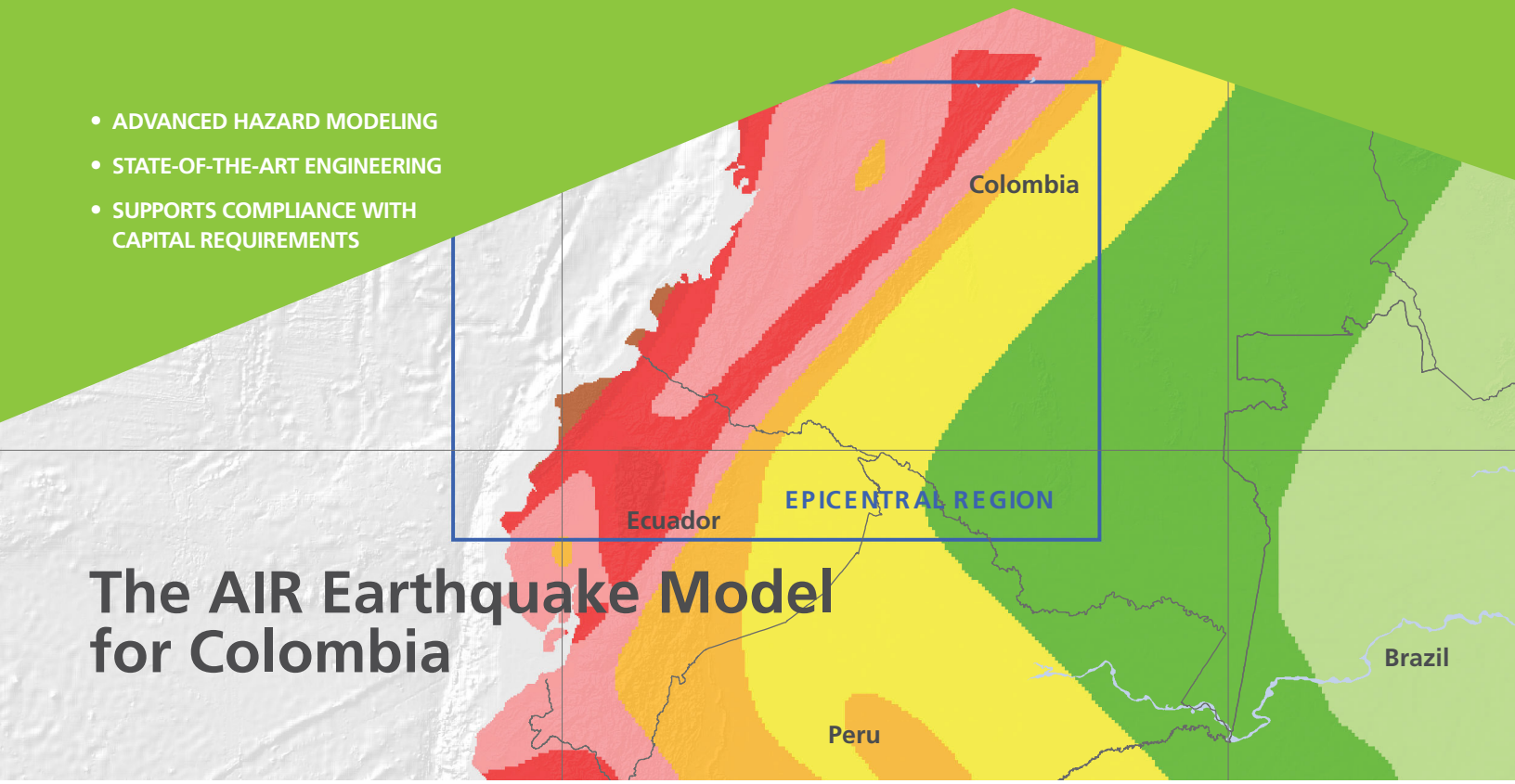
- ADVANCED HAZARD MODELING
- STATE-OF-THE-ART ENGINEERING
- SUPPORTS COMPLIANCE WITH CAPITAL REQUIREMENTS



The AIR Earthquake Model for Colombia

ADVANCED HAZARD MODELING	THE ISSUE.	THE SOLUTION.
Comprehensive Data Set to Improve Assessment of Long-Term Seismic Activity	While the region that is Colombia today has experienced earthquakes for many millions of years, the recorded history is relatively short. Therefore, additional information, including local and regional GPS data indicative of the region's long-term strain rate, is needed to improve the assessment of seismic risk.	AIR compiled detailed active fault data, which was used in conjunction with GPS data and paleoseismic data to determine the crustal deformation rate in all Colombia's seismic source zones. This information was used to create a stochastic catalog reflecting the region's long-term seismic activity.
High Resolution Geological Maps Capture Potential for Soil Amplification	Soil properties play a critical role in amplifying or de-amplifying seismic waves. Some of Colombia's biggest cities sit on volcanic ash or in young sedimentary basins where significant ground motion amplification has been observed.	The AIR model features three sets of soil maps at variable resolution, including a custom-designed microzonation map at 100-meter resolution for the capital, Bogotá.
Time-Dependent and Time-Independent Earthquake Rupture Probabilities Provide the Most Robust View of Risk	According to time-dependent views of earthquake risk, the annual probability of an earthquake occurring on a given fault is dependent on when the last earthquake occurred on that fault.	The AIR model incorporates both time-dependent and time-independent earthquake rupture probabilities—the former for seismic source zones in Colombia with well-known rupture histories, and the latter for source zones where rupture histories are not well known.
Appropriately Accounts for Loss Volatility	Infrequent, large loss-causing events—also known as "tail" events—drive the earthquake risk in Colombia (including almost half the average annual loss value). Thus, information from historical earthquakes alone is not sufficient to gauge future losses.	The AIR model appropriately captures the frequency and magnitude of "tail" events, and outputs a reliable estimate of average annual loss—one that accounts for the volatility to be expected from periods of calm interrupted by the occurrence of extreme (tail) events.
STATE-OF-THE-ART ENGINEERING		
Damage Estimation Based on Rigorous Engineering Analysis	How buildings respond to earthquakes depends on both the ground motion and the building type. Traditional approaches to damage estimation, which rely heavily on expert opinion, don't capture these complex interactions.	Complementing local expertise, damage estimation in the AIR model uses state-of-the-art engineering analysis, including results from detailed computer models of buildings subjected to actual ground motion records.

continued

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MODEL AT A GLANCE

YEAR OF RELEASE: 2000

LAST UPDATED: 2009

MODELED PERIL: Ground shaking

CATALOG: The model incorporates a 10,000-year catalog of 279,180 simulated earthquakes, 20,838 of which cause loss to industry exposure.

SUPPORTED OCCUPANCY CLASSES: 42

SUPPORTED CONSTRUCTION CLASSES: 22

HAZARD MODULE
With a complete historic catalog that integrates all global, regional, and local catalogs as follows:

- Pan American Institute of Geography and History (Instituto Panamericano de Geografía e Historia)
- United States Geological Survey (USGS), National Earthquake Information Center (NEIC), Preliminary Determination of Epicenters (PDE) catalogs
- The Colombian Institute of Geology and Mining (INGEOMINAS)—El Instituto Colombiano de Geología y Minería
- The Global Seismic Hazard Assessment Program
- The Harvard Centroid-Moment Transfer Project Earthquake Catalog

STATE-OF-THE-ART ENGINEERING *(contd.)*	THE ISSUE.	THE SOLUTION.
Considers Impact of Regional Construction on Building Vulnerability	The seismic performance of buildings in Colombia is greatly influenced by local construction practices, with damageability often affected by variations in workmanship, materials, and building code enforcement.	The AIR model takes into account these local factors and the evolution of Colombia's building codes in assessing the vulnerability of Colombia's various building types.
Comprehensive Set of Damage Functions	Colombia's building stock is diverse, and vulnerability varies by construction and occupancy.	The AIR model offers a robust set of damage functions for more than 20 construction types and more than 40 occupancy classes. Supported lines of business include residential, commercial/ industrial, and automobile.

SUPPORT FOR COMPLIANCE WITH CAPITAL REQUIREMENTS — **NO ISSUE HERE.**

Colombia's insurance market is experiencing strong growth. As local regulation aims to establish a model-based capital requirement, Colombia-based insurers can use AIR models to manage their risk and make the case to regulators for a more tailored capital reserve that better reflects their unique portfolio's risk.

INPUT SCHEMA FOR DATA TRANSPARENT AND PUBLICLY AVAILABLE

AIR has long been a proponent of open exposure data standards, as reflected by the UNICEDE® standard, which AIR makes available to the industry via a public website, unicede.com. AIR was also the first catastrophe modeling firm to support ACORD's new building authority exposure data standard.

About Us

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

Cover Image courtesy of USGS.

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