzed by scientists working for the Spanish imperial state, how did the rest of the population respond to such natural phenomena? Another question could be: How did Filipinos and Cubans conceive of what they observed in their lands and skies? It would be interesting to find out how science, as institutionalized in this book, connected with ways of adaptation and prevention in the everyday life of residents. In other words, an assessment of colonial scientific efforts in this period remains incomplete without studying its presence in nineteenth century colonial society.

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