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It’s January 2024, and as I write this, *National Geographic* reports on the unusually strong wave action sustained by communities along the California coast in the last days of 2023 and into the new year, which was attributed to “powerful storms out in the Pacific that created the swells while coinciding with the arrival of exceptionally high “king” tides.”[1] Meanwhile, the United States is entering another wave of the COVID-19 epidemic, with JN.1 overtaking HV.1 as the dominant variant in the country around the same time those storms battered Pacific infrastructures and habitats. In my coastal Floridian hometown, a few miles south of Mar-a-Lago, local political discourse ripples with the hopes and fears of another right wave. We might feel that a strange and turbulent condition is eddying in this present moment, but how can we bring forth and address messages from the mix? How do we see the signs? Stefan Helmreich’s *A Book of Waves* (2023) offers methods for reading these waves, which move across physical and formal contexts, slipping between material and metaphor.

Helmreich’s proposal is that waves are media, carrying with them the histories, concerns, memories, and expectations of their making. As a result, they should be read as cultural objects as much as natural objects, knots “indicative of the inextricability of the world and its representation” (p. xix). If we can reorient our reading of them with this in mind, Helmreich suggests, they might present as oracular “forms and forces” through which to apprehend the tempo of time and to predict possible arriving futures (p. xiv). Helmreich looks to wave science, in the field, in the lab, and in computational simulations, to map how wave scientists learn how to know waves. These scientists, in tacking between waves as empirical and conceptual things, learn to enact a kind of double reading of wave and other time: looking backward to look forward, as Helmreich puts it. This kind of reading offers scientists a handle on the clutter of
the world and its waves, and it might be brought to bear on the social and political conditions of our turbulent present.

*A Book of Waves* consists of historically informed anthropological accounts of physical wave science and scientists in the 2010s, whose work Helmreich follows across five chapters. But the book also pushes productively against the form of an academic monograph. The chapters are divided by collections of three smaller pieces of writing, which Helmreich marks as sets: those synced waves, traveling in threes, often bigger than those coming before or after them, for which surfers often wait. Each set talks across the “worldly clutter” of themes found in the preceding ethnographic chapter (p. xix). And where the book is preoccupied with ocean waves, the third member of each set moves to waves beyond the aquatic. In its effort to reorient the reader’s experience of itself as a medium for knowing wavescapes, *A Book of Waves* mirrors the work of its actors, who, in abstracting material waves and materializing abstraction, decide both what counts as waves and how those waves might be seen. This push against the coherence of the book’s genre is productive and timely. Helmreich’s offer of a new way to argue from ethnographies of science is a hopeful one for our times, when the ability of science to offer positive claims on the character of the world is subject to increasing interrogation.

Chapter 1 begins in the Netherlands, which is where, Helmreich explains, quantitative wave modeling and much wave management engineering has its origins. Dutch hydrological and cultural accounts rescript formerly dangerous waves as partners in infrastructural interventions. The following set arrives to draw out themes in chapter 1 of zoomorphosis and anthropomorphosis, waves as infrastructure, and Dutch wave science’s cross-contact with alternative wave epistemologies. Chapter 2 tells a story from the field about how scientists aboard Scripps Oceanographic Institute’s ship, the Floating Instrument Platform (FLIP)—capable of rotating between vertical and horizontal positions—learn to flip between orientating frames for seeing both their waves of study and the context of their work in value-inflected histories of applied and basic science. Essays in set 2 point to the shapes of waves, as known through embodied experience from Helmreich’s feeling of waves by bodysurfing, to the history of waves in music, to the sonic rendering of gravitational waves emanating from deep space. Chapter 3 is sited in the lab, at the “world’s largest tsunami simulation basin” (p. 28). The wave tank, says Helmreich, works by reanimating abstractions of theoretical waves so that they might predict the character of real possible disasters; such operations are challenged by the issue of scaling and modeling real time and real waves.

The third set tracks the making and uses of wave representations, beginning with cinematic waves, moving on to the woodcut “Under the Wave off Kanagawa” (1829), and ending with electrocardiograms. Helmreich’s fourth ethnographic chapter follows his experience of enrollment in a summer school to learn how to use the wave-predicting computer model WAVEWATCH. This chapter traces how computer models of waves both create and depend on the coordination of many kinds of wave times—natural, cultural, social—in turn depending on and creating the identities of waves yet to be modeled. Set 4 looks to how waves are enrolled as partners in revealing or disappearing human political and social projects, from forensic appropriation of wave data to reveal neglect of migrants making Mediterranean crossings, to aspirations of harnessing wave energy for human use, to an examination of the descriptive figure of the wave in social theory. The book’s final ethnographic chapter turns to virtual fieldwork undertaken with Bangladeshi wave scientists who are coming to grips with the colonial legacies of hydrological infrastructure and unstable futures. Asking what it might mean to know waves from the Indian Ocean, Helmreich narrates how these scientists are less interested in abstrac-
tions of the thoroughly mixed phenomena of waves, surge, and sea level rise, and are more attuned to how Bangladeshi communities encounter and mitigate local wave effects.

A Book of Waves’s empirical and theoretical interventions are numerous. First is its interest in building on recent interventions into the anthropology of temporality. The book theorizes the roles and assumptions of time in structuring how wave scientists write waves and how collectives of humans learn to anticipate social, political, and environmental futures. In understanding how to read the increasing speed of the wheel of time, deep and otherwise, as it approaches and breaks on shoals and shores of historical making, the book furthermore co-opts terms out of wave science—spray, foam, swash, turbulence, clutter, churn—as well as terms denoting waves themselves. These concepts, which are tractable objects of empirical study for wave scientists, are dense with analytical potential for historians and anthropologists who endeavor to get a grip on reading the wake in “a world turned upside down” (p. 299). Take churn, for example, which riffs on the oceanic turn: the trend over the past couple decades in humanities, arts, and social sciences scholarship that has centered marine topics and processes. Churn, though, is a species of analysis similar to patchiness in the landscape structures of the Anthropocene marked by Anna Tsing and others. It emphasizes wave models as “geographically local computations,” to borrow from Helmreich’s WAVEWATCH course notes, challenging how particular abstractions are naturalized and cast as universal models (p. 224). As he claims that “the oceanic South fuses the global and the planetary South,” Helmreich builds from more recent historiographic trends to decenter ocean basin accounts of history to reorient, for example, stories of the Pacific by following waves from South to North, or flip wave science on its head by pursuing how scientists build generalizable wave theory from southern knowledge (p. 276).

To this end, A Book of Waves promises to be of interest to a diverse set of scholars. Most immediately, the book will be useful for scholars teaching or researching topics in the history and anthropology of physical sciences, the history of science and its relationship to American and other empire, colonialism and postcolonialism, and their reckoning with histories of militarism in the Pacific and elsewhere. As it plays with the form of a monograph, the book will be interesting for those hoping to similarly experiment with the form of nonfiction narrative. And the book self-consciously positions itself within the larger oceanic turn across scholarship, which Helmreich emphasizes must be “not just to marine topics, but also toward anticipations, expectations, and anxieties about the shape of maritime worlds to come” (p. 30). Consequently, the book promises to interest a diverse set of scholars across the humanities and social sciences, as well as allied designers, artists, and policymakers, who think with oceanic places and processes.

Helmreich wraps up his account from the vantage of Deer Island in the Boston Harbor, where pandemic and other wastes roil against variously acknowledged histories of dispossession, forced migration, and pollution. And though A Book of Waves promises that these waves will come faster and harder, and evermore densely laden with historical weight, they will not arrive without decipherable messages bearing upon how to write stories about the world. We will churn in a “broken ocean,” but we need not be adrift (p. 299). For stories to tell on the future, they must, as A Book of Waves emphasizes, begin from a position of ethical accountability. The book’s praxis of reading that continuously demands reorientation between matter and meaning offers up a daunting and wonderful reflection, which is that “the past is not the past” (p. 303). Any future worth sharing demands unpacking the “disappearance and naturalization of layered property claims, histories of dispossession and ongoing realities of dehumaniz-
“Video by @laurakmorton | In the final days of 2023, communities along California’s coast were hit with massive waves and flooding, prompting evacuations in some areas. The unusually rough waters were attributed to powerful storms out in the Pacific that created the swells while coinciding with the arrival of exceptionally high ‘king’ tides. Here, in the city of Pacifica, south of San Francisco, waves are seen crashing against a seawall and underneath the city’s municipal pier. For more photographs of people and places, follow along @laurakmorton.” National Geographic (@natgeo), Instagram video, January 5, 2024, https://www.instagram.com/p/C1uJQCFLj-/.