# Querying and filtering earthquakes

The US Geological Survey (USGS) wants to use its live-feed earthquake data to promote understanding of earthquakes and their magnitude and depth. The USGS has asked you, as a representative of the American Association of Geographers, to write a lesson using this live-feed earthquake data, combined with the querying/filtering capabilities of the ArcGIS Online software.

Note: All answers will vary because of the last 7- day time frame of the data.

## Build skills in these areas

➢ Opening and modifying an existing online map

➢ Filtering data by attributes

What you need

➢ Account required

➢ Estimated time: under 30 minutes

esri | THE SCIENCE OF WHERE

On the map, earthquakes over the past 60 days are symbolized by magnitude and depth. Here are some basic facts about earthquakes:

- Earthquakes between 5 and 7 are the ones that occur most frequently and cause damage.

- Earthquakes that are 7 and above are extremely damaging and much rarer.

- Earthquakes deeper than 300 kilometers are usually associated with convergent boundaries.

Richter scale of earthquake magnitude

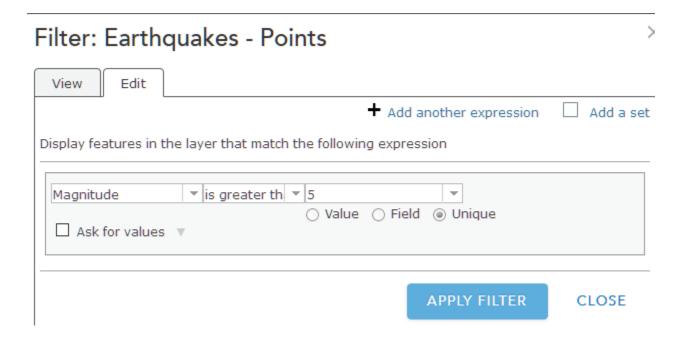| magnitude level | category | effects | earthquakes per year |
|---|---|---|---|
| less than 1.0 to 2.9 | micro | generally not felt by people, though recorded on local instruments | more than 100,000 |
| 3.0-3.9 | minor | felt by many people; no damage | 12,000-100,000 |
| 4.0-4.9 | light | felt by all; minor breakage of objects | 2,000-12,000 |
| 5.0-5.9 | moderate | some damage to weak structures | 200-2,000 |
| 6.0-6.9 | strong | moderate damage in populated areas | 20-200 |
| 7.0-7.9 | major | serious damage over large areas; loss of life | 3-20 |
| 8.0 and higher | great | severe destruction and loss of life over large areas | fewer than 3 |

# 1. Symbolizing, Querying and Filtering

## Symbolizing

1. Click Earthquakes. This map shows earthquakes that happened over the previous week.
2. Sign into your ArcGIS online organizational account.
3. Click Show Map Contents under Details.
4. Click USGS Seismic Data>>Mag. For Past Week.

## Filtering

You can use a filter to create expressions that meet certain criteria. In this section you will show earthquakes that have a magnitude greater than 5.

1. Click Filter under Mag. For Past Week.
2. Choose the Magnitude field from the drop-down menu.
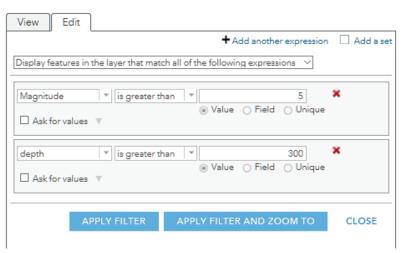3. Click Unique.
4. Type 5 for magnitude.
5. Click Apply Filter

You now see only the spatial display of the earthquakes that meet your criteria.

## Querying

You can ask questions that have more than one criterion. For example, you could ask to see all the earthquakes that have a magnitude of greater than 5 and a depth of more than 300 kilometers. If you have more than one expression, choose to display features in the layer that match All or Any of your expressions. All requires the criteria you have specified must be true. Any means that only one of your expressions must be true for the features to display.

1. Click Filter.
2. Click Remove Filter.
3. Click Edit.
   - Click Magnitude is greater than 5.
   - Add another expression.
   - Depth (kilometers) is greater 300.
   - Click Value.
   - Type in 300. (kilometers)
   - Display features in the layer that match **all** of the following expressions.

4. APPLY FILTER.

Filter: USGS_Seismic_Data - All Events by Mag.

| View | Edit |

➕ Add another expression    ☐ Add a set

Display features in the layer that match all of the following expressions ▽

| Magnitude | ▾ | is greater than | ▾ | 5 | ✖ |

◉ Value   ○ Field   ○ Unique

☐ Ask for values ▾

| depth | ▾ | is greater than | ▾ | 300 | ✖ |

◉ Value   ○ Field   ○ Unique

☐ Ask for values ▾

APPLY FILTER    APPLY FILTER AND ZOOM TO    CLOSE

The map shows earthquakes that have both a magnitude greater than 5 and a depth (kilometers) greater than 300.

In this lesson you have learned how to ask questions of spatial data using the attributes to show the designated spatial values on a map.

# Learn more

## Using Filters