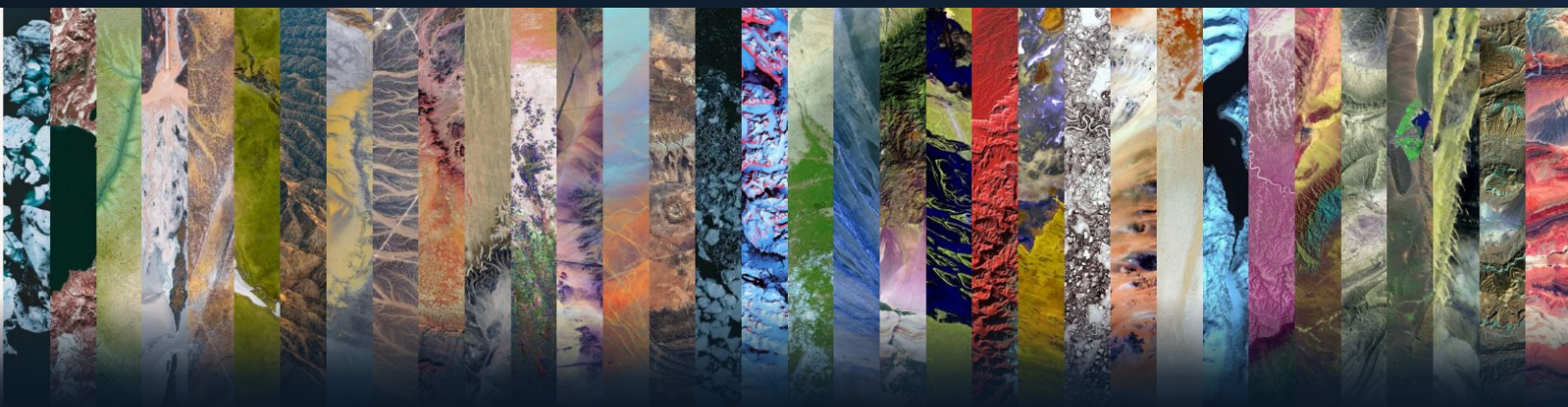




Climate projections, localized.

Synthesis transforms global climate models into actionable, city-level temperature projections, bias-corrected against observed data and ready for real-world decision-making.

45

CMIP6
MODELS

400+

MODEL RUNS

0.25°

DOWNSCALED
RESOLUTION

5

SSP EMISSIONS
SCENARIOS

8,000+

GLOBAL
CITIES

HOW IT WORKS

Synthesis bridges the gap between global climate modeling and the local-scale data that practitioners need.

From Global Models to Local Projections

Global climate models perform well at global scales, but diverge significantly at the local level, where decisions about infrastructure, investment, and policy are actually made. Synthesis incorporates the full breadth of available CMIP6 model runs, not just a curated subset, and applies bias correction and statistical downscaling against Berkeley Earth's high-resolution observational record to produce reliable, localized temperature projections at 0.25° resolution for any region on Earth.



Who Synthesis Is For



Adaptation & Investment

Climate-aligned investment, infrastructure capital allocation, and adaptation planning for assets and portfolios at the city level.



Research & Academia

Localized climate impact studies, model comparison, and temperature-dependent research across disciplines.



Policy & Planning

Urban heat planning, infrastructure adaptation, public health preparedness, and evidence-based climate policy.

THE SCIENCE

The Science Behind Bias Correction

How Synthesis turns the full CMIP6 ensemble into decision-ready projections.

Global climate models were designed and calibrated at planetary scale, and they perform well there. But the metrics that matter for real decisions, such as annual temperature maxima, cooling degree days, and extreme event thresholds, require a model to simultaneously reproduce local climatology, seasonality, and daily weather variability. Most CMIP6 models cannot do all three accurately at city scale, leading to systematic over- or underestimates of future local warming.

How We Do It

Decomposition

Each temperature signal is decomposed into long-term climatology, seasonality, and daily variability, with each component corrected independently against Berkeley Earth's BEST-HR observational record and ERA5 reanalysis.

Model Weighting

Rather than equal-weight averaging, Synthesis selects and weights models by regional historical accuracy, directly addressing the IPCC's documented "hot models" problem without relying on a single global metric.

THE OUTCOME

~50%

Uncertainty Reduction at 2100

After bias correction, the spread across the full CMIP6 ensemble narrows by approximately half, anchored to the observational record rather than by excluding models.

From Observation to Decision: The Vertical Integration Advantage

Berkeley Earth spent fifteen years building the world's most comprehensive instrumental temperature record. We built the projections layer on top of that same ground truth foundation.



Consistency

One organization, one methodology, end to end. No vendor handoffs between station data and city projections.

Anchored to Our Data

Bias correction calibrated against BEST-HR and ERA5, the dataset Synthesis is designed to extend.

Independent & Open

Nonprofit institution. Peer-reviewed record, openly documented methodology, formal peer review forthcoming.

CASE STUDY

Projecting the Evolution of Cooling Demand Under Climate Change in C40 Cities

In partnership with C40 Cities · October 2025

C40 Cities used Berkeley Earth's Climate Model Synthesis to project how cooling demand will evolve across its global network of cities through 2050. The study combined Synthesis's bias-corrected, city-level temperature projections with the Demand.ninja energy model to estimate future cooling energy needs, producing one of the first analyses to account for urban heat island effects at this scale.

Key Findings

20–30%

Average increase in Cooling Degree Days across C40 cities by 2050, with African and European cities facing increases of 50–100%.

117 → 217 Mt

Projected growth in CO₂ emissions from cooling demand across C40 cities, equivalent to 3–4x the annual emissions of New York City.

6x

Potential increase in cooling electricity demand in African C40 cities when combining climate change with demographic and economic growth.

5 SSPs

Analysis run across all five Shared Socioeconomic Pathways, enabling city planners to assess cooling needs under a range of futures.

The Role of Synthesis

Berkeley Earth's Climate Model Synthesis provided the study's climate foundation: downscaled daily temperature projections for each C40 city, corrected for urban heat island effects that standard global models miss. This city-level precision was critical. Cooling demand is driven by local temperature extremes, not regional averages, and small differences in projected daily maximums translate into large differences in energy demand estimates.

"Climate projections were based on Berkeley Earth's Climate Model Synthesis, which produces downscaled surface temperature data from CMIP6 GCMs to provide accurate city-level projections. This is important as it provides a correction for urban heat island effects and provides the daily projected temperature."

— C40 Cities, "Evolution of the Cooling Demand Under Different Climate Scenarios in C40 Cities," Summary Methodology, p. 3