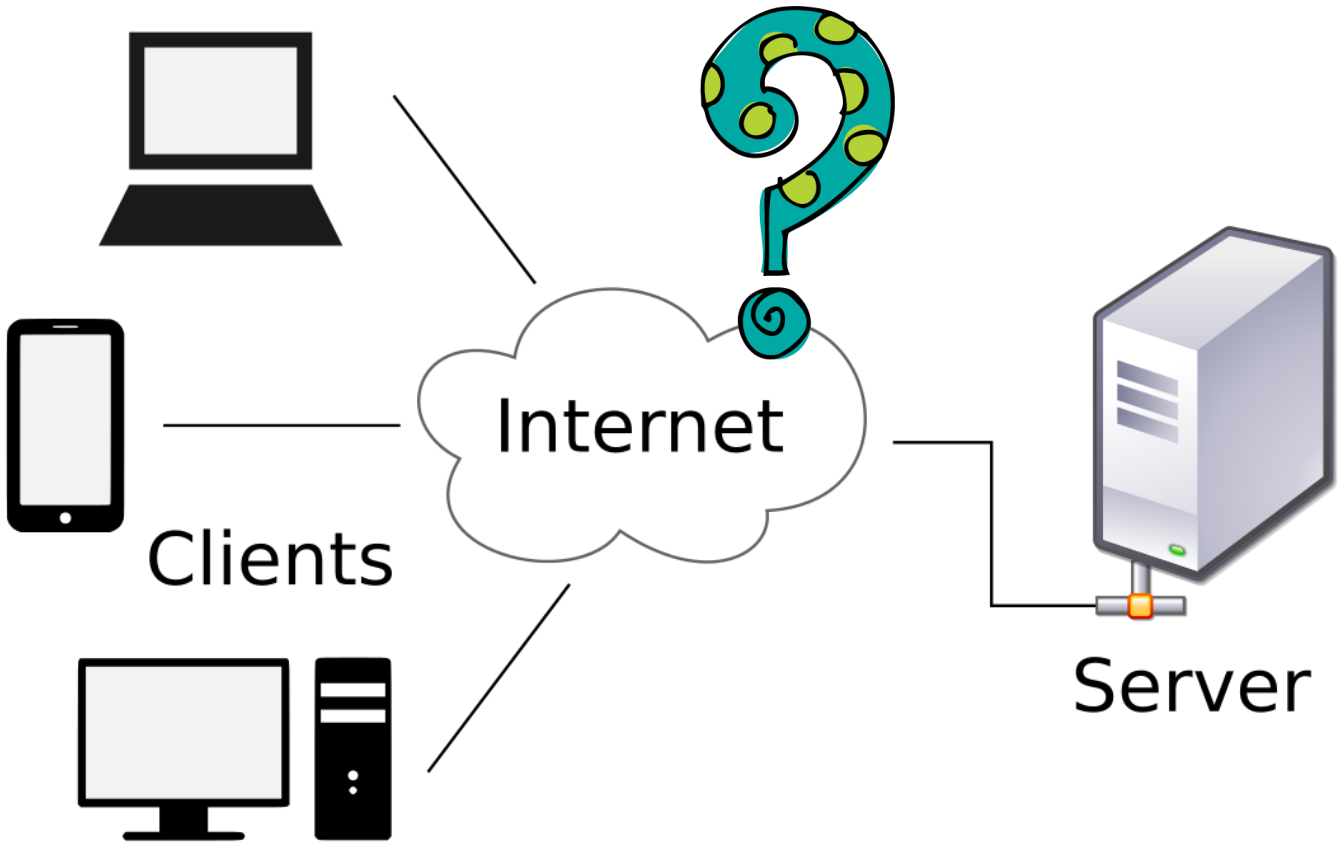
Web GIS 2: Cloud-based GIS

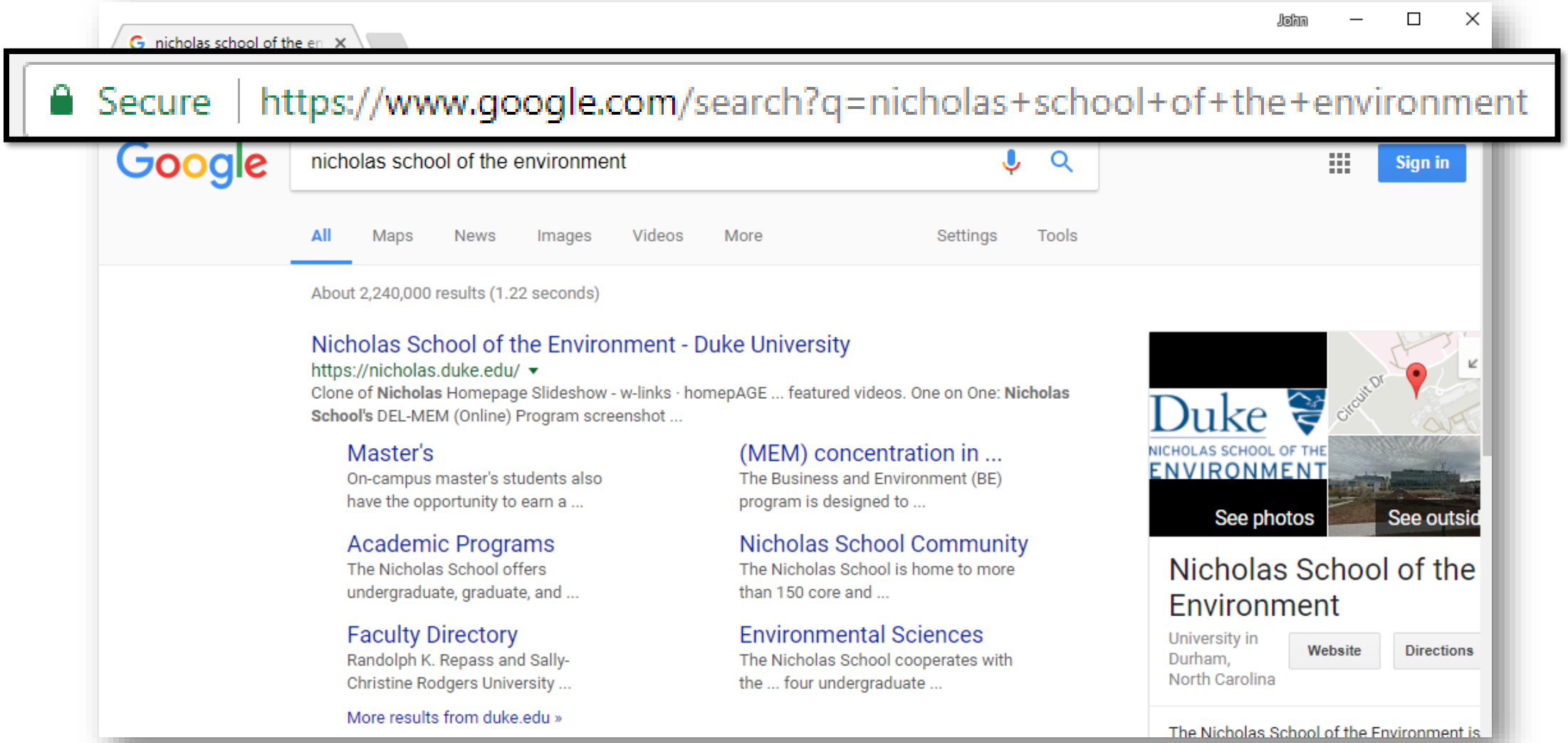
ENV 859 - Advanced GIS

Fay 2017

Client-Server relationship



Web services



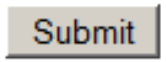
http://lmgtfy.com/?q=nicholas+school+of+the+environment

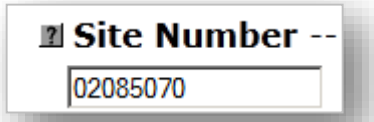
NWIS: A more complex example

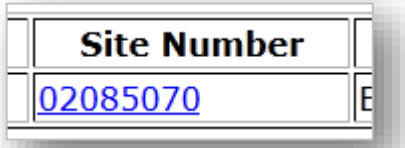
- Go to the NWIS web site that we used to download data for one of our first tutorials: http://waterdata.usgs.gov/nwis
- Click on the 

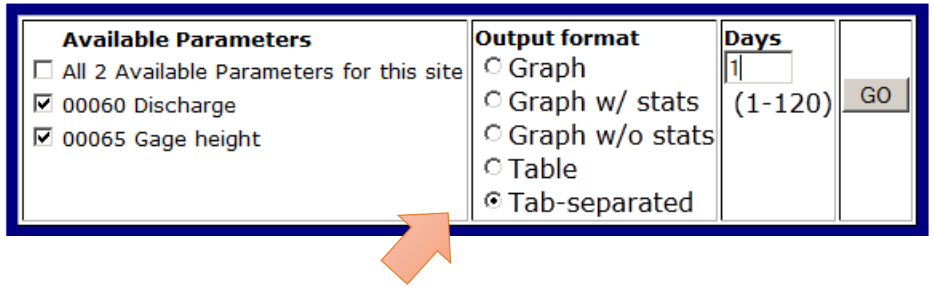
button, then 

- Next, check 

and click 

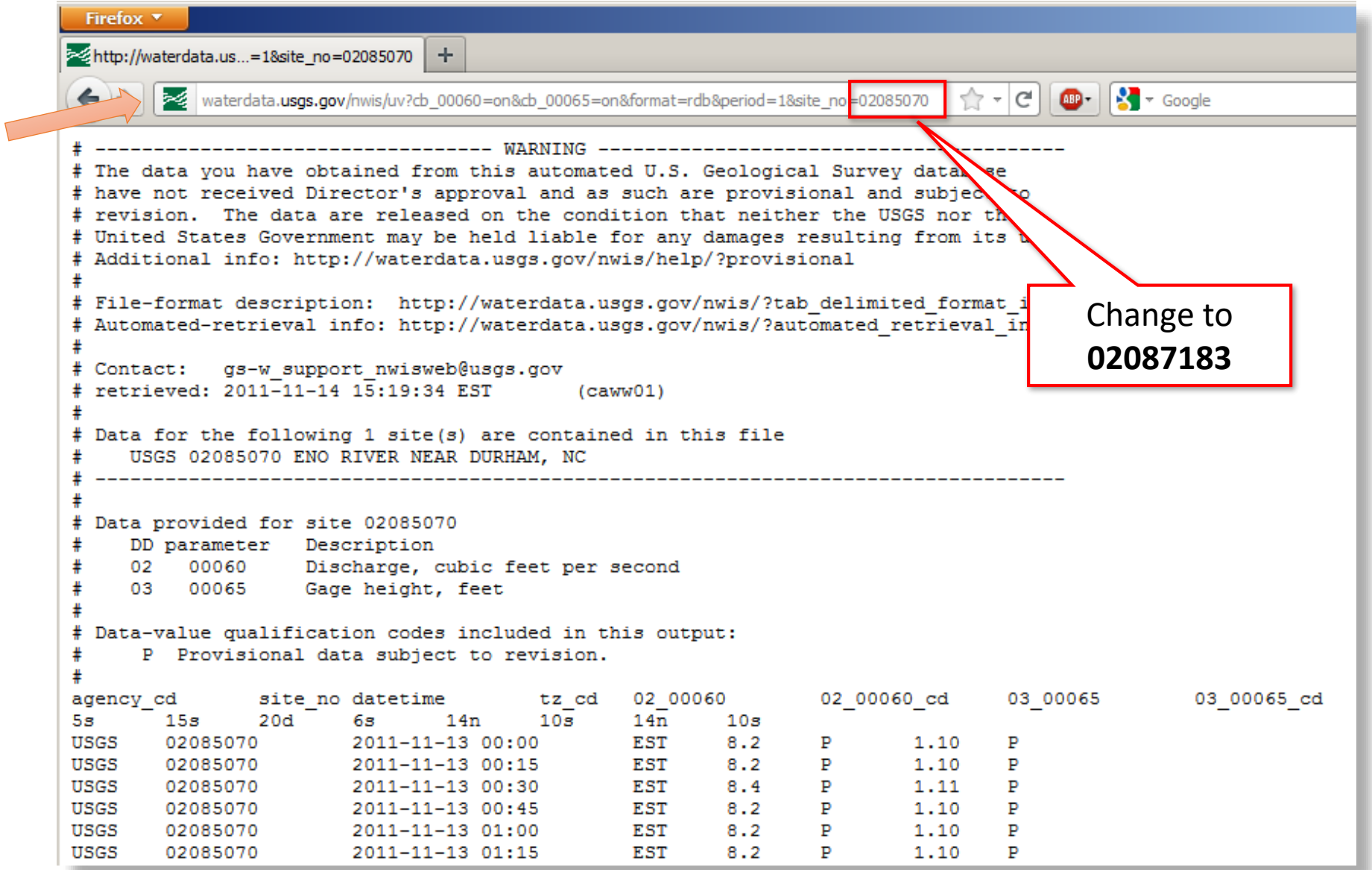
- In the next page, enter the site number **02085070**, accept all the other defaults, and click the **Submit** button. 

- In the next page, click the link in the Site Number column of the table. 



- In the next page, change 'Output Format' to Tab-Separated and 'Days' to 1. Then hit GO.

NWIS data for site *02085070*




```
# ---------------------------------- WARNING ----------------------------------------
# The data you have obtained from this automated U.S. Geological Survey data
# have not received Director's approval and as such are provisional and subject to
# revision.  The data are released on the condition that neither the USGS nor th
# United States Government may be held liable for any damages resulting from its
# Additional info: http://waterdata.usgs.gov/nwis/help/?provisional
#
# File-format description:  http://waterdata.usgs.gov/nwis/?tab_delimited_format_i
# Automated-retrieval info: http://waterdata.usgs.gov/nwis/?automated_retrieval_in
#
# Contact:   gs-w_support_nwisweb@usgs.gov
# retrieved: 2011-11-14 15:19:34 EST       (caww01)
#
# Data for the following 1 site(s) are contained in this file
#    USGS 02085070 ENO RIVER NEAR DURHAM, NC
# ------------------------------------------------------------------------------------
#
# Data provided for site 02085070
#    DD parameter   Description
#    02   00060     Discharge, cubic feet per second
#    03   00065     Gage height, feet
#
# Data-value qualification codes included in this output:
#     P  Provisional data subject to revision.
#
agency_cd       site_no datetime        tz_cd   02_00060        02_00060_cd     03_00065        03_00065_cd
5s      15s     20d     6s      14n     10s     14n     10s
USGS    02085070        2011-11-13 00:00        EST     8.2     P       1.10    P
USGS    02085070        2011-11-13 00:15        EST     8.2     P       1.10    P
USGS    02085070        2011-11-13 00:30        EST     8.4     P       1.11    P
USGS    02085070        2011-11-13 00:45        EST     8.2     P       1.10    P
USGS    02085070        2011-11-13 01:00        EST     8.2     P       1.10    P
USGS    02085070        2011-11-13 01:15        EST     8.2     P       1.10    P
```

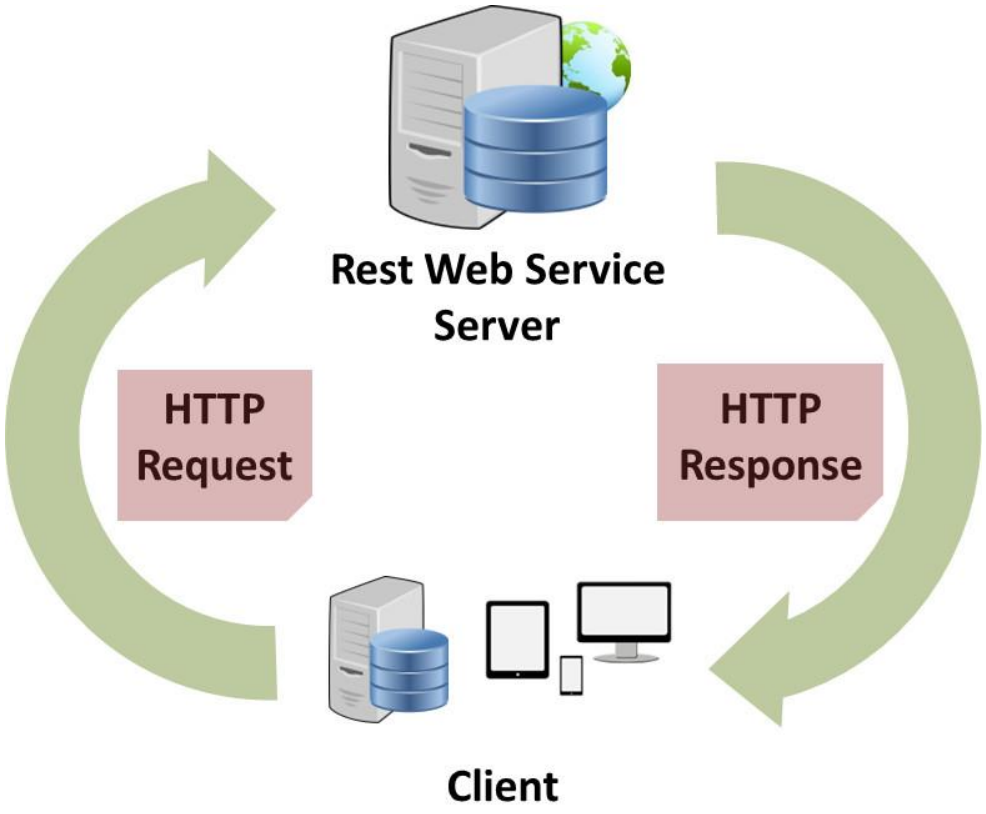
Dissecting the URL

	http://waterdata.usgs.gov/nwis	the web-service provider
	uv	the name of the service
Parameters	cb_00060=on	include discharge data in the output
	cb_00065=on	include gage height data in the output
	format=rdb	list the output as a tab-separated
	period=1	days to include in the output table
	site_no=02085070	the site number

*Parameter lists begin with a "**?**" and items are separated by "**&**"…*

REpresentational State Transfer

https://www.codecademy.com/articles/what-is-rest



1. **Client** sends a request (e.g. via URL) to server

2. **Server** interprets the request, generates a response, and passes it back to the client

Requests *and* responses *are all* ***text*** *objects passed via* ***HTTP****.*

http://people.duke.edu/~jpfay/REST.html

Application Programming Interface

An API is:

- A formalized set of instructions for communicating between a client and server…

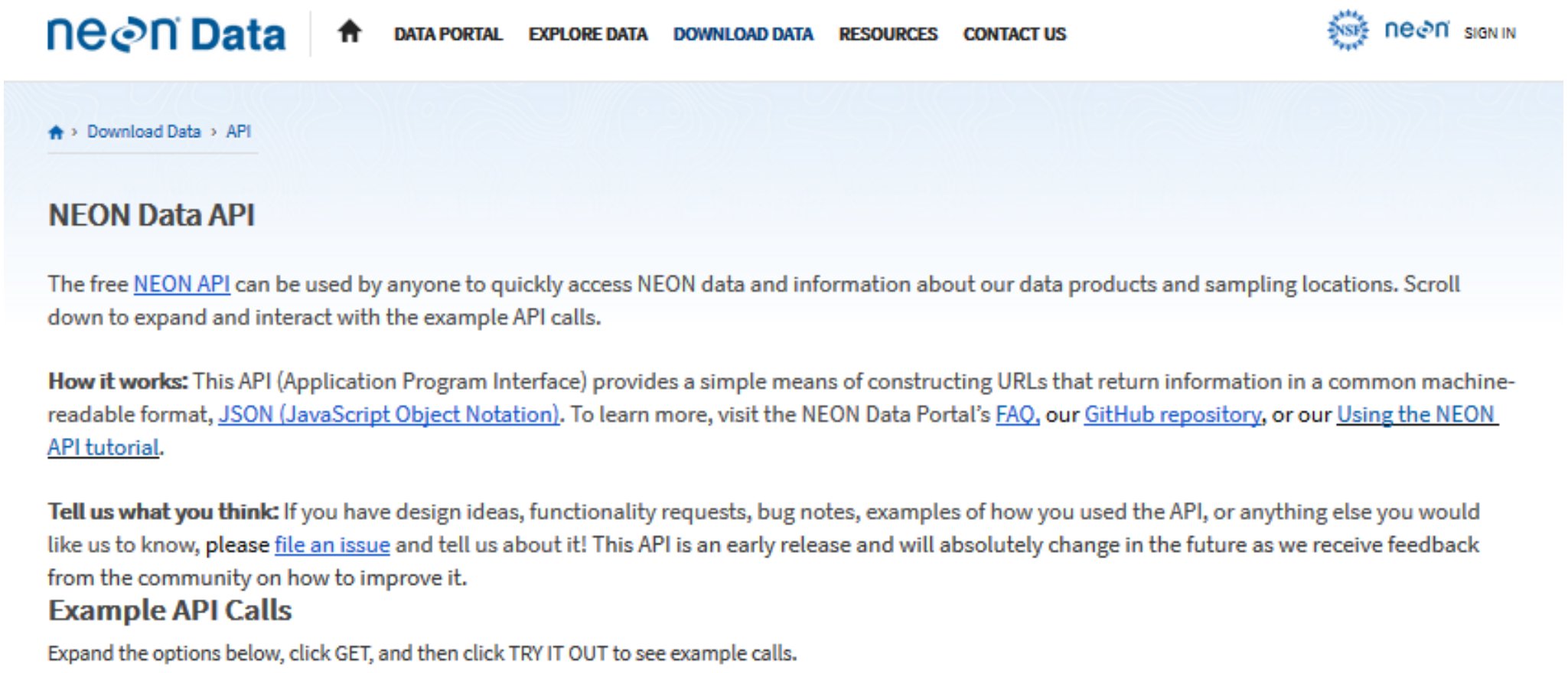
An API "call" consists of:

- The address of the server https://api.census.gov/data/2016/acs/
- The name of the service acs1
- Parameters of the request get=NAME,B01001_001E&for=state:*&key=...

https://api.census.gov/data/2016/acs/acs1?get=NAME,B01001_001E&for=state:*

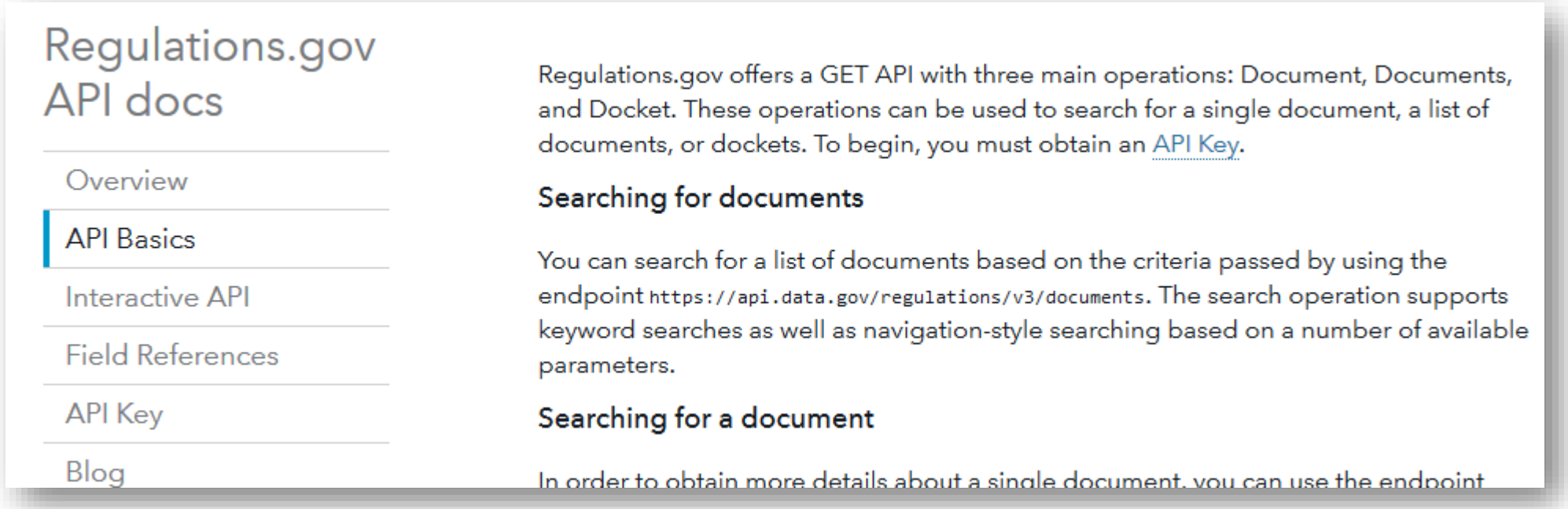
NEON Data API

http://data.neonscience.org/data-api



Regulations.gov API

https://regulationsgov.github.io/developers/

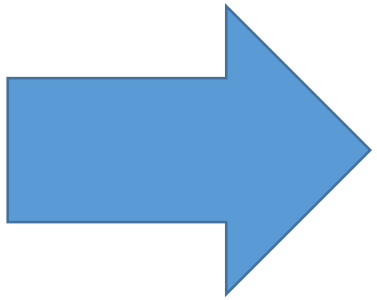


JavaScript Object Notation - JSON

http://sampleserver3.arcgisonline.com/ArcGIS/rest/services/Hurricanes/NOAA_Tracks_1851_2007/MapServer/

find?

searchText=**KATRINA**
&contains=true
&searchFields=
&sr=
&layers=**0**
&layerdefs=
&returnGeometry=true
&maxAllowableOffset=
&f=**pjson**




```
{
  "results" : [
    {
      "layerId" : 0,
      "layerName" : "Hurricane Tracks 1851-2007",
      "displayFieldName" : "NAME",
      "foundFieldName" : "Name",
      "value" : "KATRINA",
      "attributes" : {
        "OBJECTID" : "28739",
        "Shape" : "Polyline",
        "Hurricane ID" : "1078",
        "Name" : "KATRINA",
        "Latitude" : "16.9",
        "Longitude" : "-81.2",
        "Wind Speed" : "25",
        "Pressure" : "1005",
        "Category" : "TD",
        "Basin" : "North Atlantic",
        "Date" : "11/3/1981"
      }
    },
    {
      "layerId" : 0,
```

Demo time! Using APIs in Python

https://github.com/ENV859/UsingAPIs

APIs to get data…

- Revisiting NWIS stream gage data – as an API
- Grabbing species location data using the USGS's *BISON* API
- Grabbing spatial data from an ESRI API

APIs to *process* data…

- Geocoding