



# Natural Hazard Monitoring

Mapping the Dynamic Forces: Real-time Natural Hazard Tracking Across Canada and USA

**Group 11**

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## Introduction

Our planet is in a state of constant motion, with natural phenomena shaping landscapes and impacting communities. In North America, the United States and Canada experience a diverse range of environmental events, from earthquakes rumbling beneath the earth's surface to the destructive force of forest fires and the terrifying power of tornadoes. Understanding and monitoring these events in real-time is crucial for ensuring the safety and resilience of affected regions.



The Worst Natural Disasters in Canadian History | Bonus Black Friday

## Methodology

Esri, USGS | Esri, TomTom, F...

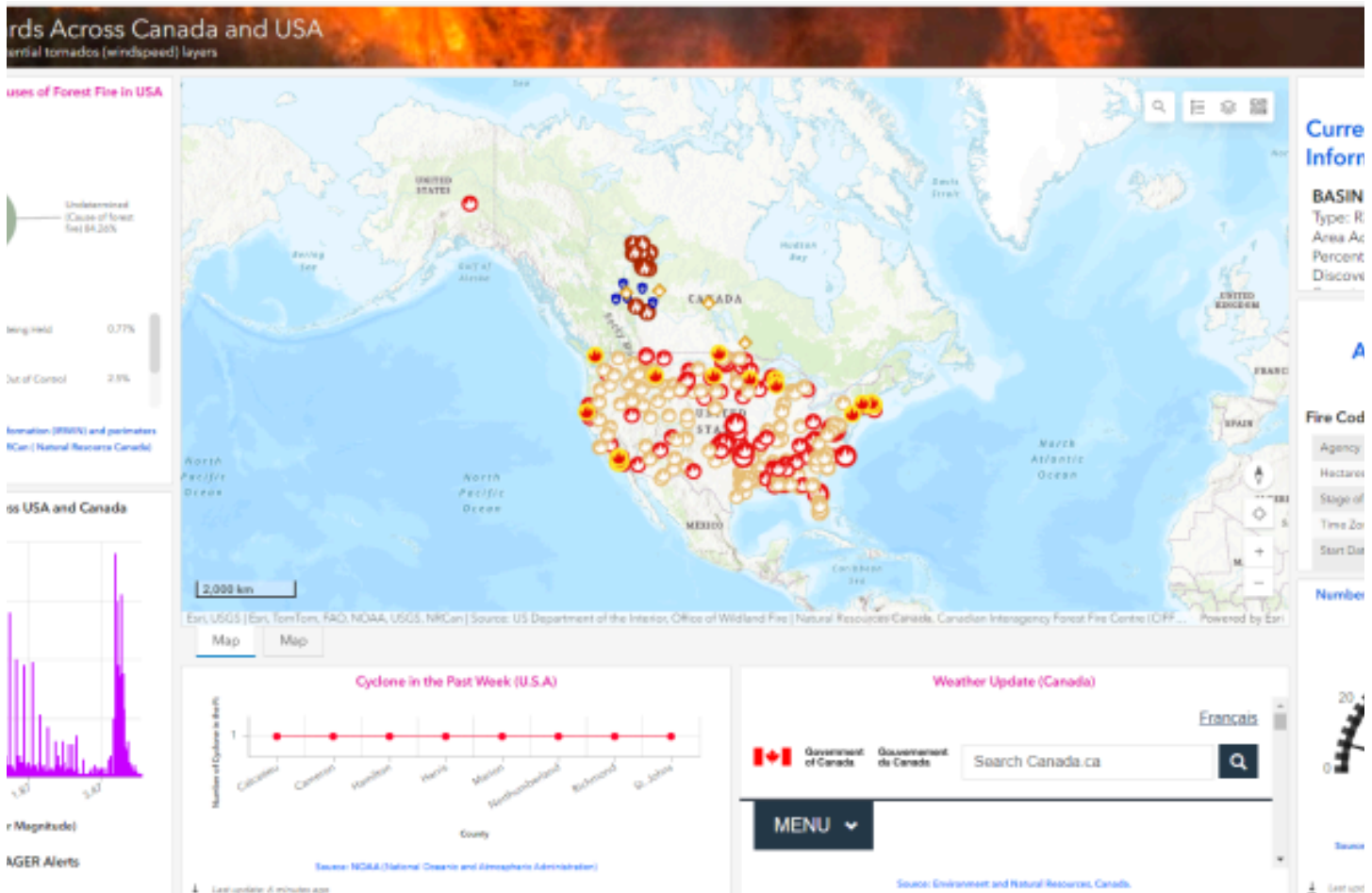
5,000 km

Powered by Esri

Natural Hazard Live Data across USA and Canada

We collect real-time data from authoritative sources such as the United States Geological Survey (USGS), the National Interagency Fire Center (NIFC), and the National Oceanic and Atmospheric Administration (NOAA) for earthquakes, forest fires, and tornadoes respectively. we assembled the live data in

a single platform. we created ArcGIS Dashboard and ArcGIS Story Map to provide a comprehensive and interactive platform for visualizing, analyzing, and disseminating live data on earthquakes, forest fires, and tornadoes in the USA and Canada. These tools offer users a dynamic way to explore real-time event information, understand spatial patterns, and support decision-making for disaster preparedness, response, and mitigation effort.



1. ArcGIS Dashboard: We created our dashboard using the ArcGIS platform, which allowed us to integrate live data on earthquakes, forest fires, and tornadoes from reliable sources such as USGS, NIFC, and NOAA. Through ArcGIS Online and the Dashboard Builder, we designed a user-friendly interface with interactive maps, charts, and widgets to visualize key metrics and trends in real-time. our dashboard continuously updates with the latest information, providing timely insights. The dashboard we've created is incredibly user-friendly,

providing intuitive navigation and interactive features. Users have the ability to zoom in or out on the map interface to examine specific regions in detail. Furthermore, they can access comprehensive information about any hazard simply by clicking on the corresponding data point, which triggers a pop-up window displaying relevant details such as location, magnitude, severity, and timestamp.



2. ArcGIS Story Map: We created an ArcGIS Story map to illustrate the interconnectedness of natural hazards and their impacts, providing a dynamic and informative platform for users to explore real-time data on earthquakes, forest fires, and tornadoes in the United States and Canada. Through interactive maps, engaging narratives, and multimedia content, our Story map aims to enhance awareness, facilitate understanding, and promote proactive measures for disaster preparedness and resilience-building efforts.



# Hazards Status



## Wildfire

There are roughly 8,000 wildfires in Canada each year. Densely forested areas across much of Canada are at risk of wildfires, particularly during dry conditions and drought. On average in Canada, wildfires burn 2.5 million ha/year, nearly half the size of Nova Scotia. Much of the country is at risk of wildfires. Most wildfires occur between April and September.

In USA, in the year 2023, around 18,300 wildfires have impacted over 511,000 acres. Densely forested areas across much of USA are at risk of wildfires, particularly during dry conditions and drought.

Live wildfire data is incredibly valuable for both the public and emergence response groups. Live data helps in early detection

and monitoring of wildfires. This can help to identify areas with high risk and issue timely evacuation orders to ensure public safety.



## Tornado

Tornadoes are unmistakable rotating columns of high-velocity wind that brings devastation to anything in their path. They are difficult to predict. Sometimes they move quickly and can leave a wide swath of destruction. 86 and 1197 tornadoes (including a fire-generated tornado) were recorded during the year 2023 in USA and Canada.

The live data of windspeed is crucial for issuing early warnings, reducing the potential risk. It helps to access the risk to specific areas, allowing authorities to implement targeted emergency response plans.

F-scale	Wind speed (km/h)	Damage
F-0	64 - 116	Light
F-1	117 - 180	Moderate
F-2	181 - 253	Considerable
F-3	254 - 331	Severe
F-4	332 - 418	Devastating
F-5	419 - 512	Massive devastation

Tornado Classification



## Earthquake

The impact of earthquake can be significant, leading to loss of life, property damage, and disruption to essential services.

Live earthquake data is crucial for early warning systems. It helps emergency responders to access the magnitude and

location of an earthquake rapidly.

## **Deadliest Hazards Recorded**





## October, 1852

1825 Miramichi Fire (USA)

Death: 160



## August, 2020

The Great Matheson Fire (Canada)

Death : 223



## June, 1912

Regina tornado (Canada)

Death: 28



## March, 1925

Tri-State Tornado (USA)

Death: 695

## January, 1700

1700 Cascadia Earthquake (Canada)

Approximate magnitude: 8.7 - 9.2

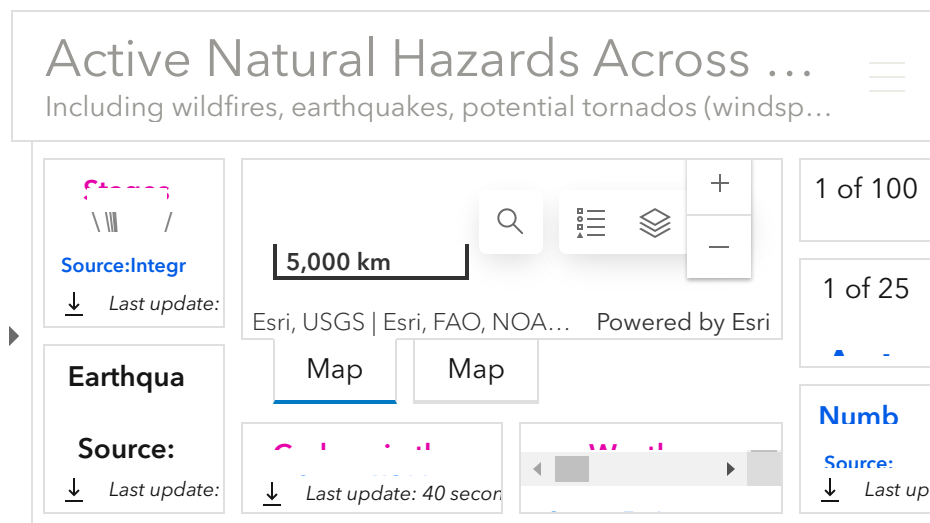


## March, 1964

Anchorage Alaska Earthquake (USA)

Approximate magnitude: 9.2

## Dashboard



Active Natural Hazards Across Canada and USA Dashboard

### Open in ArcGIS Dashboard

Our Dashboard with Live Hazard Visualization will be beneficial in following ways:

1. **Timely Alerts:** Users receive real-time updates on wildfires, earthquakes, and potential tornadoes, enabling them to promptly respond to emerging threats and take necessary precautions.
2. **Enhanced Preparedness:** By having access to live data, individuals, communities, and emergency responders can better prepare for impending hazards, reducing the likelihood of injury, loss of life, and property damage.
3. **Informed Decision-Making:** The dashboard provides comprehensive information, including wind speed for potential tornadoes, empowering users to make informed decisions regarding evacuation routes, shelter locations, and resource allocation.
4. **Resource Allocation:** Emergency management authorities can utilize the data to allocate resources efficiently, directing personnel, equipment, and supplies to areas most at risk and in need of assistance.
5. **Risk Mitigation:** With insights into the location and intensity of natural hazards, proactive measures can be implemented to mitigate risks, such as implementing firebreaks in wildfire-prone areas or reinforcing infrastructure in earthquake zones.

Photos      [https://en.wikipedia.org/wiki/1964\\_Alaska\\_earthquake](https://en.wikipedia.org/wiki/1964_Alaska_earthquake)  
<https://canadaehx.com/2020/06/27/the-regina-cyclone/>  
[https://en.wikipedia.org/wiki/Tri-State\\_tornado\\_outbreak](https://en.wikipedia.org/wiki/Tri-State_tornado_outbreak)

<https://www.queensu.ca/gazette/stories/despite-its-long-history-wildfires-canada-still-doesn-t-know-how-live-them>

<https://www.cbc.ca/news/canada/new-brunswick/nb-author-great-miramichi-fire-remember-1.5751761>

**Video**

<https://www.youtube.com/watch?v=lpSVy42V2tY>

**ArcGIS Dashboard**

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