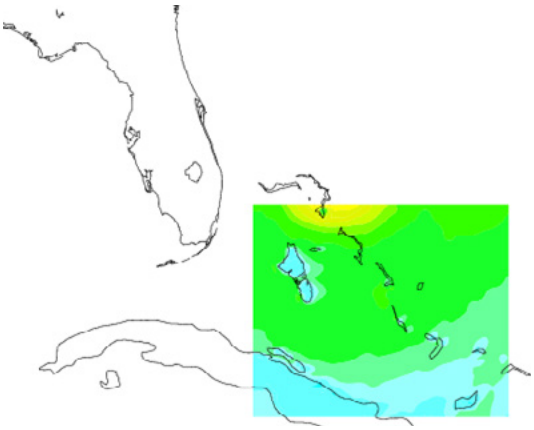
CLIMATE ANALYTICS AND STATISTICS

Supporting climate-aware and climate-resilient design with expertly interpreted, modeled and analyzed meteorological data

Good design—of buildings, infrastructure, communities—hinges on an accurate understanding of climate. Misjudge the weather and the structure fails: Construction costs more; operation costs more; usable lifespan is reduced; people are unhappy—or unsafe.



Climate analysis ensures that a design is firmly rooted in the local environment and immediate surroundings. Such design exploits the benefits of a climate while providing resiliency against its detrimental aspects. Climate-aware design also exploits the uniqueness of a given situation. For example, if passive ventilation is to work well, the building and its openings must be oriented appropriately for local winds.

Our service

There are lots of ways to get weather statistics. But when you work with us, we make sure the statistics are interpreted appropriately in relation to your site. We also help you understand what those statistics really mean and how they can benefit your design.

We offer a full range of traditional climate-related analyses. A typical engagement is to evaluate loading conditions using historical observations coupled with wind tunnel techniques. We also provide guidance on typical and extreme conditions as a baseline for design.

Our specialists have carried out such analyses around the globe. Thus, our experience includes evaluating and mitigating climate-related challenges in of extremes heat, cold, snow and wind.

We also use a custom modeling strategy that allows us to give you truly site-specific weather data. Other methods simply estimate climate based on data from the nearest meteorology station. If your work site is next door to that station, you're in luck. If the station is near a lake but your structure isn't, many aspect of the climate will be different. In that case, a traditional estimate may be inherently inaccurate.

By working with us, you get access to far more than meteorologists. Our teams also include experts in climatology, wind engineering and building performance. Working in these teams, we have developed a deeper understanding of how phenomena at all scales influence meteorology and climate. This broad perspective also informs our analysis of how meteorological parameters can vary between the data measurement location and the project site.

Supported by this cross-disciplinary outlook and a commitment to exceptional reliability, we distill a vast range of influences into usable form. You receive recommendations that correctly reflect not only broad patterns but also the unique circumstances of your project.

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RWDI is a valuable partner to clients seeking to...

Explore Innovations

- Design viable new strategies to support green, low-carbon urban development, by understanding the role of local climate in passive techniques **(ventilation, daylighting, etc.)** and wind and solar sources
- Create enjoyable communities, by comprehensively considering the impact of climate on the comfort and safety of inhabitants **(such as discomfort or risks for pedestrians from wind, snow, sun, temperature or humidity)**

Create Opportunities

- Design better building systems **(ventilation, sun/shade, wind barriers, etc.)** and improve infrastructure performance **(snow removal, road de-icing, storm water management, etc.)** by understanding typical patterns and seasonal and diurnal fluctuations
- Save on construction costs by designing to project-specific wind- and snow-loading criteria
- Improve industrial operating margins, by understanding the frequency of weather conditions that affect production or shipping

Meet Challenges

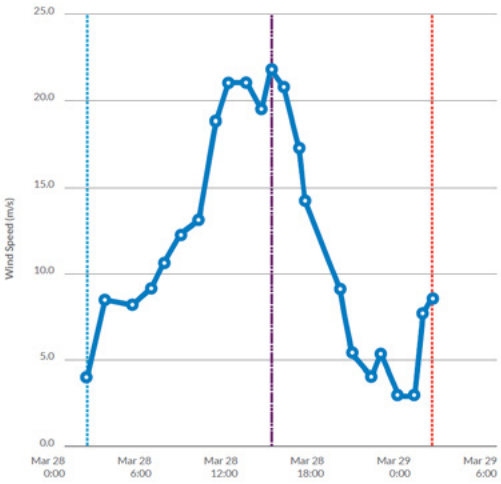
- Support resiliency, emergency preparedness and occupant comfort and safety by planning or designing for extremes **(wind/snow loads, water management, etc.)**
- Manage air quality and noise issues at industrial and resource extraction sites, by understanding the role of local climate characteristics
- Design building systems that respond correctly to challenging local conditions **(structure, cladding, HVAC, storm water management systems, etc.)**

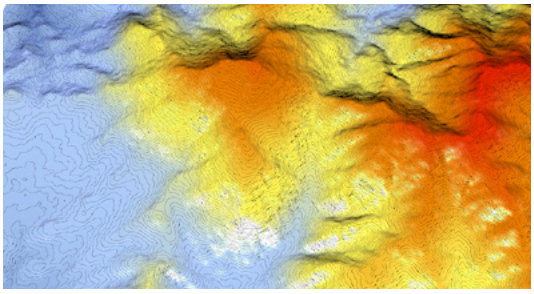
Fulfill Expectations

- Address building code requirements for leveraging local climate data in assessing wind loads
- Address regulatory requirements for sustainability and resiliency

How we work

When we evaluate a specific project site, our key question is this: How might we best represent the meteorological conditions that are important to the project and the particular design issue? Common concerns are extreme wind events; typical and peak wind, thermal and humidity conditions; and snowfall frequency and amount.





Depending on the project and its issues, we'll look at all necessary scales: global circulation, synoptic (inter-regional) phenomena, land use and topographical influences from the built and natural environment, down to building geometry and its localized effects. We start with an inventory of long-term historical meteorological records suitable for the design problem. Next, we evaluate the location of the weather stations in relation to the project site: Are the meteorological parameters and conditions at the station representative of those needed to evaluate the design problem at the project site? If not, can they be adjusted to be representative? Sometimes surface data are unavailable, are of low quality or are unrepresentative. In such cases, we leverage other simulations to estimate relevant parameters for the climate at the project site. For example, we frequently use Monte Carlo simulations of hurricane winds and mesoscale models (e.g., the Weather Research and Forecasting Model [WRF]).

Beyond arriving at values for meteorological parameters, we help you understand which parameters matter most and why. Depending on the design issue, we may use the quality-controlled data to conduct various forms of analyses:

Seasonal or diurnal variability

Understanding temporal variability can be important for optimizing building operation.

Parametric analyses

Often weather becomes critical for a design only when a combination of conditions occurs. We can do parametric analyses to identify specific conditions of risk or opportunity.

Frequency

A weather condition may pose a problem only if it occurs frequently—or infrequently, depending on the issue.

Extreme Conditions

It is often valuable to identify frequencies of extreme events based on a fixed return period or mean recurrence interval (MRI). We use extreme value analysis and other statistical regression techniques to find the relationships between extreme meteorological conditions and the frequency. These models are often used in conjunction with wind tunnel testing to evaluate wind loads, pedestrian-level wind conditions or re-entry of building exhaust.