

- ADVANCED HAZARD MODELING
- STATE-OF-THE-ART ENGINEERING
- PEER REVIEWED

AIR Tropical Cyclone Model for Central America

ADVANCED HAZARD MODELING

Captures Precipitation-Induced Flood Losses

Flood losses arising from tropical cyclones in Central America can be significant. While damaging winds diminish soon after landfall, precipitation associated with these storms can extend hundreds of kilometers inland.

The AIR model employs a separate module that explicitly captures precipitation-induced flooding. It estimates accumulated runoff (or flood depth) using detailed data on topography, elevation, and the ability of local soils to absorb water.

Model Domain Spans Two Ocean Basins

Central America experiences tropical cyclones from both the Atlantic and Pacific basins. Data show that, in any given year, if the frequency of events in the North Atlantic is below average, then the frequency in the Northeast Pacific tends to be above average, and vice versa.

The AIR model features a unified storm catalog that covers both basins (North Atlantic and Northeast Pacific) and explicitly accounts for this negative correlation.

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

Differences in surface terrain can greatly affect wind speeds. For instance, winds travel much faster over open grassland as compared to densely forested areas.

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

STATE-OF-THE-ART ENGINEERING

Comprehensive Understanding of How Buildings in Central America Respond to Wind and Flood

From one Central American country to the next, a building's response to tropical cyclone winds and its performance during flooding are highly variable.

The AIR model incorporates findings from a comprehensive study of local construction practices and building codes to appropriately capture the variation in vulnerability both between and within Central American countries.

Component-Based Approach to Modeling Complex Industrial Facilities

Traditional approaches to estimating the vulnerability of industrial facilities treat these facilities as single entities or, at best, a collection of buildings. Industrial facilities are far more complex and demand a more custom solution.

The AIR model uses a rigorous engineering-based approach that accounts for the damageability of components intrinsic to an industrial facility—such as tanks, pipe racks, compressors, and process towers—and the interconnectivity between these components. The result is a far more reliable estimate of loss.

continued

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MODEL AT A GLANCE

YEAR OF RELEASE 2011

MODELED PERILS Tropical cyclone winds and precipitation-induced flood.

CATALOGS 10,000-year standard and warm SST catalogs, each with more than 12,000 events. AIR's basinwide catalog allows companies to capture losses that span the United States, Caribbean, Mexico, and even offshore assets in the Gulf of Mexico.

HAZARD MODULE

- Captures precipitation-induced flood
- Accounts for risk to portfolios that span multiple countries.
- Incorporates land use/land cover data to capture surface winds at any location

VULNERABILITY MODULE

- Separate wind and flood damage functions
- Based on understanding of regional wind and flood hazard characteristics that impact vulnerability in each modeled country
- Large industrial facilities damage functions based on component-based approach

MODEL VALIDATION Extensively validated against loss estimates issued by industry sources and results from detailed damage surveys. In addition to AIR's internal model validation, the model was peer reviewed by an independent external consultant.

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Modeling the Effects of Storm Duration

Most models estimate damage using peak wind speed alone. However, claims data repeatedly show that building damage is also a function of how long the storm batters the structure.

The AIR model accounts not only for the peak wind speeds experienced during tropical cyclones, but also for duration—that is, for the increased damage that results from prolonged exposure to wind from slow-moving storms.

THE ISSUE.

THE SOLUTION.

ADDRESSING THE CHALLENGES OF AGGREGATE DATA

NO ISSUE HERE.

Model results are only as good as the exposure data input. But AIR recognizes that many companies writing business in Latin America only have access to aggregate sums insured data by CRESTA zone and are therefore unable to leverage the full potential of a detailed model. That's why AIR software features innovative capabilities that leverage our detailed, high resolution industry exposure databases to disaggregate the exposure data in companies' portfolios to a highly detailed level for improved loss estimates.

EXTENSIVE MODEL VALIDATION

The hazard and vulnerability components of the AIR model have been independently validated against data from multiple sources. However, this is not sufficient to ensure that the model as a whole will produce reasonable losses. As a final test, modeled losses have been validated using industry estimates as well as company-specific loss experience data. The AIR Tropical Cyclone Model for Central America has also been peer-reviewed.

"The AIR Central America Tropical Cyclone Model is well-researched and provides a reasonable view of hurricane risk, which will be useful to risk managers in the region."

*Jose Luis Moncada, FIDES,
Independent Consultant
& Central American risk expert*

About AIR Worldwide

AIR Worldwide (AIR) is the scientific leader and most respected provider of risk modeling software and consulting services. AIR founded the catastrophe modeling industry in 1987 and today models the risk from natural catastrophes and terrorism in more than 90 countries. More than 400 insurance, reinsurance, financial, corporate, and government clients rely on AIR software and services for catastrophe risk management, insurance-linked securities, detailed site-specific wind and seismic engineering analyses, and agricultural risk management. AIR is a member of the Verisk Insurance Solutions group at Verisk Analytics (Nasdaq:VRSK) and is headquartered in Boston with additional offices in North America, Europe, and Asia. For more information, please visit www.air-worldwide.com.



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