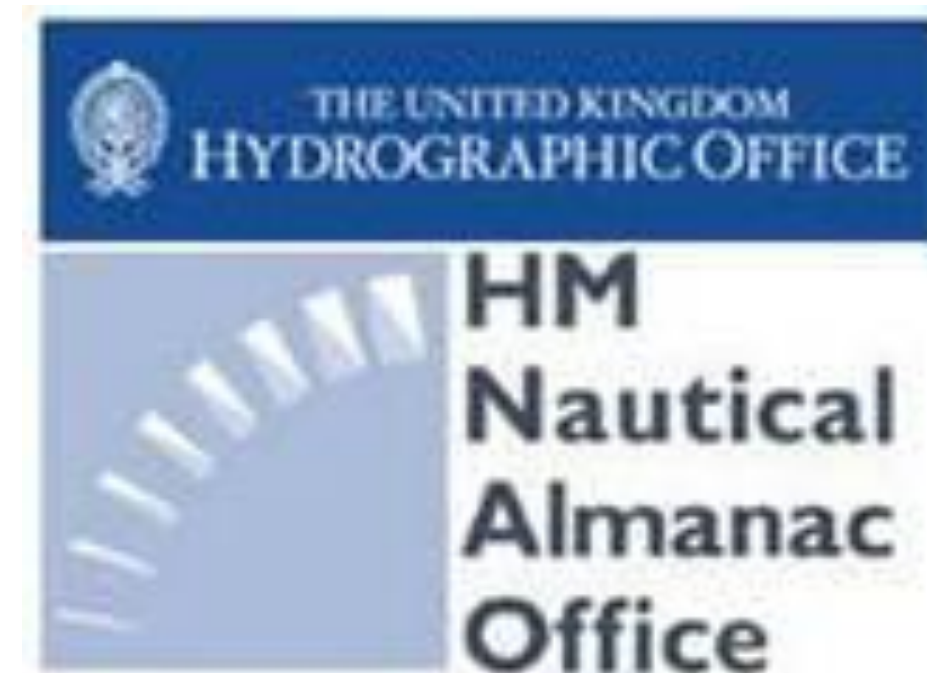


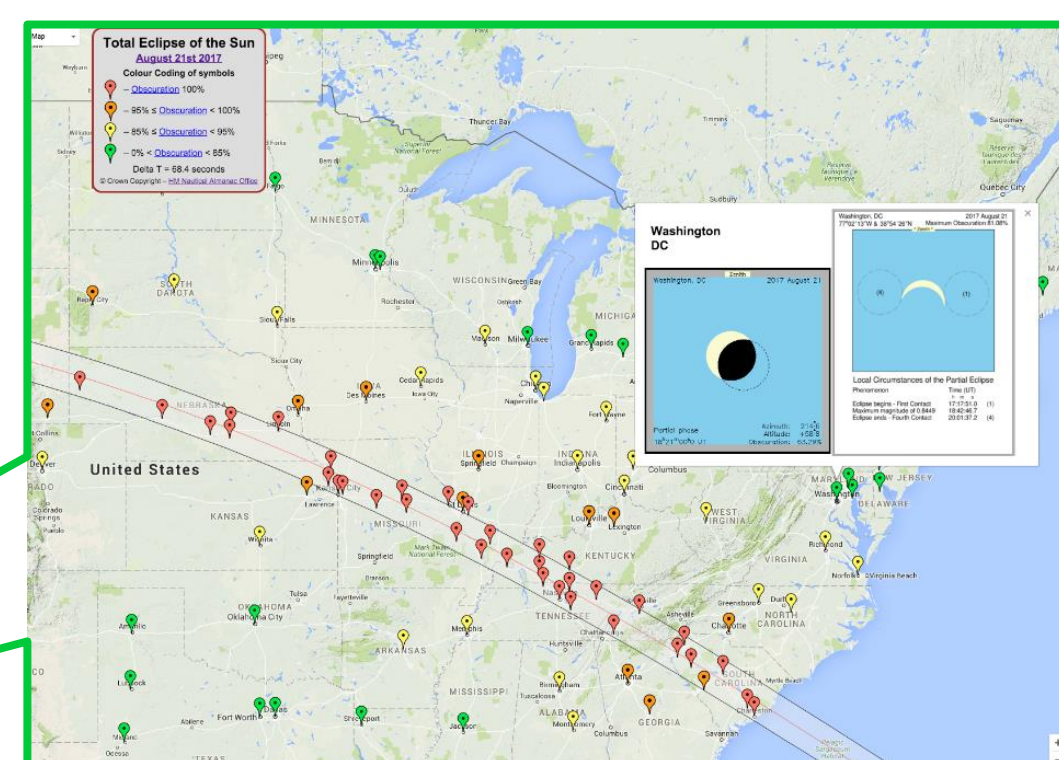
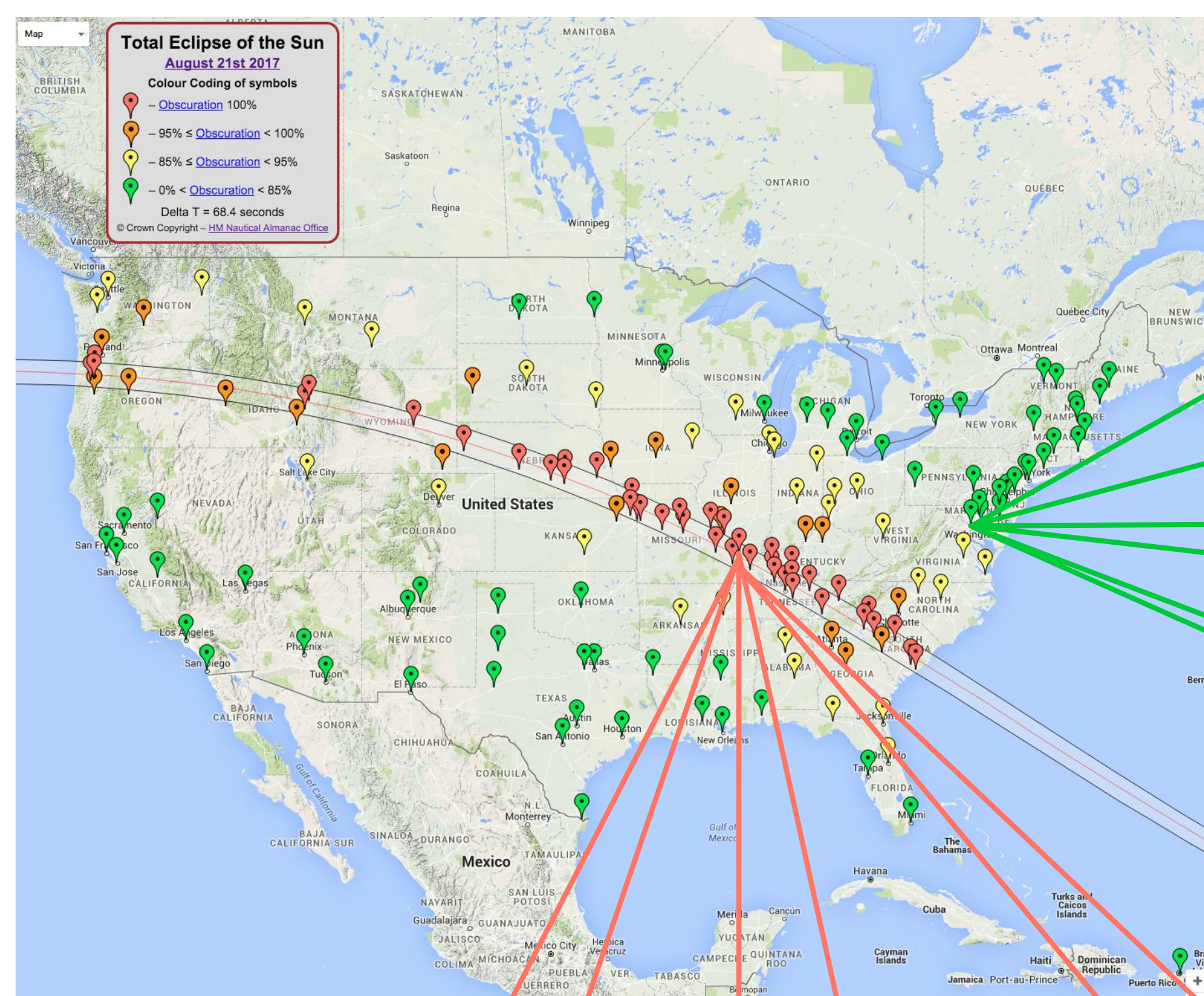


Solar Eclipse Computer API: Planning Ahead for August 2017



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& Steve Bell (HM Nautical Almanac Office)

2017 August 21—Total Solar Eclipse



Solar Eclipse Computer

U.S. Naval Observatory
Astronomical Applications Department

Solar Eclipse of 2017 Aug. 21
Sun in Partial Eclipse at this Location

Washington, District of Columbia (Longitude 77° 1' 48.0", Latitude 38° 53' 24.0", Height 0m)
Delta T: 69.4s

Phenomenon	Day	Time	Altitude	Azimuth	Position Angle	Vertex Angle
Eclipse Begins	21	17:17:33.2	62.9	183.6	284.1	284.4
Maximum Eclipse	21	18:42:48.8	56.2	223.2		
Eclipse Ends	21	20:01:38.9	43.6	246.2	123.6	77.0

Duration: 2h 43m 45.7s
Magnitude: 0.845
Obscuration: 91.1%

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Local Circumstances for 2017 in 3 Ways

HMNAO provides a 2017 total solar eclipse map, which is available on the USNO 2017 August 21 Total Solar Eclipse resource page. The map contains detailed information about the eclipse for selected US cities, including local circumstances, animations, and diagrams.

2017 August 21 Total Solar Eclipse
<http://aa.usno.navy.mil/data/docs/Eclipse2017.php>

USNO provides a simple input form with options for U.S. locations (Form A) or for world-wide locations through coordinate entry (Form B). It produces a formatted tables for the requested site.

Solar Eclipse Computer
<http://aa.usno.navy.mil/data/docs/SolarEclipses.php>

USNO also provides API access to the Solar Eclipse Computer. See the API documentation for all of the options and sample calls. The JSON output can be incorporated into Web sites or applications.

Application Programming Interface
<http://aa.usno.navy.mil/data/docs/api.php>

<http://api.usno.navy.mil/eclipses/solar?loc=Washington,DC&height=50&date=8/21/2017>

Looking for Another Solar Eclipse

<http://api.usno.navy.mil/eclipses/solar?year=2017>



Returning a list of solar eclipses for a requested year is a new feature of the API-enabled Solar Eclipse Computer.

```
{
  "error": false,
  "apiversion": "1.1.0",
  "event": "Solar Eclipse of 2017 Aug. 21",
  "description": "Sun in Total Eclipse at this Location",
  "day": 21,
  "month": 8,
  "year": 2017,
  "deltaT": "69.4s",
  "lat": "38.890000",
  "lon": "-77.030000",
  "height": "50m",
  "tz": "0",
  "local_data": {
    {
      "phenomenon": "Eclipse Begins",
      "day": "21",
      "time": "17:17:33.2",
      "altitude": "62.9",
      "azimuth": "183.6",
      "position_angle": "284.1",
      "vertex_angle": "284.4"
    },
    {
      "phenomenon": "Maximum Eclipse",
      "day": "21",
      "time": "18:42:48.8",
      "altitude": "56.2",
      "azimuth": "223.2"
    },
    {
      "phenomenon": "Eclipse Ends",
      "day": "21",
      "time": "20:01:38.9",
      "altitude": "43.6",
      "azimuth": "246.2",
      "position_angle": "123.6",
      "vertex_angle": "77.0"
    }
  },
  "duration": "2h 43m 45.7s",
  "magnitude": "0.845",
  "obscuration": "91.1%"
}
```

<http://api.usno.navy.mil/eclipses/solar?date=8/21/2017&coords=37.63667,-89.25667&height=0&format=json>

```
{
  "error": false,
  "apiversion": "1.1.0",
  "event": "Solar Eclipse of 2017 Aug. 21",
  "description": "Sun in Total Eclipse at this Location",
  "day": 21,
  "month": 8,
  "year": 2017,
  "deltaT": "69.4s",
  "lat": "37.636667",
  "lon": "-89.256667",
  "height": "0m",
  "tz": "0",
  "local_data": {
    {
      "phenomenon": "Eclipse Begins",
      "day": "21",
      "time": "16:52:23.4",
      "altitude": "60.1",
      "azimuth": "143.1",
      "position_angle": "292.3",
      "vertex_angle": "320.0"
    },
    {
      "phenomenon": "Totality Begins",
      "day": "21",
      "time": "18:20:03.9",
      "altitude": "63.9",
      "azimuth": "191.2",
      "position_angle": "113.8",
      "vertex_angle": "104.9"
    },
    {
      "phenomenon": "Maximum Eclipse",
      "day": "21",
      "time": "18:21:24.1",
      "altitude": "63.7",
      "azimuth": "192.4",
      "position_angle": "114.2",
      "vertex_angle": "78.4"
    },
    {
      "phenomenon": "Totality Ends",
      "day": "21",
      "time": "18:22:46.4",
      "altitude": "63.7",
      "azimuth": "192.4",
      "position_angle": "114.2",
      "vertex_angle": "78.4"
    },
    {
      "phenomenon": "Eclipse Ends",
      "day": "21",
      "time": "19:47:31.2",
      "altitude": "54.8",
      "azimuth": "230.0",
      "position_angle": "114.2",
      "vertex_angle": "76.0"
    }
  },
  "duration": "2h 55m 07.8s",
  "duration_of_totality": "2m 42.5s",
  "magnitude": "1.015",
  "obscuration": "100.0%"
}
```

Other API-enabled Data Services

Complete Sun and Moon Data for One Day
(Rise, transit, & set times for the Sun & Moon plus lunar phase)
http://aa.usno.navy.mil/data/docs/RS_OneDay.php

Phases of the Moon
(Dates and times of the primary lunar phases)
<http://aa.usno.navy.mil/data/docs/MoonPhase.php>

Day and Night Across the Earth
(Creates synthetic view of the Earth's surface for specified time)
<http://aa.usno.navy.mil/data/docs/earthview.php>

Apparent Disk of a Solar System Object
(Simulates appearance of selected bodies in a small telescope for specified time)
<http://aa.usno.navy.mil/data/docs/diskmap.php>

And more in progress ...

Image Acknowledgements

USNO images used unless otherwise indicated.
Clipart Panda. 2014. "Keyboard Clip Art," digital clip art, [ClipartPanda.com](http://www.clipartpanda.com) (CA: Clipart Panda) http://www.clipartpanda.com/clipart_images/keyboard-clip-art-17456135 last accessed 2015 Dec 29
Freepik. 2014. "Hands Typing on Keyboard," digital clip art, [Freepik.com](http://www.freepik.com) (Málaga, España: Graphic Resources) http://www.freepik.com/free-vector/hands-typing-on-keyboard_761450.htm#term=computer&page=1&position=2 last accessed 2015 Dec 29
Kelly. 2012. "Typing on Keyboard," digital clip art, [Clker.com](http://www.clker.com) (Oswego, IL: Rolera) <http://www.clker.com/clipart-240597.html> last accessed 2015 Dec 29
Map data copyright 2015 Google

Abstract

With the total solar eclipse of 2017 August 21 over the continental United States approaching, the USNO on-line Solar Eclipse Computer can now be accessed via an application programming interface (API). This flexible interface returns local circumstances for any solar eclipse in JavaScript Object Notation (JSON) that can be incorporated into third-party Web sites or applications. For a given year, it can also return a list of solar eclipses that can be used to build a more specific request for local circumstances.

Over the course of a particular eclipse as viewed from a specific site, several events may be visible: the beginning and ending of the eclipse (1st & 4th contacts), the beginning and ending of totality (2nd & 3rd contacts), the moment of maximum eclipse, sunrise, or sunset. For each of these events, the USNO Solar Eclipse Computer reports the time, Sun's altitude and azimuth, and the event's position and vertex angles. The computer also reports the duration of the total phase, the duration of the eclipse, the magnitude of the eclipse, and the percent of the Sun obscured for a particular eclipse site.

For More Information

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