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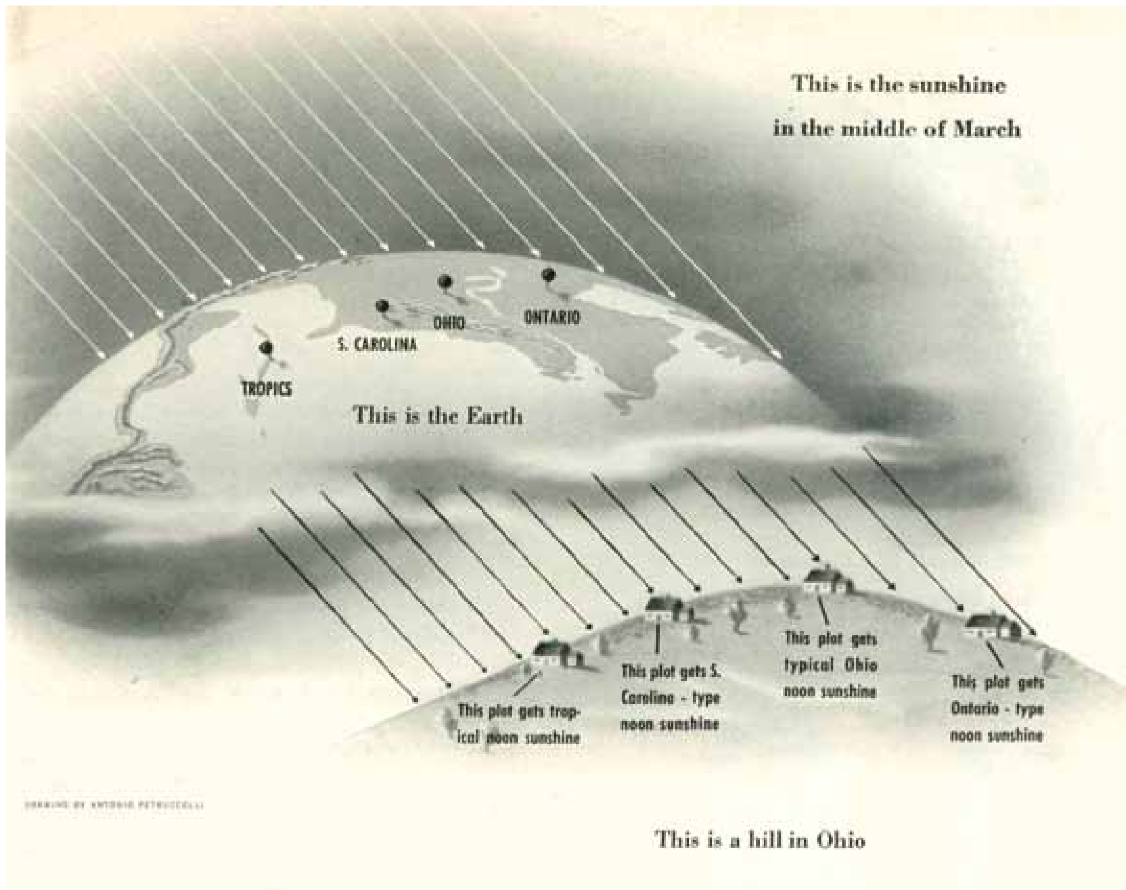


Antonio Petruccelli, "This is a Hill in Ohio," illustration from "How to Pick Your Private Climate" part of the "Climate Control" series, *House Beautiful* (February, 1949).

CLIMATE AND REGION The Post-War American Architecture of Victor and Aladar Olgyay

BY DANIEL A. BARBER

RIGHT AFTER WORLD WAR II there was a flurry of interest—among architects, physicists, sociologists, and others—in the relationship between architecture and climate. Some of the most prominent work in this regard was that of Victor and Aladar Olgyay, Hungarian émigrés who developed robust research programs into designing for different climatic regions at both MIT and Princeton University. On the one hand, their inquiries established a very particular form of interest in the "science of design" that had been a prominent aspect of modernism before the war; on the other hand it developed in relationship to a global trend towards adapting modernist strategies to engage regional contingencies of climate, labor, materials, and industry. In the decade before HVAC (Heating, Ventilation and Air Conditioning) became widely available, interest in how to use modern design strategies to mitigate climatic challenges helped to globalize the international style.

More than an overture toward the emulation of their design methods, what's at stake in re-examining the Olgyays' work is an understanding of how the disciplinary expansion of architecture developed according to specific geophysical and geopolitical pressures.

Twin brothers, the Olgyays were born in Budapest in 1910 and trained as architects at the Royal Hungarian Polytechnic, and quickly cast their lot with the growing interest in modern architectural methods. They became known for a 1939 apartment building in Budapest, a simple slab building called the Reverse House, in which the more prominent façade looked away from the street, orienting the building to the garden rather than to the city.[1]

1 *The Work of Architect's Olgyay and Olgyay: with a preface by Marcel Breuer and an Introduction by Peter Blake* (New York: Reinhold, 1952). The cover of the book was designed by György Kepes.

The project also used shading devices to seasonally manage solar incidence.

By this time the Olgyays had already entered the international scene of modern architecture, having been awarded the Rome prize in 1934, spending a year on a fellowship at Columbia University, and exploiting their travel furloughs in London to meet Marcel Breuer, Walter Gropius, and other Bahauslers on their way to the U.S. They also got to know Maxwell Fry, whose Sun House of 1935 helped to spark the modernist discourse on engagement with climatic conditions—as did Serge Chermayeff's House at Halland, Sussex of 1938. Fry, with Jane Drew and others, would go on after the war to develop a program at the Architectural Association on Tropical Architecture, exploring how parameters of climate, materials, and design could be inserted into the process of post-colonial economic development.[2]

In 1947, the Olgyay brothers moved to the U.S. under the sponsorship of Breuer, and took a position at Notre Dame University. Two years later, they joined the Department of Architecture at MIT as Research Associates to pursue funded research projects looking at architecture as a means of climatic mitigation. In the years right after the war, before the financial and regulatory mechanisms of suburban development had been consolidated, the terms of inhabitation of the expanded American territory was open to experimentation. Government and private interests were investing in new means to build, with attention to prefabrication, energy generation, materials science, and design method. A number of experiments in suburban living were funded by government agencies and their private counterparts—at MIT, this included the Housing and Home Finance Agency, the Building Research Advisory Board, the Ford Foundation, MIT's internal think-tank (the Bemis Foundation), and numerous other government and institutional grants.

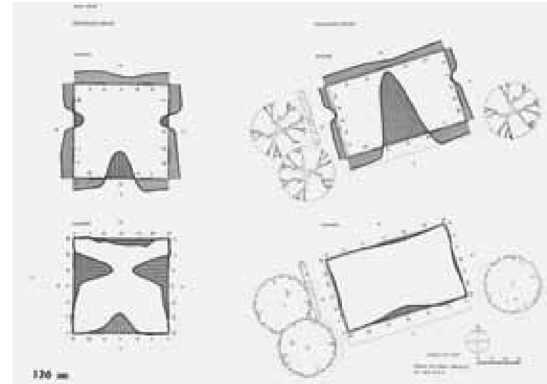
A range of related projects were already ongoing at MIT. Researchers there were contributing to the *House Beautiful* / AIA (American Institute of Architects) collaboration called "Climate Control," a series of articles which ran in the magazine from 1949 to 1951, and which was also the basis for a number of pamphlets distributed by the AIA to its members—user's guides for climatic adaptability.[3] The "Climate Control" research informed a series of regional climatic charts developed by the U.S. Army Corps of Engineers, which were widely distributed by the AIA in order to provide a starting point for the new kinds of analyses architects could perform. Following on the early sun diagrams of William Atkinson in the early twentieth century, a concerted research project performed and published by the Royal Institute of British Architects, and extensive work on solar incidence done at the Adler Planetarium in Chicago in the late 1930s, the Climate Control charts brought together diverse aspects of this new body of knowledge and made it available and readily usable as a means to inform design proposals.[4] Through these and other avenues, the experimental milieu at MIT explored climatic design as an important consideration in industrial programs for suburban expansion into the American territory.

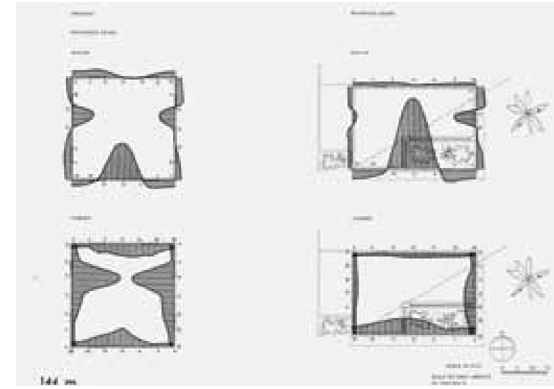
The MIT research resulted in the Olgyays' "Temperate House" analysis, a project

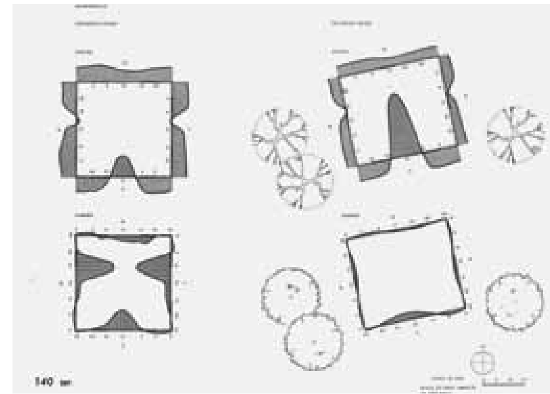
2 Maxwell Fry and Jane Drew, *Tropical Architecture in the Humid Zone* (New York: Reinhold, 1956), 20. Along with the Olgyays and Fry and Drew, Richard Neutra offers another prominent inquiry in this regard. See Richard Neutra. *Architecture of Social Concern in Regions of Mild Climate* (São Paolo: Gerth Todtmann, 1948). Both Neutra and Fry and Drew engaged climatic methods directly on post- or neo-colonial terms, as a means to encourage certain forms of economic and political development in the global south.

3 See for example Elizabeth Gordon "What climate does to YOU and what you can do to CLIMATE" in *House Beautiful* (Oct 1949).

4 A 1931 article in *Architectural Record* brought together both Atkinson's research and that at the Adler, while also relating it to the recent discussion on "rational site-planning" at the third CIAM conference in Brussels in 1930. See Howard T. Fisher, "A Rapid Method for Determining Sunlight on Buildings," in *Architectural Record*, vol. 70, no. 12, (December, 1931): 445–454; See Walter Gropius, "Houses, Walk-ups or High-Rise Apartment Blocks?" (1931) in *The Scope of Total Architecture: A New Way of Life* (New York: Harper and Row, 1943), 119–135; and CIAM, *Rationelle Bebauungsweisen: Ergebnisse des 3. Internationalen Kongresses für Neues Bauen* (Stuttgart: J. Hoffman, 1931). On the RIBA-funded research see H.E. Beckett, "Orientation of Buildings" in *Journal of the Royal Institute of British Architects*, vol. 40 (1933): 61–65 and P.J. Waldram, "Universal Diagrams" in *Journal of the Royal Institute of British Architects*, vol. 40 (1933): 50–55.







Victor Olgyay, analysis of "building shape" in New York (top left), Minneapolis (top right) and Phoenix (right); from Design with Climate, 1963.

published in *Architectural Forum* in March of 1951 and exhibited at MIT.[5] The article laid out their three-step methodological premise for the design of a suburban house responsive to climate: first, perform a careful analysis of a building's regional condition, with attention to both seasonal and daily temperature variations; second, consider building shape and orientation as a means to maximize a beneficial relationship to solar incidence.[6] The formal implications of climatic adaptation were the subject of endless analysis by the Olgyays, and led to a range of basic shapes and orientations for different American regions. The third step of their method involved selecting an appropriate shading device system for each façade; in *Solar Control and Shading Devices* of 1957, they provided a careful typology of *brise-soleil*, organized according to characteristics appropriate to a given façade condition. They also detailed the use of trees with seasonal foliage, and their placement in relationship to other buildings to clarify the shading analysis.[7] Though the Olgyays' work is self-consciously more expansive on disciplinary terms and more integrative as a design approach than our current historical perception of mid-century modernism, in fact the methods on which they focused were widely used in the period, albeit often in a piecemeal fashion.[8]

As a result of this research and publication activity, the Olgyays developed a reputation as climate experts and began to assist other

5 Victor Olgyay, "The Temperate House" in *Architectural Forum*, (March 1951).

6 While the developed driven model of mass produced subdivisions such as Levittown became the dominant mode of suburban growth, in the late 40s a number of alternatives were envisioned, most of them strongly invested in modern design and material concerns. See for example "Seven Postwar Houses" in *Architectural Forum*, vol. 87, no. 9 (September, 1947): 77–124; Museum of Modern Art (Elizabeth Mock and Richard Pratt). *Tomorrow's Small House: Models and Plans* (New York: Museum of Modern Art, 1945); Robert A. Beauregard, *When America Became Suburban* (Minneapolis, MN: University of Minnesota Press, 2006); and Daniel A. Barber, Tomorrow's House: Architecture and The Future of Energy in the 1940s in *Technology and Culture*, vol. 55, no. 1 (forthcoming January 2014).

7 Victor and Aladar Olgyay, *Solar Control and Shading Devices* (Princeton, NJ: Princeton University Press, 1957), 5. For an analysis of the derivation of the brise-soleil as an architectural tool, and its complicated relationship to vernacular practices, see Daniel A. Barber, "Le Corbusier, the Brise-soleil, and the Socio-climatic Legacy of Modern Architecture" in *Thresholds* no. 40: "Socio-" (Summer, 2012): 21–32.

8 For a prominent example of this general tendency, see Marcel Breuer, *Sun and Shadow, the Philosophy of an Architect* (New York: Dodd, Mead, 1955); as well as the examples collected in Jeffrey Aronin, *Climate and Architecture* (New York: Reinhold/Progressive Architecture, 1953) and Groff Conklin, "Sun Control Methods" in *Progressive Architecture* (June, 1950): 92–96.

Faulkner, Kingsbury, and Stenhouse with Olgyay and Olgyay consulting, American Association for the Advancement of Science Building, Washington, D. C., 1955.

Projects were proposed in upstate New York and in the suburbs of Dallas and Minneapolis. with each iteration, the climatic specifics of the site became another opportunity to refine strategies of regional analysis and design method. Their second major book, *Design with Climate: A Bio-Regional Approach to Architectural Regionalism* focused on this subdivision scale, with a final section on site orientation and massing examples in six American regions.[10]

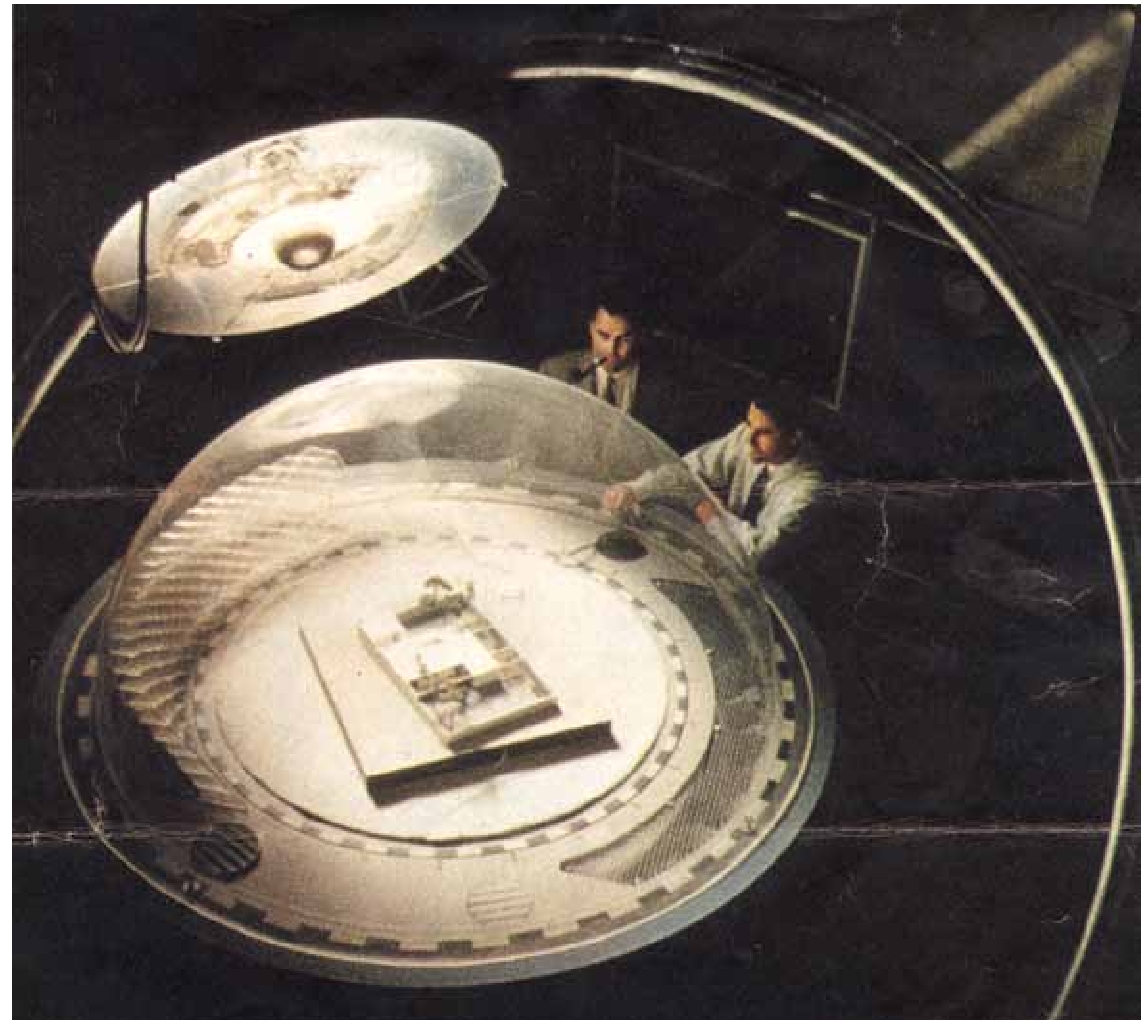
In 1953, the Olgyays were hired by the Princeton University School of Architecture as Research Professors, and began to work in the recently established Princeton Architectural Laboratory. This became the site for their other major project of the mid-50s,

architects on a variety of projects. Their work for the American Academy for the Advancement of Science building in Washington, D.C., with Faulkner, Kingsbury, and Stenhouse was especially well-received in the press and by the clients. While both of the brothers designed a number of houses in the Princeton area, their role as consultants was more prominent. Aladar consulted with a number of developers on the orientation of subdivisions to maximize solar heating in the winter and shading in the summer, thereby rendering the homes they built more cost-effective for the consumer.[9]

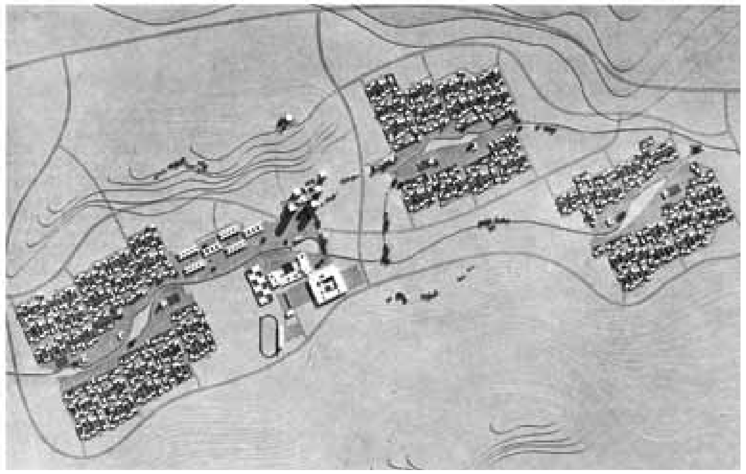
the design and construction of the Thermoheliodon device. The Thermoheliodon offered a marked improvement on the heliodons that had, since the late nineteenth century, served to provide analytic parameters of the sun's path useful to architects. The Olgyays' machine was able to control the parameters not only of solar incidence, but also of wind, humidity, and soil conditions. Here, A significantly more detailed model of the climatic world became available to the designer. The Olgyays worked through the summer of 1957 to solve the one problem that remained—that of

9 These developments were not built. After Eisenhower was elected in 1952, and the regulatory structure of oil imports transformed towards allowing massive imports from the Middle East, the economic argument no longer held. See David S. Painter, *Oil and the American Century: The Political Economy of U.S. Foreign Oil Policy, 1941–1954* (Baltimore, MD: Johns Hopkins Press, 1986) and Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (New York: Verso, 2011).

10 Victor Olgyay, *Design with Climate: A Bioclimatic Approach to Architectural Regionalism* (New York: Van Nostrand Reinhold, 1963); see especially Chapter XII: Examples in Four Regions, 153–189.



Victor and Aladar Olgyay with the "Thermoheliodon," Princeton Architectural Laboratory, 1956



Victor Olgyay, "Hot-Arid Zone Housing Layout" from Design with Climate, 1963.

upscaling the thermal effects of materials from the model to full scale. Frustrated with the elaborate calculations necessary, they proposed constructing houses at Princeton, Los Angeles, and Montreal to act as "control houses." With real time monitoring of these buildings, they hoped to perpetually refine their material predictions.[11]

While this refined technological means of placing the house in its regional context was initially well-received, other forces of globalization were beginning to cloud the picture. The American Society of Heating, Refrigeration, and Air Conditioning Engineers was formed in 1959 out of a number of predecessor agencies. The "American" in the society's name is misleading, as the merger was intended to develop a series of industry regulations on a global scale, one that focused on specific conditioning, thermal, and ventilation conditions in contemporary buildings.[12] Design for climate was, at least at the beginning, overwhelmed by a global industrial and regulatory regime embraced by modern architects worldwide and dependent, for the most part, on American engineering expertise–that looked to mechanical systems to manage all air conditioning needs.

All the same, the Olgyays' focus on *method* and *research* resonated across a number of forms of inquiry in the period. Just down the street from the Architectural Laboratory, at the Princeton Institute for Advanced Study, John von Neumann (another Hungarian émigré) had been developing "The Meteorology Project." Von Neumann, a mathematician, started the project in order to "demonstrate, with a particular scientific problem, the revolutionary potential of computing."[13] He chose the analysis of climate as a sort of test case amenable both in terms of the scale of data available and the speed with which it needed to be processed. In the immediate post-war period, following the successful forecasts during the Normandy invasion that helped end the war, the operating assumption was that more precise climate knowledge would allow for precise long term weather predictions. This knowledge of future conditions was seen as a crucial strategic asset not only for possible military use, but also in maximizing regional crop management regimes. Von Neumann pushed the engineers and manufacturers to an ever more demanding speed of data processing in order to meet this goal, until the problem was less with computational power and more with availability of data.[14]

11 Victor and Aladar Olgyay, *Report on the Thermoheliodon: Laboratory Machine for Testing Thermal Behavior of Buildings through Model Structures* (Princeton, NJ: School of Architecture and School of Engineering, June 1956), 32.

12 W. Stephen Comstock and B.J. Spanos, *Proclaiming the Truth: An Illustrated History of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.* (Washington, D.C.: AHRAE, 1995), 71–73.

13 Frederick Nebeker, "A History of Calculating Machines in Meteorology" in James Fleiming, editor, *Historical Essays on Meteorology, 1919–1995* (Washington, D.C.: American Meteorology Society, 1996): 157–178.

14 Frederik Nebeker, *Calculating the Weather: Meteorology in the 20th Century* (San Diego: Academic Press, 1995), 67. The accumulation of climate data itself has a long history, rife with complications over finding means for comparing and calibrating data. See Paul N. Edwards, *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming* (Cambridge, MA: MIT Press, 2010).

That problem would also be solved. From 1957 to 1959, a global scientific initiative was organized to increase knowledge of earth, ocean, and atmospheric systems. The International Geophysical Year, as it was called, involved collaborations across political boundaries to better conceptualize the earth's systems. Climate science was one of the beneficiaries of these analyses: observation stations multiplied, as nearly every experiment around the globe also served as an opportunity to gather climatic data, and dramatically increase the accuracy of climate models. It is also worth noting that the International Geophysical Year also saw the beginning of the Keeling curve, the longest record of carbon buildup in the atmosphere. Even with all this data, and indeed because of it, it became clear that the climate system was so complex that precise long term meteorological prediction was untenable.[15] The more interesting discovery was the ability of these models to approximate the chaotic and non-linear capacities of the weather system, an epistemological advance that would impact the pursuit of scientific knowledge more generally.[16]

If the shelf life of the Olgyays' analyses appears to have been brief, the resurgent interest in design for climate in the current architectural discourse would seem to be an occasion for re-appraisal. On instrumental terms this has already occurred. though the Olgyays themselves are barely known to the current generation of architects, the methods they produced and the analytic tools, diagrams, and images that accompanied them became the basis for Eco-tect, one of the most ubiquitous climate modeling softwares in use. A veritable ghost in the machine, the Olgyays' interest in regionally appropriate designs emerges through over- and under-heating charts and incidence analyses on architectural boards across the nation. Of course, the current interest in climate is on terms unrecognizable to the concerns over the method of suburban expansion under discussion in the 1950s. Regional concerns are now inseparable from their global consequences, and the precise relationships of climatic causes and effects are augured according to a nuanced matrix of unpredictability. As much as their specific means of analysis, both the Olgyays' focus on research and method and their willingness to engage other disciplines in grappling with environmental complications maps in its outlines a compelling model for the architecture of the present.

15 Paul N. Edwards, "Meteorology as Infrastructural Globalism" in Osiris 21 (2006): 229–250; see also Paul N. Edwards, *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming* (Cambridge, MA: MIT Press, 2011).

16 See James Gleick, *Chaos: Making a New Science* (New York: Penguin, 1987); see also Gilles Deleuze and Felix Guattari, *What is Philosophy?* (New York: Columbia University Press, 1991), especially chapter 4, "Geophilosophy," 85–116.