



Image courtesy of USGS.



Image courtesy of NOAA.

12.103

The Science and Policy of Natural Hazards



Image courtesy of USGS.



Image courtesy of NOAA.

Topics

Four categories of hazards will be investigated in this class, as part of the following modules:

Module 1 (9 classes):	Earthquakes (SR)
Module 2 (9 classes):	Tornadoes and severe weather (KAE)
Module 3 (11 classes):	Volcanoes (SR)
Module 4 (8 classes):	Hurricanes (KAE)

We will address the following aspects of each hazard category (when applicable):

1. Phenomenology
2. Physics
3. Forecasting
4. Economics
5. Hazard risk assessment
6. Mitigation
7. Adaptation
8. Public Policy
 - a. Building codes
 - b. Insurance regulation
 - c. Federal insurance
 - d. Evacuation
 - e. Reconstruction

Course Structure

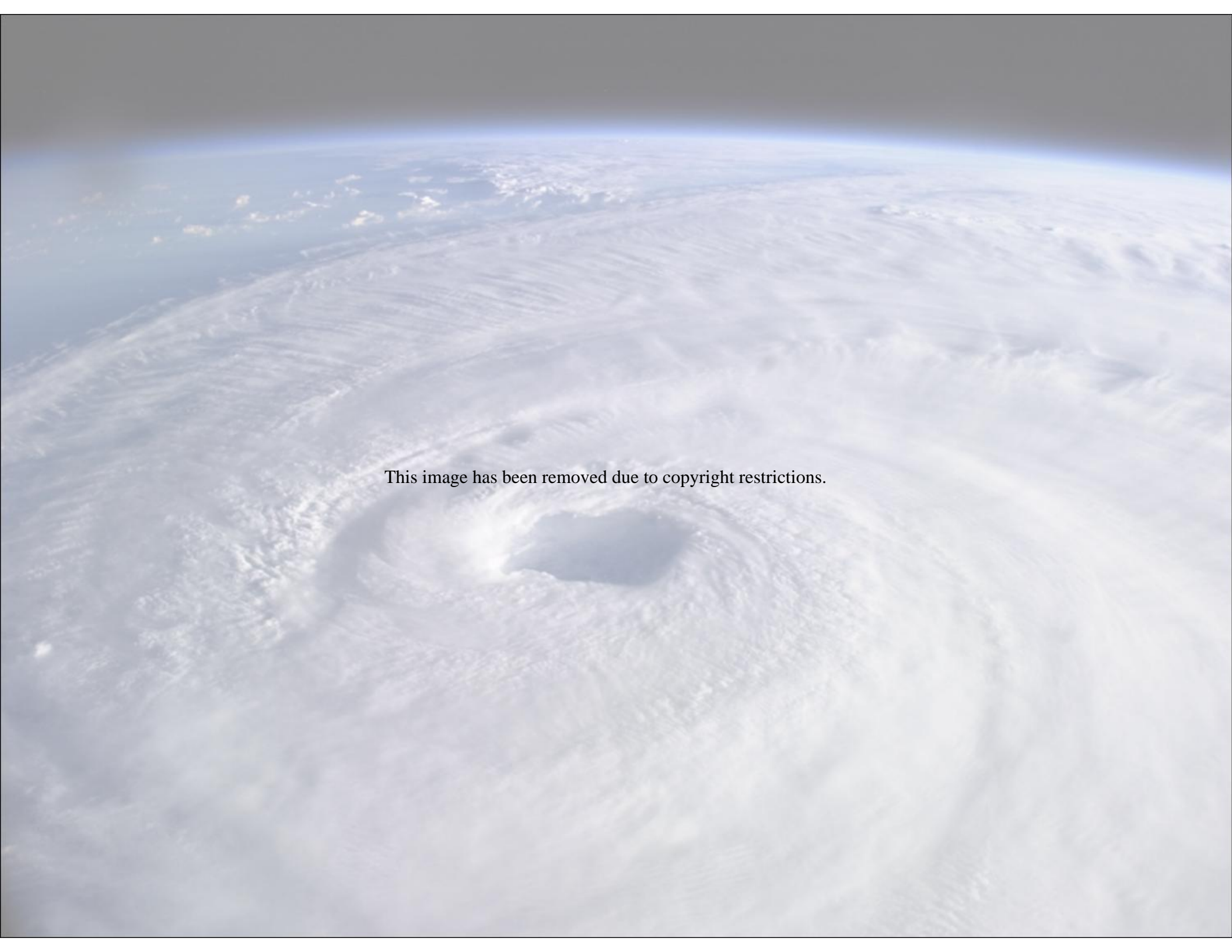
- Each module will have an associated problem set
- Term project will involve a comprehensive risk assessment for a particular location

An aerial satellite view of a tropical cyclone over the ocean. The cyclone's eye is a dark, circular center surrounded by a bright, white ring of clouds. The surrounding clouds spiral outwards in a clockwise direction. The ocean surface is visible as a textured, light blue-grey area. The horizon of the Earth is visible at the top of the image, showing a thin blue line against a dark background.

Overview of Natural Hazards

2008 Disasters

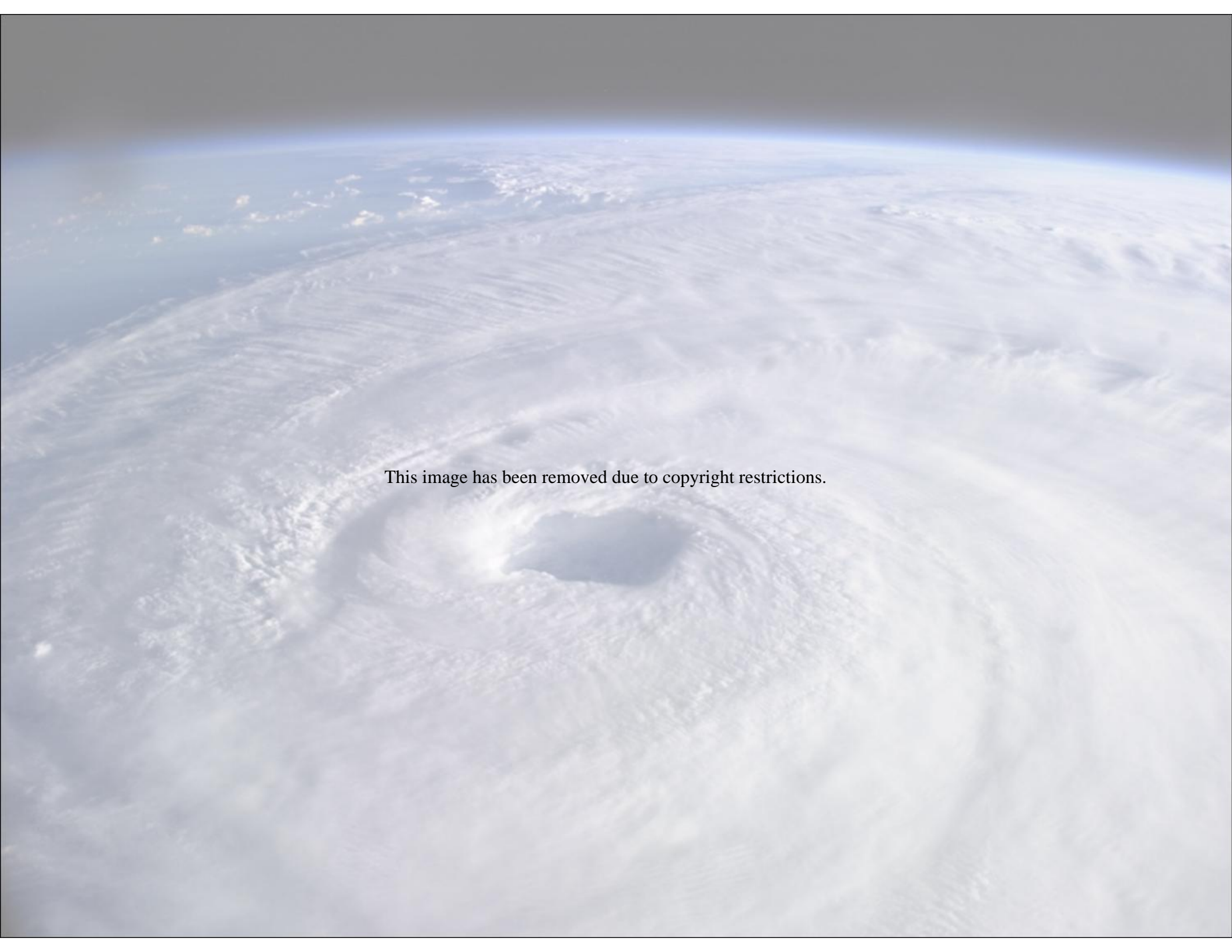
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Trends in Natural Disasters

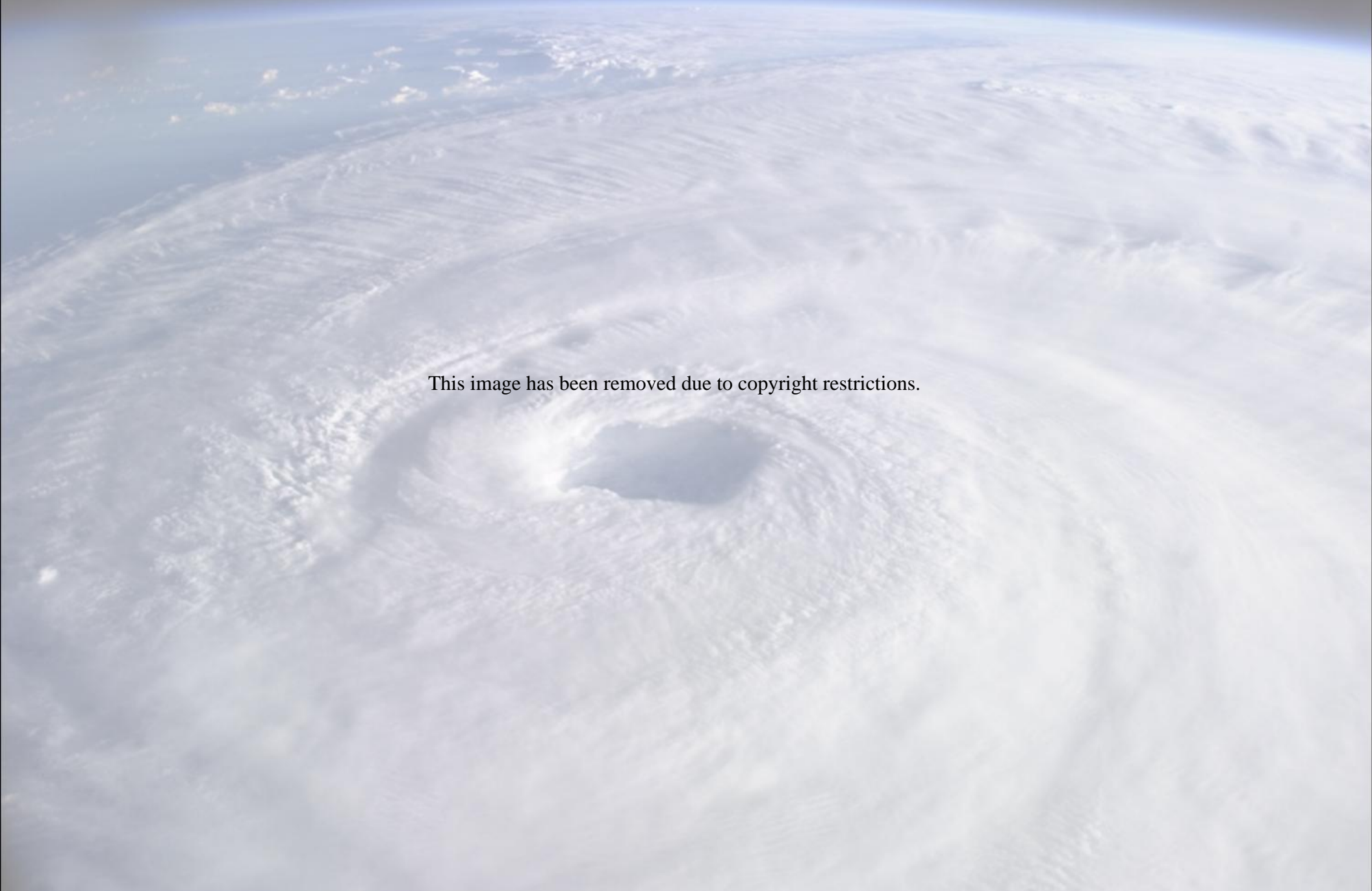
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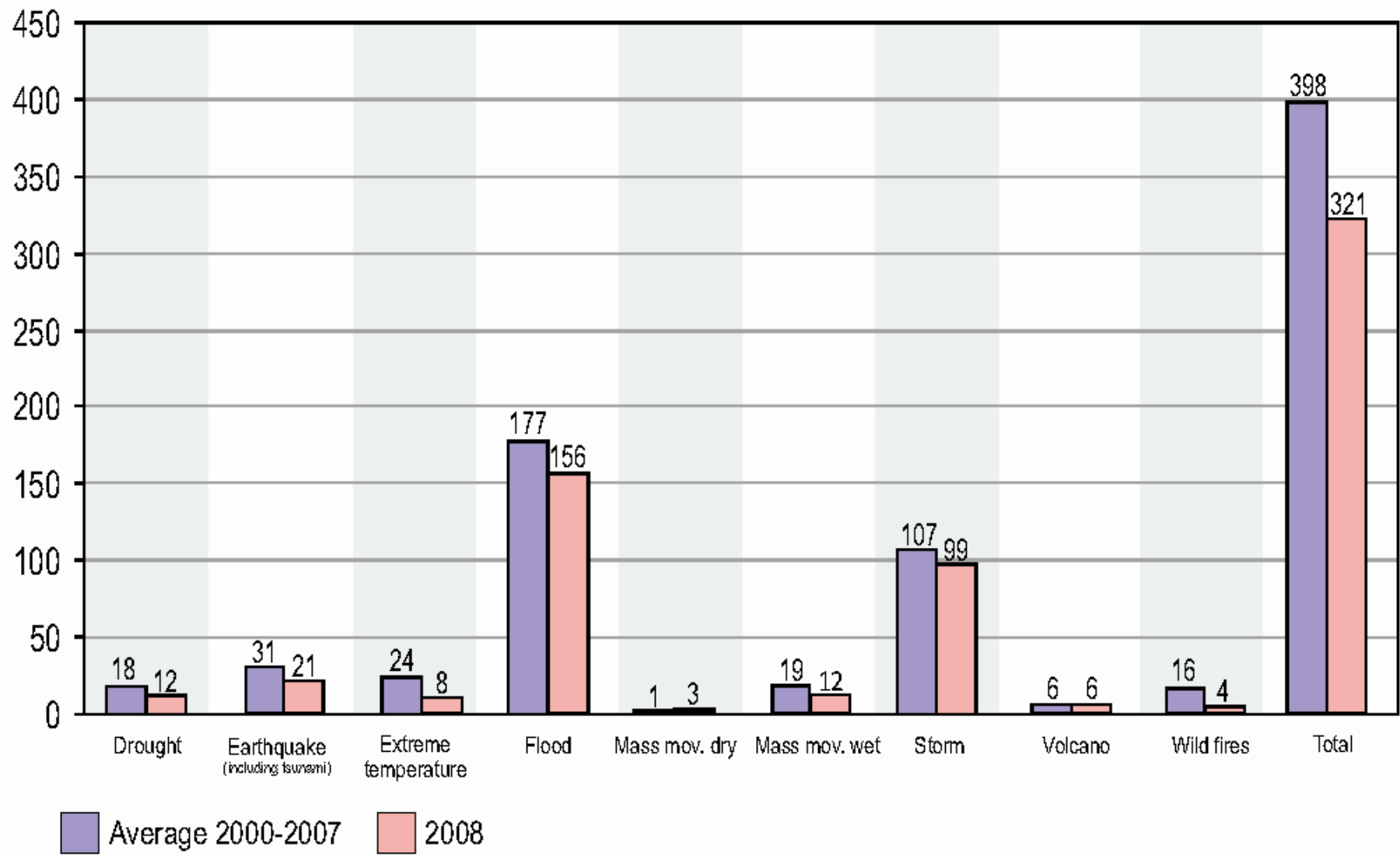
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Types of Disasters

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Natural disaster occurrence by disaster type

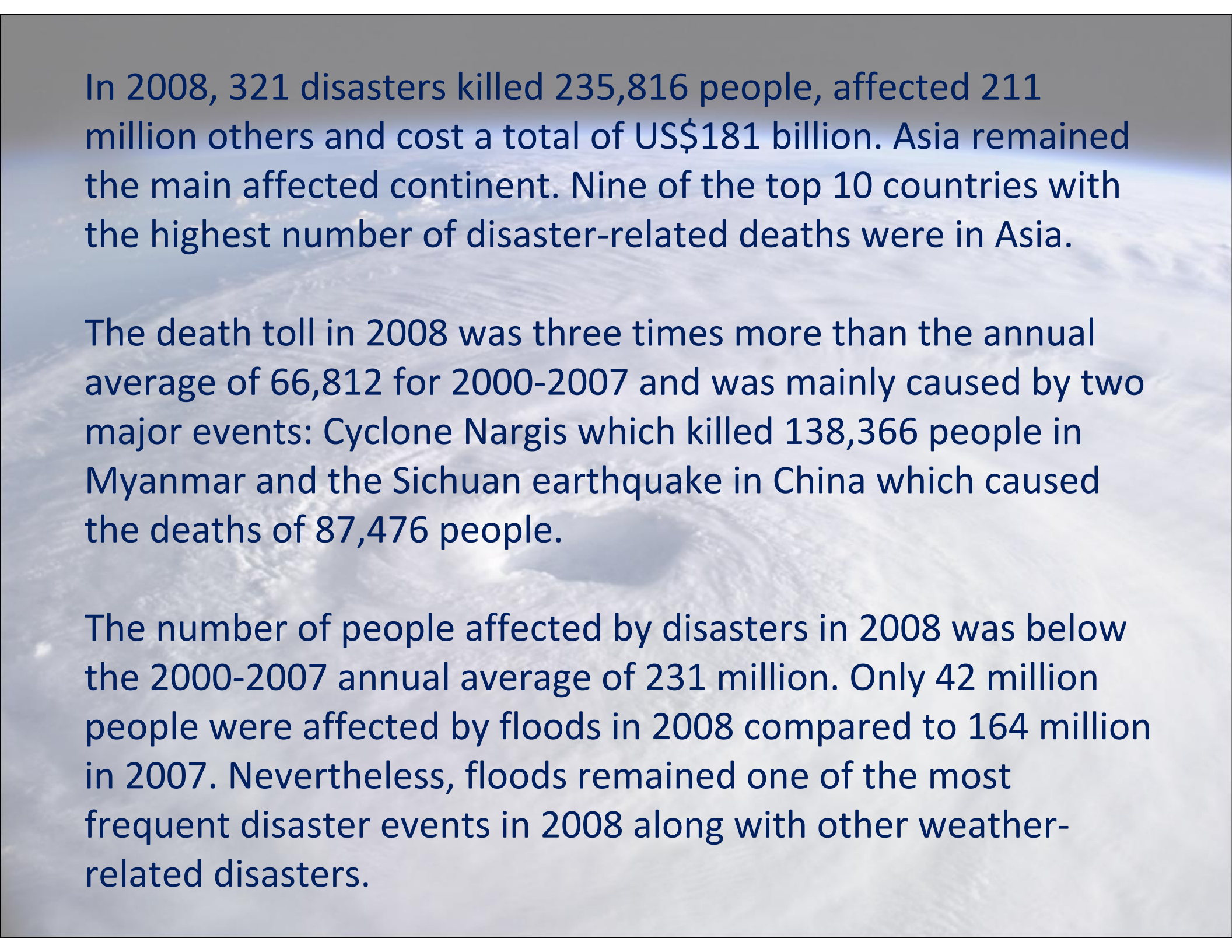




Press Release
22 January 2009

Deaths and economic losses jump in 2008

Geneva – 2008 saw a marked increase in the number of deaths and economic losses compared to the 2000-2007 yearly average. The Center for Research on Epidemiology of Disasters (CRED) released disaster figures for 2008 today in Geneva at a joint press conference with the United Nations International Strategy for Disaster Reduction (UNISDR) Secretariat.

An aerial photograph of a large body of water, possibly a lake or a wide river, with a small, dark island in the center. The water is a light blue-grey color, and the sky is a pale, hazy blue. The overall scene is somewhat desaturated and has a soft, ethereal quality.

In 2008, 321 disasters killed 235,816 people, affected 211 million others and cost a total of US\$181 billion. Asia remained the main affected continent. Nine of the top 10 countries with the highest number of disaster-related deaths were in Asia.

The death toll in 2008 was three times more than the annual average of 66,812 for 2000-2007 and was mainly caused by two major events: Cyclone Nargis which killed 138,366 people in Myanmar and the Sichuan earthquake in China which caused the deaths of 87,476 people.

The number of people affected by disasters in 2008 was below the 2000-2007 annual average of 231 million. Only 42 million people were affected by floods in 2008 compared to 164 million in 2007. Nevertheless, floods remained one of the most frequent disaster events in 2008 along with other weather-related disasters.

Disaster costs in 2008 were twice the US\$81 billion annual average for 2000-2007 and mainly attributed to the Sichuan earthquake in China (US\$85 billion) and hurricane Ike in the U.S. (US\$30 billion).

“The dramatic increase in human and economic losses from disasters in 2008 is alarming. Sadly, these losses could have been substantially reduced if buildings in China, particularly schools and hospitals, had been built to be more earthquake-resilient. An effective early warning system with good community preparedness could have also saved many lives in Myanmar if it had been implemented before Cyclone Nargis,” said Salvano Briceño, Director of UNISDR.

An aerial photograph of a vast, flat, light-colored desert landscape. In the center, there is a prominent, circular, crater-like depression with a dark, shadowed interior. The surrounding terrain is relatively flat with some subtle textures and shadows. The sky is clear and blue, with a thin white line of clouds or haze near the horizon.

U.S. Hazards

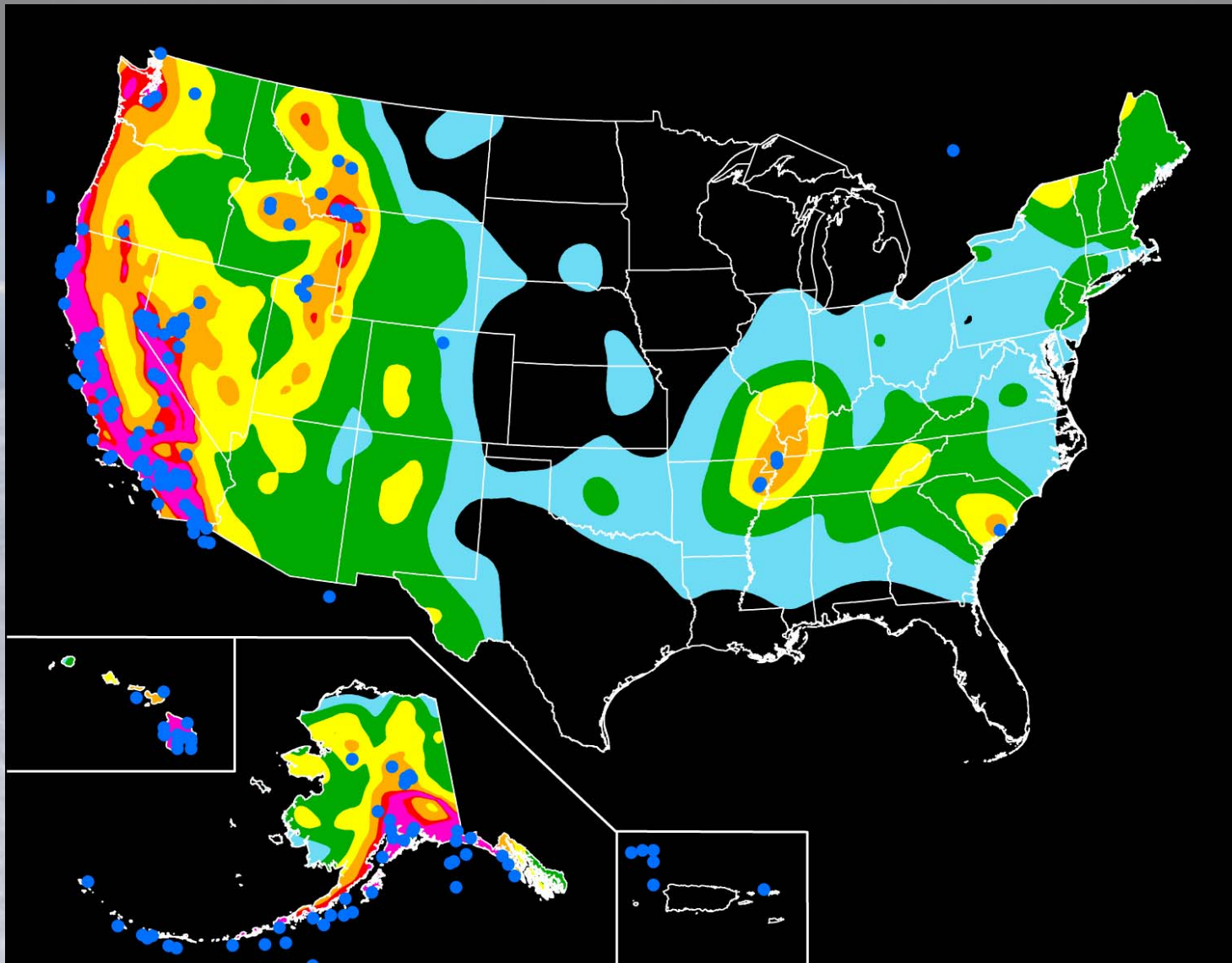
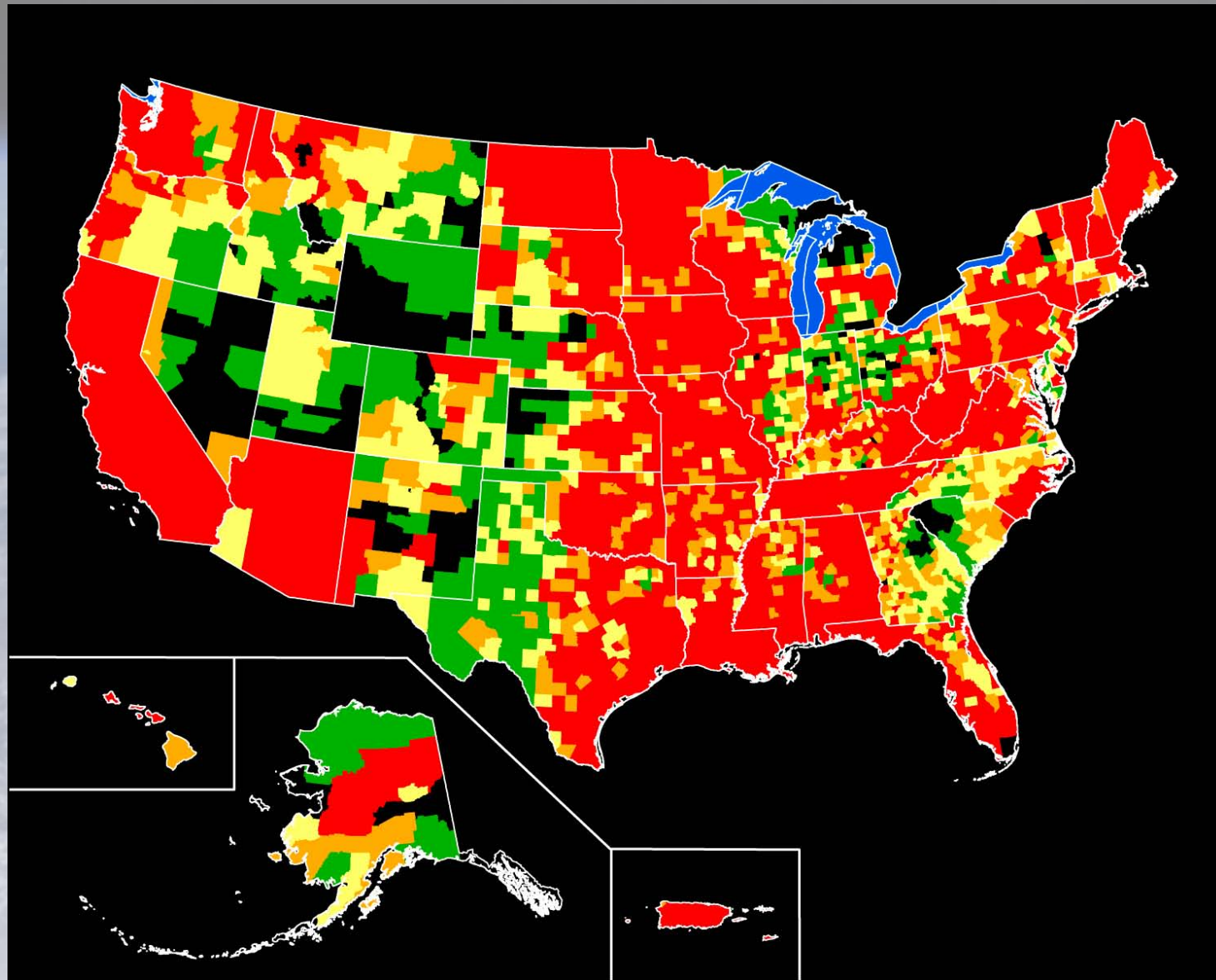
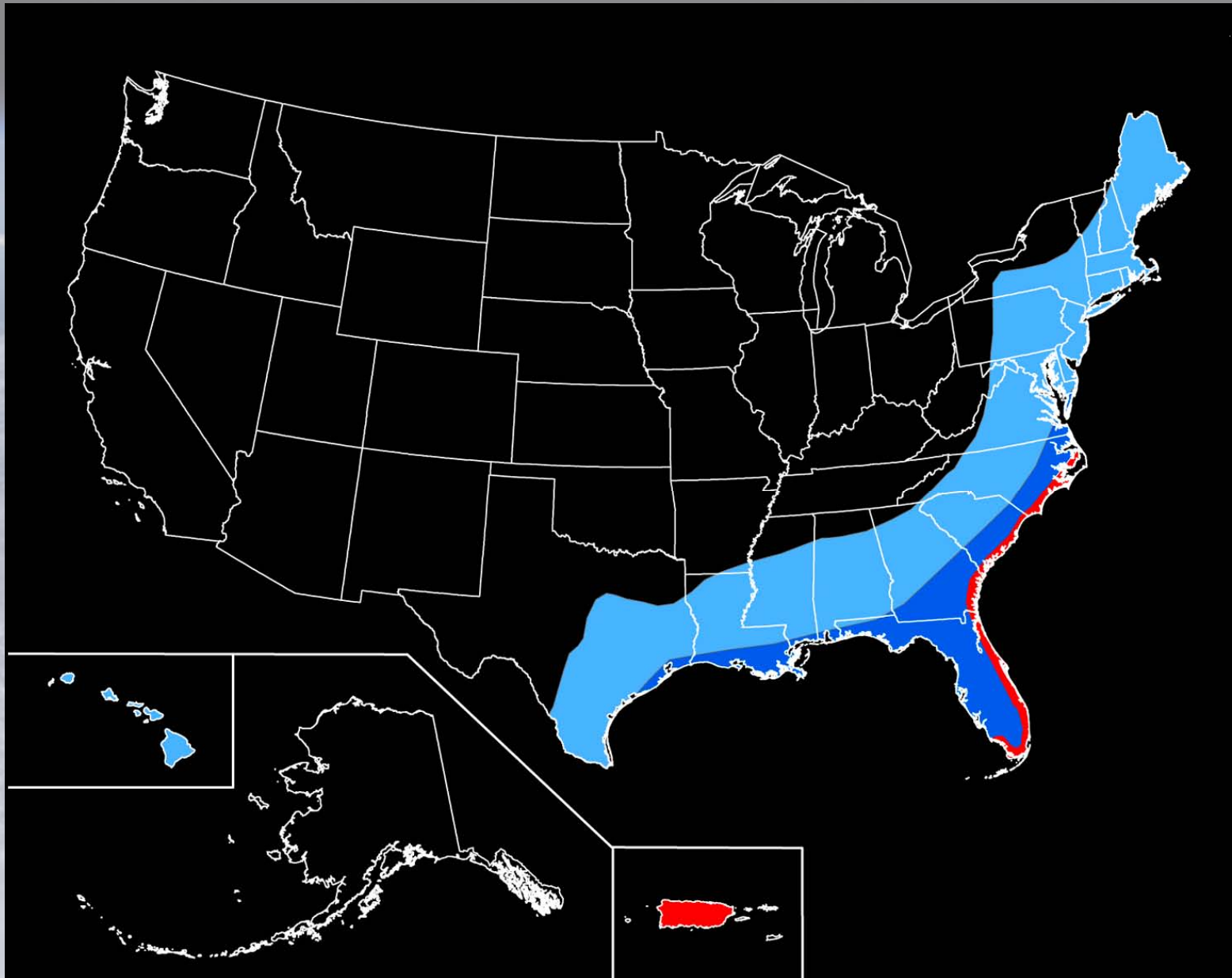


Image courtesy of USGS.

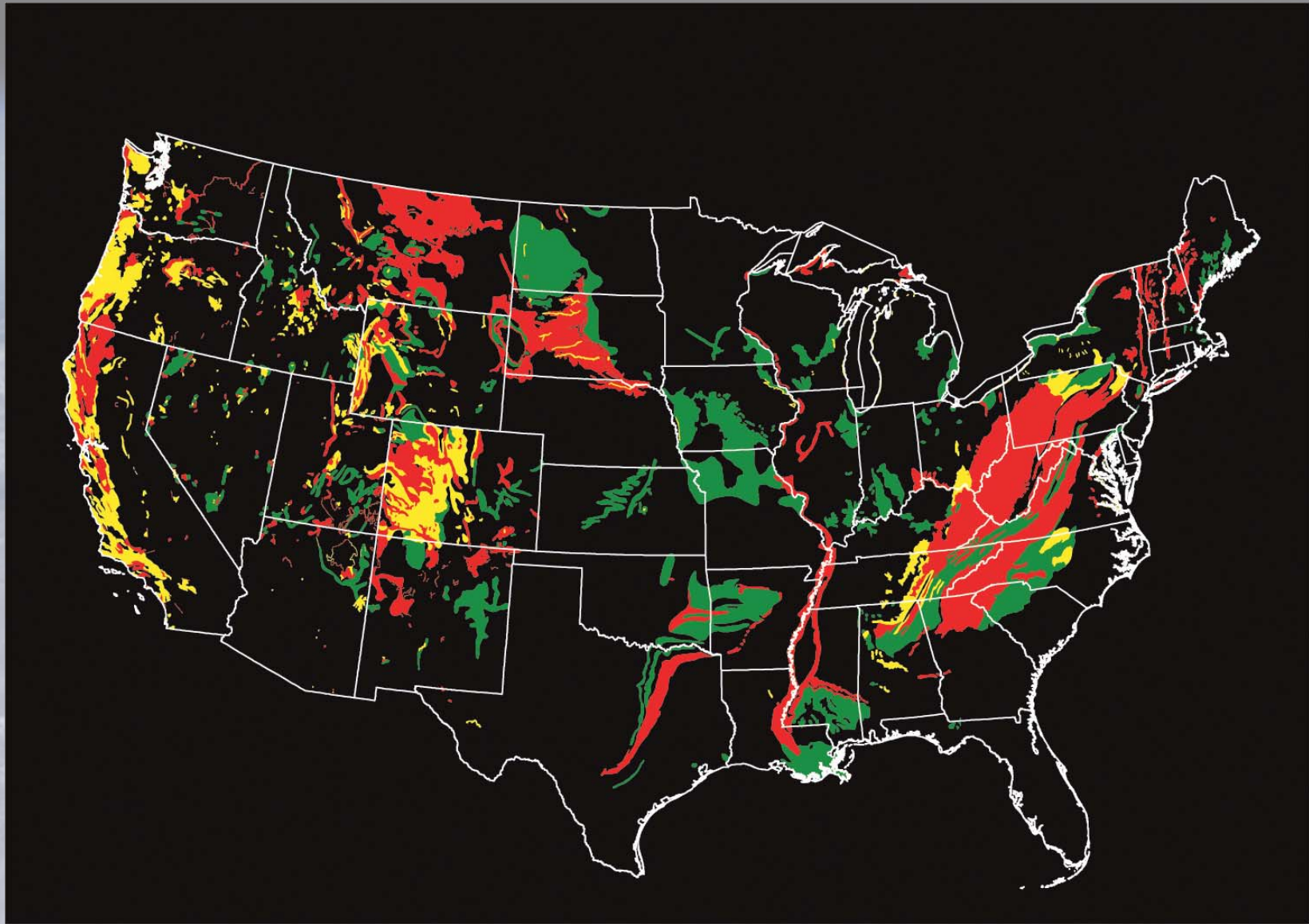
This map shows relative shaking hazards in the United States and Puerto Rico. During a 50-year time period, the probability of strong shaking increases from very low (white), to moderate (blue, green, and yellow), to high (orange, pink, and red). Map not to scale.



Presidential disaster declarations related to flooding in the United States, shown by county: Green areas represent one declaration; yellow areas represent two declarations; orange areas represent three declarations; red areas represent four or more declarations between June 1, 1965, and June 1, 2003. Map not to scale. Sources: FEMA, Michael Baker Jr., Inc., the National Atlas, and the USGS



The number of hurricanes expected to occur during a 100-year period based on historical data—light blue area, 20 to 40; dark blue area, 40 to 60; red area, more than 60. Map not to scale. Source: the National Atlas and the USGS



Landslide potential of the conterminous United States: Red areas have very high potential, yellow areas have high potential, and green areas have moderate potential. Landslides can and do occur in the black areas, but the potential is low. Map not to scale. Sources: the National Atlas and the USGS



This map shows seven earthquake-generated tsunami events in the United States from the years 900 to 1964. The earthquakes that caused these tsunamis are: Prince William Sound, Alaska, 1964, magnitude 9.2; Chile, 1960, magnitude 9.5; Alaska, 1946, magnitude 7.3; Puerto Rico/Mona Rift, 1918, magnitude 7.3 to 7.5; Virgin Islands, 1867, magnitude undetermined; Cascadia, 1700, magnitude 9; and Puget Sound, 900, magnitude 7.5. Map not to scale. Sources: National Geophysical Data Center, NOAA, USGS

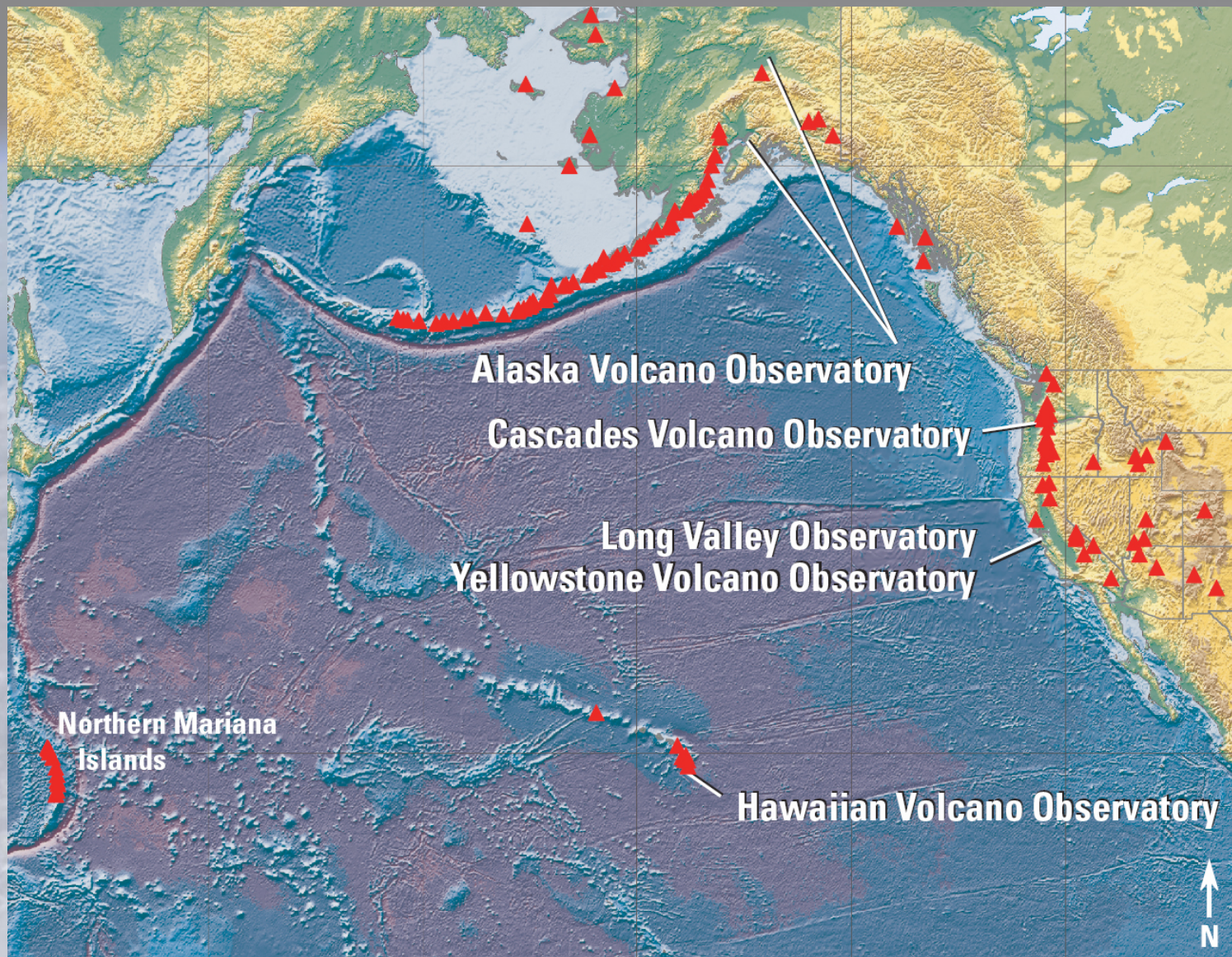
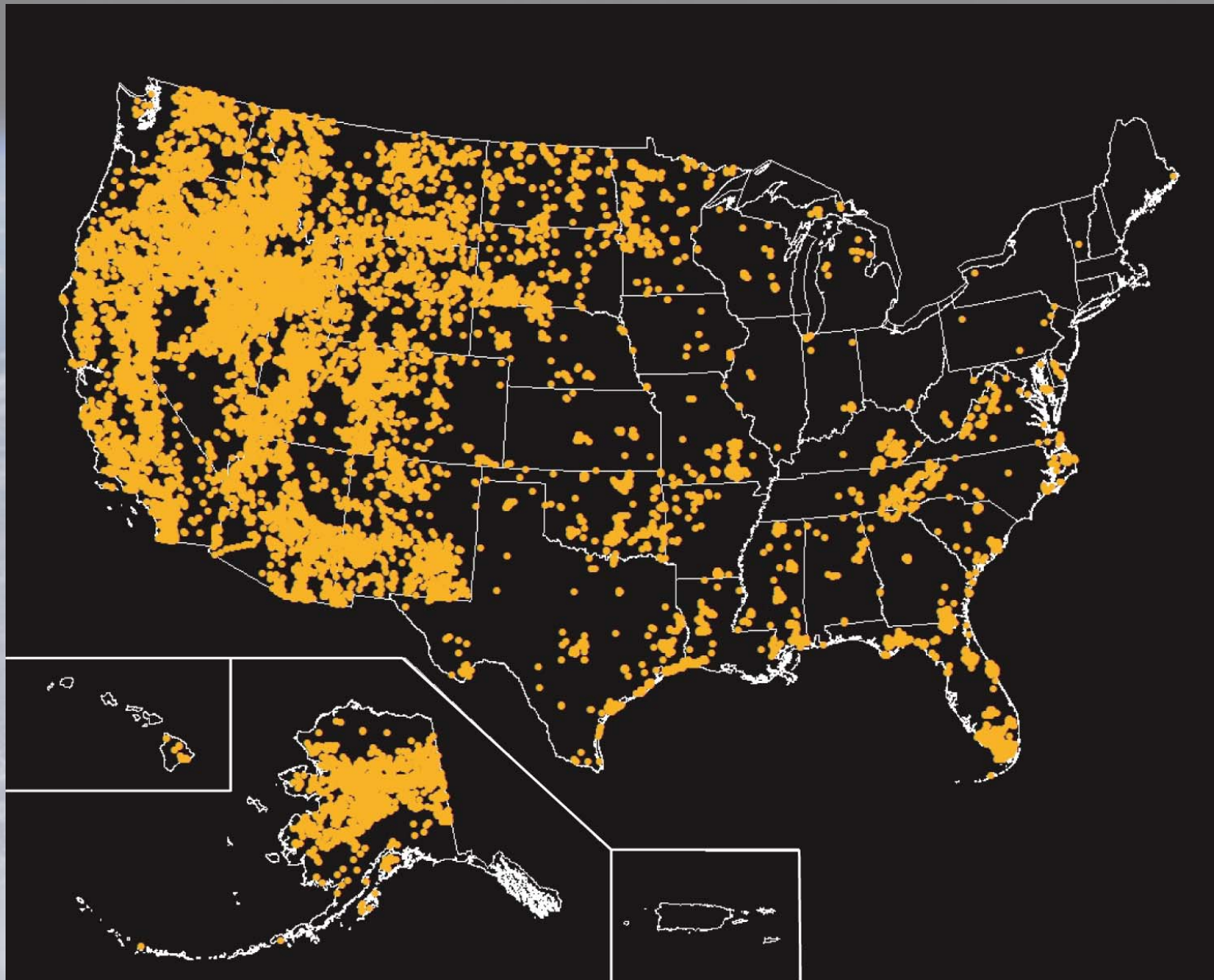


Image courtesy of USGS.

The U.S. Geological Survey (USGS) is responsible for monitoring our Nation's 170 active volcanoes (red triangles) for signs of unrest and for issuing timely warnings of hazardous activity to government officials and the public. This responsibility is carried out by scientists at the five volcano observatories operated by the USGS Volcano Hazards Program and also by State and university cooperators.



This map shows locations that experienced wildfires greater than 250 acres, from 1980 to 2003. Map not to scale. Sources: Bureau of Land Management, U.S. Forest Service, U.S. Fish and Wildlife Service, Bureau of Indian Affairs, National Park Service, and the USGS National Atlas



Weather Fatalities

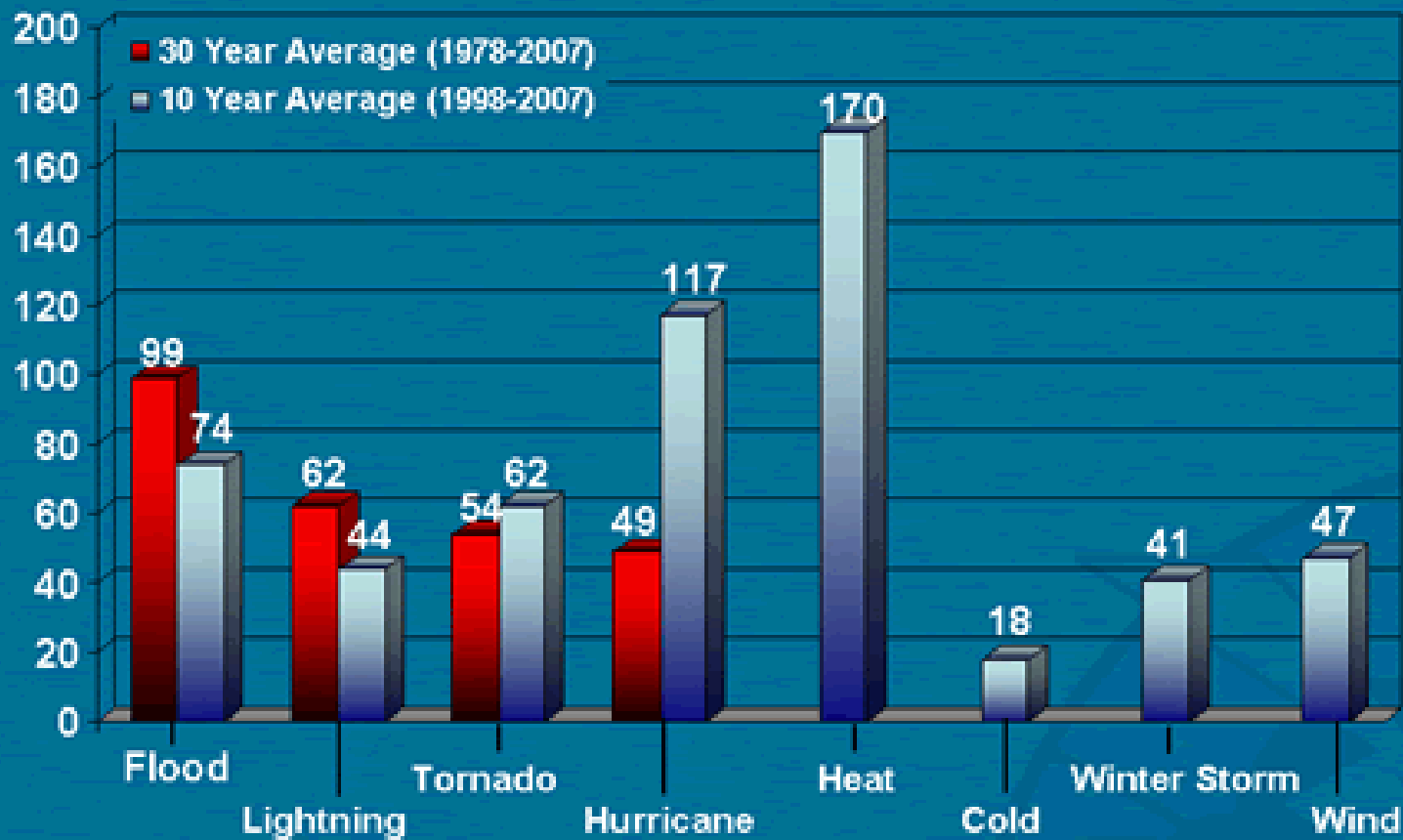


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