AIR Currents Special Edition

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Getting a Handle on Wildfire Risk—Beyond the Models

Each summer, the threat of wildfire flares up across much of the western United States. AIR currently models wildfire in California, but other states, such as Colorado, also have significant risk. Between 2011 and 2013, Colorado saw its record for most destructive wildfire broken three times. The Black Forest Fire, the last of the three, destroyed 486 homes and damaged dozens more, killed two people, and caused over USD 85 million in damage in and around the city of Colorado Springs, according to the El Paso County Assessor's Office. Using the Geospatial Analytics Module in Touchstone®, companies can quantify their risk for a wide range of modeled and non-modeled perils, including wildfire risk in non-modeled states.

Let's look at a use case. Suppose a company wishes to determine their present-day exposure to a historical wildfire—in this case, the Black Forest Fire of June 2013. The user can first import a freely available U.S. Geological Survey (USGS) burn perimeter shapefile of the historical event into the Geospatial Analytics Module (Figure 1). The user can then calculate how much of their exposure falls within the burn perimeter itself, as well as within custom-specified distance bands ringing the perimeter (to calculate potential losses had the fire grown larger, for example). Because Touchstone's geospatial capabilities are fully integrated with its financial module, policy terms can be applied to accumulate exposed limits, not just replacement values. This same process can also be used in real time for an ongoing fire. Perimeters are again freely available from the USGS's Geospatial Multi-Agency Coordination (GeoMAC) website.

The Geospatial Analytics Module can also be used to quantify wildfire hazard, independent of an actual event. Areas in or near vegetation, for example, can be considered to be at greater risk for wildfire than sparsely vegetated areas. The user can import a third-party hazard layer—a shapefile containing Wildland Urban Interface (WUI) data on vegetation in Colorado—into Touchstone (Figure 2). The SILVIS Lab at the University of Wisconsin makes this data freely available for all 50 states. The user can then determine how much of their portfolio is in high risk and low risk zones. This enables the company to set better underwriting guidelines and avoid overexposure in high hazard areas.

Wildfires pose considerable risk to companies with exposures in both modeled and non-modeled states. The Geospatial Analytics Module can help companies quantify the risk from these and other deadly and unpredictable catastrophes—before, during, or after an

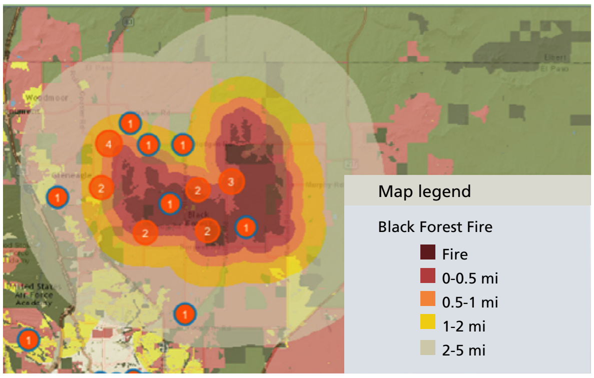


Figure 1. The burn perimeter of the Black Forest Fire imported into Touchstone, shown with hypothetical company exposures. (Source: AIR)

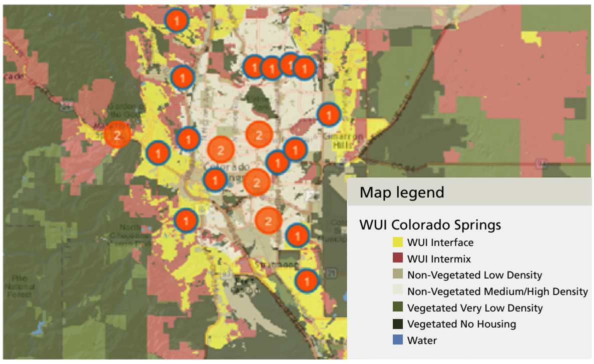


Figure 2. Vegetation data for the city of Colorado Springs, shown with hypothetical company exposures

PCI Annual Meeting

Contents

AIR WORLDWIDE®

The Future of Technology in Catastrophe Modeling

Risk managers are calling for ever more sophisticated business intelligence and analytics tools, faster and more detailed models, and greater modeling workflow efficiencies. In today's business environment, immediacy is the new norm, and companies want to run analyses faster—and run more of them—than ever before. The need for modeling companies to improve analytical performance is propelling catastrophe modeling into an exciting new era.

Over the past decade, technological advances like high performance computing are making it possible to achieve previously unattainable levels of performance. Large, computationally complex analyses can now be scaled in parallel across hundreds of cores, dramatically reducing model run times. And performance will only continue to accelerate as AIR implements new technologies in the future.

However, the more sophisticated and powerful catastrophe modeling platforms increase the computing resources footprint on the user side. Thus, it is also AIR's responsibility to explore cost-effective solutions for clients to deploy, manage, and support the new generation of modeling environments. The trend across many industries is toward increasing cloud adoption, but it's not a one-size-fits-all solution—at least not yet. The flexibility and agility of the cloud can be attractive, and some of AIR's clients have already embraced cloud solutions and have adapted their workflows. Other companies are hesitant to entrust their data and critical operations to a cloud service provider—and in some countries, data privacy concerns are resulting in more stringent regulations.

Furthermore, it's a misconception that the cloud in itself delivers significant performance improvements in catastrophe modeling. Rather, performance is the result of the platform architecture and the efficiency of underlying core algorithms. There are portable and affordable new generation technologies that can enable high performance modeling regardless of where they are deployed. One such technology is the analytical clustered database, often referred to as a massively parallel processing (MPP) database. MPP and other cutting-edge technologies will propel Touchstone's next quantum leap forward—increasing the price-performance ratio by at least a factor of 10.

There has also been growing interest in a hybrid cloud solution from companies that want on-demand elasticity without purchasing additional hardware or potentially compromising their data security. They do not have to move their entire modeling platform into the cloud, and certain types of data, including mission-critical or highly confidential data, can always remain on premises. Additional compute capacity can be tapped through cloud bursting as needed, which allows a company to keep its modeling system and personally identifiable information within its data centers, while offloading some or all of the computational processing to the cloud. This is especially useful during periods of high activity, such as during reinsurance renewals or for special projects.

Today's insurance executives are faced with important strategic and operational decisions, and the ability to weigh the costs and benefits of emerging technologies—and to dig beyond the hype—is a required skill. Ultimately, to best serve client needs, AIR offers a choice in deployment strategy, whether it's a public or private cloud, an on-premises installation, a hybrid cloud solution, or as an integrated part of the model user's own internal systems. AIR is fully committed to explaining the choices and helping companies establish an environment that works best for them.

Managing U.S. Inland Flood Risk—Challenges and Opportunities

Managing flood risk in the U.S. has always been a challenge. While probabilistic models have been available for U.S. earthquakes and hurricanes for more than 25 years, effective tools to help the insurance industry understand, price, and transfer flood risk have been absent. Yet the risk is ubiquitous and perennial; only a few inches of water in basements and ground floors can cause damage to contents and nonstructural components. Replacement of drywall, insulation, and flooring, as well as treatment for mold and bacterial growth, can add up to high losses.

The flood peril itself is a complex phenomenon that results from the interaction of many factors. The precipitation might be very intense and highly localized, or it can occur in the form of extreme snowfall over a long winter and subsequent rapid snowmelt. If the ground is already saturated, even a small amount of precipitation can lead to flooding.

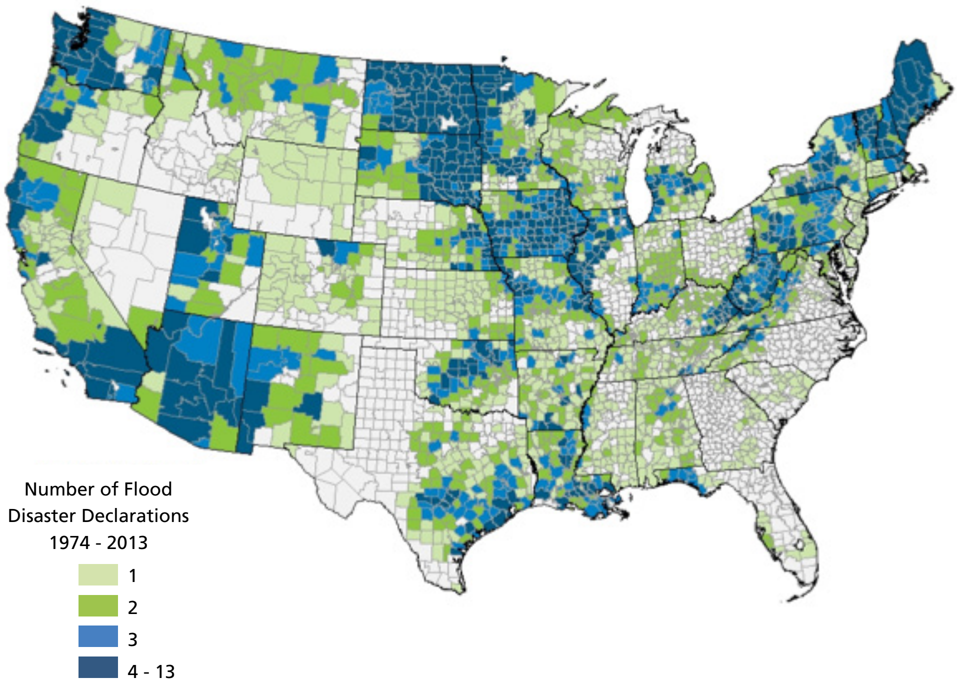
While many of the largest flood occurrence losses are the result of hurricanes, the aggregation of inland flood losses can be significant, with potentially hundreds of smaller events adding up to very large losses.

Flood modeling requires enormous amounts of data at very high resolution. Recently available data sets, combined with more advanced technology and near exponential increases in compute power (power that has enabled a 10,000-year continuous simulation of the global atmosphere), have allowed AIR to take on the challenge of modeling inland flood risk in the U.S.

The new model offers a granular view of both on- and off-floodplain risk using detailed terrain data and technological improvements in large-scale weather simulation. It combines historical data with a robust atmospheric model, taking into account the effects of multiple weather systems, snowmelt, the presence of lakes and reservoirs, soil types, flood defenses, regional differences in building vulnerability, and other factors that contribute to flood losses.

Unlike commonly used flood maps that can only identify a property as being on or off the floodplain, a probabilistic approach allows for a much more granular level of risk differentiation in terms of both hazard and vulnerability. Beyond basic building attributes, model users can enter information like foundation type, custom flood protection, base flood elevation, first floor height, floor of interest, and contents vulnerability to obtain the most robust view of potential losses.

The new model from AIR offers a significantly improved approach to underwriting this complex risk and for uncovering new opportunities in the evolving flood insurance market, including the possibility of indemnity-triggered ILS transactions for at-risk portfolios.



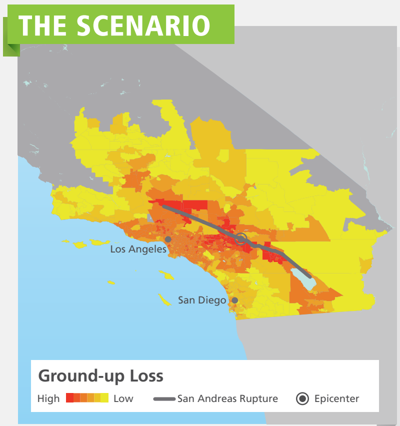
WHO Will Pay for the Next Great California Earthquake?

20 years ago the M6.7 Northridge earthquake struck Southern California, damaging 40,000 buildings and causing insured losses of $12.5 billion (In 1994 dollars).

No U.S. earthquake since has come close to this level of damage, but the USGS in 2007 estimated a **94%** probability that an **M7.0** or greater earthquake will strike California before 2037.

What will happen when the **Big One** strikes?

THE SCENARIO



An M7.9 earthquake, similar to the 2008 ShakeOut scenario, ruptures a staggering **22 segments** of the San Andreas Fault.

Properties across 13 counties of Southern California suffer damage. Total replacement value affected is more than **$4 trillion**, about 40% of which is in **Los Angeles County**.

THE LOSSES

Commercial Loss in Billions

Insured	Uninsured
19	78

Residential Loss in Billions

Insured	Uninsured
12	94

Total Loss in Billions

Insured	Uninsured
30	172

$202 Billion in total damage, 85% uninsured

WHO PAYS?

Insurance Industry
Insurance payouts (including from the California Earthquake Authority) would cover just $30 billion, or about 15% of the total loss. The loss has an approximate annual exceedance probability of 0.5% (or a 200-year return period), a level most companies should be prepared for.

Home and Business Owners
Homeowners, landlords, and businesses are responsible for the uninsured portion. Cost of repairs decreases savings, increases debt, and affects profit margins for businesses. Some businesses may file for bankruptcy, and homeowners may walk away from their mortgages. Thus, a large portion of the uninsured loss may shift to other stakeholders.

Lending Institutions
Large disasters can reduce overall real estate and economic activity in an area for many decades. Homeowners may negotiate for lower payments or moratoriums, and mortgage defaults will force lending institutions to sell foreclosed properties at a loss. In this scenario, a $1 billion loss to the mortgage industry represents only 1.5% of the uninsured residential loss.

Taxpayers
After a major disaster strikes, federal agencies like FEMA and state entities provide short-term emergency relief funding and longer-term aid. In January 2013, a $50 billion federal aid bill was passed by Congress for post-Hurricane Sandy relief, a portion of which goes toward loans and grants to help repair homes and businesses.

MIND THE GAP

The shortfall in earthquake insurance coverage in California means that the next large event will have far-reaching consequences across private and public sectors.

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