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November 2014

***NATURE'S FURY: THE SCIENCE OF NATURAL DISASTERS***  
**ON VIEW AT THE AMERICAN MUSEUM OF NATURAL HISTORY**  
**FROM NOVEMBER 15, 2014, TO AUGUST 9, 2015**

**EXPLORING THE CAUSES AND CONSEQUENCES OF DESTRUCTIVE NATURAL PHENOMENA**

From earthquakes and volcanoes to tornadoes and hurricanes, nature's forces shape our dynamic planet and often endanger people around the world. Opening at the American Museum of Natural History on November 15, *Nature's Fury: The Science of Natural Disasters* will uncover the causes of these natural disasters, explore the consequences, and consider the risks they pose.

Starting with a powerful panoramic video installation that contrasts nature's immense power with our own human scale, *Nature's Fury* will tell the stories of how individuals and communities cope and adapt in the aftermath of these events – and how scientists are helping to reduce the risks, to plan responses, and to prepare for future events. Interactive stations will help visitors discover the processes behind each of these natural phenomena with touchable specimens, videos and animations, models, and simulations. Visitors also will generate a virtual volcano, stand in the eye of a roaring tornado, and experience the sounds of earthquakes – even create an “earthquake” by jumping next to a seismometer.

“Natural disasters are powerful reminders that we live on a dynamic Earth shaped by complex meteorological and geological forces,” said Ellen V. Futter, President of the American Museum of Natural History. “While these events often instill fear, understanding the science behind them helps us better predict, prepare for, and cope with them. This exhibition is part of the Museum’s longstanding effort to explore the interactions between humans and the natural world. And as our climate warms and our environment changes, understanding the impact of these phenomena is more important than ever.”

“Although we live with natural disasters, major ones occur so infrequently in any one place that it is difficult for most of us to understand the real risks they pose – for us individually,

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and for society,” said Edmond Mathez, curator of *Nature’s Fury* and curator in the Museum’s Department of Earth and Planetary Sciences. “In this exhibition, I hope our visitors gain a sense of those risks, as well as an understanding of the phenomena and how we study them.”

The exhibition is made possible through the sponsorship of [Travelers](#). “We are pleased to support the American Museum of Natural History in its presentation of *Nature’s Fury*, as it highlights the potential impact of natural disasters to people, homes, businesses, and our communities,” said Andy Bessette, executive vice president and chief administrative officer at Travelers.

## EARTHQUAKES

*Nature’s Fury* offers an overview of plate tectonics – the theory of the movement of the 100-kilometer-thick plates that make up the rigid outer skin of Earth – to reveal the causes of volcanoes, earthquakes, and tsunamis. Faults occur where these plates grind against each other. As the plates move – typically at the rate at which a finger nail grows – the rocks on either side of the fault bend to accommodate that movement, building up stress that eventually exceeds the rock strength and forces the fault to rupture, the rocks to snap back to their original shapes, and the stored energy to be released as a shock wave – the earthquake. Examples of destructive quakes presented in the exhibition include the great San Francisco earthquake of 1906 and the three 1811-1812 quakes that struck New Madrid, in southern Missouri. Although quakes cannot be predicted, geologists are able to estimate the probability of one happening in an area based on how often they have struck there in the past. Using the Global Positioning System (GPS) and thousands of seismometers around the world, scientists study minute details of Earth’s day-to-day movement, sometimes to the millimeter.

Very large earthquakes sometimes cause devastating tsunamis, two of which are highlighted in the exhibition. An unexpected 9.3-magnitude earthquake in the Indian Ocean in 2004 caused a catastrophic tsunami, and the exhibition focuses on the challenges communities face as they try to balance the need to be prepared for an event that may not be repeated for generations with more immediate needs given limited resources. *Nature’s Fury* will also feature a tsunami that struck Samoa in 2009 and will include artifacts from the Museum’s collection that relate to the Samoan *àva* ceremony, a traditional gathering that reinforces the strong community bonds that are essential to tsunami recovery.

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## VOLCANOES

More than 75 percent of the world's volcanoes are found in a 25,000-mile horseshoe-shaped arc around the Pacific Ocean known as the Ring of Fire. Massive volcanic eruptions are powerful enough to temporarily alter Earth's climate for several years, as the exhibition's case study of the 1883 eruption of Krakatau in Indonesia demonstrates. The explosive eruption sent a column of gas and ash an estimated 30 miles into the sky, and as gases high in the atmosphere reacted with water vapor to form tiny particles that blocked sunlight, global temperatures dropped for several years.

The exhibition will also examine the processes behind volcanic eruptions through several other historic events, including the 1980 Mount St. Helens eruption in Washington, which released 520 million tons of ash; the eruption in A.D. 79 of Mount Vesuvius in Italy, which destroyed Pompeii; and the Mount Pelée eruption of 1902 on the Caribbean island of Martinique, which destroyed the port city of St. Pierre, then known as the Paris of the Caribbean. As part of the story of the 1902 eruption, the exhibition will feature rarely-displayed artifacts and geological specimens collected by Edmund Hovey, a Museum curator who was one of the first geologists to arrive on the island to document the catastrophe's aftermath.

Volcanoes don't just represent hazards, however; they may be the reason life thrives on Earth. Underneath Yellowstone National Park lies a powerful supervolcano. When it last erupted 640,000 years ago, it probably obliterated all life for hundreds of miles. But now the heat from this volcano powers Yellowstone's scalding hot springs, which are home to colonies of tiny bacteria that may not be too different from the early life forms on the planet. And over the centuries, humans have learned to harness the power of volcanoes. Volcanic soil is some of the most fertile in the world for agriculture; for example, wine is made at the thriving vineyards on the slopes of Mount Vesuvius. Volcanic heat can also be harnessed and transformed into geothermal energy.

## TORNADOES

About 75 percent of all tornadoes – violent winds accompanied by a funnel-shaped cloud – take place in an area covering eight states in the central United States, known collectively as "Tornado Alley." In this region, warm, humid air from the Gulf of Mexico collides with cool, dry air from the north to trigger thunderstorms, creating conditions that spawn 600 tornadoes in an average year. It's no coincidence that much of today's tornado research takes place here as

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well. Probes are used by scientists and storm chasers to document wind speeds and to record air pressure drops, humidity, temperature, and wind direction inside a tornado – data that can be used to help engineers design structures and help meteorologists make forecasts and issue warnings.

The exhibition highlights a 2007 tornado that struck and demolished the town of Greensburg, Kansas, and earned the highest rating on the so-called Fujita scale used to classify the strength of a tornado. The Greensburg tornado, which had estimated wind speed greater than 200 miles an hour, toppled brick buildings and swept away house foundations, leaving the town with a major rebuilding effort – and opportunities to consider environmentally sound materials and sustainable energy resources.

## **HURRICANES**

Hurricanes, also known as cyclones or typhoons depending on the region of the world, are rotating storms with winds of at least 74 miles per hour that typically form in the tropics. The exhibition focuses on a nameless hurricane that hit the island of Galveston, Texas, in 1900, killing 8,000 people and causing the deadliest natural disaster in United States history. Isaac Cline, head meteorologist at the U.S. Weather Bureau's Galveston office, received no local storm warning but raised the alarm the day before the hurricane landed based on his own observations of swelling seas. Cline, who lost his pregnant wife and two sons in the disaster, committed himself to studying hurricanes and was at the forefront of a century of advances in hurricane research. Since the 1960s, satellite photos of cloud movement have helped meteorologists track developing storms and have made it possible to issue early warnings to areas in hurricane paths.

Even advance warnings may not offer a clear view of what to anticipate from a storm, as New Yorkers who experienced Hurricane Sandy in 2012 will recall. An interactive map of New York City – highlighting its 520 miles of coastline, which is longer than the coastlines of Miami, Boston, Los Angeles, and San Francisco combined – will allow visitors to explore why some parts of the city were particularly vulnerable to Hurricane Sandy's storm surge and how New York can mitigate the effects of future events.

With each hurricane season comes the same pressing question: Is the warming of the global climate making hurricanes worse? Hurricanes feed on warm seawater, and more heat is now available for hurricanes. But the number and strength of hurricanes depend on a variety of factors, and the relation between hurricane activity and global warming is not thoroughly

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understood. The historical record of hurricane activity may help us understand future hurricane activity. As the exhibition explains, one way of researching historical hurricane patterns is to examine long-living trees' growth rings. Rain from hurricanes is chemically different from normal rain, and because trees absorb moisture from their environment, this chemical difference shows up in their woody tissue and may offer some answers. Climate models are also important in predicting future hurricane activity. The latest models now suggest that both the number and strength of hurricanes will increase if climate continues to warm. Rising sea level – which exacerbates hurricane-driven storm surge – is also making hurricanes more dangerous.

Visitors can learn about *Nature's Fury: The Science of Natural Disasters*, watch special videos, purchase tickets to the exhibition, and more by visiting the *Nature's Fury* section of the Museum's website at [amnh.org](http://amnh.org).

#### **GOTTESMAN HALL OF PLANET EARTH**

The Museum is home to the David S. and Ruth L. Gottesman Hall of Planet Earth, which showcases 168 spectacular specimens collected on 28 expeditions to areas all over the world, from Antarctica to Central Park. The most important sample was recovered from the deep ocean floor – a hot spring deposit teeming with life that never saw the light of the Sun but lived on the chemical energy of Earth, known as a sulfide chimney or a black smoker. Touchable rock specimens as well as computer interactives, video, and soundscapes convey the power and beauty of our dynamic planet and describe how it works. The chief curator of the Hall is Edmond Mathez, curator of the Department of Earth and Planetary Sciences at the Museum. Co-curators include James Webster and Rosamond Kinzler. *(For more information, please see the accompanying release.)*

#### **DEPARTMENT OF EARTH AND PLANETARY SCIENCES**

Scientists in the American Museum of Natural History's Department of Earth and Planetary Sciences are engaged in a wide variety of projects in the fields of mineralogy, petrology, geochemistry, volcanology, and cosmochemistry. The department's curators, as well as research scientists and students, conduct a wide range of studies, from investigating volatile gases that lead to volcanic eruptions to determining the origin of rubies in Southeast Asia. Members of the department's scientific staff also study the mineral and chemical origins of solar systems, specifically the transformation and aggregation of interstellar dust into the building

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blocks of asteroids, comets, and meteorites; the differentiation of planetary bodies; the subduction of the Earth's tectonic plates; and the formation of numerous minerals, gems, rocks, and mineral deposits. *(For more information, please see the accompanying release.)*

#### EXHIBITION ORGANIZATION

*Nature's Fury: The Science of Natural Disasters* at the American Museum of Natural History is overseen by Curator Edmond Mathez in the Museum's Department of Earth and Planetary Sciences, whose research interests include mantle petrology, the petrological evolution of layered mafic intrusions, and the evolution of early Earth.

*Nature's Fury: The Science of Natural Disasters* was originally created by The Field Museum, Chicago, with additional content developed by the American Museum of Natural History ([amnh.org](http://amnh.org)).

*Nature's Fury* is proudly sponsored by **Travelers**.

#### AMERICAN MUSEUM OF NATURAL HISTORY ([AMNH.ORG](http://AMNH.ORG))

The American Museum of Natural History, founded in 1869, is one of the world's preeminent scientific, educational, and cultural institutions. The Museum encompasses 45 permanent exhibition halls, including the Rose Center for Earth and Space and the Hayden Planetarium, as well as galleries for temporary exhibitions. It is home to the Theodore Roosevelt Memorial, New York State's official memorial to its 33rd governor and the nation's 26th president, and a tribute to Roosevelt's enduring legacy of conservation. The Museum's five active research divisions and three cross-disciplinary centers support approximately 200 scientists, whose work draws on a world-class permanent collection of more than 33 million specimens and artifacts, as well as specialized collections for frozen tissue and genomic and astrophysical data, and one of the largest natural history libraries in the world. Through its Richard Gilder Graduate School, it is the only American museum authorized to grant the Ph.D. degree. In 2012, the Museum began offering a pilot Master of Arts in Teaching program with a specialization in Earth science, which is the only non-university affiliated such program in the United States. Approximately 5 million visitors from around the world came to the Museum last year, and its exhibitions and Space Shows can be seen in venues on five continents. The Museum's website and collection of apps for mobile devices extend its collections, exhibitions, and educational programs to millions more beyond its walls. Visit [amnh.org](http://amnh.org) for more information.

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## Hours

The Museum is open daily, 10 am–5:45 pm. The Museum is closed on Thanksgiving and Christmas.

## Admission

Museum admission is free to all New York City school and camp groups.

Suggested general admission, which supports the Museum’s scientific and educational endeavors and offers access to the Museum’s 45 halls including the Rose Center for Earth and Space, is \$22 (adults) suggested, \$17 (students/seniors) suggested, \$12.50 (children) suggested. All prices are subject to change.

The Museum offers discounted combination ticket prices that include suggested general admission plus special exhibitions, IMAX or 3D films, and Space Shows.

- Museum Plus One includes one special exhibition, IMAX or 3D film, or Space Show: \$27 (adults), \$22 (students/seniors), \$16 (children)
- Museum Supersaver includes all special exhibitions, IMAX or 3D film, and Space Show: \$35 (adults), \$28 (students/seniors), \$22 (children)

Visitors who wish to pay less than the suggested Museum admission and also purchase a ticket to attend a special exhibition, IMAX or 3D film, or Space Show may do so on-site at the Museum. To the amount they wish to pay for general admission, they add \$25 (adults), \$20.50 (students/seniors), or \$13.50 (children) for a Space Show, special exhibition, or IMAX or 3D film.

## Public Information

For additional information, the public may call 212-769-5100 or visit the Museum’s website at [amnh.org](http://amnh.org).

## Follow

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