PLRB's Map Services

A map service makes maps, features, and attribute data available inside many types of client applications. PLRB makes maps in ArcMap (the main component of Esri's ArcGIS suite of geospatial processing programs), then publishes the maps as services to our ArcGIS Server site. Internet or intranet users can then use the map service in web applications, ArcGIS for Desktop, ArcGIS Online, and other client applications.

Through the use of RESTful services and web interfaces, ArcGIS facilitates open information sharing and integration. REST is an architecture designed for sharing information through the use of simple HTTP protocols. For documentation regarding the ArcGIS REST API please click here.

The PLRB Catastrophe Services Maps & Applications Portal combines ArcGIS services from PLRB's internal archived services and external services (NOAA/NWS, Esri, NIFC, USGS, and FEMA). The internal services may be accessed using a secured communication over "https." An ID and Password are needed to access the services, or you may set up a proxy to handle token authentication. For more information on authentication, please visit the Esri Working with Secured Resources page here.

Benefits of integrating *PLRB's* internal map services include:

- Enable analyses while keeping your sensitive claims and policy data behind your firewall
- Streamline workflow by automating searches
- Users only need to use one system
- Run your own proprietary analyses using desktop mapping applications

For more information, please contact Andrew Louchios, AVP - Catastrophe Services, alouchios@plrb.org, 630-724-2233

PLRB Map Services

Peril History

Represented by points on the map, these reports represent National Weather Service (NWS) Local Storm Reports (LSR), as well as other perils. LSRs are issued by local NWS forecast offices for their area of responsibility.

These reports are generated from storm spotters who witness the event and contact the National Weather Service with their report. Reports could be submitted by police and fire personnel, dispatchers, EMS workers, public utility workers, NWS employees, private citizens, social media, mPING (crowdsourcing weather reports app), and CoCoRaHS (grassroots volunteer network of backyard weather observers all working together to measure and map precipitation (rain, hail and snow) in their local communities). Storm spotters may take a class offered by the SKYWARN program. LSRs are quality control filtered to some degree by the issuing NWS office. The reports are intended to give the adjuster an idea of what severe weather was occurring in and around the insured. The NWS uses coordinates to two decimal places. Therefore, the true location of the report is within 0.7 mile of the data point.

Local Storm Reports archived include:

- Preliminary Tornado Reports
- Preliminary Wind Reports (Wind gusts of 58 MPH or greater and/or wind damage
- Preliminary Hail Reports* (Includes small hail reports down to 0.25 inch)
- Official Public Hail Reports (0.75 inch or greater; May also include reports less than 0.75 inch); On occasion, hail reports of less than 0.75 inch are made official by NOAA if they caused a significant accumulation of hail on the ground and led to damage or other impacts. Official public hail reports are typically made available on a 75-90 day delay. Official public hail reports are **not** certified. If certified data is needed, please contact NCEI or a meteorological consultant.
- Preliminary Flood Reports
- Preliminary Debris Flow Reports
- Preliminary Freezing Rain Reports

*Preliminary hail reports of 0.75 inch or greater are removed from the database after official public hail reports are loaded.
Also displayed are events such as earthquakes (usually only when damage is reported), riots, fires, hazmat incidences, and explosions. Fire data points usually refer to non-wildfires or damage reports caused by any type of fire including wildfires. To view current and historic wildfire perimeters please see PLRB's Wildfires web app. **Data available 1999 to present. Official hail reports 1955 to present.**

Lightning Estimate

The GFS-LAMP (Global Forecast System - Localized Aviation MOS Program) lightning probability data is updated hourly by the National Weather Service, and each hourly forecast represents the probability (%) of one or more cloud to ground lightning strikes during a 1-hour

period. Catastrophe Services takes the hourly forecast lightning probability GIS data and creates a new layer which displays only the highest lightning probability of the day. This data is different than an actual lightning strike report obtained from a third party vendor. A lightning strike report is an address specific report which details the number and intensity of nearby lightning strikes as recorded by the vendor's private network of lightning detection equipment. For more information regarding the GFS-LAMP, please click here to visit the NWS site. **Data available 12/1/2010 to present.**

GOES-R Geostationary Lightning Mapper (GLM) Level 2 Lightning Detection

GLM detects the light emitted by lightning at the tops of clouds day and night and collects information such as the frequency, location and extent of lightning discharges. The instrument measures total lightning, both in-cloud and cloud-to-ground. **GLM cannot distinguish between in-cloud and cloud-to-ground lightning.** GLM spatial resolution can range from a few square kilometers to several thousand square kilometers. This data is different than an actual lightning strike report obtained from a third party vendor.

PLRB Catastrophe Services uses the flash_area variable within the data to create the different sized polygon areas representing the general areas of lightning. GLM data for the conterminous United States, Hawaii, Puerto Rico, and southern Canada is archived. For more information see the National Centers for Environmental Information. **Data is available 1/1/2020 to present.**

GOES-R Algorithm Working Group and GOES-R Series Program, (2018): NOAA GOES-R Series Geostationary Lightning Mapper (GLM) Level 2 Lightning Detection: Events, Groups, and Flashes. [Flash]. NOAA National Centers for Environmental Information. doi:10.7289/V5KH0KK6. [2020].

Maximum Hail Size Estimates (Hail Swaths)

May 24, 2022 to Present:

Multi-Radar / Multi Sensor (MRMS) Maximum Estimated Size of Hail (MESH) Hail Swath 1440-min data from the National Severe Storms Laboratory. The MRMS system was developed to produce severe weather, transportation, and precipitation products for improved decision-making capability to improve hazardous weather forecasts and warnings, along with hydrology, aviation, and numerical weather prediction. MRMS is a system with fully-automated algorithms that quickly and intelligently integrate data streams from multiple radars, surface and upper air observations, lightning detection systems, satellite observations, and forecast models. Hail is detected in the entire 3-dimensional reflectivity structure of the storm (up to and including storm top). Coverage area includes the conterminous United States, also known as the Lower 48, and southern Canada. The spatial resolution is approximately 1 km x 1 km, and the temporal resolution is 2 minutes. **The hail swaths are only considered approximate**. The polygons do not represent exact data; **it is possible hail may have fallen outside of the polygon areas. It is possible MRMS contains missing data and/or bad radar data that escapes QC checks.**

PLRB archives the 1440-min (24 hour) MESH data which equates to maximum hail size estimate for the day. Central Standard Time is used to determine the day. For example, if searching for 5/24/2022 data, this represents MRMS maximum estimated size of hail data for the 24 hour period beginning 12am CST to 11:59pm CST (5/24/2022 0600 UTC to 5/25/2022 0559 UTC).

March 18, 2015 to May 23, 2022:

The NEXRAD (Next-Generation Radar) Level III hail signatures point data are used to create this layer. Point values of maximum hail size estimates of 0.50 in. to greater than 4 in. (values > 4 in. are not specified) are used as the raw data. The point locations are the mass weighted centroids of the storms, not necessarily where it is actively hailing. This data is downloaded every 6 minutes.

According to the National Severe Storm Laboratory (NSSL), a division of NOAA, hail swaths can range in size from a few acres to an area 10 miles wide and 100 miles long. For this reason, PLRB Cats Services utiliizes ArcGIS software to create a grid over a 2 mile buffer radius around hail signature points to create an "average" maximum hail size estimate region for that day. **The hail swaths are only considered approximate**. The polygons do not represent exact data; **it is possible hail may have fallen outside of the polygon areas.** NEXRAD hail size estimate data may be missing if a RADAR station experiences an outage. The field **MAXSIZEGRID** should be used for hail estimate data beginning 3/18/2015.

Observed Precipitation

Observed precipitation is a byproduct of National Weather Service (NWS) operations at the 12 CONUS River Forecast Centers (RFCs), and is displayed as a gridded field with a spatial resolution of roughly 4x4 km. Observed data is expressed as a 24-hour total ending at 1200 Z (same as Greenwich Mean Time, or GMT), 1200 GMT coincides with 8 AM EDT, 7 AM EST, 7 AM CDT, 6 AM CST, etc. Gauge reports, radar, and PRISM data are used in the methodology to create the grids. For more information please visit the About NWS Precipitation Analysis webpage here. **Data available 1/1/2005 to present.**

Snowfall

This data set contains output from the NOAA National Weather Service's National Operational Hydrologic Remote Sensing Center (NOHRSC) SNOw Data Assimilation System (SNODAS). The current version of the analysis is generated by interpolating observations of 24-hour snowfall accumulations at point locations over the conterminous United States (CONUS), taken primarily from Cooperative observers, CoCoRaHS observers and NWS spotter reports. The interpolation method is a Barnes 2-pass analysis performed for 1200 UTC each day at a resolution of 0.04 degrees (144 arc sec). The products originally included a 0000 UTC analysis, but this was discontinued due to its poor quality. For more information please see: NOHRSC.
Data available 1/1/2015 to present. Trace amounts and snowfall less than 1 inch polygons only available 1/1/2016 to present.

ShakeMap

A ShakeMap, produced by the United States Geological Survey (USGS), is a representation of ground shaking produced by an earthquake. The ShakeMap produces a range of ground shaking levels at sites throughout the region depending on factors such as distance from the earthquake, rock and soil conditions, and complexities in the structure of the Earth's crust. The ShakeMaps correspond

with the Modified Mercalli Intensity (MMI) scale and make it easier to relate the recorded ground motions to the expected felt and damage distribution. For example, strong perceived shaking and light potential damage is associated with an MMI value of VI. **Data available 1/1/2014 to present and includes notable earthquakes from 2003 to 2013.**

ShakeMaps are generated automatically following moderate and large earthquakes and can only be considered approximate. For more information about ShakeMaps please click here to visit the USGS site. For more information about MMI please click here to visit the USGS site.

Fire Perimeters

Prior to March 2020, the Geospatial Multi-Agency Coordination (GeoMAC) provided fire perimeter data using input from incident intelligence sources, GPS data, and infrared (IR) imagery from fixed wing and satellite platforms. In March 2020, GeoMAC duties transitioned to the National Interagency Fire Center (NIFC). The Archived Wildfire Perimeters GIS shapefile data is loaded into PLRB's database daily. The NIFC shapefile contains daily polygon updates of fire perimeters. PLRB Catastrophe Services merges these daily fire perimeter updates into one polygon feature per fire for better display. The NIFC fields CreateDate and DateCurrent are used to represent the start and end dates of the fire respectively. This represents a general approximation of the start and end dates. DateCurrent represents the last edit, update, of the GIS record in the NIFC database. **Data available 1/1/2017 to present.**

Fire Smoke Analysis

Areas of smoke are analyzed using GOES-EAST and GOES-WEST visible satellite imagery. Only a general description of areas of smoke or significant smoke plumes are analyzed. Widespread cloudiness may prevent the detection of smoke even from significant fires.

The density (in units of $\mu g/m^3$) is a rough estimate and the values should not be used as an exact measure of the density of the smoke. They roughly represent a range of values and are mostly meant in a subjective way to distinguish the areas of thicker smoke from surrounding smoke. Fire smoke analysis data is loaded into the PLRB database when it becomes available, usually on a 2-3 day delay.

- 5 $\mu g/m^3$ - Light Smoke
- 16 $\mu g/m^3$ - Medium Smoke
- 27 $\mu g/m^3$ - Heavy Smoke

For more information please click here to visit the Hazard Mapping System (HMS) Fire and Smoke Product web page.
Data available 1/1/2015 to present.

Weather Observations

Daily weather observations are quality controlled local climatological data from the National Centers for Environmental Information (NCEI). This product consists of daily summaries for approximately 1,275 U.S. locations. These stations are assigned a WBAN (Weather Bureau-Army Navy) number and the station IDs begin with "USW000." The vast majority are airport stations. Weather observation data is loaded into our database when it becomes available, usually on a 7-10 day delay. **Data available 1/1/2008 to present.**

Data (if available) for each location includes:

City, State of the weather station
Dew Point, Average (Degrees Fahrenheit)
Precipitation, Rainfall & melted snow (inches)
Snowfall (inches)*
Snow/Ice Depth as of 6AM CST (inches)*
Sunrise, Local Standard Time (Calculated, not observed)
Sunset, Local Standard Time (Calculated, not observed)
Temperature, High (Degrees Fahrenheit)
Temperature, Low (Degrees Fahrenheit)
Wind Gust, Highest (MPH)
Wind Speed, Highest Sustained (MPH)

n/a - missing data, suspect data, or data that are not normally reported for the station.
*Not all stations report snow totals.

Wind Gust Estimate

The highest wind gust of the day estimate layer is created using ArcGIS software by averaging the values of quality controlled local climatological data from the National Climatic Data Center. Highest daily wind gust speeds from approximately 1,060 weather stations across the US are used to create this layer. Wind gust estimate data is loaded into our database when weather observation station data becomes available, usually on a 7-10 day delay. This layer should not be used for estimating tornado wind speeds and may not represent an accurate estimate for areas of isolated or scattered thunderstorms. **The data is dependent on proximity to weather observation stations and if wind gust data were captured at the station. Data available 1/1/2008 to present.**

Watches, Warnings, and Advisories

Data is available 1-2 days after the event has expired. Date and time are displayed in your browser's local time. Long term watches and warnings such as Tornado Watch, Winter Weather Advisory, High Wind Warning, etc. are typically issued for entire counties. Short term warnings (severe thunderstorm warning, tornado warning, and flash flood warning) are typically displayed as irregular polygons. PLRB does not archive Gale Warnings, Air Stagnation Advisories, or Brisk Wind Advisories. This data is obtained as shapefiles from Iowa

Mesonet Environmental. The color symbology will be updated in 2019 as this is the scheduled update for NWS to update their legend. **Data available 1/1/2017 to present.**

Did You Feel It? Crowdsourcing Earthquake Maps

The Did You Feel It? system was developed to tap the abundant information available about earthquakes from the people who experience them. For United States earthquakes, intensities are assigned on the basis of the Modified Mercalli Intensity (MMI) Scale (Wood and Neumann, 1931; Richter, 1958). The Modified Mercalli Intensity or MMI was based in part on postal questionnaires, in which respondents summarize the effects of shaking in their communities. In addition, MMI incorporates observations from field studies in areas of significant damage, on damage maps produced by emergency response agencies, on reports produced by the earthquake engineering community, and on press reports.

The procedure used to calculate the DYFI maps was calibrated so that the Community Decimal Intensity (CDI) values should, on average, be similar to the MMI values for the same communities (Dengler and Dewey, 1998). The United States Geological Survey has seen that DYFI data will serve as a useful approximation to MMI maps in the hours, days, and months following damaging earthquakes.

The CDI is an aggregate (not an average) of the weighted sums of the various indices of the DYFI questionnaires. There are eight questions used in the calculation. Data is aggregated into 10km x 10km cells.

PLRB Weather/CAT Services archives DYFI data daily between 24 and 48 hours after an earthquake to give ample time for responses to be collected. It is possible the USGS receives additional responses after this period, and it is also possible the data is revised after PLRB Weather/CAT Services archives the data. DYFI data available for the United States and Puerto Rico 1/1/2023 to present. Data is preliminary and accuracy depends on responses from the public.

Tropical Cyclone Track (Spaghetti) Models

Spaghetti models are computer models that show potential tropical cyclone paths. These models provide a way to visualize where a tropical storm or hurricane may lead. Models that are close together would indicate higher than normal confidence in the track, while a wide spread in the tracks may indicate a forecast that is more uncertain. This is not an exhaustive set of models. It includes the skillful models the National Hurricane Center uses in its consensus aids. It includes the official forecast (OFCL), TVCN and IVCN, which are used frequently, and several others. PLRB checks and processes new model updates hourly.

National Hurricane Center Model Data Files: https://ftp.nhc.noaa.gov/atcf/aid_public/
Model Summary: https://www.nhc.noaa.gov/modelsummary.shtml
Verification: https://www.nhc.noaa.gov/verification/
Full List of Models: https://ftp.nhc.noaa.gov/atcf/docs/nhc_techlist.dat

Power Outages

PLRB has partnered with Gridmetrics to provide historical power outage reports via their Power Event Notification System (PENS) product. PENS power sensors are tightly aligned with population density and cover many metro, urban, and suburban areas of the United States. About 50% of the US population lives within 1km of a Gridmetrics sensor. PENS scans approximately 348,000 sensors, located in the last miles of the power distribution grid, every 5 minutes to identify power events. Sensor data is extrapolated to 1km x 1km resolution. Power outage data may not be representative of a specific address. PLRB does not disclose any member user information or address information to Gridmetrics. Denial of claims should not be based solely on the information found within PENS. PENS data is not certified, and is independent of power utility supplied data sources. Data is being offered as is and no warranty is made. PENS also offers real-time, hyper-local power outage insights across the U.S. For a free trial to up-to-date data about power events that can be integrated into your platform or applications visit Gridmetrics.

Tropical Cyclone Best Track

The storm track line, points, and cumulative wind swath data come from the National Hurricane Center GIS Archive – Tropical Cyclone Best Track. The best track is a living database which serves as the official U.S. National Weather Service historical record of the tropical cyclone. Data available 2008 to present.

The best track polyline is a subjectively-smoothed representation of the tropical cyclone's location and intensity at 6-h interval over its lifetime. These best track positions and intensity (maximum 1-minute sustained surface wind speed and minimum sea-level pressure) are based on a post-storm assessment of all available data and may differ from values contained in real-time storm advisories. In general, they will not reflect the erratic motion implied by connecting the individual center fix positions.

The best track wind swath shows how the size of the storm has changed and the areas potentially affected by sustained winds of tropical storm force (34 Knot), 50 knot and hurricane force (64 knot) from a tropical cyclone. These data are based on the wind radii contained in the Automated Tropical Cyclone Forecasting (ATCF) system's working best track. Users are reminded that the best track wind radii represent the maximum possible extent of a given wind speed within particular quadrants around the tropical cyclone. As a result, not all locations falling within the swaths will have experienced the indicated sustained wind speeds. These data are intended for geographic display and analysis at the national level and for large regional areas.

Disclaimer
PLRB Catastrophe Services Weather/CAT data is considered preliminary and should be treated as such. Denial of claims should not be based solely on the information found within. If you need certified weather data you will need to contact a meteorological consulting firm. PLRB does not make coverage decisions. Insureds should never be told that they were provided or denied coverage because of the PLRB. Meteorological data collected from the PLRB must be interpreted by insurance professionals at your company along with other relevant facts in order to make coverage determinations.

External Map Services

Popular GIS Map Services Main Directories

National Weather Service - https://www.weather.gov/gis/cloudgiswebservices
National Interagency Fire Center Wildfire Data - https://data-nifc.opendata.arcgis.com
ArcGIS (Search) – https://www.arcgis.com
Esri LiveFeeds – This is now a subscription service available from Esri. ArcGIS Online organizational users have free access.
DigitalCoast (NOAA) - https://coast.noaa.gov/digitalcoast/data/home.html

Catastrophe Imagery

NOAA Emergency Response Imagery - https://storms.ngs.noaa.gov/

Civil Air Patrol Recent Imagery Viewer - https://disasters.geoplatform.gov/imagerybrowser/?webmap=2c7dabb4a0594861a8bac3944b931d2d

Damage Assessments

Damage Assessments (NWS)
Description - Meteorologists from the local forecast office are assembled into a Damage Assessment Team and tasked with surveying reported storm damage to determine if it was caused by a tornado or straight line wind. They often include pictures with their assessments and the link is provided once the user clicks on a point on the map.

This database is a fairly new tool for the NWS. As such there can be quite a bit of difference in the amount of detail going in from office to office. In addition, the time it takes for survey data to be quality-controlled and made available to the public services can vary as well. Damages points are likely to begin appearing in the first 1-2 days following an event. However, depending on the scope of the event, damage paths and polygons may take longer. Data available 2010 to present.
REST URL - https://services.dat.noaa.gov/arcgis/rest/services/nws_damageassessmenttoolkit/DamageViewer/MapServer

Radar, Weather, and Watches/Warnings

Weather Radar (National Weather Service)
https://opengeo.ncep.noaa.gov/geoserver/www/index.html

https://mapservices.weather.noaa.gov/eventdriven/rest/services/radar

Current Watches and Warnings (NWS)
Description & REST URL - https://mapservices.weather.noaa.gov/eventdriven/rest/services/WWA

Current Mesoscale Discussions (NWS)
Description - The Storm Prediction Center issues mesoscale discussions when severe weather events are possible in the next few hours. Mesoscale discussions precede watches and warnings.
KML URL - http://www.spc.noaa.gov/products/md/ActiveMD.kmz

Risk Potential

Coastal Flood Exposure (NOAA)
Data Portal - https://coast.noaa.gov/digitalcoast/data/home.html

Tropical Weather

Tropical Storms + 2 & 7 day probability outlook, probabilistic storm surge and winds (NWS)
Description & REST URL directory - https://mapservices.weather.noaa.gov/tropical/rest/services/tropical

Weather Buoy Observations (NOAA)
KML URL - http://www.ndbc.noaa.gov/kml/marineobs_by_pgm.kml

Wildfire Perimeters

Active & Historical Fires / Fire Perimeters (NIFC)
REST URL - https://data-nifc.opendata.arcgis.com/

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