

Earthquake API

In the earthquake system, tmpst uses an API to fetch data depending on a user's query. The API used is provided by USGS (U.S Geological Survey). The USGS API provides multiple endpoints for different levels of earthquake magnitude as well as for different time periods such as hourly which return GeoJSON. The USGS data feeds do not require keys to be accessed and can be requested as many times as required.

The available USGS feed categories are shown below:

Time Format

- Hourly
- Daily
- Weekly
- Monthly

Magnitude Level

- Significant
- Magnitude 4.5 and above
- Magnitude 2.5 and above
- Magnitude 1 and above
- All earthquakes

Each time format has a magnitude level endpoint which provides up to date information which is update every 5 minutes. Monthly data is updated every 5 minutes.

In this tutorial:

Pre-requisites:

- Understanding of GeoJSON format
- A USGS API endpoint address
(<https://earthquake.usgs.gov/earthquakes/feed/v1.0/geojson.php>)
- A suitable method for making a request (Postman:
<https://www.getpostman.com/downloads/> or in new tab)

Aims:

- Learn how to request data from one of the USGS earthquake feeds in Postman
- Learn how to request data from one of the USGS earthquake feeds in a new tab
- Learn how to request data from one of the USGS earthquake feeds using AJAX call

Postman Request Tutorial

In this tutorial, we will create a request to a USGS earthquake feed using the postman application on Windows. Before proceeding with this tutorial, please ensure you have access to the Postman application or are using the online version.

Steps:

1. Choose endpoint to request data from
2. Construct request in Postman

Step 1: Choose endpoint to request data from

As mentioned earlier, USGS offers many earthquake feed endpoints to choose from. In this tutorial, not all sources will be shown because the request format is identical for all. It is important to keep in mind that not all sources will have data at the time of request. For example, making a request for significant earthquakes in the last hour may not return any information because no earthquakes may have occurred. With that in mind, the endpoint that will be used for this tutorial is all monthly earthquakes. This endpoint will almost always have data so it is good as an example. The endpoint is shown below:

https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_month.geojson

Step 2: Construct request in Postman

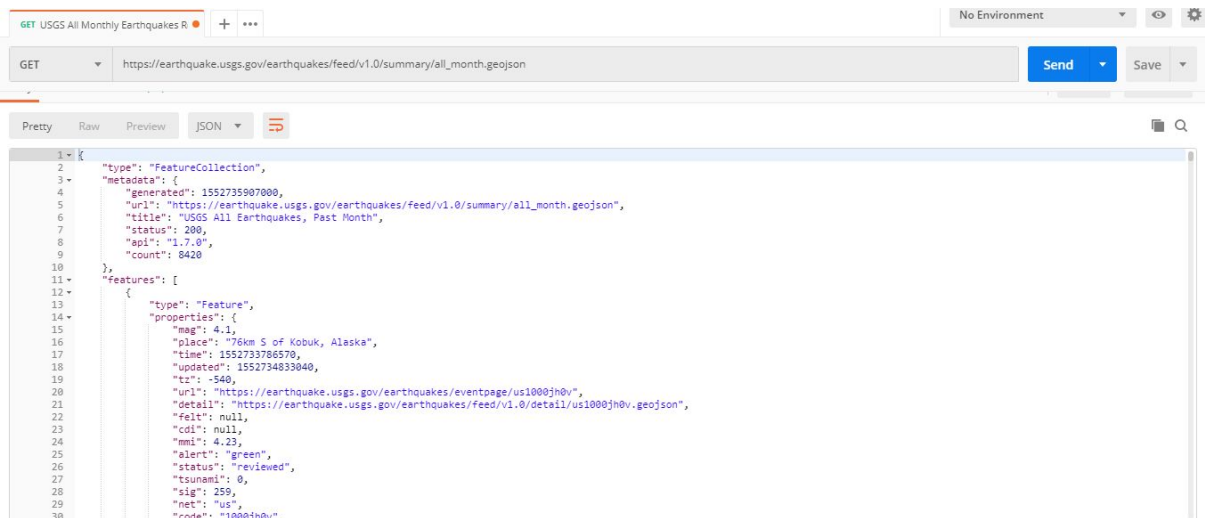
This tutorial assumes that you have a basic understanding of how to use Postman. If not, we provide a tutorial on how to utilise Postman properly that you may wish to read before you continue with this tutorial. If you know how to use Postman, create a new GET request and give it an appropriate name. The name I will use in this tutorial is “USGS All Monthly Earthquakes Request”. If you have setup the request properly you should see the following:



The screenshot shows the Postman application interface. At the top, there's a tab labeled "GET USGS All Monthly Earthquakes" with a close button (X) and a plus sign (+). Below the tab, the request name "USGS All Monthly Earthquakes Request" is displayed. The main area shows a "GET" method selected from a dropdown, followed by a text input field labeled "Enter request URL". To the right of the input field are "Send" and "Save" buttons. Below the input field, there are tabs for "Params", "Authorization", "Headers", "Body", "Pre-request Script", and "Tests". The "Params" tab is active, showing a table for "Query Params". The table has columns for "KEY", "VALUE", and "DESCRIPTION". There is a "Bulk Edit" link to the right of the table.

KEY	VALUE	DESCRIPTION
Key	Value	Description

Nothing will happen if you attempt to send the request as the url box is empty. Now all that is required is to add the url mentioned in step 1 to the url box and hit send. You should see the following:



Part of the response is shown below in plain text:

```
{
  "type": "FeatureCollection",
  "metadata": {
    "generated": 1552735907000,
    "url": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_month.geojson",
    "title": "USGS All Earthquakes, Past Month",
    "status": 200,
    "api": "1.7.0",
    "count": 8420
  },
  "features": [
    {
      "type": "Feature",
      "properties": {
        "mag": 4.1,
        "place": "76km S of Kobuk, Alaska",
        "time": 1552733786570,
        "updated": 1552734833040,
        "tz": -540,
        "url": "https://earthquake.usgs.gov/earthquakes/eventpage/us1000jh0v",
        "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us1000jh0v.geojson",
        "felt": null,
        "cdi": null,
        "mmi": 4.23,
        "alert": "green",
        "status": "reviewed",
        "tsunami": 0,
        "sig": 259,
        "net": "us",
        "code": "1000jh0v",

```

```

    "code": "1000jh0v",
    "ids": ",us1000jh0v,ak0193g7lf43,",
    "sources": ",us,ak,",
    "types": ",geoserve,losspager,origin,phase-data,shakemap,",
    "nst": null,
    "dmin": 2.388,
    "rms": 0.63,
    "gap": 95,
    "magType": "ml",
    "type": "earthquake",
    "title": "M 4.1 - 76km S of Kobuk, Alaska"
  },
  "geometry": {
    "type": "Point",
    "coordinates": [
      -157.1611,
      66.233,
      10
    ]
  },
  "id": "us1000jh0v"
}
]
}

```

The full response can't be shown as it is too large. As you can see the response is in a GeoJSON format which defines a list of features with geographical points for each item.

Browser Request Tutorial

In this tutorial, we will create a request to a USGS earthquake feed using a new tab on a Google Chrome browser. For this tutorial, we will use the same endpoint as is used in the Postman example:

https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_month.geojson

Step 1: Add url to tab and run

This tutorial is easier than either the Postman method or the AJAX method (still to come) as it only involves using a tab in a browser as if you are navigating to a web page. To get a result, add the url to the address bar and hit enter and you should see the following:

```
{
  "type": "FeatureCollection",
  "metadata": {
    "generated": 1552737104000,
    "url": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_month.geojson",
    "title": "USGS All Earthquakes, Past Month",
    "status": 200,
    "api": "1.7.0",
    "count": 8419
  },
  "features": [
    {
      "type": "Feature",
      "properties": {
        "mag": 2.3,
        "place": "44km SE of Redoubt Volcano, Alaska",
        "time": 1552736060879,
        "updated": 1552736366711,
        "tz": -540,
        "url": "https://earthquake.usgs.gov/earthquakes/eventpage/ak0193g824nc",
        "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/ak0193g824nc.geojson",
        "felt": null,
        "cdi": null,
        "mmi": null,
        "alert": null,
        "status": "automatic",
        "tsunami": 0,
        "sig": 81,
        "net": "ak",
        "code": "0193g824nc",
        "ids": "ak0193g824nc",
        "sources": "ak",
        "types": "geoserve,origin",
        "nst": null,
        "dmin": null,
        "rms": 1.4,
        "gap": null,
        "magType": "ml",
        "type": "earthquake",
        "title": "M 2.3 - 44km SE of Redoubt Volcano, Alaska"
      },
      "geometry": {
        "type": "Point",
        "coordinates": [-152.2208, 60.1776, 15.7]
      },
      "id": "ak0193g824nc"
    },
    {
      "type": "Feature",
      "properties": {
        "mag": 4,
        "place": "76km S of Kobuk, Alaska",
        "time": 1552733782196,
        "updated": 1552736970673,
        "tz": -540,
        "url": "https://earthquake.usgs.gov/earthquakes/eventpage/ak0193g71f43",
        "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/ak0193g71f43.geojson",
        "felt": null,
        "cdi": null,
        "mmi": 3.91,
        "alert": "green",
        "status": "reviewed",
        "tsunami": 0,
        "sig": 246,
        "net": "ak",
        "code": "0193g71f43",
        "ids": "ak0193g71f43,us1000jh0v",
        "sources": "ak,us",
        "types": "geoserve,losspager,origin,phase-data,shakemap",
        "nst": null,
        "dmin": null,
        "rms": 0.68,
        "gap": null,
        "magType": "ml",
        "type": "earthquake",
        "title": "M 4.0 - 76km S of Kobuk, Alaska"
      },
      "geometry": {
        "type": "Point",
        "coordinates": [-157.3667, 66.3303, 3.3]
      },
      "id": "ak0193g71f43"
    },
    {
      "type": "Feature",
      "properties": {
        "mag": 1.75,
        "place": "8km E of Pahala, Hawaii",
        "time": 1552733623080,
        "updated": 1552733824310,
        "tz": -600,
        "url": "https://earthquake.usgs.gov/earthquakes/eventpage/hv70867712",
        "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/hv70867712.geojson",
        "felt": null,
        "cdi": null,
        "mmi": null,
        "alert": null,
        "status": "automatic",
        "tsunami": 0,
        "sig": 47,
        "net": "hv",
        "code": "70867712",
        "ids": "hv70867712",
        "sources": "hv",
        "types": "geoserve,origin,phase-data",
        "nst": 40,
        "dmin": 0.02398,
        "rms": 0.12,
        "gap": 155,
        "magType": "md",
        "type": "earthquake",
        "title": "M 1.8 - 8km E of Pahala, Hawaii"
      },
      "geometry": {
        "type": "Point",
        "coordinates": [-155.4044952, 19.2143326, 32.14]
      },
      "id": "hv70867712"
    }
  ]
}
```

The result is shown in plain text below:

```
{
  "type": "FeatureCollection",
  "metadata": {
    "generated": 1552737104000,
    "url": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_month.geojson",
    "title": "USGS All Earthquakes, Past Month",
    "status": 200,
    "api": "1.7.0",
    "count": 8419
  },
  "features": [
    {
      "type": "Feature",
      "properties": {
        "mag": 2.3,
        "place": "44km SE of Redoubt Volcano, Alaska",
        "time": 1552736060879,
        "updated": 1552736366711,
        "tz": -540,
        "url": "https://earthquake.usgs.gov/earthquakes/eventpage/ak0193g824nc",
        "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/ak0193g824nc.geojson",
        "felt": null,
        "cdi": null,
        "mmi": null,
        "alert": null,
        "status": "automatic",
        "tsunami": 0,
        "sig": 81,
        "net": "ak",
        "code": "0193g824nc",
        "ids": "ak0193g824nc",
        "sources": "ak",
        "types": "geoserve,origin",
        "nst": null,
        "dmin": null,
        "rms": 1.4,
        "gap": null,
        "magType": "ml",
        "type": "earthquake",
        "title": "M 2.3 - 44km SE of Redoubt Volcano, Alaska"
      },
      "geometry": {
        "type": "Point",
        "coordinates": [-152.2208, 60.1776, 15.7]
      },
      "id": "ak0193g824nc"
    },
    {
      "type": "Feature",
      "properties": {
        "mag": 4,
        "place": "76km S of Kobuk, Alaska",
        "time": 1552733782196,
        "updated": 1552736970673,
        "tz": -540,
        "url": "https://earthquake.usgs.gov/earthquakes/eventpage/ak0193g71f43",
        "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/ak0193g71f43.geojson",
        "felt": null,
        "cdi": null,
        "mmi": 3.91,
        "alert": "green",
        "status": "reviewed",
        "tsunami": 0,
        "sig": 246,
        "net": "ak",
        "code": "0193g71f43",
        "ids": "ak0193g71f43,us1000jh0v",
        "sources": "ak,us",
        "types": "geoserve,losspager,origin,phase-data,shakemap",
        "nst": null,
        "dmin": null,
        "rms": 0.68,
        "gap": null,
        "magType": "ml",
        "type": "earthquake",
        "title": "M 4.0 - 76km S of Kobuk, Alaska"
      },
      "geometry": {
        "type": "Point",
        "coordinates": [-157.3667, 66.3303, 3.3]
      },
      "id": "ak0193g71f43"
    },
    {
      "type": "Feature",
      "properties": {
        "mag": 1.75,
        "place": "8km E of Pahala, Hawaii",
        "time": 1552733623080,
        "updated": 1552733824310,
        "tz": -600,
        "url": "https://earthquake.usgs.gov/earthquakes/eventpage/hv70867712",
        "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/hv70867712.geojson",
        "felt": null,
        "cdi": null,
        "mmi": null,
        "alert": null,
        "status": "automatic",
        "tsunami": 0,
        "sig": 47,
        "net": "hv",
        "code": "70867712",
        "ids": "hv70867712",
        "sources": "hv",
        "types": "geoserve,origin,phase-data",
        "nst": 40,
        "dmin": 0.02398,
        "rms": 0.12,
        "gap": 155,
        "magType": "md",
        "type": "earthquake",
        "title": "M 1.8 - 8km E of Pahala, Hawaii"
      },
      "geometry": {
        "type": "Point",
        "coordinates": [-155.4044952, 19.2143326, 32.14]
      },
      "id": "hv70867712"
    }
  ]
}
```

```

    "mmi": null,
    "alert": null,
    "status": "automatic",
    "tsunami": 0,
    "sig": 81,
    "net": "ak",
    "code": "0193g824nc",
    "ids": ",ak0193g824nc,",
    "sources": ",ak,",
    "types": ",geoserve,origin,",
    "nst": null,
    "dmin": null,
    "rms": 1.4,
    "gap": null,
    "magType": "ml",
    "type": "earthquake",
    "title": "M 2.3 - 44km SE of Redoubt Volcano, Alaska"
  },
  "geometry": {
    "type": "Point",
    "coordinates": [
      -152.2208,
      60.1776,
      15.7
    ]
  },
  "id": "ak0193g824nc"
},
{
  "type": "Feature",
  "properties": {
    "mag": 4,
    "place": "76km S of Kobuk, Alaska",
    "time": 1552733782190,
    "updated": 1552736970673,
    "tz": -540,
    "url": "https://earthquake.usgs.gov/earthquakes/eventpage/ak0193g7lf43",
    "detail":
      "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/ak0193g7lf43.geojson",
    "felt": null,
    "cdi": null,
    "mmi": 3.91,
    "alert": "green",
    "status": "reviewed",
    "tsunami": 0,
    "sig": 246,

```

```

    "net": "ak",
    "code": "0193g7lf43",
    "ids": ",ak0193g7lf43,us1000jh0v,",
    "sources": ",ak,us,",
    "types": ",geoserve,losspager,origin,phase-data,shakemap,",
    "nst": null,
    "dmin": null,
    "rms": 0.68,
    "gap": null,
    "magType": "ml",
    "type": "earthquake",
    "title": "M 4.0 - 76km S of Kobuk, Alaska"
  },
  "geometry": {
    "type": "Point",
    "coordinates": [
      -157.3667,
      66.3303,
      3.3
    ]
  },
  "id": "ak0193g7lf43"
},
{
  "type": "Feature",
  "properties": {
    "mag": 1.75,
    "place": "8km E of Pahala, Hawaii",
    "time": 1552733623080,
    "updated": 1552733824310,
    "tz": -600,
    "url": "https://earthquake.usgs.gov/earthquakes/eventpage/hv70867712",
    "detail":
      "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/hv70867712.geojson",
    "felt": null,
    "cdi": null,
    "mmi": null,
    "alert": null,
    "status": "automatic",
    "tsunami": 0,
    "sig": 47,
    "net": "hv",
    "code": "70867712",
    "ids": ",hv70867712,",
    "sources": ",hv,",
    "types": ",geoserve,origin,phase-data,"
  }
}

```

```
"nst": 40,  
"dmin": 0.02398,  
"rms": 0.12,  
"gap": 155,  
"magType": "md",  
"type": "earthquake",  
"title": "M 1.8 - 8km E of Pahala, Hawaii"  
},  
"geometry": {  
  "type": "Point",  
  "coordinates": [  
    -155.4044952,  
    19.2143326,  
    32.14  
  ]  
},  
"id": "hv70867712"  
}  
]  
}
```

Once again, the full response is not shown as it is too large.

AJAX Tutorial

The above methods show you how to access the USGS feed and view the data, however, neither method involves any coding and neither would work well in an application's context. So, in this tutorial we will connect to the monthly feed using AJAX which can then be put into the javascript of any application

Steps:

1. Create a new playcode project
2. Add the provided AJAX code and run

Step 1: Create a new playcode project

For this tutorial, playcode will be used to demonstrate the AJAX request. Although we are using playcode, almost any online JavaScript IDE would work (JsFiddle). If you search for playcode and click on the link you should see the following default project setup:



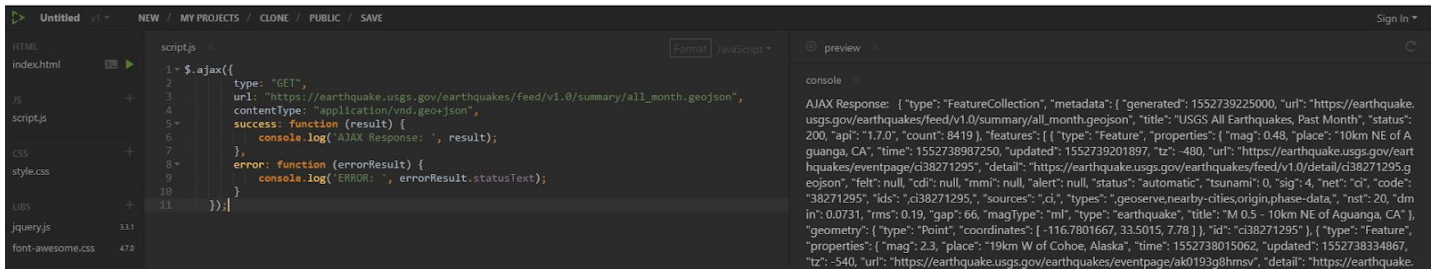
Playcode is ideal for this tutorial as we only need to change the js file and view the console as jquery is referenced as standard

Step 2: Add the provided AJAX code and run

The AJAX required to fetch the data programmatically is:

```
$.ajax({
  type: "GET",
  url: "https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_month.geojson",
  contentType: "application/vnd.geo+json",
  success: function (result) {
    console.log('AJAX Response: ', result);
  },
  error: function (errorResult) {
    console.log('ERROR: ', errorResult.statusText);
  }
});
```

If you replace the contents of script.js with the above AJAX and run the code, you should see the following:



The screenshot shows a code editor with a file named 'script.js' containing the following code:

```
1- $.ajax({
2-   type: "GET",
3-   url: "https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_month.geojson",
4-   contentType: "application/vnd.geo+json",
5-   success: function (result) {
6-     console.log('AJAX Response: ', result);
7-   },
8-   error: function (errorResult) {
9-     console.log('ERROR: ', errorResult.statusText);
10-  }
11-});
```

The console on the right displays the 'AJAX Response' as a JSON object representing a FeatureCollection of earthquakes. The response includes metadata such as 'generated', 'url', 'title', 'status', 'count', and a list of earthquake features with their respective properties like 'mag', 'place', 'time', 'updated', 'tz', 'url', and 'detail'.

As you can see this result looks similar to the other results we have seen earlier in the project, however, this code can be added to an application and the data can be fetched and altered dynamically.

Note: If playcode hangs or feels unresponsive when running this code there is no need to worry, there is a lot of data to process from this feed

Conclusion

That is the methods which can be used to request data from the USGS feeds. The most useful of the methods is AJAX, however, the others can be used for testing and ensuring the quality of the data

Common Issues:

Normally, implementing the methods discussed in this tutorial are relatively easy, however, some of the most common issues are detailed below:

- Lack of responsiveness - Depending on the feed chosen, the method used to fetch the data can seem slow because it has to process thousands of earthquakes sometimes. Normally, the request should complete quite quickly without too much impact on the user

Outcomes

You should now be able to:

- Request data from one of the USGS earthquake feeds in Postman
- Request data from one of the USGS earthquake feeds in a new tab
- Request data from one of the USGS earthquake feeds using AJAX call

References

Although we hope this tutorial has been all the help you need, here are some useful links that may be of use:

Useful Resources:

- USGS data feeds - <https://earthquake.usgs.gov/earthquakes/feed/v1.0/geojson.php>
- Functional playcode AJAX request - <https://playcode.io/268741?tabs=console&script.js&output>

Tools:

- Postman - <https://www.getpostman.com/downloads/>
- Playcode - <https://playcode.io/>