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Deep-Time Architecture

Building as Material-Event

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Despite our tendency to conceive, perceive, and represent buildings as static objects, buildings are, in their abundant reality, matter and energy in flux. As Heraclitus famously remarked in his *panta rhei* (πάντα ῥεῖ): “everything flows.”¹ Buildings are no different, and they need to be better thought through as entities in motion. In architectural literature, many voices have challenged the prevailing notion of the building as a static object. Bruno Latour, for instance, claims that a building is rather “a moving project, and that even once it has been built, it ages, it is transformed by its users, modified by all of what happens inside and outside, and that it will pass or be renovated, adulterated and transformed beyond recognition.”² Another attempt to express architecture’s fluidity is Bernard Tschumi’s triad, “space, event and movement,” with which he aimed to expand what constitutes building beyond a static object and form: “There is no space without event, no architecture without movement.”³ And here we must add that there is no movement without time—and further, that given enough time, even a solid-like material (think of a building here) flows.

This last idea, a solid flowing, is represented in rheology—the branch of physics that deals with the deformation and flow of matter—through the unitless Deborah number (De). The term was coined by Marcus Reiner, a scientist inspired by the Prophetess Deborah’s words in the Book of Judges: “the mountains flowed before the Lord.”⁴ Reiner insisted

that Deborah knew two things: “First, that the mountains flow, as everything flows. But, secondly, that they flowed before the Lord, and not before man, for the simple reason that man in his short lifetime cannot see them flowing, while the time of observation of God is infinite. We may therefore well define a nondimensional number, the Deborah number $De = \text{time of relaxation}/\text{time of observation}$.”⁵

In the context of architecture, the Deborah number is evocative of how increasing the time frames of observation has resulted in more fluid conceptions of the building. If Latour and Tschumi highlighted the fluidity of architecture, they let it flow only in the limited timescales of human perception—of the body, the building, and the city. The Deborahic conundrum is that, today, for the first time in our 200,000 years of existence, humans are operating at the deep temporal scales of the Earth. We are now leading geomorphic agents. “The built”—broadly defined as the result of all the activities involved in the processes of construction and deconstruction for which humans are collectively responsible—has acquired planetary dimensions. Just as the natural geomorphic cycle is a balance of erosion, flows of Earth’s matter, and landform building, so “the built” entails cyclic processes of excavation, extraction, transportation, construction, demolition, and redistribution of matter back into the Earth.

As a major player in “the built,” the power of architecture—and the material processes it entails—compares to that of titanic natural forces.⁶ Architecture has become a

geological force whose consequences need to be viewed from the vantage point of the planet, from geological timescales of observation. The deep, cyclical flows of architectural production demand a daunting shift in our perception toward deep time, a move that dates back to the work of eighteenth-century geologist James Hutton, whose *Theory of the Earth*, first published in 1788, extended the Earth’s age far beyond the prevailing biblical theory of 6,000 years.⁷ However, it was creative non-fiction pioneer John McPhee who, in his book *Basin and Range* (1980), officially coined the term *deep time* as the multimillion-year timeframe within which the Earth has existed.⁸ Geological deep time suggests timeframes of observation under which all solid materials acquire the potential to manifest as fluids. Indeed, observed through deep timescales, the seemingly fixed configuration of the Earth’s continents is in constant motion. What we observe day to day is merely a snapshot of the planet moving in deep time. Had this “snapshot” been taken 300 million years ago, it would have shown a very different image: Pangaea—a continuous landmass formed by all the continents prior to their separation. Scientists predict that another snapshot taken 300 million years from now will show Pangaea Proxima—all the land masses rejoined again to form a supercontinent.⁹

Like the Earth’s tectonic plates, architecture seen through ‘Deborahic’ deep timescales of perception manifests radical degrees of motion that we architects can no longer ignore. We must go a step further: if Tschumi’s notion of



Figure 1. Temple Al-Khazneh (Arabic: *الكنز*; "The Treasury"), one of the most elaborate structures carved out of a sandstone rock face in Petra, Jordan. This area of the world was inhabited from as early as 7000 BC and Petra became the capital of the Nabatean Kingdom in the second century BC.

"space-event" revealed architecture as a time-oriented enterprise driven by human activities, today the ecological consequences of these human activities, reframed through deep time, require a much larger event timescale: the deep-time *material-event*. Shifting architecture from "space-event" to "material-event" is about revealing the radically fluid condition of building. In *Empire, State & Building*, Kiel Moe argues the need to "see the convection of material and energy across the surface of the earth, its assembly in a building for a limited duration, and the dissipation of that material back into the environment as constitutive of building and therefore design."¹⁰ Reorienting architecture toward the "material-event" renders the building not as an isolated object-instance in a human timeline, but rather as a moment of convergence of material and energy that flow across deep temporal scales. It situates building at the intersection between human timescales and Earth cycles, between geology and technology in their

act of world making, both equally translated into actions that relate to material, place, and process¹¹—collapsing, eroding, releasing, capturing, calcifying, diluting, flowing—inevitably blurring the boundary between culture and nature. It suggests the possibility of a *deep-time architecture* that fully embraces tectonics in its multiple meanings: tectonics in architecture, as the science of construction and techniques of material assemblies, and tectonics in geology, as the structure of the crust of the Earth, its processes, and its evolution through time (Figure 1).

In *Matter and Memory*, philosopher Henri Bergson theorized that a "present" is folded back on the "past."¹² In the words of Elisabeth Grosz, this implies that,

the earliest events—even those bound up with the very origins of the universe, long before the evolutionary emergence of life—do not cease to have their effects on everything that is subsequent, even if

they are restructured, given new impact and force, made meaningful, in their present effects. In other words, every actual present is subtended by the virtual entirety of the past. Deep time, the time of the universe's unfolding, the construction of the earth and all that appears on it, the eruption of life forms, all the momentous and unpredictable emergences, never cease...¹³

By extension, therefore, in deep-time architecture, a building in the present contains all its past within, carrying it as it continuously transforms itself into the future. Deep-time architecture enlarges the frame of the architectural experience of the building by deepening the segment of the historical time that it occupies and by connecting it with a plurality of heterogeneous deep pasts and futures of our planet. Indeed, buildings embody stories—enormous timelines of the environment millions of years before us, stories of material events that we enact in the present, and stories of Earth's deep futures with which we humans have become deeply entangled through our present actions.

The global challenges that the Earth is facing today cross vastly different temporal scales. Short-term environmental urgencies coexist with deep existential planetary concerns.¹⁴ We are forced to toggle between temporal dimensions that we understand, and those that escape the human intellect—between the timescales of the "urgent now," of us, living on this planet, and the timescales of the "deep future," of them, future generations to come. Deep-time architecture pursues the premise that, as the geological actors we have become, architects must develop deep-time literacy to become true planetary stewards; and that thinking architecture in the radical long term of the planet has become a pressing ethical imperative that will change the way we design in the short term.

At a time when architecture is making ever-greater interventions into the shallow and deep timescales of the Earth, building needs to develop a different relationship to time, one that accounts for its essential ecological condition as a deep-time material-event: one that radically expands architecture's perceptual timeframes, encompassing the deep geological resources it draws from. Deep-time architecture requires a scholarly reappraisal of the discipline, a new approach to analyzing "the built" and to thinking the history of architecture. In addition to the above-mentioned work of Kiel Moe, who dissects the construction ecologies and material geographies of modern architectures, other scholars and practitioners are developing deep-time readings of "the built" as "material-event." In *Reciprocal Landscapes. Stories of Material Movements* Jane Hutton, for instance, traces everyday landscape construction materials from seminal public landscapes back to where they came from, and in *Architecture in the Anthropocene: Encounters Among Design, Deep Time, Science and Philosophy*, Etienne Turpin brings together essays, conversations, and design proposals that respond to the "geological imperative" for contemporary architecture scholarship and practice.

Through this deep-time perspective, architecture begins to acquire time-consciousness, better able to function at the timescales of the urgencies of the now without abandoning foresight of the imperatives of the deep future. It begins to integrate its immediate actions with the planetary timescales at which they really operate. Deep-time architecture is a call for architects to start performing according to much broader temporal scales, embracing architecture's material practice in its relation with the Earth. It establishes a mode of thinking, designing, and making where architects are both accountable for the ecological crisis brought

on by technological achievements thus far and capable of redirecting the long-term course of deep-time planetary "material-events."

Author Biography

Cristina Parreño Alonso is an architect, designer, and educator at the School of Architecture and Planning at the Massachusetts Institute of Technology, where her research "Transtectonics" explores cultural, contextual, and environmental implications of expanded temporal sensibilities in architectural material practice. She is the director of her eponymous architectural firm, which made her recipient of the European 40 Under 40 Award and the Emerging Firm Award at the Design Boston Biennial. Her work is currently on view at the Schusev State Museum of Architecture in Moscow, and she is one of the architects selected to participate in the 2021 *La Biennale di Venezia*.

Notes

- 1 Antony N. Beris and A. Jeffrey Giacomini, "πάντα ῥεῖ: Everything Flows," *Journal of Rheology* 59, no. 2 (March 2015): 473. The Greek philosopher Heraclitus of Ephesus was credited with the phrase "panta rhei." The word *rhei* here is the Greek word for "to stream," which gives the name to rheology: the science of deformation and flow within a material.
- 2 Bruno Latour and Albenia Yaneva, "'Give me a Gun and I will Make All Buildings Move': An ANT's View of Architecture," in *Explorations in Architecture: Teaching, Design, Research*, ed. Reto Geiser (Basel: Birkhäuser, 2008), 80–89.
- 3 Bernard Tschumi, *The Manhattan Transcripts* (London: Academy Editions, 1994).
- 4 Judges 5:5. A warrior and prophetess, Deborah is the only woman in the Hebrew Bible with hard political power who is portrayed positively.
- 5 Marcus Reiner, "The Deborah Number," *Physics Today* 17, no. 1 (January 1964): 62. The paper by Reiner is a reproduction of his after-dinner speech to the Fourth International Congress on Rheology in 1962.
- 6 Architecture entails processes of extraction, like quarrying and mining, that leave profound scars in the crust of the Earth: transportation, manufacturing, and construction, responsible for great deal of the carbon emissions that are causing the anthropogenic climate change; and activities of demolition and waste disposal leaving plastics and other non-biodegradable materials that will last for

- 7 James Hutton, *Theory of the Earth; or an Investigation of the Laws Observable in the Composition, Dissolution, and Restoration of Land upon the Globe* (Scotland: Royal Society of Edinburgh, 1788). In 1654, the Archbishop of the Church of Ireland, James Ussher, with astonishing precision, had calculated the date of the Earth's creation: Sunday, October 23, 4004 BC. Hutton's insight to see the vastness of geological time supposed a major rupture with the biblical limitations of the Mosaic chronology in the eighteenth century.
- 8 John McPhee, *Basin and Range* (New York: Farrar, Straus and Giroux, 1981). Parts of this book, which introduced the concept of deep time, originally appeared in *The New Yorker* magazine.
- 9 The idea that the present continents once formed a single land mass (later called Pangea) was first suggested in 1912 by meteorologist Alfred Wegener. His "continental drift" idea, developed in his 1915 book *The Origin of Continents and Oceans*, led to today's plate-tectonics theory, which was only accepted by the geoscientific community in the early 1960s.
- 10 Kiel Moe, *Empire, State & Building* (Barcelona: Actar Publishers, 2017).
- 11 In *Verb List* (1967–68) artist Richard Serra listed the infinitives of 84 verbs—to roll, to crease, to fold, to flow, etc.—that signified both geological events and the human actions that he performed to develop his art. Serra, alongside other land artists such as Michael Heizer and Robert Smithson, reappropriated large-scale techniques of construction to make their earthworks, situating land art in the realm of the "planetary built."
- 12 Henri Bergson, *Matter and Memory* (London: George Allen & Unwin Ltd., 1911).
- 13 Etienne Turpin, Heather Davis, and Elisabeth Grosz, "Time Matters, On Temporality in the Anthropocene," in *Architecture in the Anthropocene: Encounters Among Design, Deep Time, Science and Philosophy*, ed. Etienne Turpin. (Open Humanities Press, 2014), 129–138.
- 14 The Bureau of Linguistical Reality coins "shadowtime" as the feeling of living in two distinctly different temporal scales simultaneously. In the essay "Deep Timescales of Our Most Urgent Crises" I list "shadowtime" among the multiple unfamiliar temporal experiences with potential to contribute to the human time literacy that will be required to address the deep timescales of our most urgent crises. Cristina Parreño Alonso, "Deep Timescales of Our Most Urgent Crises," *Strelka Magazine*, August 17, 2020, <https://strelkamag.com/en/article/deep-timescales-of-our-most-urgent-crises>.