Agenda

- About AIR Worldwide
- How does AIR Worldwide use public data?
- The importance of public data in catastrophe modeling
- Public data in the international market
- Summary
About AIR Worldwide

- Founded the catastrophe modeling industry in 1987
- Scientific leader of risk modeling software and consulting services
- Locations in U.S., London, Munich, Beijing, Tokyo, Singapore, and Hyderabad
- Grown to more than 400 clients in a wide range of industries, including insurance, reinsurance, finance, corporate, and government
- Member of the Verisk Insurance Solutions group at Verisk Analytics
A Brief History of Catastrophe Modeling

- **Cat Models capture the attention of the industry**
  - Hurricane Andrew (1992) $16B
  - Northridge EQ (1994) $12B
  - 1992, 1994

- **First Catastrophe Bond Issued**
  - Transferring Risk to Capital Markets
  - Mid-1990s

- **World Trade Center Attack**
  - First Terrorism, Workers’ Comp Models Introduced One Year Later
  - 2001, 2002

- **Record Breaking Hurricane Seasons of 2004 & 2005**
  - Hurricane Katrina (2005) $41B
  - 2004, 2005

- **US Quake Models Updated to Reflect Latest USGS National Seismic Hazard Maps**
  - 2009

- **AIR Introduces TOUCSTONE, the next generation platform designed to help entities better own their risk**
  - 2013

**MODEL DEVELOPMENT TIMELINE**

- **Late 1980s**
  - 11 Insolvencies after Hurricane Andrew

- **1997**
  - First AIR Earthquake Model for Europe

- **2003**
  - NWP-Based European Wind Model 2nd Generation
  - Full 3D Mesoscale Model

- **2006**
  - Introduction of First Hurricane Models Conditioned on Warm Sea-Surface Temperatures

- **2010**
  - US Hurricane Model Features Unified Catalog Enabling Basinwide Risk Assessment
  - NWP-Based European Wind Model 4th Generation

- **2011**
  - Pan European Wind and Earthquake Models
  - U.S. Severe Thunderstorms, Thai Floods Christchurch and Tohoku (Japanese) Earthquakes $110B
What Questions Are Catastrophe Models Designed to Answer?

- Where are future events likely to occur?
- How intense are they likely to be?
- For each potential event, what is the estimated range of damage and insured loss?
- What is the probability of a given level of loss for my portfolio in a wide range of catastrophe scenarios?
One of the Most Valuable Components of AIR’s Catastrophe Models Is the Industry Exposure Database

- Industry exposure databases provide a view of the built environment
  - Building counts
  - Physical characteristics of the buildings
    - Occupancy
    - Construction
    - Size
  - Building replacement values
- The primary sources of data used to build the U.S. industry exposure database are the Decennial Census and American Community Survey (ACS)
- First industry exposure database for the U.S. was created in 1987 and it has been updated annually since
AIR Employs a Robust Approach for Building Industry Exposure Databases

**Sources of Data**
- Risk Counts
  - Population & economic censuses
  - Housing surveys
- Risk Attributes
  - Occupancy
  - Construction & height
  - Floor area
- Construction Costs
  - Costing manuals
  - Construction indexes

**Rebuild Cost Approach**
- Replacement Values
  - Costs vary by construction type and height
- Spatial Cost Index
  - National costs adjusted for regional variation

**Benchmarking**
- Risk Counts & Replacement Values
  - Insurance publications
  - Client data
  - Economic reports

**Industry Exposure Database**
The U.S. Decennial Censuses Provide a Portrait of America…

- Basic data on population and housing
- New data available every 10 years
The ACS Enables Quantification of Building Vulnerability at High Geographic Resolution

Year Structure Built

- Seminole County, FL
- Philadelphia City, PA

Units in Structure

Pennsylvania

Florida

Wood

Masonry

Masonry Veneer

Wood

Masonry

Masonry Veneer
Primary Driver of Growing Catastrophe Losses Is the Increase in Numbers and Values of Properties at Risk

“The total value of insured properties in coastal states continues to grow at an average annual rate of 7%, which will result in a doubling every decade”

From AIR’s report The Coastline at Risk: 2008 Update to the Estimated Insured Value of U.S. Coastal Properties

<table>
<thead>
<tr>
<th>State</th>
<th>Total Value ($ billion)</th>
<th>% Coastal Counties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>745</td>
<td>12%</td>
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<tr>
<td>Connecticut</td>
<td>750</td>
<td>64%</td>
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<tr>
<td>Delaware</td>
<td>171</td>
<td>36%</td>
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<tr>
<td>Florida</td>
<td>3,120</td>
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<tr>
<td>Georgia</td>
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<tr>
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<tr>
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<tr>
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<tr>
<td>Rhode Island</td>
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<tr>
<td>South Carolina</td>
<td>698</td>
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<tr>
<td>Texas</td>
<td>3,493</td>
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<tr>
<td>Virginia</td>
<td>1,409</td>
<td>11%</td>
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<tr>
<td>All Above States</td>
<td>23,332</td>
<td>38%</td>
</tr>
<tr>
<td>Total U.S.</td>
<td>53,495</td>
<td>17%</td>
</tr>
</tbody>
</table>
Public Data Is Critical for Catastrophe Modeling

- AIR annually produces a robust industry exposure database of the U.S. using census and ACS data

- Industry exposure databases provide the foundation for risk management and more reliable loss estimates
  - Developing and validating models
  - Estimating industry losses for historic and real-time events
  - Validating losses for individual companies
  - Assessing exposure data quality for individual companies
AIR Tracks Events Worldwide

** ALERT™ WORLDWIDE **

ABOUT ALERT | MODELED PERILS | AIR MODELING

*** Last Updated 5:45 pm EDT, August 29, 2014 ***
AIR Currently Has Industry Exposure Databases for More than 90 Modeled Countries
Summary

- ACS and decennial census data are used to identify areas of risk and capture changes over time in the U.S.
- Public data is used in many components of the industry exposure database and becomes an integral part of AIR’s products
- AIR is dedicated to helping our clients (more than 400 insurance, reinsurance, financial, corporate, and government entities) mitigate the impact of catastrophes and develop risk management strategies that promote financial stability, maximize growth, and improve overall results