

- ADVANCED HAZARD MODELING
- STATE-OF-THE-ART ENGINEERING
- THE INDUSTRY LEADER

The AIR Tropical Cyclone Model for Canada

ADVANCED HAZARD MODELING

Provides Comprehensive Spatial Coverage of Tropical Cyclone Activity

Damaging winds from tropical cyclones can affect not only provinces within Atlantic Canada, but also areas hundreds of miles inland in provinces outside this region.

THE ISSUE.

THE SOLUTION.

The AIR Tropical Cyclone Model for Canada captures the effects of damaging winds from both landfalling and bypassing tropical cyclones not only in Atlantic Canada, where storms are experienced more frequently, but also in areas affected by storms that have moved into Canada from the United States, bringing damaging winds that can penetrate as far inland as northern Quebec and eastern Manitoba.

Features Wind Field Modeling that Produces Realistic Storm Simulations

Tropical cyclones display considerable variability in structure and wind speed, which has major implications for the location of the most damaging surface winds.

The AIR model explicitly captures the wide variability in the structure of tropical cyclones that could potentially reach Canada throughout their entire life cycle as they track over water, make landfall, and move inland. The methodology ensures realistic losses, both at the coast and farther inland.

Incorporates Land Use/Land Cover Data to Capture Realistic Surface Winds at Any Location

Differences in surface terrain can greatly affect wind speeds. For example, winds that have traveled over open grassland will be stronger and potentially more damaging than those that have traveled through densely forested areas.

Using the latest high-resolution (1 km) land use/land cover data, the AIR model captures the effects of surface friction based on the direction of wind at each location.

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MODEL AT A GLANCE

MODELED PERIL Tropical cyclone wind

CATALOG

- 10,000-year standard and climate-conditioned catalogs, each with more than 11,000 events, 7 Extreme Disaster Scenarios, and 6 historical events

HAZARD MODULE

- Advanced scientific methodology provides realistic modeled winds capturing the variability in storm structure
- Standard and warm sea surface temperature catalogs provide two robust and scientifically defensible views of the risk

VULNERABILITY MODULE

- Explicitly accounts for the effect of wind duration, which can be a significant driver of loss
- Damage functions vary by occupancy, construction, height, and year-built
- Incorporates regional variation in vulnerability

MODEL VALIDATION

- Hazard components are validated against data from NOAA—including data from the National Hurricane Center and National Climatic Data Center—Environment Canada, and other sources
- Modeled losses are validated against data from the Insurance Bureau of Canada, PCS Canada®, Public Safety Canada, and the Institute for Catastrophic Loss Reduction, as well as published research

Cover image: Hurricane Juan South of Nova Scotia, courtesy of NASA

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STATE-OF-THE-ART ENGINEERING

Models the Effects of Wind Duration as well as Wind Speed

Damage from tropical cyclones depends on their wind intensity and duration. Lower wind speeds that last longer due to a storm's slower forward movement can be just as damaging as stronger winds from fast-moving storms.

Accounts for Regional and Temporal Variations in Building Codes and Practices

The vulnerability of buildings is not the same across Canada, and building vulnerability changes over time due to the differences in building practices and the aging of the structures.

THE ISSUE.

THE SOLUTION.

By considering the duration of damaging winds as well as the maximum wind speed for each location, the AIR model effectively captures the cumulative effects of tropical cyclone wind loads on structures.

The AIR model incorporates exhaustive research by AIR engineers into the regional and temporal variations in Canadian building codes. It supports 36 construction classes and 110 occupancy classes, including 62 for large industrial facilities.

UNPARALLELED INDUSTRY EXPOSURE DATABASE

AIR's industry exposure database (IED) is based on the latest available information on risk counts, building characteristics, and construction costs. The benefits and uses of the IED are many, from supporting industry loss warranties that pay out based on industry losses to providing the means by which companies can disaggregate their data for more accurate loss estimates, as well as creating damage functions for buildings with unknown characteristics calculated by averaging damage functions for buildings with known characteristics using weights for each construction type from the IED.

NO ISSUE HERE.

THE INDUSTRY LEADER IN TROPICAL CYCLONE MODELING

The advanced methodology used in the AIR Tropical Cyclone Model for Canada provides the most consistent, realistic, and comprehensive view of tropical cyclone wind risk in the industry. The model's catalog is consistent with the Atlantic basinwide catalog and the AIR Hurricane Model for the United States, which has been the industry leader since its release in 1987. The model's catalog contains a robust set of stochastic events that provide a full range of loss scenarios from tropical cyclone winds in Canada.

ABOUT AIR WORLDWIDE

AIR Worldwide (AIR) provides risk modeling solutions that make individuals, businesses, and society more resilient to extreme events. In 1987, AIR Worldwide founded the catastrophe modeling industry and today models the risk from natural catastrophes, terrorism, pandemics, casualty catastrophes, and cyber incidents. Insurance, reinsurance, financial, corporate, and government clients rely on AIR's advanced science, software, and consulting services for catastrophe risk management, insurance-linked securities, site-specific engineering analyses, and agricultural risk management. AIR Worldwide, a Verisk (Nasdaq:VRSK) business, is headquartered in Boston, with additional offices in North America, Europe, and Asia. For more information, please visit www.air-worldwide.com.

