

<https://studiolab.sagemaker.aws/>

REGISTER ASAP

Important links	2
Github	2
Figma	2
Miro	2
Natural disasters	2
Deaths by natural disasters	3
GDP Impact by disaster type	4
Storm	4
Wildfire	5
Floods	6
Earthquake	7
Ideas	8
ML problems	10
Datasets	11
Categories	13
Mitigation	13
Preparedness	13
Response	13
Recovery	13
Examples	13
Judging criteria	13
Potential Value	13
Quality of the Idea	13
Implementation	14
Misc content	14

Important links

Github

<https://github.com/orgs/Amazon-AWS-Disaster-Relief-Challenge>

Figma

<https://www.figma.com/file/KcDI5KTEfe6hPMmg9jwWZm/Designs>

Miro

[https://miro.com/welcomeonboard/NWlycXh0SHRrU1lpUTRVNVNadVltWFNFOG5TNUk0RUhnTFg0T\[...\]bk40bGdMN3wzMDc0NDU3MzQ2NDU3OTU1MDE1?invite_link_id=247868229819](https://miro.com/welcomeonboard/NWlycXh0SHRrU1lpUTRVNVNadVltWFNFOG5TNUk0RUhnTFg0T[...]bk40bGdMN3wzMDc0NDU3MzQ2NDU3OTU1MDE1?invite_link_id=247868229819)

Natural disasters

<https://ourworldindata.org/natural-disasters>
<https://outforia.com/types-of-natural-disasters/>

1. Volcanic activity
2. Drought
3. Mass movement
4. Landslide
5. Extreme weather
 - a. Tornado
 - b. Hurricane
 - c. Cyclones
 - d. Hailstorm
 - e. Ice storm
 - f. Thunderstorm
6. Extreme temperature
 - a. Extreme cold
 - b. Extreme heat / heat wave
7. Flood
8. Wildfire
9. Earthquake

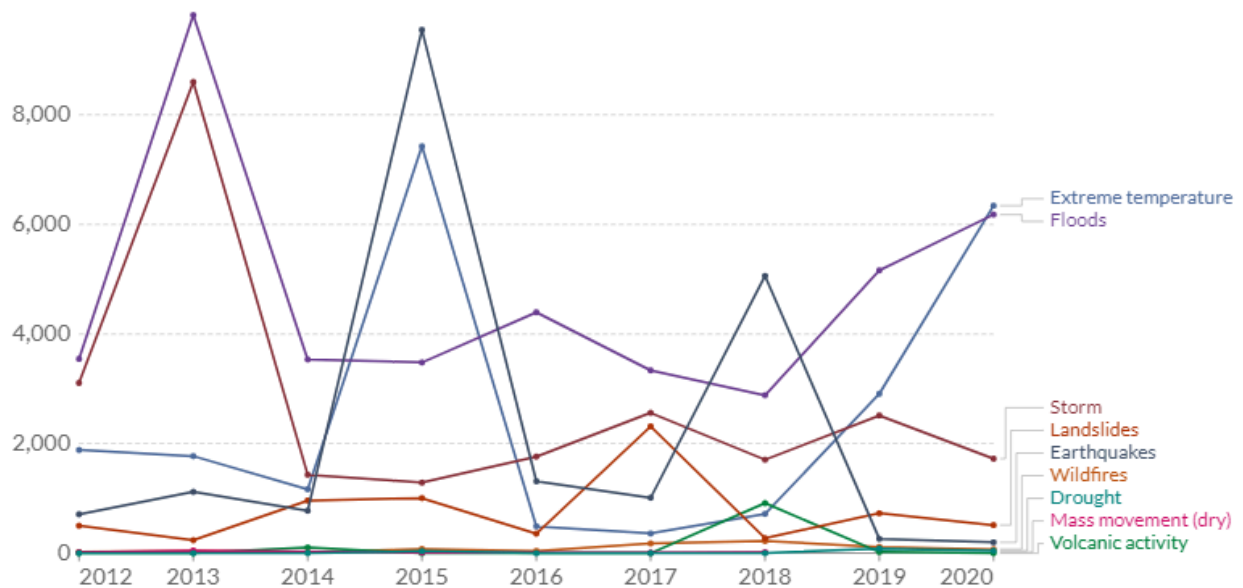
- 10. Impact event
- 11. Solar Flare

Deaths by natural disasters

Deaths from natural disasters by type, World, 2012 to 2020

Our World
in Data

Change country



https://en.wikipedia.org/wiki/List_of_natural_disasters_by_death_toll

GDP Impact by disaster type

Storm

DISASTER TYPE: Storms

IMPACT: Economic damages (% GD...

TIMESPAN: ☐ Decadal average ☒ Annual

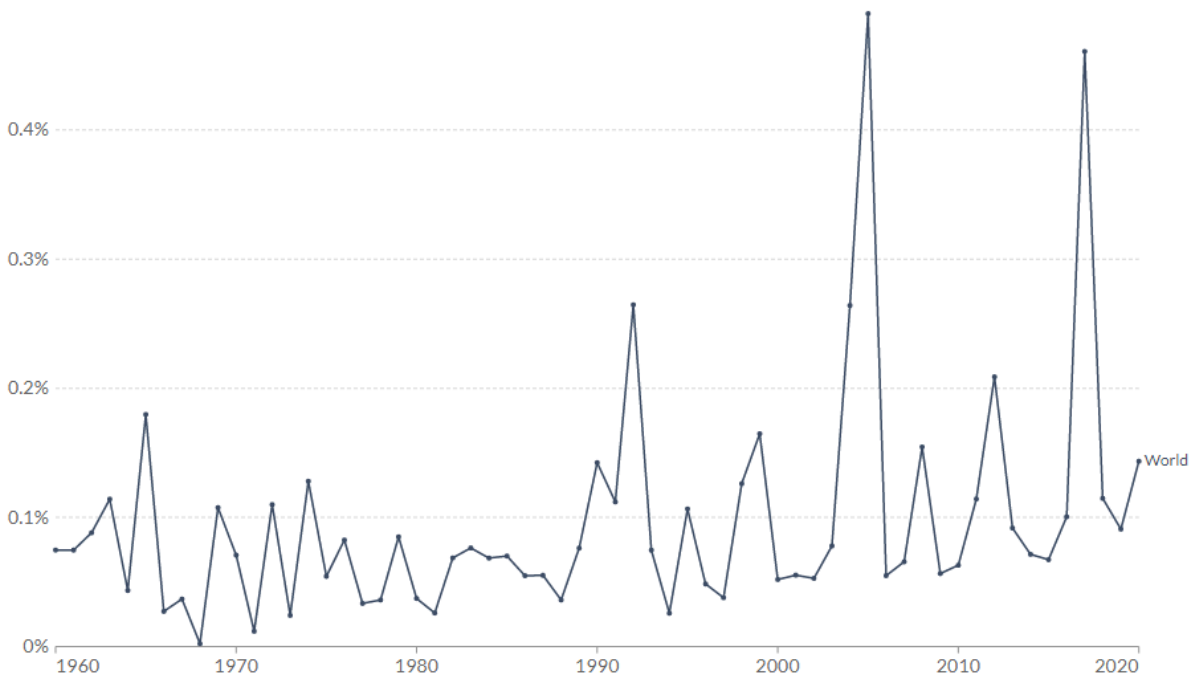
☐ Per capita

Total economic damages from storms as a share of GDP

Storms include tornado, hail, thunderstorm, sand storm, blizzards and extreme wind events.

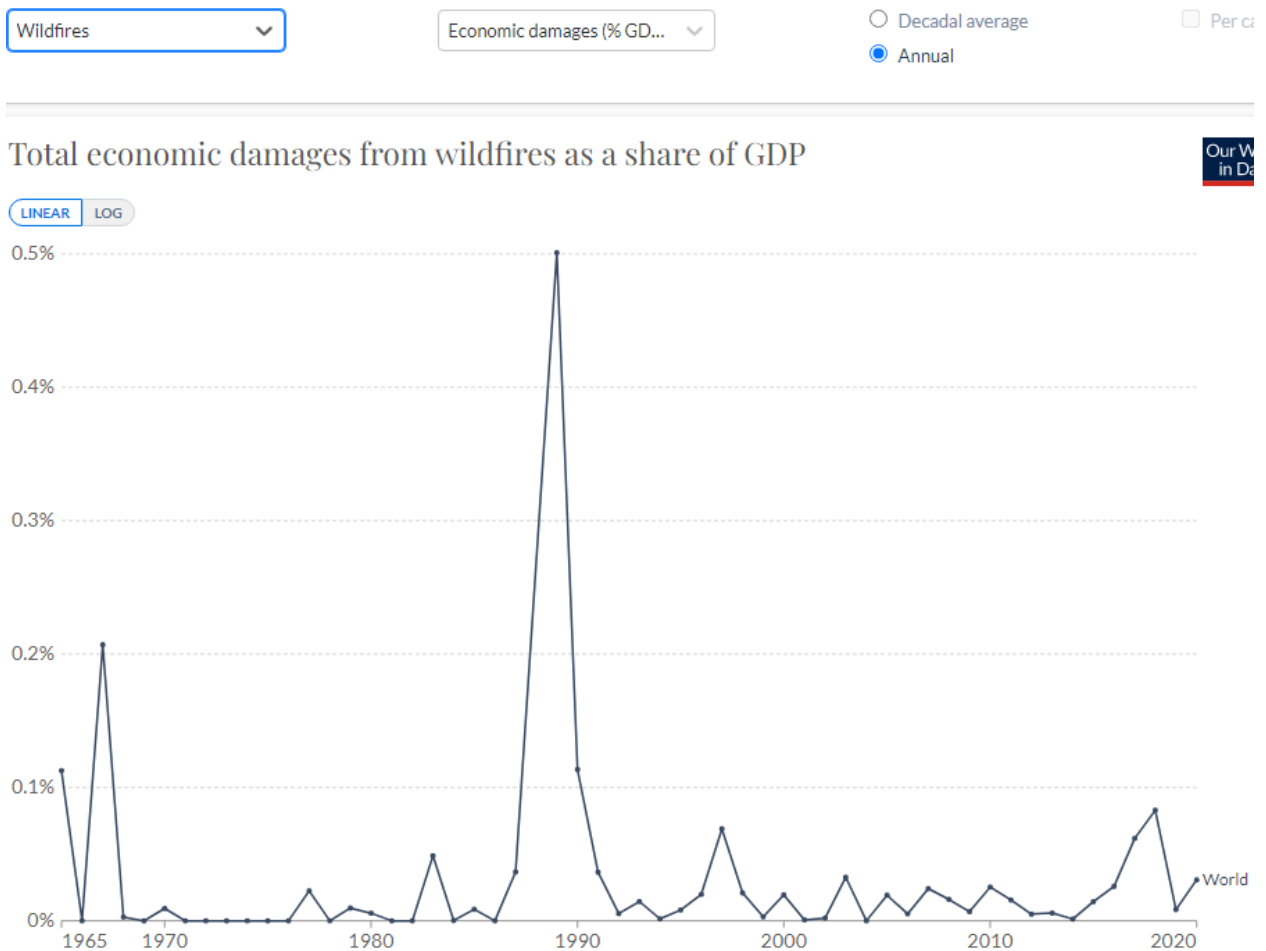


LINEAR LOG



https://ourworldindata.org/explorers/natural-disasters?facet=none&Disaster+Type=Storms&Impact=Economic+damages+%28%25+GDP%29&Timespan=Annual&Per+capita=false&country=~OWID_WRL

Wildfire



https://ourworldindata.org/explorers/natural-disasters?facet=none&Disaster+Type=Wildfires&Impact=Economic+damages+%28%25+GDP%29&Timespan=Annual&Per+capita=false&country=~OWID_WRL

Floods

Floods

Economic damages (% GD...

☐ Decadal average

☐ Per ca

☒ Annual

Total economic damages from floods as a share of GDP

Our W
in D

LINEAR

LOG



https://ourworldindata.org/explorers/natural-disasters?facet=none&Disaster+Type=Floods&Impact=Economic+damages+%28%25+GDP%29&Timespan=Annual&Per+capita=false&country=~OWID_WRL

Earthquake

Earthquakes

Economic damages (% GD...

☐ Decadal average

☐ Per ca

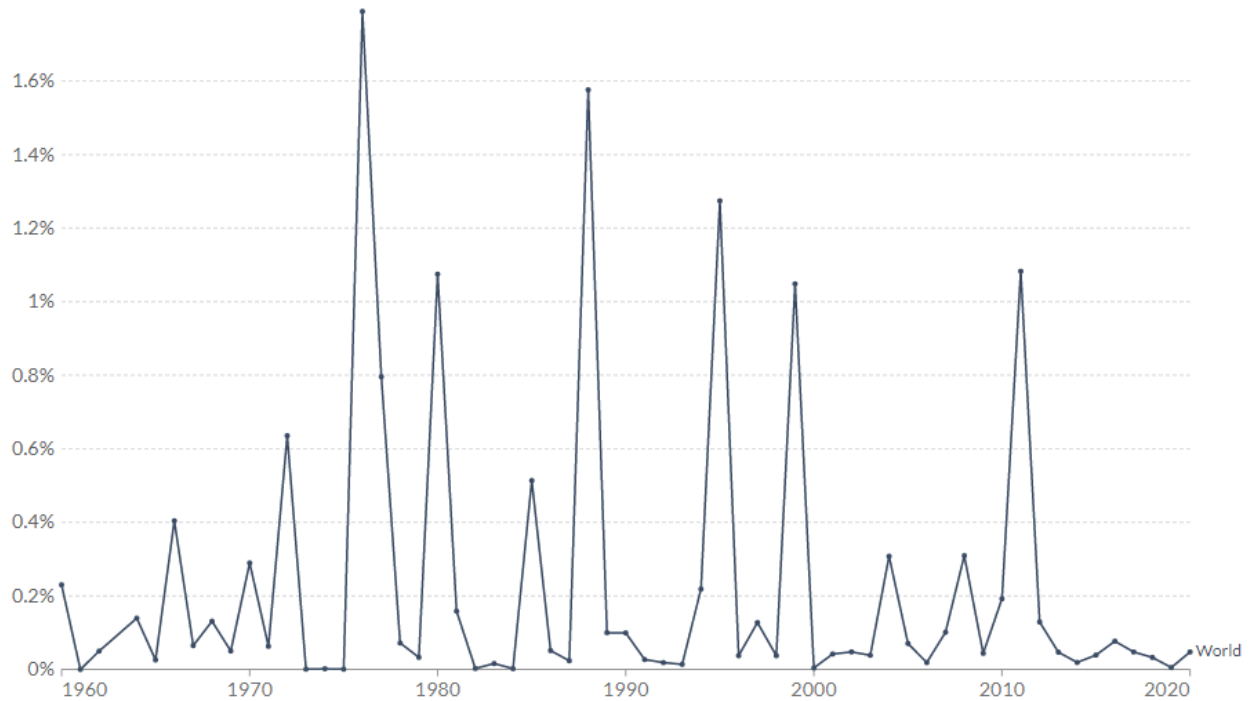
☒ Annual

Total economic damages from earthquakes as a share of GDP

Earthquakes include the impacts of earthquake events, aftershocks and tsunamis.

Our World
in Data

LINEAR LOG



https://ourworldindata.org/explorers/natural-disasters?facet=none&Disaster+Type=Earthquakes&Impact=Economic+damages+%28%25+GDP%29&Timespan=Annual&Per+capita=false&country=~OWID_WRL

Ideas

<https://devpost.com/software/evacuation-support-app>
<https://devpost.com/software/search?page=1&query=disaster++aws>
<https://devpost.com/software/flood-predictor-l5obxk>
<https://github.com/AWS-Disaster-Response-Hackathon/Main>
<https://devpost.com/software/todo-ot17ds>
https://github.com/rtp-aws/devpost_aws_disaster_response
https://devpost.com/software/disaster_breaker
<http://disaster-breaker.herokuapp.com/>

Safest route recommendation

https://www.researchgate.net/publication/336972546_Envision_of_Route_Safety_Direction_Using_Machine_Learning
https://www.google.com/search?q=safest+route+recommendation+machine+learning&rlz=1C10NGR_en-GBGB976GB976&ei=cEO-YcXmPJG78gLJqbv4DQ&oq=safest+route+recommendation&gs_lcp=Cgdnd3Mtd2l6EAMYATIFCCEQoAEyBQghEKABMgUIIRCgAToFCAAQkQI6CgguEMcBENEDEEM6CwgAEIAEELEDEIMBOg4ILhCABBCxAxDHARCjAjoRCC4QgAQQsQMQgwEQxwEQowI6DgguEIAEELEDEMcbENEDoQUILhCABDoECAAQQzoKCC4QxwEQrweQQzoEC4QQzoHCC4QsQMQQzoHCAAQyQMQQzoHCAAQsQMQQzoLCC4QgAQQsQMQgwE6CwguEIAEEMcBEK8BOggIABCABBCxAzoFCAAQgAQ6CwguEIAEEMcBENEDoGYIABAWEB46CAghEBYQHRAeOgcIIRAKEKABSgQIQRgASgQIRhgAUABY5BtgpCdoAHAAeACAAVylAe4OkgeCMjeYAQCgAQHAAQE&scient=gws-wiz

<https://apps.apple.com/us/app/citizen-protect-the-world/id1039889567>
<https://citizen.com/>

<https://www.washingtonpost.com/weather/2021/12/17/tornado-death-trends-mayfield-outbreak/>

<https://en.x-mol.com/paper/article/1459644184525701120>

<https://ai.googleblog.com/2020/06/machine-learning-based-damage.html>

<https://ieeexplore.ieee.org/abstract/document/9554812> **Damaged Road Extraction Based on Simulated Post-Disaster Remote Sensing Images**
<https://arxiv.org/pdf/2004.07312.pdf> **RescueNet: Joint Building Segmentation and Damage Assessment from Satellite Imagery**
<https://dl.acm.org/doi/abs/10.1145/3474717.3483651> **Updating Street Maps using Changes Detected in Satellite Imagery**
<https://github.com/songtaohe/Sat2Graph>

<https://www.mdpi.com/2072-4292/7/4/4948> **Knowledge-Based Detection and Assessment of Damaged Roads Using Post-Disaster High-Resolution Remote Sensing Image**

<https://www.mdpi.com/2072-4292/13/11/2176/htm> **Detecting Demolished Buildings after a Natural Hazard Using High Resolution RGB Satellite Imagery and Modified U-Net Convolutional Neural Networks**

<http://www.arxiv-sanity.com/search?q=road+damage+remote+sensing>

<https://arxiv.org/pdf/2108.12611v1.pdf> Stagewise Unsupervised Domain Adaptation with Adversarial Self-Training for Road Segmentation of Remote Sensing Images

<https://arxiv.org/pdf/1807.01232v3.pdf> SpaceNet: A Remote Sensing Dataset and Challenge

<https://awsdisasterresponse.devpost.com/details/inspiration>

Risk analysis/recommender for

- Building flood walls
- Raising property elevations
- Fully shielding properties from wildfire
- Designing buildings to withstand stronger hurricane windspeeds
- Upgrading drainage to cope with more intense rainfalls
- Developing seeds for crops that can better tolerate high temperatures and drought conditions
- Having facilities in place to shelter those at greatest risk in heat waves

A probabilistic flood hazard and loss model is developed for several time-steps into the future. Flood loss is modeled with and without the flood wall. The reductions in loss brought by the wall are then displayed into the future, from which it is possible to answer: How do the costs of the adaptation compare with the benefits over the next few decades?

Helping people to reunite pets lost during/after natural disaster

Stochastic Event modelling - simulate what could happen over time based on what has happened

Hazar event level modelling - strength of wind around strom, estimation of ground motion for earthquakes and so on

Vulnerability modelling - how building might respond to hazards in a certain areas

Exposure heatmap for a certain hazard/natural disaster, hazard scoring for different type of a natural disaster

Twitter/social media based natural disaster recognition, which are about actual disasters which are not <https://github.com/FredericGodin/TwitterEmbeddings>
<https://www.kaggle.com/dryad/human-mobility-during-natural-disasters>

Finding lost people/victims based on natural language description of them and/or GPS coordinate, emergency messages, and so on - probability on their whereabouts after a natural disaster.

Human mobility prediction - what would people do after a natural disaster, where would they go, where should they go?

<https://datadryad.org/stash/dataset/doi:10.5061/dryad.88354>

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0147299>

<https://awsdisasterresponse.devpost.com/details/inspiration>

<https://devpost.com/software/natural-event-tracker>

<https://devpost.com/software/disaster-relief-inventory-mgmt>

<https://devpost.com/software/natdisp>

https://github.com/jishnusaarav/The_Best_Team_ShellHacks

<https://devpost.com/software/res-queue>

<https://devpost.com/software/wellcheck>

<https://devpost.com/software/homefinding>

<https://devpost.com/software/disasterduck>

<https://devpost.com/software/skynet-ela2x3>

<https://mobilisesarawak.uthm.edu.my/>

ML problems

Using the heatmap and satellite imagery try to enhance our shelter recommendation system -

https://awsdisasterresponse.devpost.com/details/inspiration#h_4217402512051638291483738

Using the disaster alert API provides us real time information of the disaster. Using that and additional derived information from the satellite imagery we could recommend better shelters.

This output information and model can be further enhanced by user inputs - this could be another modality in our ML model.

Priority -> 1st ML problem:

We have satellite imagery, pass that into a ML model that is going to identify civil structures and we are going to analyze those features for broken civil structure, roads blocked, and roads blocked.

Classification problem

- + We can also create a feedback loop where users can say yes or no to verify

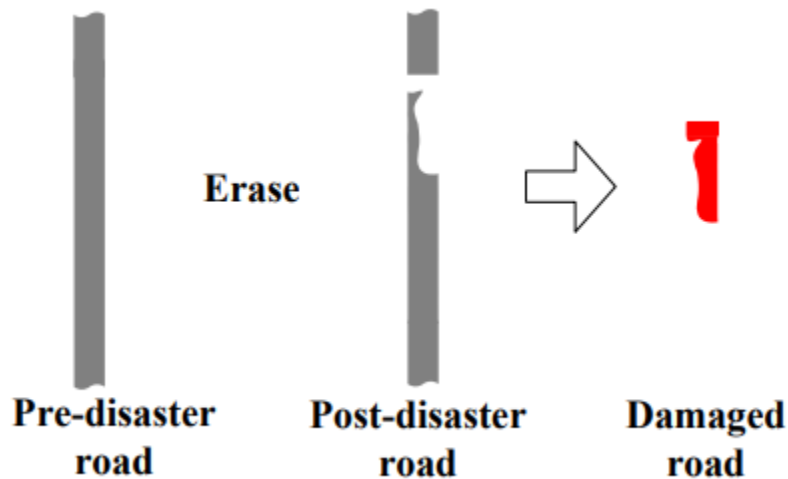
https://awsdisasterresponse.devpost.com/details/inspiration#h_4217402512051638291483738

Suggested datasets;

- <https://appliedsciences.nasa.gov/what-we-do/disasters/inside-disasters>
- <https://registry.opendata.aws/usgs-landsat/>
- <https://registry.opendata.aws/sentinel-2-l2a-cogs/>
- <https://registry.opendata.aws/sentinel-1/>
- <https://registry.opendata.aws/osm/>
- <https://registry.opendata.aws/spacenet/>
- <https://registry.opendata.aws/ladi/>
- <https://registry.opendata.aws/noaa-goes/>
- <https://registry.opendata.aws/noaa-himawari/>
- <https://registry.opendata.aws/sentinel-s2-l2a-mosaic-120/>

Solution idea:

1. Need a road extraction model



- 2.

Example;

Is road A blocked and B blocker?

- Users can give us additional information to verify.

Potential papers/docs that can help:

<https://medium.com/the-downlinq/creating-training-datasets-for-the-spacenet-road-detection-and-routing-challenge-6f970d413e2f>

<https://medium.com/the-downlinq/introducing-the-spacenet-road-detection-and-routing-challenge-and-dataset-7604de39b779>

<https://www.mdpi.com/2072-4292/13/11/2176/htm>

2nd ML problem: Shelter Recommendation

Recommendation engines based on existing google api and user information enhancing the first model potentially (we don't know whether it will enhance it) to better recommend shelters and/or be more accurate in our damaged/broken civil structure identification.

Datasets

- <https://drive.google.com/drive/folders/1aJw4rqAKkcgAuHpbBnQ4EeYV7uQSPJmO>
- <https://www.kaggle.com/fantineh/next-day-wildfire-spread>

- <https://registry.opendata.aws/tag/disaster-response/>
- <https://appliedsciences.nasa.gov/what-we-do/disasters/inside-disasters>
- <https://registry.opendata.aws/usgs-landsat/>
- <https://registry.opendata.aws/sentinel-2-l2a-cogs/>
- <https://registry.opendata.aws/sentinel-1/>
- <https://registry.opendata.aws/speedtest-global-performance/>
- <https://registry.opendata.aws/osm/>
- <https://registry.opendata.aws/spacenet/>
- <https://registry.opendata.aws/ladi/>
- <https://registry.opendata.aws/noaa-goes/>
- <https://registry.opendata.aws/noaa-himawari/>
- <https://registry.opendata.aws/sentinel-s2-l2a-mosaic-120/>
- <https://openaerialmap.org/>
- <https://developers.arcgis.com/rest/>
- https://services9.arcgis.com/RHVPPKiFTONKtxq3/arcgis/rest/services/USA_Wildfires_v1/FeatureServer
- <https://registry.opendata.aws/noaa-himawari/>
- <https://science.nasa.gov/citizenscience>
- <https://www.kaggle.com/dryad/human-mobility-during-natural-disasters>
- <https://www.kaggle.com/reubencpereira/spatial-data-repo>
- The historical wildfire data are from the [MOD14A1 V6 data set](#)
- Topography data are from the [Shuttle Radar Topography Mission \(SRTM\)](#)
- Weather data are from the [Gridded Surface Meteorological data set \(GRIDMET\)](#)
- Drought data are from the [GRIDMET Drought data set](#)
- Vegetation data are from the [NASA VIIRS Vegetation Indices \(VNP13A1\) data set](#)
- Population density data are from the [Gridded Population of World Version 4 \(GPWv4\) data set](#)
- [IMERG: Integrated Multi-satellitE Retrievals for GPM | NASA Global Precipitation Measurement Mission](#) NASA IMERG
- <https://gpm.nasa.gov/landslides/> NASA landslides resources

- <https://pmm.nasa.gov/applications/global-landslide-model> NASA Landslides model
- [Landslide Hazards - Data & Tools \(usgs.gov\)](#) USGS Landslides data
- <https://ceos.org/ourwork/workinggroups/disasters/landslide-pilot/> CEOS Landslides demo.
- [Landslides - Emergency Management - Thematic Areas - Sentinel Online - Sentinel Online \(esa.int\)](#)
- [Earthdata \(nasa.gov\)](#)
- <https://www.meteorologicaltechnologyinternational.com/news/nowcasting/nasa-machine-learning-model-doubles-accuracy-of-global-landslide-nowcasts.html>

Categories

Mitigation

1.

Preparedness

1.

Response

1.

Recovery

1.

Examples

<https://github.com/aws/studio-lab-examples>

Codes

<https://github.com/BinaLab>

Judging criteria

- Potential Value
 - Includes the extent to which the solution can be widely useful to disaster response organizations, easy to use, accessible, etc.
- Quality of the Idea
 - Includes creativity, originality of the project, such as finding and using unique public datasets, or solving a challenge in a unique way.
- Implementation
 - Includes how well the idea was prototyped by the developers using machine learning and Amazon SageMaker Studio Lab.

Misc content

For submission video

<https://www.bloomberg.com/features/climate-change-best-photos-2021/>