

I wrote to a dead address in a
deleted PDF and now I know
where all the airplanes are!!

!!Con 2017 • May 6, 2017

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One of the dangers of working freelance, as I have done for the last decade, is the temptation to start viewing yourself the way that your clients tend to do:



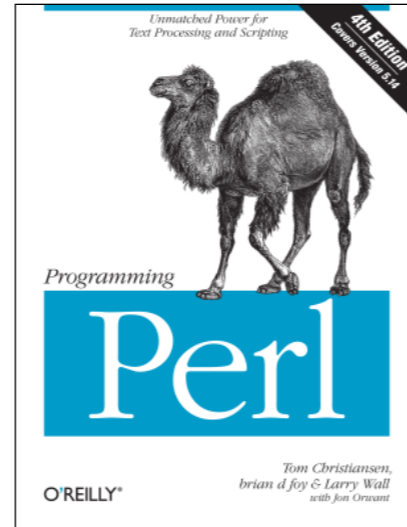
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as a wizard, ensconced in your high tower, with only



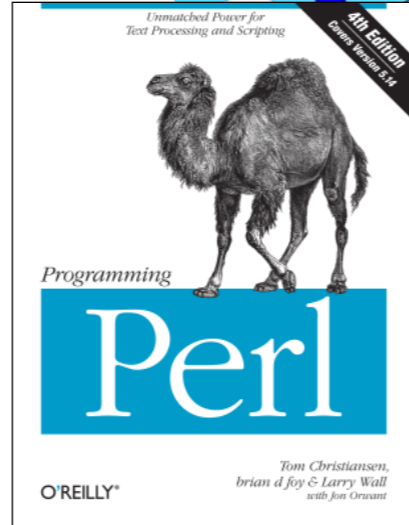
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your grimoire and



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your Palantir, working in beautiful isolation to



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bend reality to match your will. The danger lurks in how this view can feel quite accurate -- 90 percent of the time.



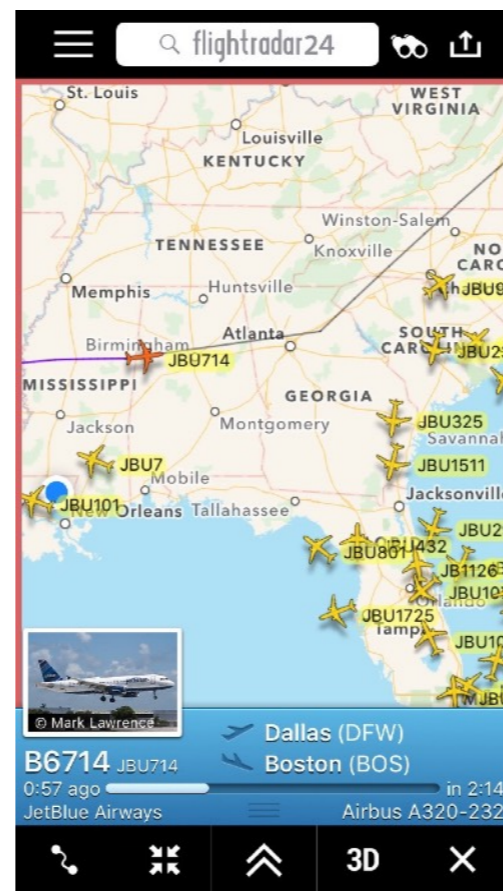
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But sealing yourself off like this all the time can block even the most experienced hacker from realizing some of their best work, which requires not just showing up at conferences and such



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but truly venturing outside one's comfort zone, taking the initiative to reach out and ask for knowledge, access, or perspective that will never come through a mere search query.

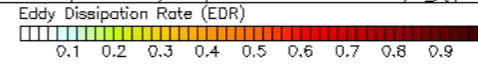
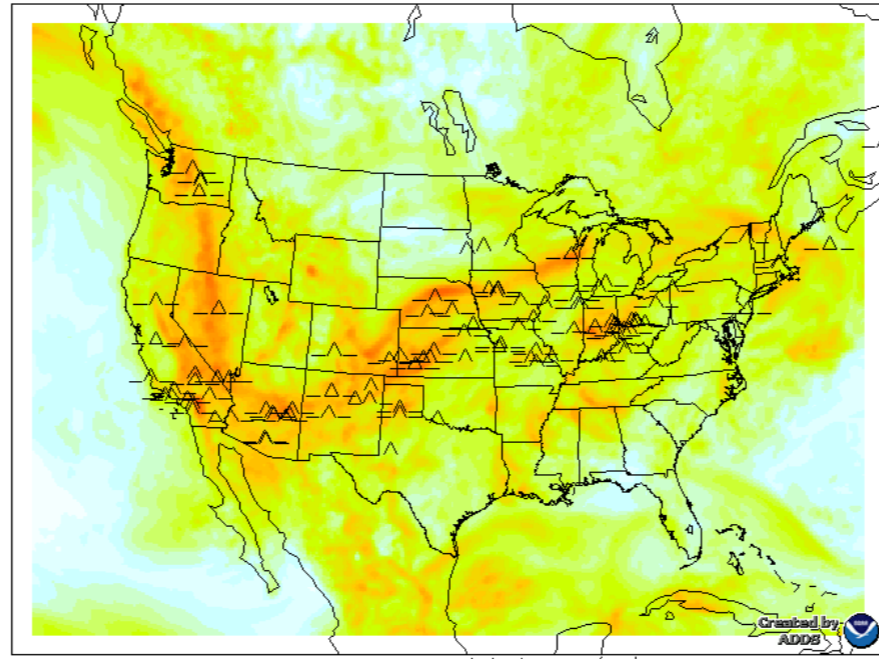


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In November 2015 I noticed that the FlightRadar iPhone app somehow knew ahead of time that the plane I sat on would take a slight left turn over Atlanta — implying that the app had access to commercial flight plans. In a flash, I saw that if I could somehow get this data too, then I could write my own app,

GTG - Max combined intensity (1000 ft. MSL to FL500)

00 hr forecast valid 2300 UTC Fri 28 Apr 2017



Turb PIREP Symbols

○ Smooth	^ Light	— Moderate	▲ Severe
- - Smooth-Light	^ Light-Moderate	▲ Moderate-Severe	▲ Extreme

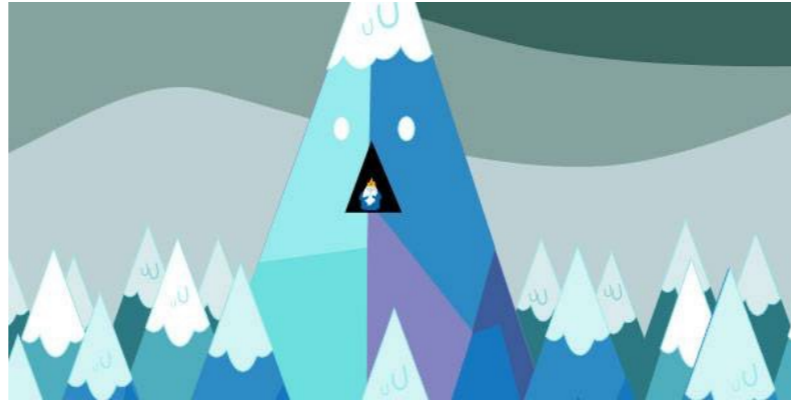
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one that would use weather data, such as that used by NOAA to generate maps like this — to predict turbulence location and intensity during flights, a boon to nervous fliers like me. And so, as with any project,



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I began by retreating into my workshop,



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assuming that I could apply



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all my usual methods of isolated study and experimentation until the day I



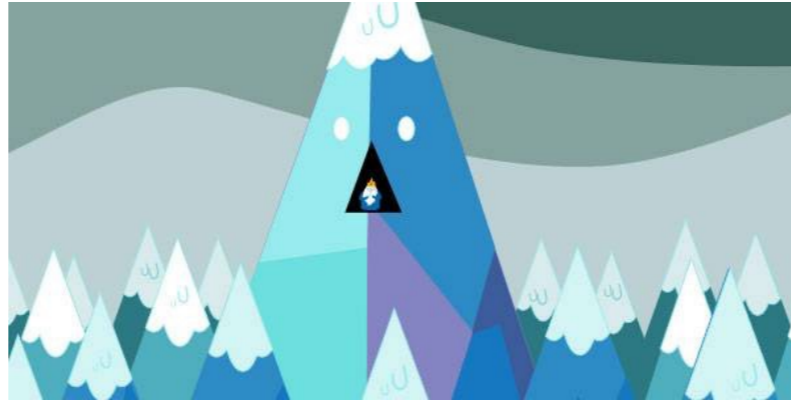
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shipped



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just as I would with



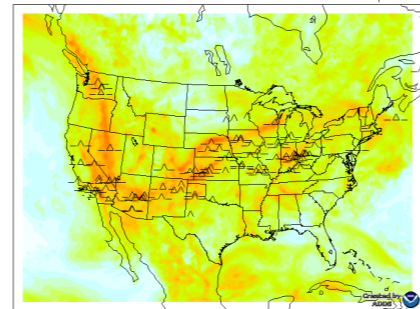
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any client-driven task.

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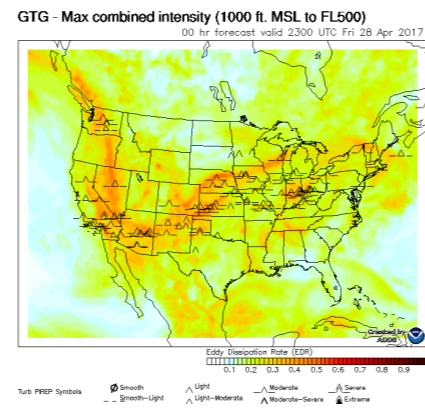
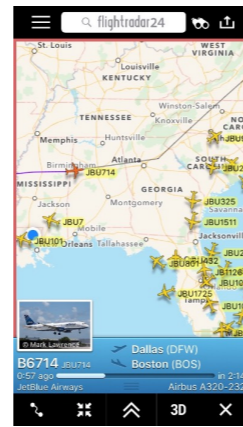
Obviously I would need access to two data sources:

GTG - Max combined intensity (1000 ft. MSL to FL500)
00 hr forecast valid 2300 UTC Fri 28 Apr 2017



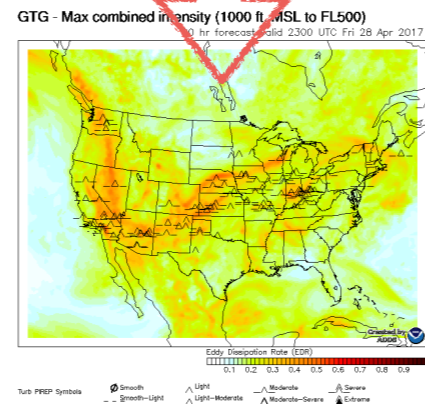
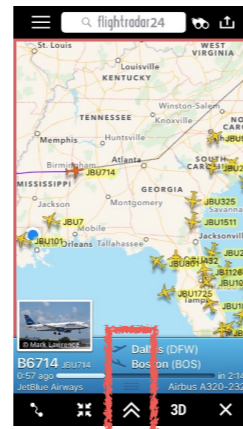
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One for weather conditions,



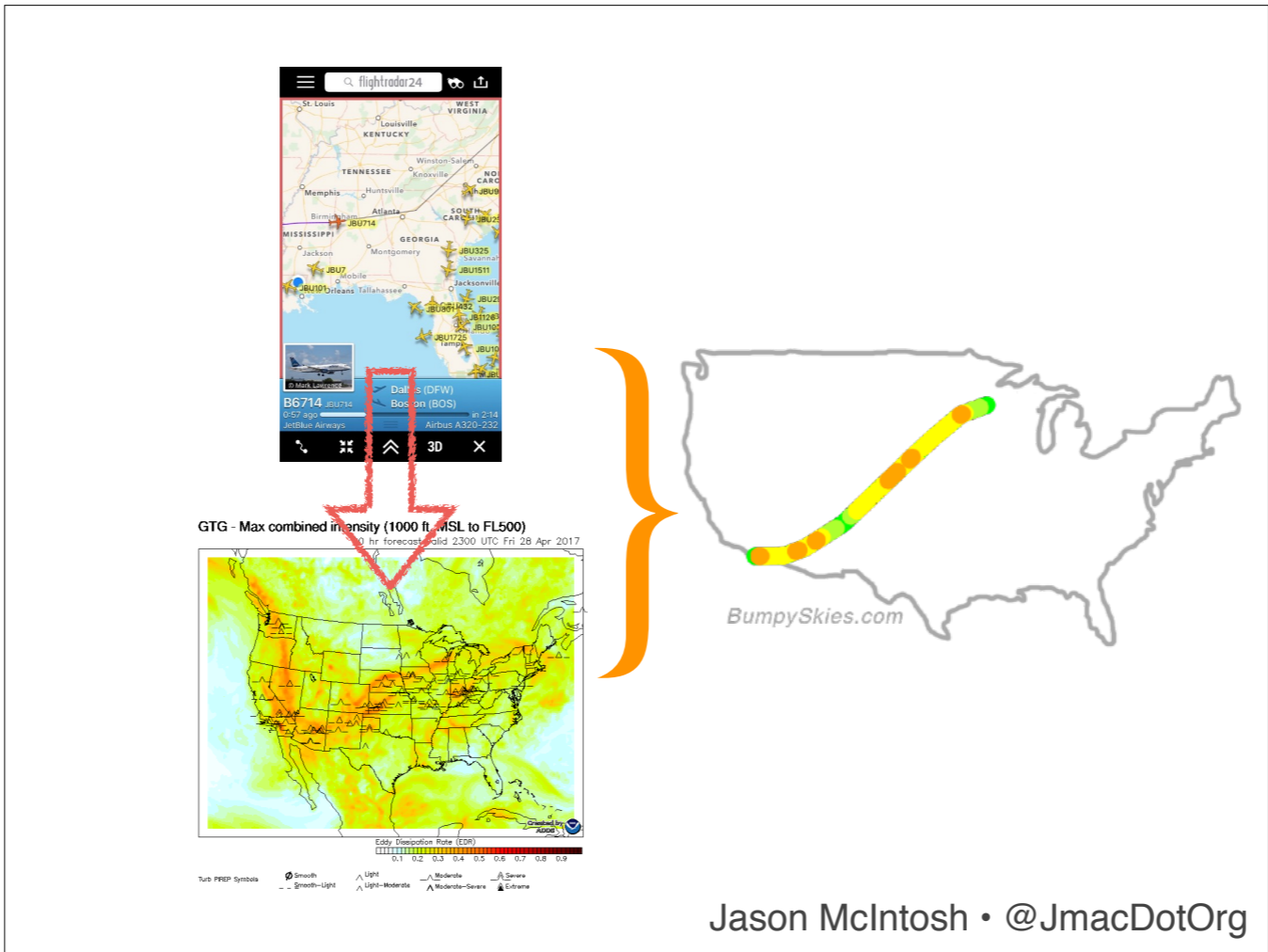
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and one for flight routes. My idea being that for a given flight,



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I'd just run the latter through the former



and show you the numbers, somehow. And my natural introverted starting point was: let's find the public APIs! Surely there are public APIs!



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I started with the flight plans, and to my surprise



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I didn't find any obvious APIs offered by the FAA, even though I had a notion that flight plans were public information. I did quickly find a commercial API

jmacdotorg My FlightAware My Alerts English (USA) 03:57PM EDT

FlightAware All Search for flight, tail, airport, or city Track +1-800-713-8570 Chat


LIVE FLIGHT TRACKING PRODUCTS ADS-B PHOTOS SQUAWKS DISCUSSIONS ABOUT CONTACT

Flight Tracking and Flight Status API

Harness FlightAware's infrastructure to build an awesome aviation app using FlightXML.

Get your FlightAware API key →

View API activity and billing history →



PHP

```
// get flight status on flight
SWA2558
$params = array(
    'ident' => "SWA2558",
    'howMany' => 1,
    'offset' => 0 );
$result = $client->FlightInfoEX($params);
```

JavaScript (with jQuery)

```
// get aviation weather (METAR)
at LAX
$.ajax({
    url: fxml_url + 'Metar',
    data: { 'airport': 'KLAX' },
    dataType: 'jsonp',
    jsonp: 'jsonp_callback',
    xhrFields: { withCredentials:
true }
});
```

Ruby

```
# get tracking data on flights
en route to JFK
result =
client.request(:enroute) do
    soap.body = {
        :airport => 'KJFK',
        :how_many => 10,
        :filter => '',
        :offset => 0
    }
end
```

Python

```
# Get the flights enroute to
KSMO
result =
api.service.Enroute('KSMO', 10,
'', 0)
print result
```

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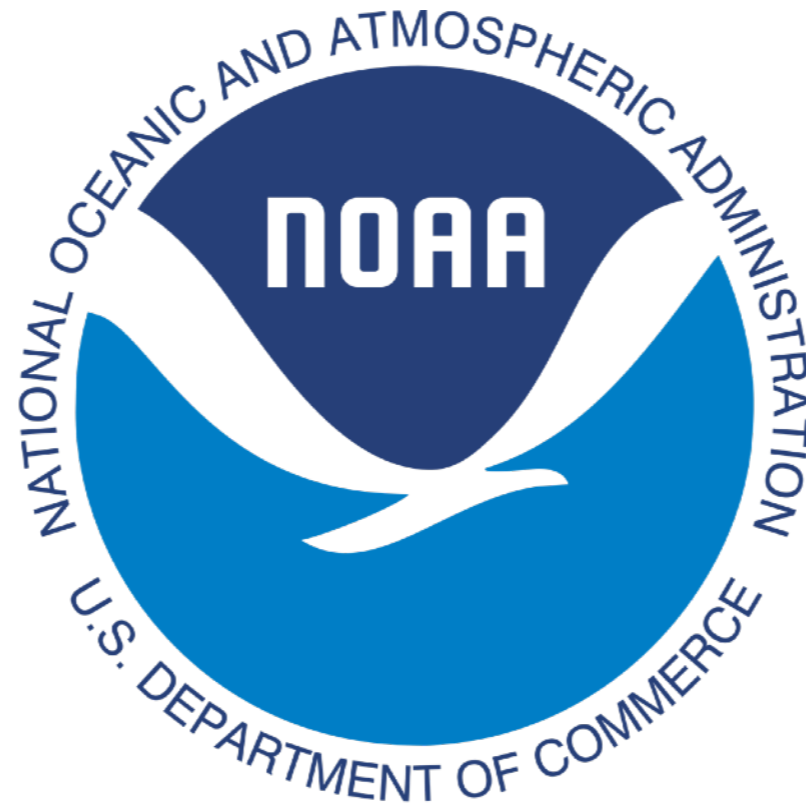
offered by a company called FlightAware, which offered me exactly the information I wanted for

Pricing

Total queries per month	Class 1	Class 2	Class 3	Class 4
1 - 9,999	\$0.0120	\$0.0079	\$0.0020	\$0.0008
10,000 - 24,999	\$0.0070	\$0.0046	\$0.0012	\$0.0005
25,000 - 49,999	\$0.0060	\$0.0040	\$0.0010	\$0.0004
50,000 - 99,999	\$0.0050	\$0.0033	\$0.0008	\$0.0003
100,000 - 249,999	\$0.0040	\$0.0026	\$0.0007	\$0.0003
250,000 - 999,999	\$0.0030	\$0.0020	\$0.0005	\$0.0002
1,000,000 - 4,999,999	\$0.0020	\$0.0013	\$0.0003	\$0.0001
More than 5,000,000?	Contact FlightAware			

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the low low price of two tenths a cent per query. OK, well: so noted. Put that aside for now.



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NOAA! They have public APIs! One even involves air turbulence!

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ADDS Text Data Server ver 1.3

The text data server complements and enhances the ADDS website by providing direct and queryable access to much of the real-time data that is depicted elsewhere on the site.

This service facilitates access to ADDS data via automated computer-to-computer processes and is an ideal mechanism for users who consistently need access to raw data, for those users who need more control over the data than is currently available through the ADDS website, or for users wishing to build custom applications based on ADDS data.

For example, as the text data server only stores the past 3 days of data, and as such is not intended to support historical data access, one might build a client application that automatically contacts the text data server at regular intervals to obtain records of interest and store them locally, thus building their own history. Further, one might build custom aviation/weather tools for a website, desktop application, or mobile device.

One of the features of the text data server is the ability to request data specific to an intended use. Clients target specific areas of interest and limit the volume of data returned by including product specific constraints in their requests. Some constraints limit results by space and time, some perform sophisticated operations - such as returning data adjacent to a user-specified flight path, and others are required with high-volume data products to reduce load on the server.

```

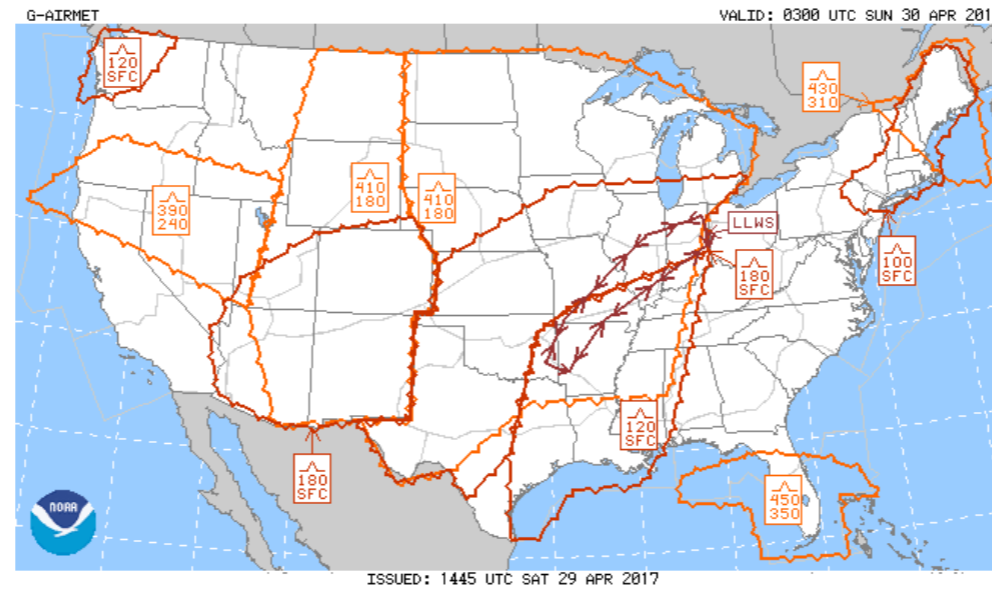
<?xml version="1.0" xmlns="http://www.noaa.gov/avweather/adds/schema/metar_1.xsd"
  <request_index>326</request_index>
  <data_source name="metars" />
  <request_type="metars" />
  <errors />
  <warnings />
  <time_taken_ms>5</time_taken_ms>
  <data_num_results>1</data_num_results>
  <data>
    <row_text>EDWH 062532 06000KT 10SM 02000 02100 26/00
    A3007 RMK AO2 SLP123 T02516000</raw_text>
    <station_id>EDWH</station_id>
    <observation_time>2013-01-08T22:51:00Z</observation_time>
    <latitude>39.83</latitude>
    <longitude>-104.65</longitude>
    <temp_c>26.1</temp_c>
    <dewpoint_c>14.0</dewpoint_c>
    <wind_dir_degrees>10</wind_dir_degrees>
    <wind_speed_kt>9</wind_speed_kt>
    <visibility_statute_mi>10.0</visibility_statute_mi>
    <altim_in_hg>30.070866</altim_in_hg>
    <sea_level_pressure_mb>1012.3</sea_level_pressure_mb>
    <quality_control_flags>
      <auto_station>TRUE</auto_station>
      <quality_control_flags>
        <sky_condition sky_cover="100" cloud_base_ft_agl="000" />
        <sky_condition sky_cover="500" cloud_base_ft_agl="18000" />
      </sky_condition>
      <flight_category>VFR</flight_category>
      <metar_type>METAR</metar_type>
      <elevation_m>1640.0</elevation_m>
    </METAR>
  </data>
  </?xml>
  
```

	Examples	Field Description	Output
METARs	Examples	Field Description	Output
Aircraft Reports	Examples	Field Description	Output
TAFs	Examples	Field Description	Output
AIR/SIGMETs	Examples	Field Description	Output
G-AIRMETs	Examples	Field Description	Output
STATION INFO	Examples	Field Description	Output

Please see the [Best Practices](#) and [Summary of Constraints](#) sections. Also see the [Release Notes](#) section.

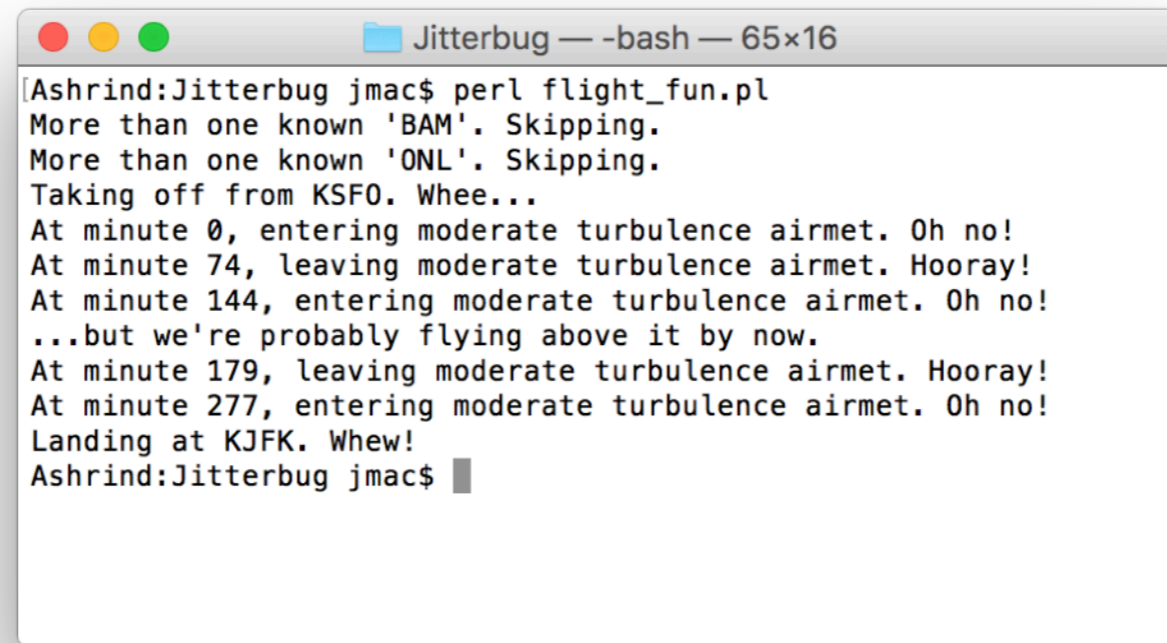
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It's a lot of fun! You can give it a path of geographical fixes and a timestamp and it'll send you XML telling you about all the AIRMETs along the way.



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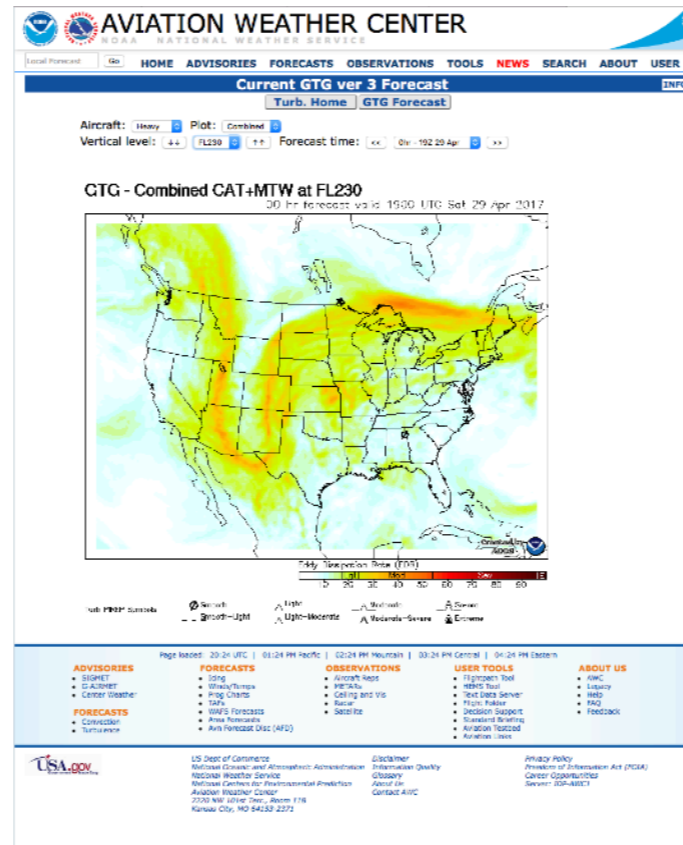
AIRMETs look like this. They're big old irregular polyhedra floating in the air, with floors and ceilings defined at certain altitudes. They define a 3D space that contain an increased likelihood of atmospheric conditions for aircraft passing through them, including turbulence. Sounds perfect!



```
Jitterbug — -bash — 65x16
[Ashrind:Jitterbug jmac$ perl flight_fun.pl
More than one known 'BAM'. Skipping.
More than one known 'ONL'. Skipping.
Taking off from KSFO. Whee...
At minute 0, entering moderate turbulence airmet. Oh no!
At minute 74, leaving moderate turbulence airmet. Hooray!
At minute 144, entering moderate turbulence airmet. Oh no!
...but we're probably flying above it by now.
At minute 179, leaving moderate turbulence airmet. Hooray!
At minute 277, entering moderate turbulence airmet. Oh no!
Landing at KJFK. Whew!
Ashrind:Jitterbug jmac$ █
```


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And I drafted a prototype out of it! And some friends tested it, but it was clearly too broad to be a useful predictor of anything from a passenger's perspective.



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What I wanted was something like this, NOAA's graphical turbulence display, which I've used as part of my own pre-flight meditation for many years. And friends, I sunk many serious hours into the puzzle of downloading and analyzing these images, pixel by pixel,


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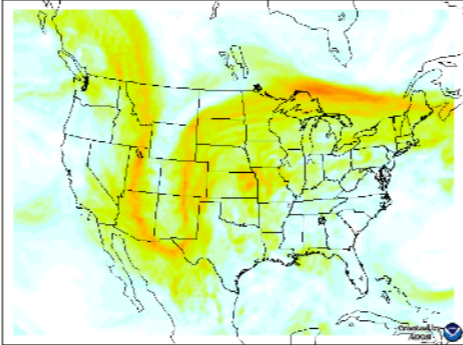
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Current GTG ver 3 Forecast [INFO](#)

[Turb. Home](#) | [GTG Forecast](#)

Aircraft: Heavy | Pilot: Combined
 Vertical level: FL230 Forecast time: 0hr -19Z 29 Apr

GTG - Combined CAT+MTW at FL230
30 hr forecast valid 1500 UTC Sat 29 Apr 2017




Fully Turbulent Area (FTA)
0 20 30 40 50 60 70 80 90

Sub-PRCP Contour | Search | Light | Light-Moderate | Moderate-Severe | Extreme

ADVISORIES <ul style="list-style-type: none"> • SIGMET • C.A.M.E.T. • Center Weather 	FORECASTS <ul style="list-style-type: none"> • Long • Wind/Temps • Prog Charts • TAFs • WWS Forecasts • Area Forecasts • AFB Forecast Disc (AFD) 	OBSERVATIONS <ul style="list-style-type: none"> • Airport Rept • METARs • Celling and Vis • Radar • Satellite 	USER TOOLS <ul style="list-style-type: none"> • Flightplan Tool • METR Tool • Real Data Server • Flight Planner • Decision Support • Turbulent Reporting • Aviation Forecast • Aviation Links 	ABOUT US <ul style="list-style-type: none"> • AWC • Legacy • Help • FAQ • Feedback
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Page loads: 20:24 UTC | 01:24 PM Pacific | 02:24 PM Mountain | 03:24 PM Central | 04:24 PM Eastern


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National Oceanic and Atmospheric Administration
National Weather Service
National Center for Environmental Prediction
Aviation Weather Center
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Kansas City, MO 64128 2271

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before I even began to consider the possibility of doing something with those contact links down at the bottom.



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Now, my wife is a public servant -- that's her on the left. She works as a librarian for the U.S. Navy. And upon hearing my image-analysis woes, she said:



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To send us a message please complete the form below and click Send Message. NOTE: If this form does not work, send email to ncep.awcweb@noaa.gov

Enter your name: *

Enter your email address: *


Subject: *

Message: *

Please verify the letters in this image: * 

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you know, that contact form is probably monitored by someone who cares deeply about their work, seldom hears honest curiosity about it, and who would be absolutely delighted to hear from a member of the taxpaying public for whom they ostensibly labor. This struck me as counterintuitive, given my own



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typical private-sector response to unsolicited requests for my attention from strangers,



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but I like to think I know when to defer to experts.

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To send us a message please complete the form below and click Send Message. NOTE: If this form does not work, send email to ncep.awcweb@noaa.gov

Enter your name: *

Enter your email address: *

Subject: *

Message: *

Please verify the letters in this image: *

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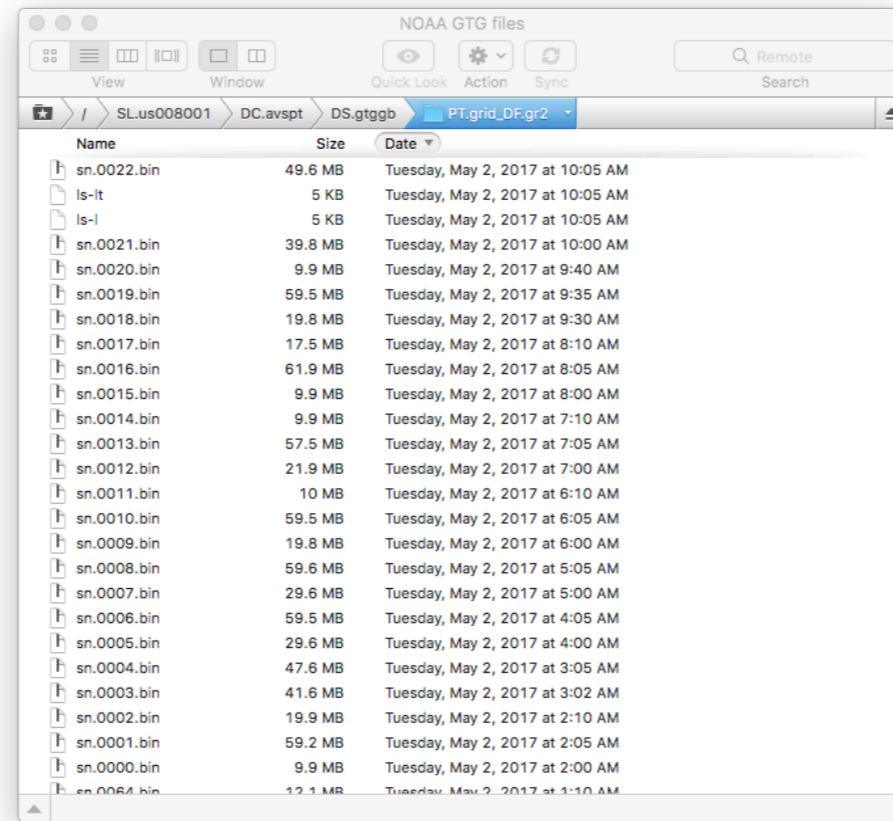
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And so I filled out that contact form. Feeling optimistic about the AIRMET API, I asked if they made their graphical turbulence data available in some plain text format. XML, maybe JSON. And I got a response almost immediately. And they said: JSON or XML files? Yeah, sorry, we don't have any data like that.



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But we do have an anonymous FTP directory full of up-to-the minute weather data using a format that meteorologists use called GRIB, and here is all the information you need to get at it. Would that be useful? And I said:



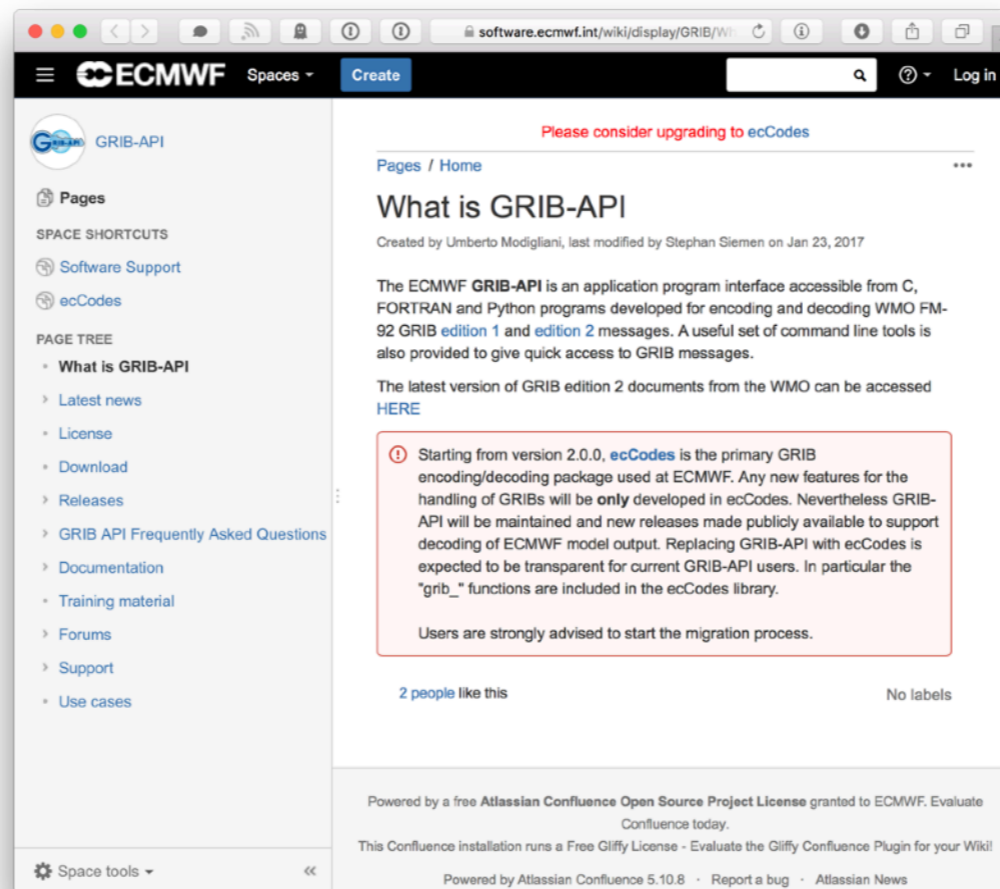
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I'll will let you know. And so I retreated to my tower



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which that particular afternoon was actually the Blue State coffee house in Allston, Massachusetts and there did work I've no doubt most anyone in this room could have done, and I had a great deal of fun. Does there already exist



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a suite of open-source tools specifically for working with GRIB data? Yes. Was it already

The screenshot shows a web browser window displaying the Homebrew Formulas page for 'GribApi'. The browser's address bar shows 'brewformulas.org/GribApi'. The page header includes 'Homebrew Formulas', 'Homebrew project', 'Brewformulas.org', and a search bar with the text 'Formula' and 'Name, filename or description'. The main heading is 'GribApi grib-api' with a 'Tweet' button. Below this is a 'Description' section with a paragraph of text: 'The ECMWF GRIB-API is an application program interface accessible from C, FORTRAN and Python programs developed for encoding and decoding WMO FM-92 GRIB edition 1 and edition 2 messages. A useful set of command line tools is also provided to give quick access to GRIB messages. The latest version of GRIB edition 2 documents from the WMO can be accessed HERE Starting from version 2.0.0, ecCodes is the primary GRIB encoding/decoding package used at ECMWF. Any new features for the handling of GRIBs will be only developed in ecCodes. Nevertheless GRIB-API will be maintained and new releases made publicly available to support decoding of ECMWF model output. Replacing GRIB-API with ecCodes is expected to be transparent for current GRIB-API users.' Below the description is a note: '- Extracted automatically from GribApi homepage'. There is a table with two rows: 'Homepage' with the URL 'https://software.ecmwf.int/wiki/display/GRIB/Home' and 'Version' with the value 'Unavailable'. The 'Install GribApi' section contains a code block with the command 'brew install grib-api'. The 'Dependencies' section shows '3' dependencies: 'Openjpeg', 'Fortran', and 'Jasper'. At the bottom, it says '© Open source from 2013 until 2017'.

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packaged up for macOS Homebrew? Yes. Did it feel indescribably refreshing to work with open source tools that processed data


```

|**** FILE: sn.0017.bin
#===== MESSAGE 1 ( length=21691 )
GRIB {
# Meteorological products (grib2/tables/2
discipline = 0;
editionNumber = 2;
# US National Weather Service - NCEP (WM
centre = 7;
subCentre = 8;
# Start of forecast (grib2/tables/2/1.2.t
significanceOfReferenceTime = 1;
dataDate = 20160116;
dateTime = 1500;
# Operational products (grib2/tables/2/1.
productionStatusOfProcessedData = 0;
# Forecast products (grib2/tables/2/1.4.t
typeOfProcessedData = 1;
numberOfDataPoints = 151987;
# There is no appended list (grib2/tables
interpretationOfNumberOfPoints = 0;
# Lambert Conformal can be secant or tang
2/3.1.table)
gridDefinitionTemplateNumber = 30;
# Earth assumed spherical with radius of
shapeOfTheEarth = 6;
Nx = 451;
Ny = 337;
latitudeOfFirstGridPointInDegrees = 16.28
longitudeOfFirstGridPointInDegrees = 233.
LaInDegrees = 25;
LoInDegrees = 265;
DxInMetres = 13545.1;
DyInMetres = 13545.1;
# (1=0) North Pole is on the projection plane;(2=0) Only one projection centre is
used:grib2/tables/[tablesVersion]/3.5.table
# flags: 00000000
projectionCentreFlag = 0;
iScansNegatively = 0;
jScansPositively = 1;
jPointsAreConsecutive = 0;
alternativeRowScanning = 0;
Latin1InDegrees = 25;
Latin2 = 25000000;
Latin2InDegrees = 25;
latitudeOfSouthernPoleInDegrees = 0;
longitudeOfSouthernPoleInDegrees = 0;
gridType = lambert;
NV = 0;
# Analysis or forecast at a horizontal level or in a horizontal layer at a point in
(grib2/tables/2/4.0.table)
productDefinitionTemplateNumber = 0;
# Physical atmospheric properties (grib2/tables/2/4.1.0.table)
parameterCategory = 19;
# Unknown code table entry (grib2/tables/2/4.2.0.19.table)
parameterNumber = 28;
#-READ ONLY- parameterUnits = 28;
#-READ ONLY- parameterName = 28;
# Forecast (grib2/tables/2/4.3.table)

```

The image contains three main components. On the left is a grid map of the Northern Hemisphere with latitude and longitude lines. In the center is a color-coded map of the United States titled "GTG - Combined CAT+MTW at 5000 ft. MSL" with a subtitle "00 hr forecast valid 1600 UTC Sat". The map shows varying levels of turbulence, with a color scale from light blue (low) to red (high). Below the map is a legend for "Eddy Dissipation Rate (EDR)" with a color scale from 0.1 to 0.6. To the right of the legend are "Turb PREP Symbols" including Smooth, Light, Moderate, and Severe, each with a corresponding symbol and line style.

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for a purpose more focused than data-processing's own sake, as so often feels like the foundation of my career? GOD YES. And my discovery of this territory would have been impossible had I not jumped the track and contacted someone from outside of

stackoverflow Questions Tags Users Badges Unanswered Ask Question

Add a number to another number in JavaScript

hallo
 I have got a number in my JavaScript variable! Now how do I add another number to it? Please

0
 javascript

3 Answers

oldest newest votes

22
 You should definitely use jQuery. It's really great and does all things
 answered 11 minutes ago
 I agree, jQuery is really the best, it solves all kinds of browser problems and is good, as well
 +1 jquery is best quality code ever, if you don't use your a idiot - Worry_Togen 4 mins ago

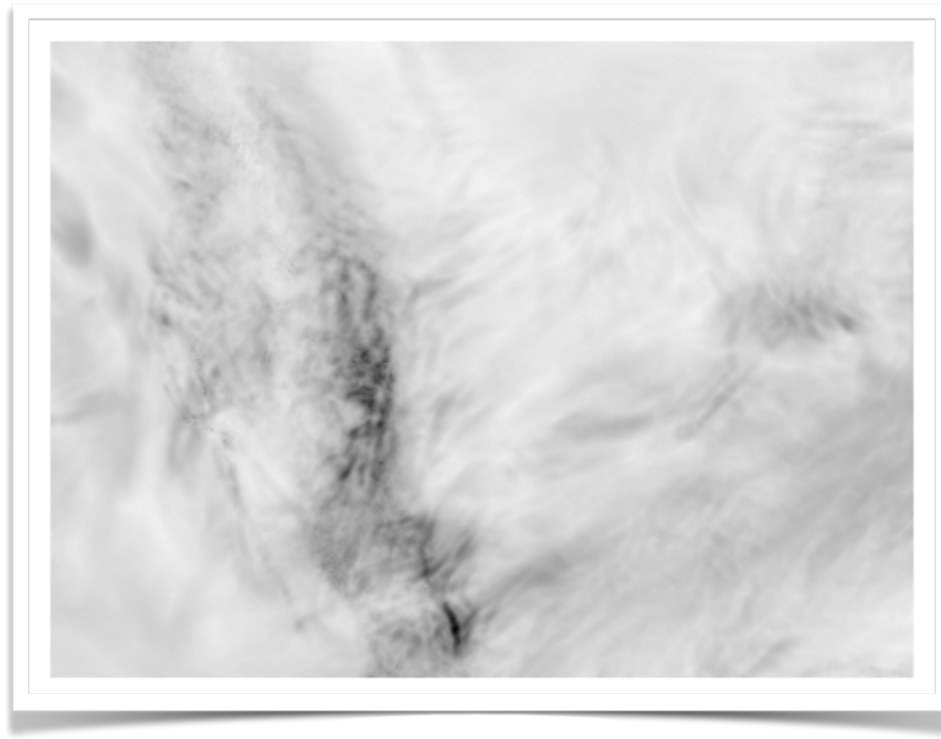
4
 I think there's a jQuery plugin for that. Google for jQuery basic arithmetic plugin.
 answered 5 minutes ago
 yeah, jQuery is definitely the way to go
 I used the jQuery dlet plugin and lost 10kg in a week - Jaty 4 mins ago

-2
 To add numbers together you should use the + operator, for example:
 answered 50 seconds ago
 -1 not enough jQuery - jsum00ds 30 secs ago

tagged javascript x 18553
 asked a while ago
 viewed some times
 latest activity just now
 Wanted: Yet another ASP.NET developer. See this and other great job listings at jobs.stackoverflow.com.
 Related
 What is the best number?
 How can I use JavaScript to parse some HTML, using regex?
 JavaScript: why is my text content getting mangled when I clone nodes? Obviously I must be doing something wrong as jQuery is perfect
 Stupid JavaScript floating point numbers are broken
 How can I extract number from HTML using a regex without matching the same that ends the string?
 Is there a jQuery plugin for making an HTML page appear in the browser?
 Where are my legs?

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my usual sphere. And so I ended up that afternoon



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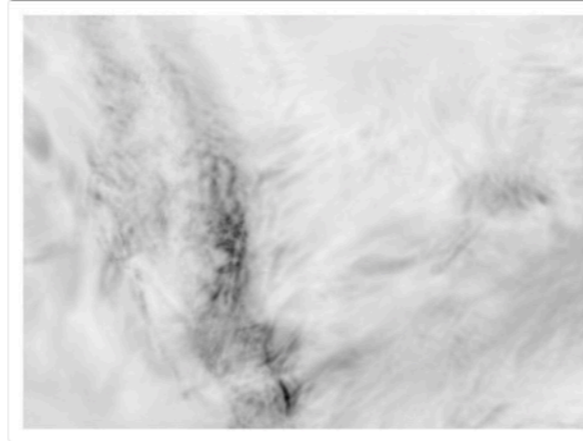
with this. And I felt jubilant! And I



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@JmacDotOrg



Jitterbug progress. Hello, beautiful. [Special note to Facebook friends: this is not an ultrasound. Sorry!]



LIKE

1



2:50 PM - 16 Jan 2016

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posted it to Twitter! Jitterbug being an early code name for the project. And my friend Jenni said



Jenni McCowboymilk
@lycrashampoo Following

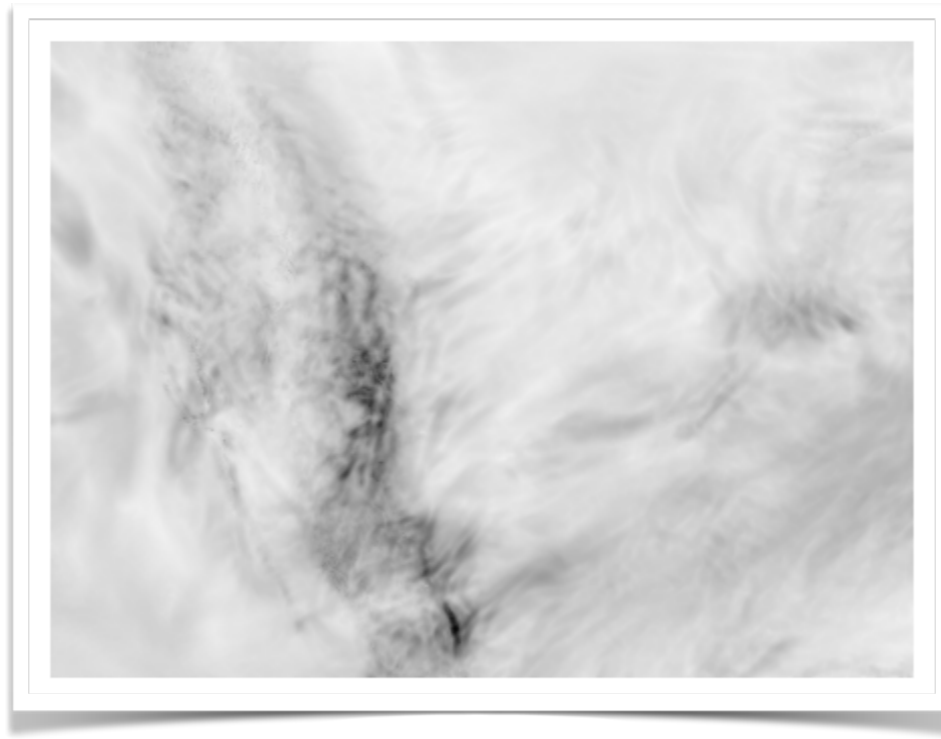
Replying to @JmacDotOrg
[@JmacDotOrg](#) is it a tumor

2:57 PM - 16 Jan 2016

1 reply 1 like

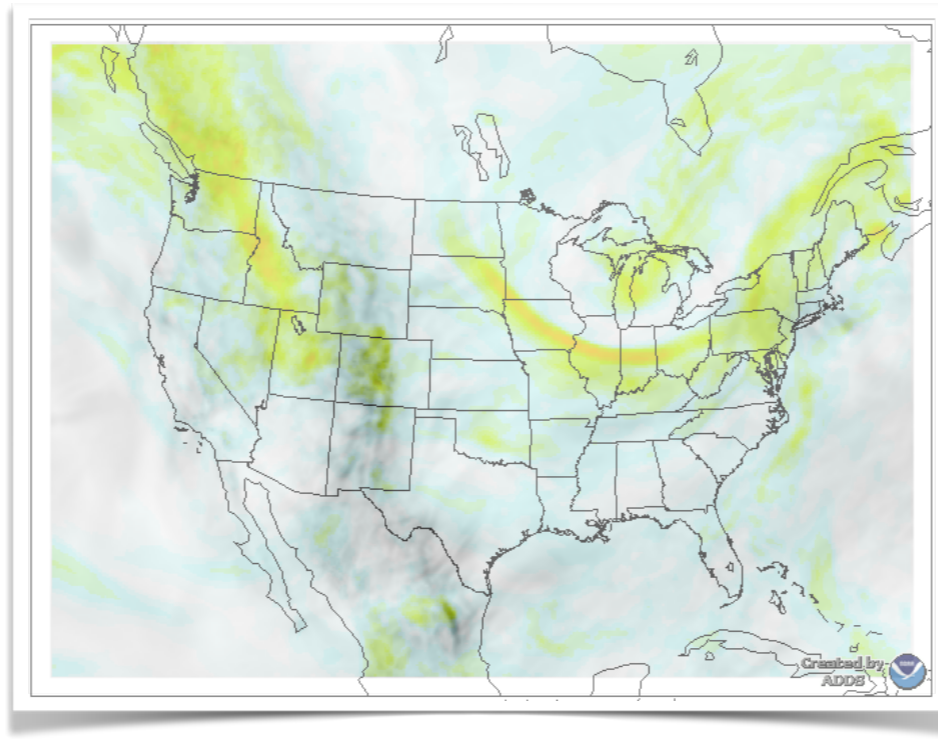
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"Is it a tumor" and I was like No, Jenni, but yeah okay I didn't really provide any context so that's fair but no!



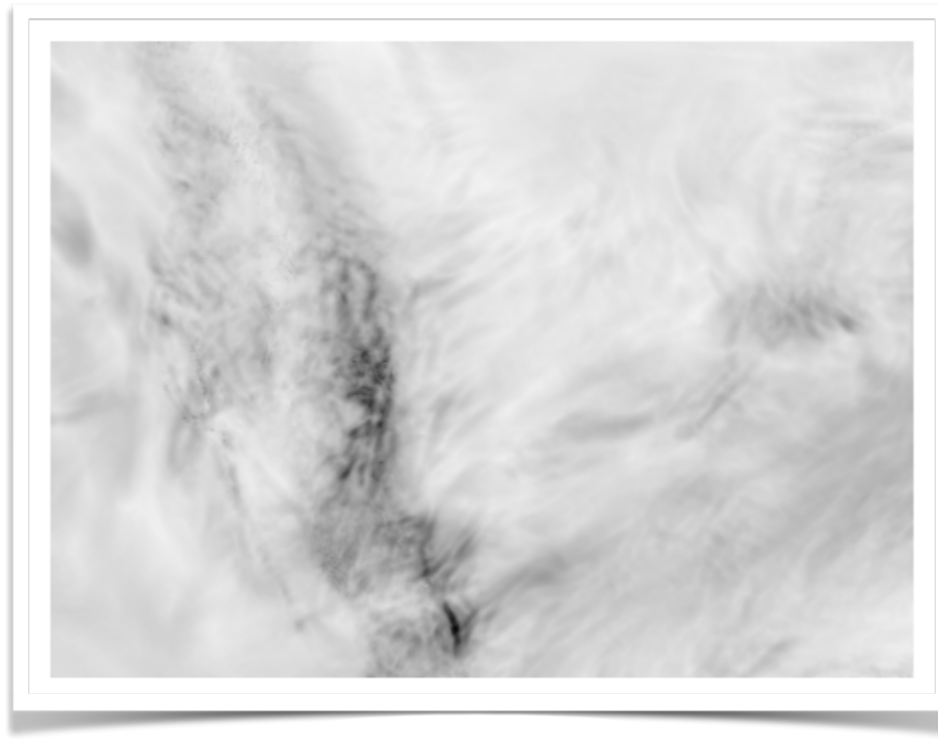
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It's CONUS!



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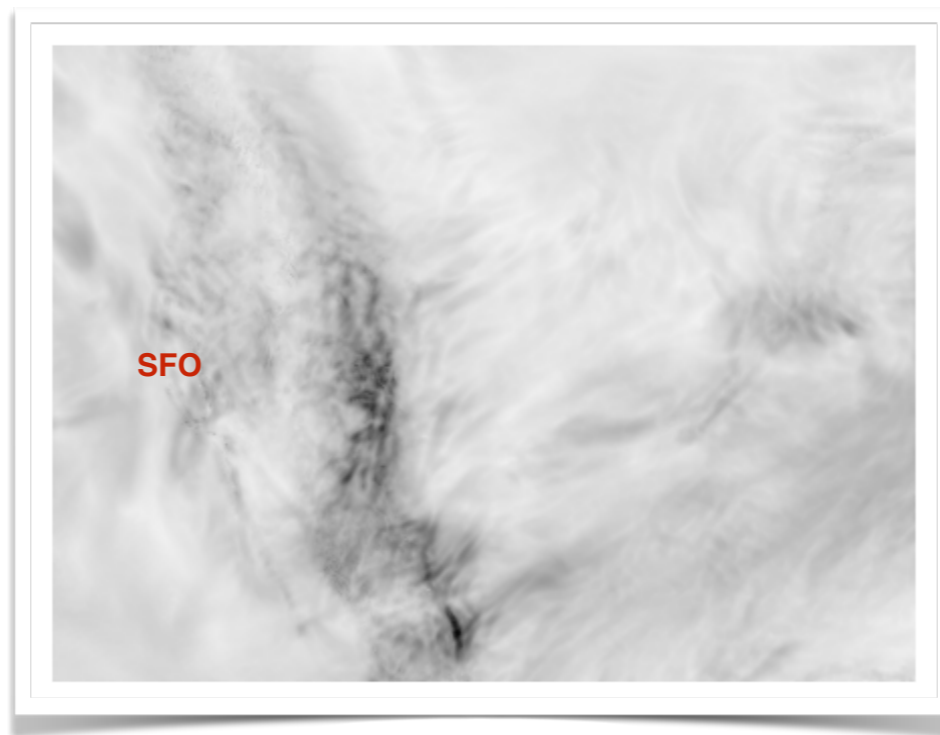
It's the continental United States or rather a slice of the atmosphere above it, or rather a forecast of clear-air turbulence intensities at a particular altitude at a particular minute on January 16, 2016.



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I was able to read the data well enough to create this image. This is the moment where I knew this project had potential. Which left the problem of the airplanes. I had enough that, given

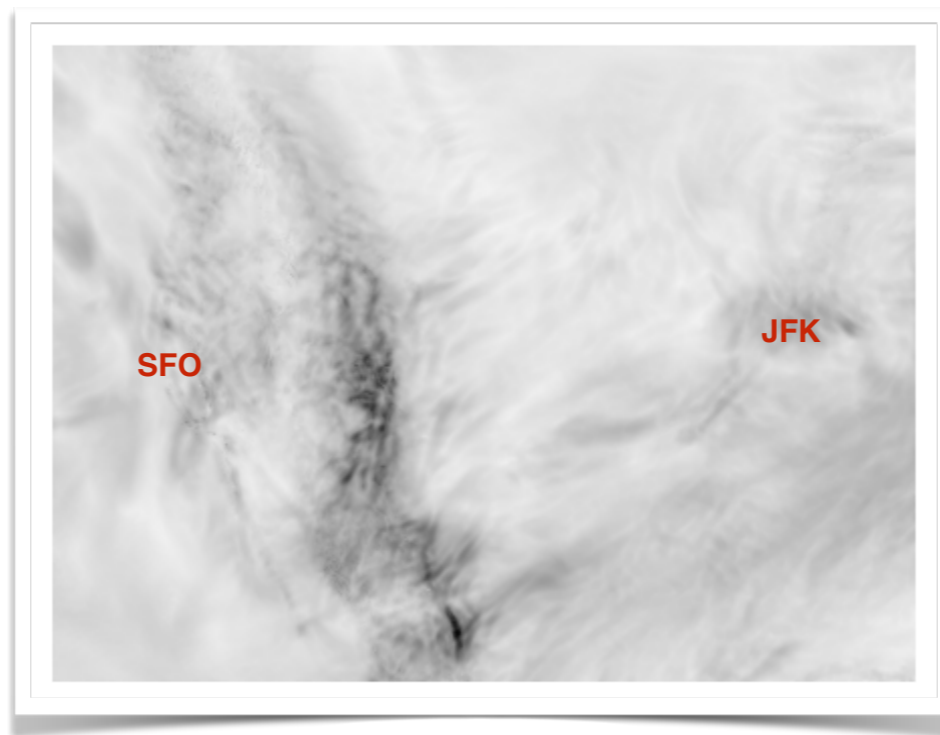
JetBlue flight 616, SFO-JFK, typical path



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takeoff and

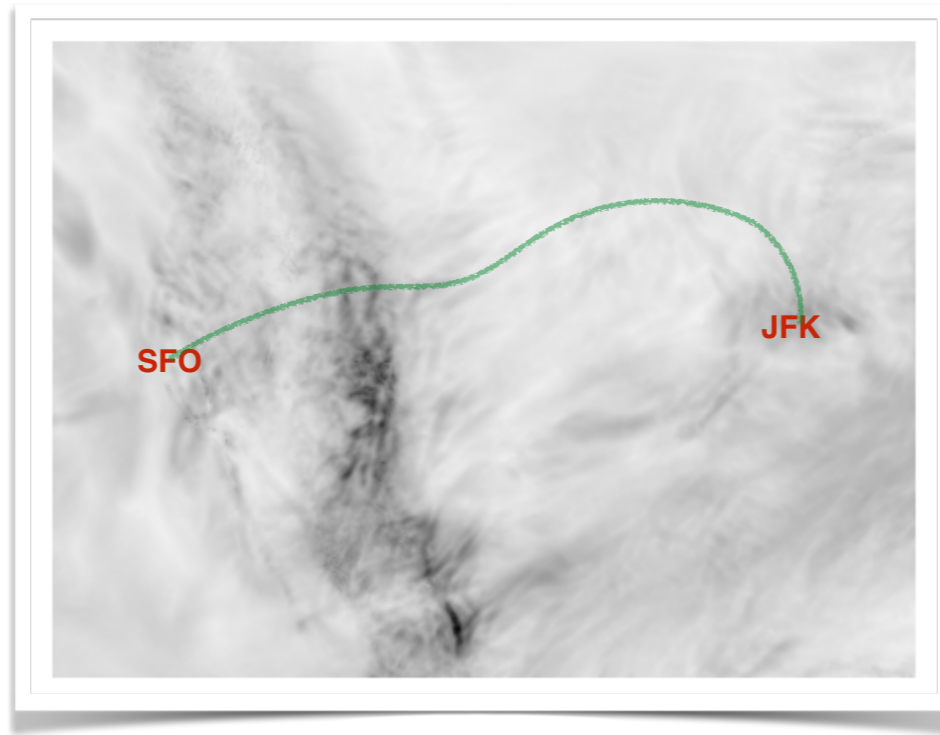
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landing times and

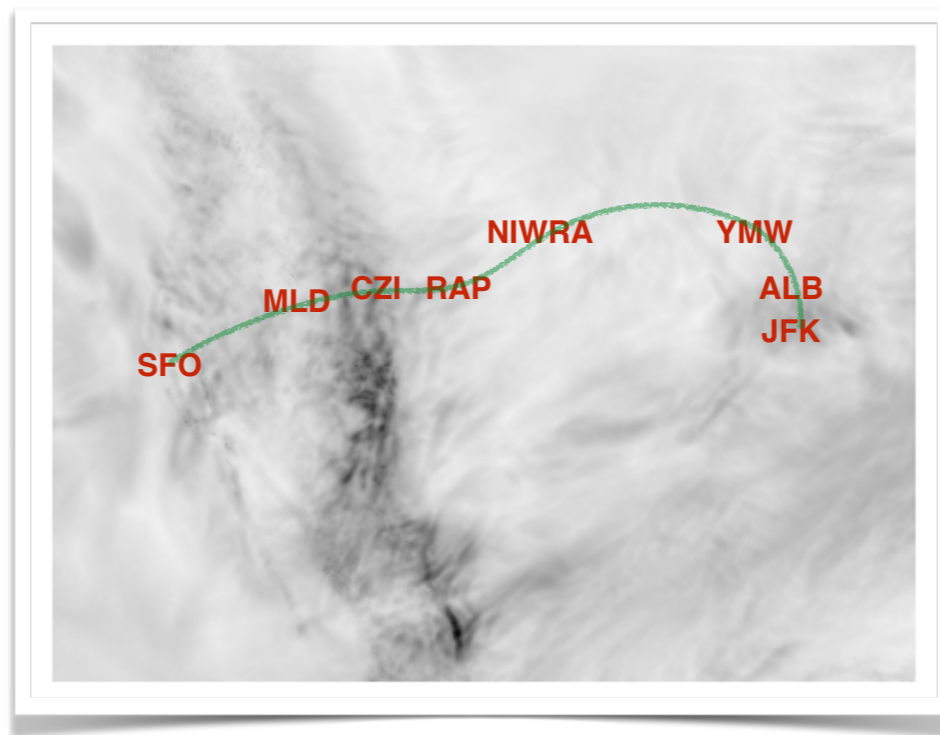
JetBlue flight 616, SFO-JFK, typical path



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a line of

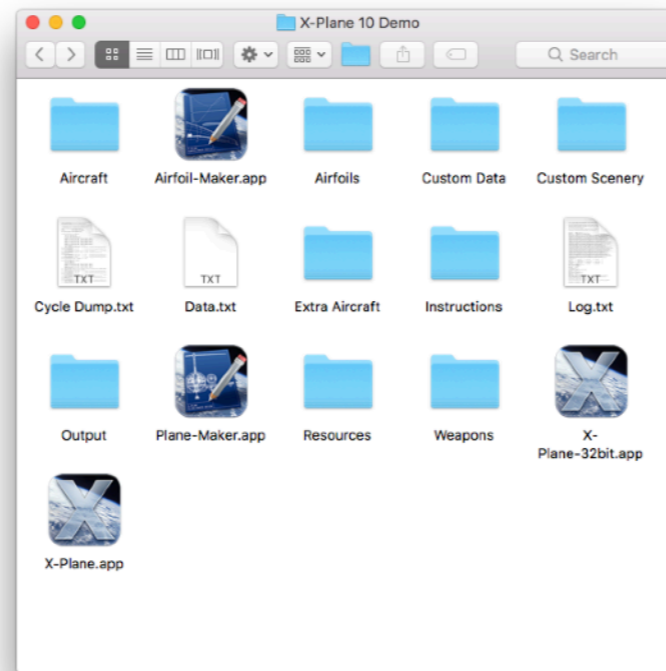
JetBlue flight 616, SFO-JFK, typical path



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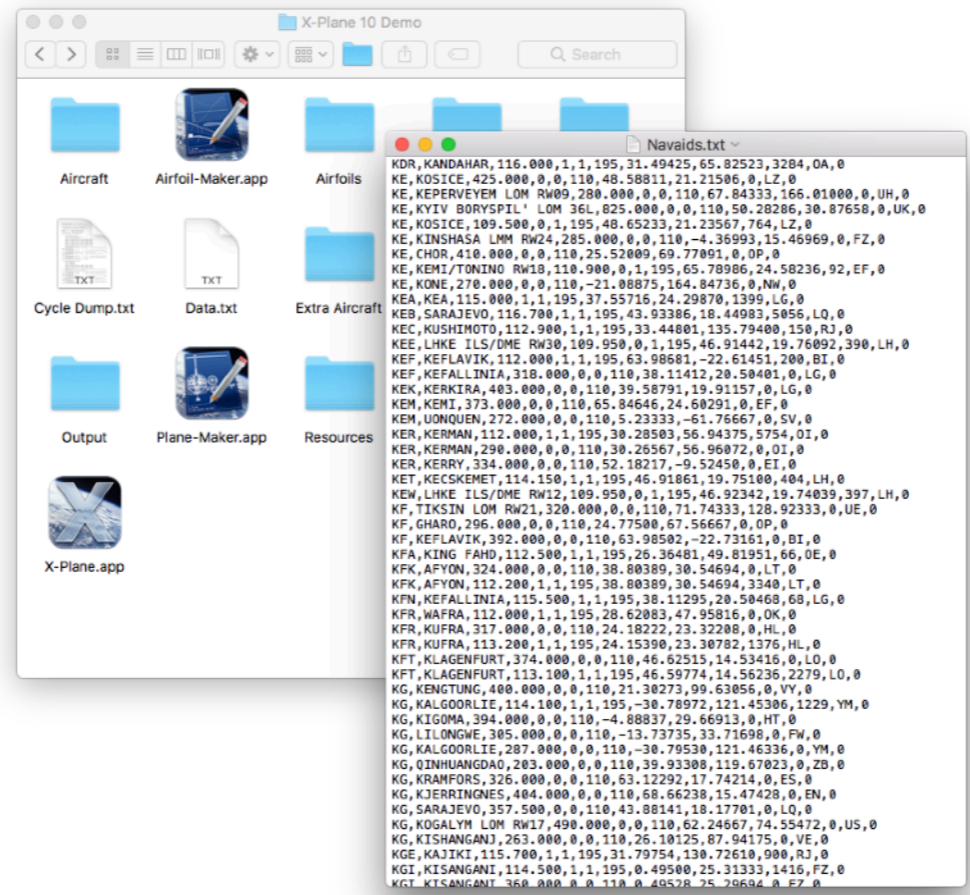
navigational fixes I could estimate what conditions surrounded the plane at any given point on its journey. But asking users to look up and type in nav codes of their upcoming flight, versus just a flight number, was a non-starter.

As an aside: I learned a lot about aeronautical navigation points for this project, and how there's no good public database of them all, but you can fake it well enough by



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downloading the free trial of the super-nerdy X-Plane flight simulator and raiding



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its data textfiles. But that is a tale for another time.



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Back to my tower, which I wasn't ready to leave again, just yet.

jmacdotorg My FlightAware My Alerts English (USA) 03:57PM EDT

FlightAware All Search for flight, tail, airport, or city Track +1-800-713-8570 Chat


LIVE FLIGHT TRACKING PRODUCTS ADS-B PHOTOS SQUAWKS DISCUSSIONS ABOUT CONTACT

Flight Tracking and Flight Status API

Harness FlightAware's infrastructure to build an awesome aviation app using FlightXML.

Get your FlightAware API key →

View API activity and billing history →



PHP

```
// get flight status on flight
SWA2558
$params = array(
    'ident' => "SWA2558",
    'howMany' => 1,
    'offset' => 0 );
$result = $client->FlightInfoEX($params);
```

JavaScript (with jQuery)

```
// get aviation weather (METAR)
at LAX
$.ajax({
    url: fxml_url + 'Metar',
    data: { 'airport': 'KLAX' },
    dataType: 'jsonp',
    jsonp: 'jsonp_callback',
    xhrFields: { withCredentials:
true }
});
```

Ruby

```
# get tracking data on flights
en route to JFK
result =
client.request(:enroute) do
    soap.body = {
        :airport => 'KJFK',
        :how_many => 10,
        :filter => '',
        :offset => 0
    }
end
```

Python

```
# Get the flights enroute to
KSMO
result =
api.service.Enroute('KSMO', 10,
'', 0)
print result
```

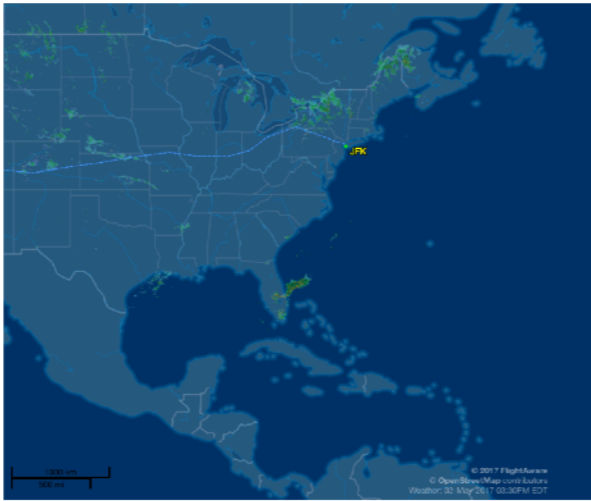
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I returned to my old friends at FlightAware, they of the commercial API, and... well.

FlightAware.com/flight/JBU616

5h 20m total flight time
NOT YOUR FLIGHT?
JBU616 flight schedule

John F Kennedy Intl is experiencing delays
• departure delays an average of 27 minutes



Flight Details

Track inbound plane
All flights between SFO and JFK
Add JBU616 to My FA

DEPARTURE TIMES

	Gate	Departure	Taxiing	Takeoff
Estimated			-----	01:29PM PDT
Scheduled		01:29PM PDT		01:29PM PDT

Average Delay: More than 1 hour

ARRIVAL TIMES

	Landing	Taxiing	Gate Arrival
Estimated	08:49PM EDT	-----	08:49PM EDT
Scheduled	08:49PM EDT		10:15PM EDT

Average Delay: More than 1 hour

AIRCRAFT INFORMATION

Aircraft Type: Airbus A321 (twin-jet) [A321] [Photos](#)

AIRLINE INFORMATION

Airline: JetBlue "JetBlue" [all flights](#)

Average Fare: \$295.20 (airline insight)

Cabin: Business / Economy: Meal

FLIGHT DATA

Speed: Filed: 518 mph [graph](#)

Altitude: Filed: 35,000 ft [graph](#)

Distance: Planned: 2,878 mi (Direct: 2,582 mi)

Route: TRUKN2 SYRAH Q128 EDLES HBU HLC IRK SPI VHP ROD DJB JHW J70 LVZ LENDY6 [decode](#)

TOP AIRBUS A321 (TWIN-JET) PHOTOS

Activity Log

UPCOMING FLIGHTS

Date	Departure	Arrival	Aircraft	Duration
Wednesday 03-May-2017	01:20PM PDT San Francisco Intl - SFO	08:56PM EDT John F Kennedy Intl - JFK	A320	5h 36m
Tuesday 02-May-2017	01:29PM PDT San Francisco Intl - SFO	08:49PM EDT John F Kennedy Intl - JFK	A321	5h 20m

PAST FLIGHTS

Date	Departure	Arrival	Aircraft	Duration
Monday 01-May-2017	04:20PM PDT San Francisco Intl - SFO	01:52AM EDT (+1) John F Kennedy Intl - JFK	A320	6h 32m
Sunday 30-Apr-2017	01:34PM PDT San Francisco Intl - SFO	10:25PM EDT John F Kennedy Intl - JFK	A320	5h 51m
Saturday	02:35PM PDT	10:55PM EDT	A320	5h 20m

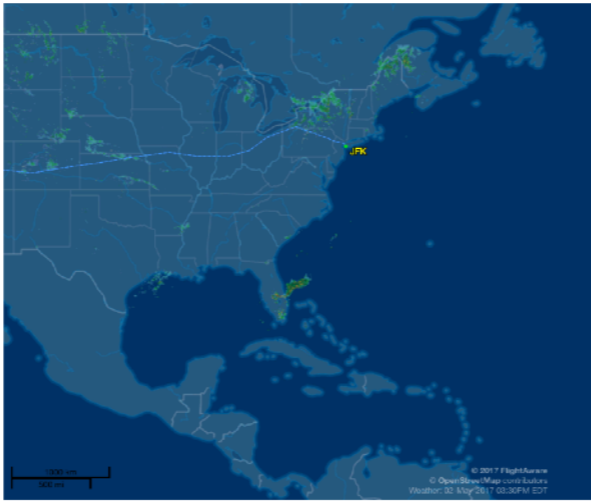
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built a screen-scraper of their webapp, which among other things turns flight numbers

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5h 20m total flight time
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JBU616 flight schedule

John F Kennedy Intl is experiencing delays
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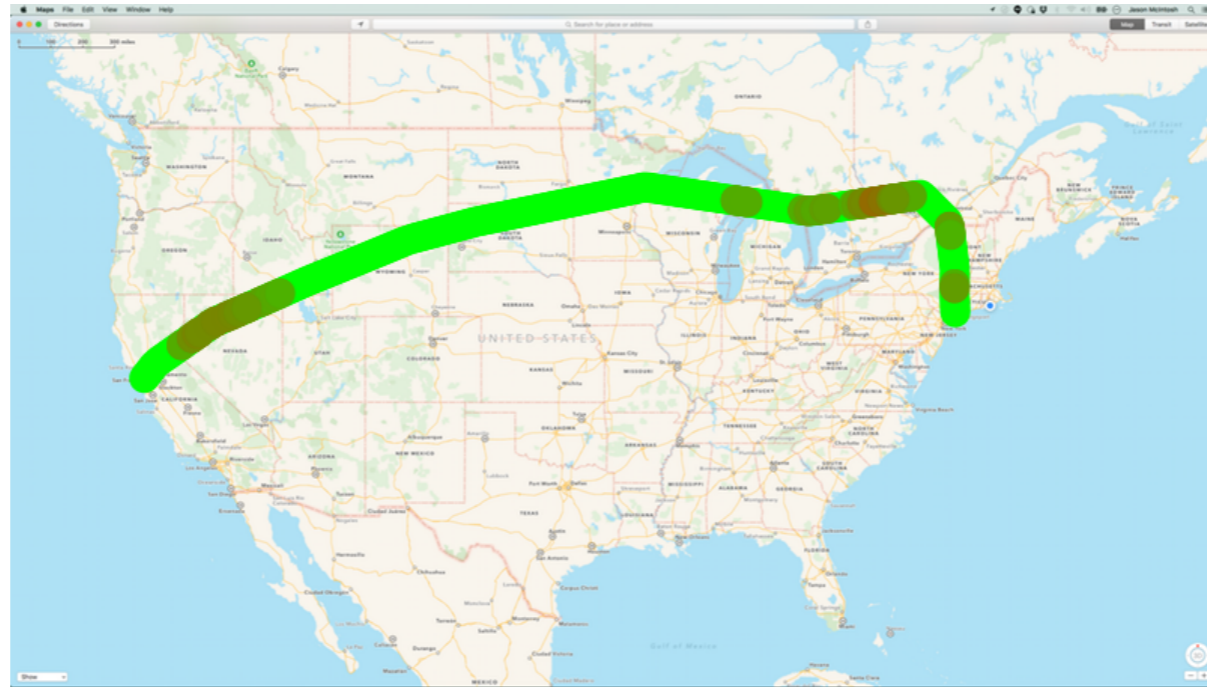
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into nav paths. This would not scale to production, but it did let me complete

JetBlue flight 616, SFO-JFK, June 5, 2016



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my proof of concept, of which me and some friends were the only users. (And yes, that's plotted against an Apple Maps screengrab. It was there, and it was good enough.) But now progress slowed down.



(xkcd 979)

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"Never have I felt so close to another soul", writes Randal Munroe in XKCD 979, "..."

Naturally I wasn't the only jerk on the internet who wanted FAA data, and indeed found many instances of people asking, but no clear answers. I did find some tantalizing, almost rumor-level pointers in multiple years-old forum posts



<https://www.fly.faa.gov/ASDI/asdi.html>



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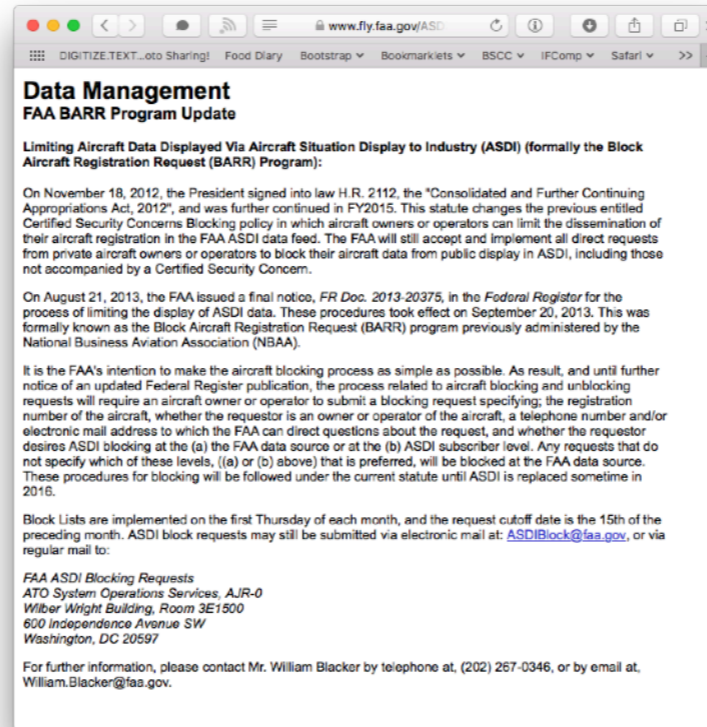
that all linked to the same URL, and clearly there

<https://www.fly.faa.gov/ASDI/asdi.html>

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used to be a website there, but now it just held

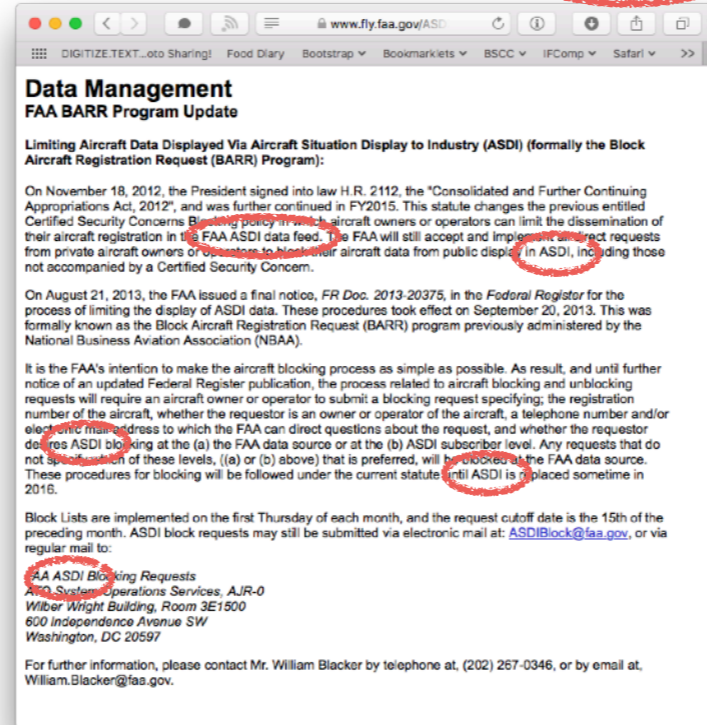
<https://www.fly.faa.gov/ASDI/asdi.html>



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a 2011 press release describing a random policy change, like a fading concert flier tacked to an old warehouse. However, it had an acronym I hadn't seen before:

<https://www.fly.faa.gov/ASDI/asdi.html>



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ASDI, and a reference to something called the FAA ASDI data feed. That gave me another handle to search on. And I found, for example,

Class	London	Company	Firstname	Lastname	Email	Phone1
Class 1	Yes	ARINC, Incorporated	Jeanine	Hendricks	jh@arinc.com	410-266-4560
Class1	Yes	ARINC, Incorporated	Kevin	Traub	ktraub@arinc.com	410-266-2380
Class 1	Yes	Aviation Data Systems	Andy	Green	green@fbweb.com	407-323-4697
Class 1	Yes	Aviation Data Systems	Andy	Green	ag@ads.aero	407-323-4697
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Class 1	Yes	Embry Riddle Aeronautical University Center for Applied ATM Research	John	Pesce	Pescrj@erau.edu	386-226-7437
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Class 2		Honeywell Global Data Center	James	Harvey	james.harvey@honeywell.com	425-885-8974
Class 2		Honeywell Global Data Center	George	Risinger	george.risinger@honeywell.com	425-885-8629
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Class 2		Honeywell Technology Solutions Inc.	David	Dougherty	david.dougherty@honeywell.com	303-682-9140
Class 2		Lennox Development B.V.	Bert	van den Brinkvanden	brink@lennox.com	310-575-468720

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this document listing users of ASDI — whatever it was — which included

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Class 1	Yes	ARINC, Incorporated	Jeanine	Hendricks	jh@arinc.com	410-266-4560
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Class 2		Honeywell Global Data Center	James	Harvey	james.harvey@honeywell.com	425-885-8974
Class 2		Honeywell Global Data Center	George	Risinger	george.risinger@honeywell.com	425-885-8629
Class 2		Honeywell Technology Solutions Inc.	Alan	Morgan	alan.morgan@honeywell.com	979-693-2683
Class 2		Honeywell Technology Solutions Inc.	David	Dougherty	david.dougherty@honeywell.com	303-682-9140
Class 2		Lennox Development B.V.	Bert	van den Brinkvanden	brink@lennox.com	310-575-468720

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my friends at FlightAware. OK: right track. I'd also seen mention of this

Class	London	Company	Firstname	Lastname	Email	Phone
Class 1	Yes	ARINC, Incorporated	Jeanine	Hendricks	jh@arinc.com	410-266-4560
Class 1	Yes	ARINC, Incorporated	Kevin	Traub	ktraub@arinc.com	410-266-2380
Class 1	Yes	Aviation Data Systems	Andy	Green	green@fbweb.com	407-323-4697
Class 1	Yes	Aviation Data Systems	Andy	Green	ag@ads.aero	407-323-4697
Class 1		Embry Riddle Aeronautical University Center for Applied ATM Research	John	Pesce	Pescrj@erau.edu	386-226-7437
Class 1	Yes	Embry Riddle Aeronautical University Center for Applied ATM Research	John	Pesce	386-226-7437	
Class 1	Yes	FlyteComm Inc.	Maurice	Bailey	mabail@flytecomm.com	650-404-8100
Class 1	Yes	FlyteComm Inc.	Maurice	Bailey	mabail@flytecomm.com	650-404-8100
Class 1		IT&T (ERA)	Bill	Colligan	bcolligan@erabeyondradar.com	703-637-7250
Class 1		Metron, Inc.	Miro	Lehky	lehky@metronaviation.com	
Class 1		OAG Worldwide Inc.	Melinda	Breitman	mbreitman@oag.com	630-515-3934
Class 1		OAG Worldwide Inc.	Graham	Mockett	graham.mockett@oag.com	
Class 1		OAG Worldwide Inc.	Stephen	Bray	stephenbray@oag.com	
Class 1	Yes	Passur Aerospace, Inc. (Megadata)	Jeff	Devaney	jeffdevaney@passur.com	631-589-6800
Class 1	Yes	Passur Aerospace, Inc. (Megadata)	Ron	Dunsky	rondunsky@passur.com	631-589-6800
Class 1	Yes	RLM Software Inc. (FlightView)	Jim	Steinberg	jimsteinberg@flightview.com	617-787-4200
Class 1	Yes	Sabre, Inc.	Beth	Conord	beth.conord@sabre.com	301-634-8210
Class 1	Yes	Sabre, Inc.	John	Cheng	john.cheng@sabre.com	301-634-8214
Class 1		Sabre, Inc.	John	Cheng	john.cheng@sabre.com	301-634-8214
Class 1		Sabre, Inc.	Beth	Conord	beth.conord@sabre.com	301-634-8210
Class 1		Sensis Corporation, Syracuse	Dan	London	dan.london@sensis.com	315-445-5721
Class 1	Yes	WSI Corporation, Atlanta	Mark D.	Miller	mmiller@wsi.com	978-983-6711
Class 1	Yes	WSI Corporation, Boston	Mark D.	Miller	mmiller@wsi.com	978-983-6711
Class 2		Aerospace Engineering and Research Associates	Kathy	Bolin	kathy@freeflight.com 3	301-450-4484
Class 2		Air Routing International LP	Jim	Rouse	jim.rouse@argis.com	713-430-7072
Class 2		Air Routing International LP	Greg	Murray	greg.murray@argis.com	
Class 2		AIRNAV Systems	Andre	Brandao	acrb@airnavsystems.com	619-330-2482
Class 2		ARINC, Incorporated	Jeanine	Hendricks	jh@arinc.com	410-266-4560
Class 2		ARINC, Incorporated	Kevin	Traub	ktraub@arinc.com	410-266-2380
Class 2		Ascent Technology Inc	Alan	Hartstone	alanh@ascent.com	617-395-4815
Class 2		ATAC Corporation	Charles	Winkleman	cew@atac.com	408-736-2822
Class 2		Austin Digital, Inc	Ben	Prager	bap@ausdig.com	512-452-8178
Class 2		Bruel & Kjaer (formerly Lochard)	Robert	Brodecky	robert.brodecky@lochard.com	866-240-8307
Class 2		Bruel&Kjaer	Robert	Brodecky	robert.brodecky@lochard.com	866-240-8307
Class 2		Business Aviation Technology	Greg	Johnson	greg@onesky.com	877-293-4019
Class 2		Camp Systems International, Inc.	Steve E	Attard	sattard@campsystems.com	631-588-3200
Class 2		Conductive Technology Corporation	Jeff	Kennedy	jeffk@conducivetech.com	503-445-4236
Class 2		Conductive Technology Corporation	Shuchi	Agrawal		972-973-5801
Class 2		Conductive Technology Corporation	Michael	Crozier	crozier@conducivetech.com	503-445-4233
Class 2		FlightAware	Daniel	Baker	dbaker@flightaware.com	800-713-8570
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Class 2		Honeywell Technology Solutions Inc.	David	Dougherty	david.dougherty@honeywell.com	303-682-9140
Class 2		Lennox Development B.V.	Bert	van den Brinkvanden	brink@lennox.com	310-575-468720

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Class 1 versus Class 2 designation, which would come in handy later. Finally I found

ASDI Contact Information

FAA contact information:

Contact the FAA ASDI Program Office at asdi-program-office@faa.gov

FAA TFMS Operations Help Desk contact information:

To report a data outage with your operational ASDI connection, 24x7 call TFMS Operations Help Desk: (609) 485-9601. The Operations Help Desk staff can verify normal server functioning. Please follow-up ALL calls with an email describing the problem to: 9-ACT-ASDI@faa.gov

To report all other questions and issues other than loss of service, (for example; data questions), send an email to 9-ACT-ASDI@faa.gov.

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this PDF, sitting in a directory containing no index files, and on an FAA website

www.fly.faa.gov/flyfaa/usmap.jsp

Federal Aviation Administration FAA Home

Flight Delay Information - Air Traffic Control System Command Center

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 View by Major Airport:

The status information provided on this site indicates general airport conditions; it is not flight-specific. [Check with your airline](#) to determine if your flight is affected. Information on [wait times at security checkpoints](#).

Legend

- General Arrival/Departure delays are 15 minutes or less.
- Departures are experiencing taxi delays of 16 to 45 minutes and/or arrivals are experiencing airborne holding delays of 16 to 45 minutes.
- Traffic destined to this airport is being delayed at its departure point. Check your departure airport to see if your flight may be affected.
- Departures are experiencing taxi delays greater than 45 minutes and/or arrivals are experiencing airborne holding delays greater than 45 minutes.
- This denotes a closed airport!

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otherwise dedicated to flight delays. That search engines had indexed it bespoke a dignified past for the document,

ASDI Contact Information

FAA contact information:

Contact the FAA ASDI Program Office at asdi-program-office@faa.gov

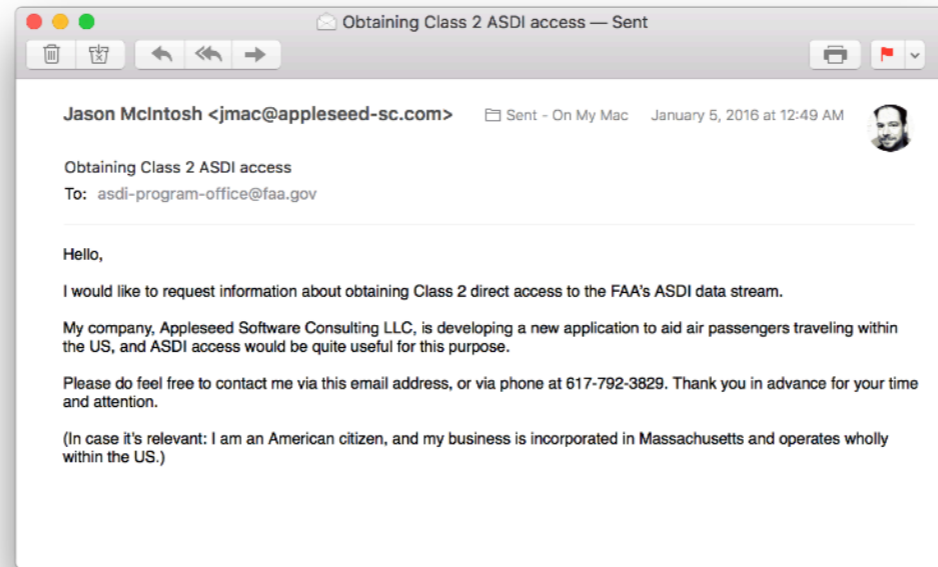
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and I could only assume its continued existence an organizational oversight. I didn't let that stop me. I had learned my lesson earlier. I wrote the email address printed on it. Like a tourist speaking from a phrasebook, I pieced together vocabulary I had encountered but not necessarily fully understood, and I said



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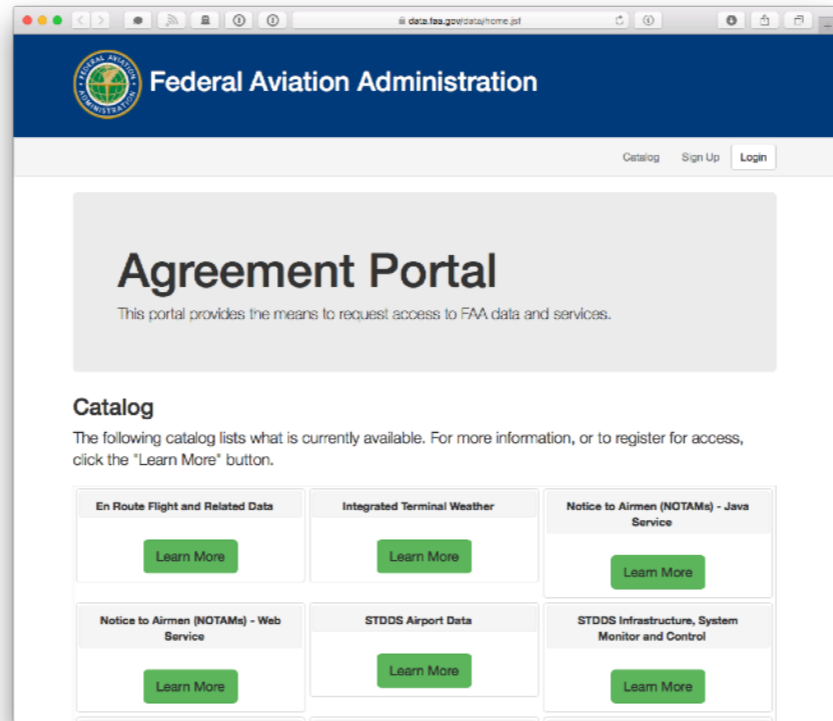
"Hello, I would like to request information about obtaining Class 2 direct access to the FAA's ASDI data stream." A week later I got a response. And it said: ASDI! We've retired that. Have you checked

<https://data.faa.gov>

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data.faa.gov? You know, the website we have that is

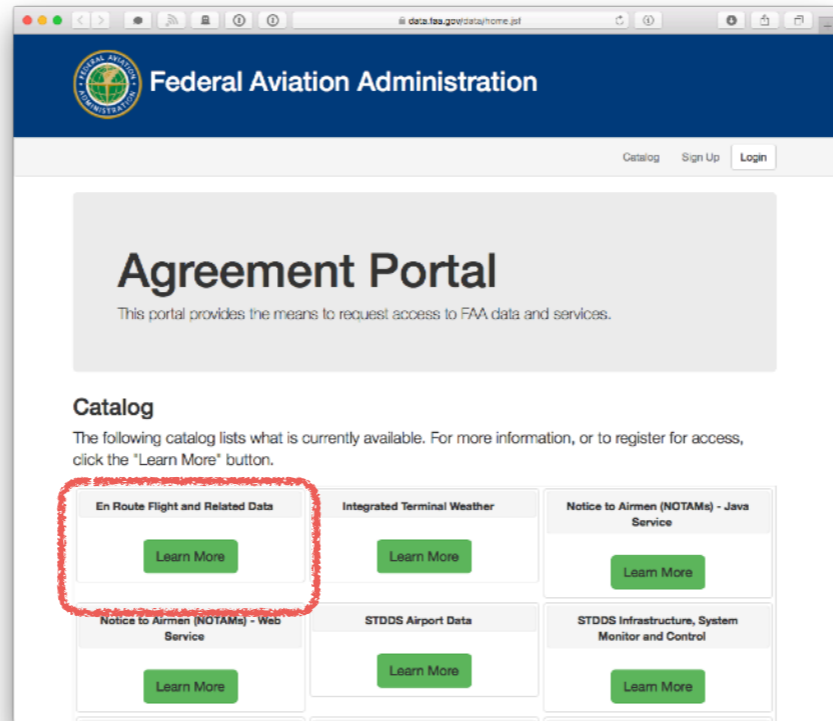
<https://data.faa.gov>



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covered in giant green buttons, the very first one of which is labeled

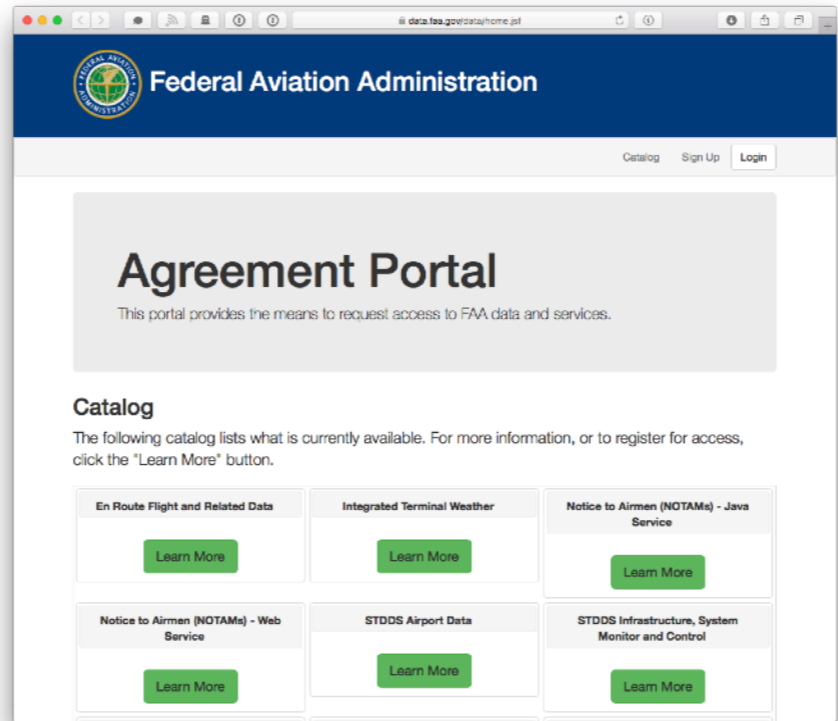
<https://data.faa.gov>



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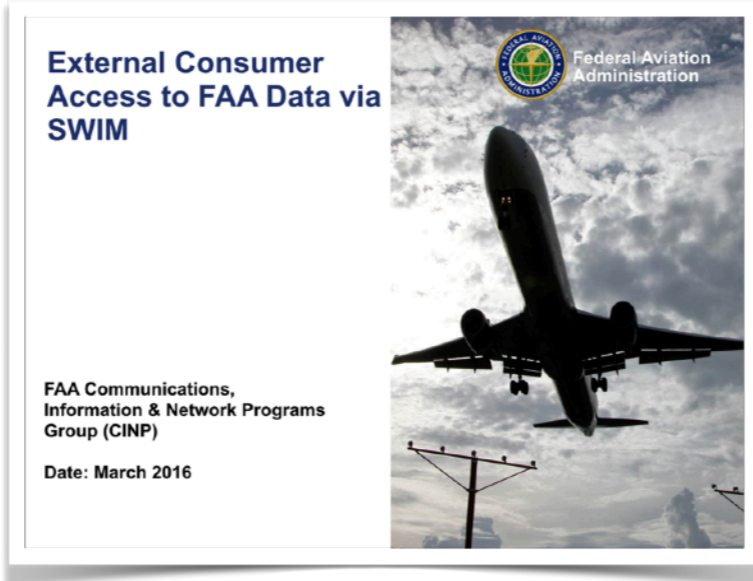
En Route Flight and Related Data? And I said: How is your robots.txt file...

https://data.faa.gov



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You know what... never mind. *Thank you.* And friends, I hit that button.



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Within days I had an assigned contact within the FAA to help set me up with its full firehose of flight-plan and aircraft positional data

**External Consumer
Access to FAA Data via
SWIM**



Federal Aviation
Administration

FAA Communications,
Information & Network Programs
Group (CINP)

Date: March 2016

Volpe *The National Transportation Systems Center*

SWIM Flight Data Publication Service
(SFDPS)

Reference Manual

Version 1.2
March 23, 2015

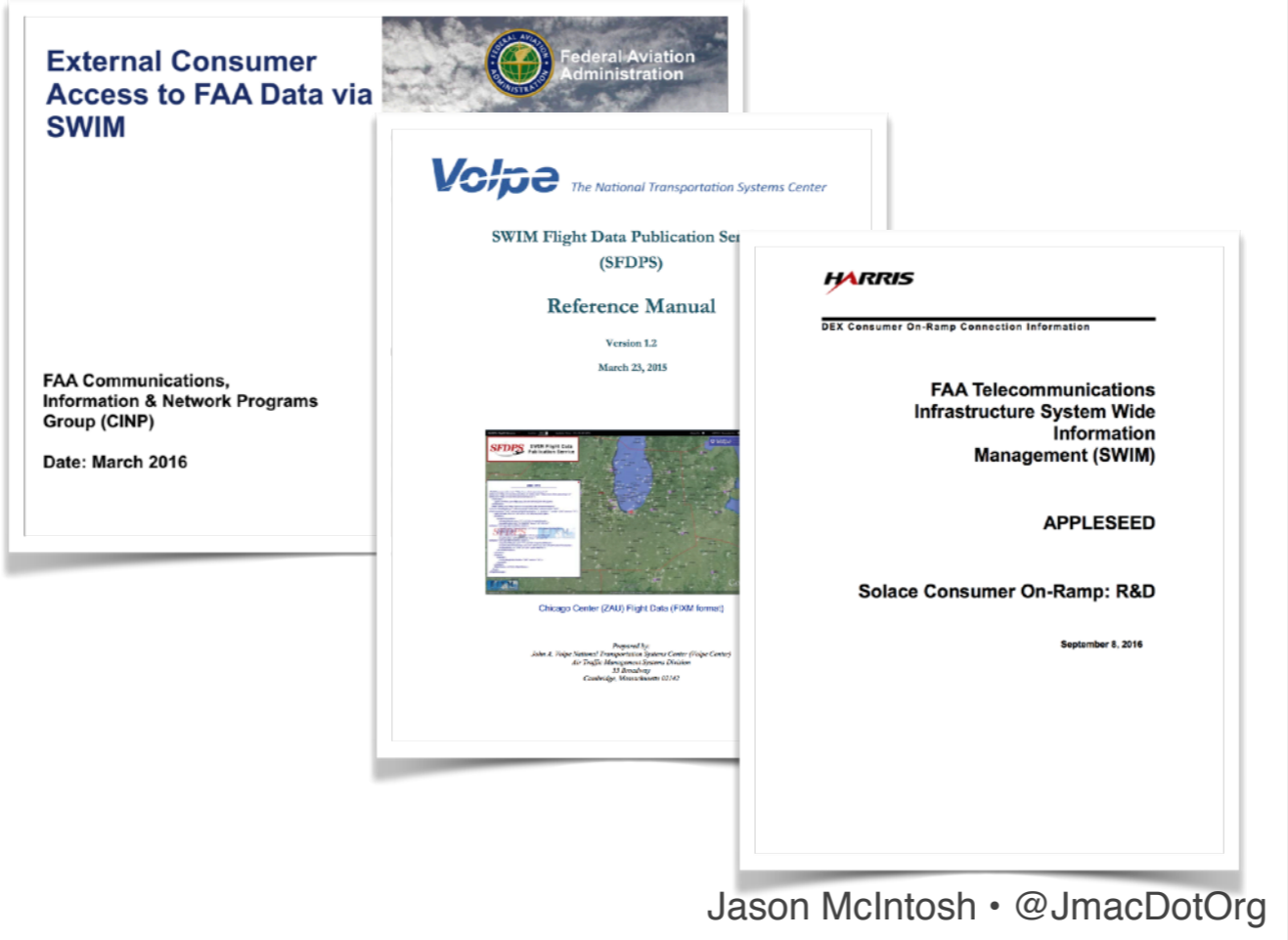


Chicago Center (ZAU) Flight Data (FDM format)

Prepared by:
John A. Volpe National Transportation Systems Center (Volpe Center)
Air Traffic Management Systems Division
33 Bushyway
Cambridge, Massachusetts 02142

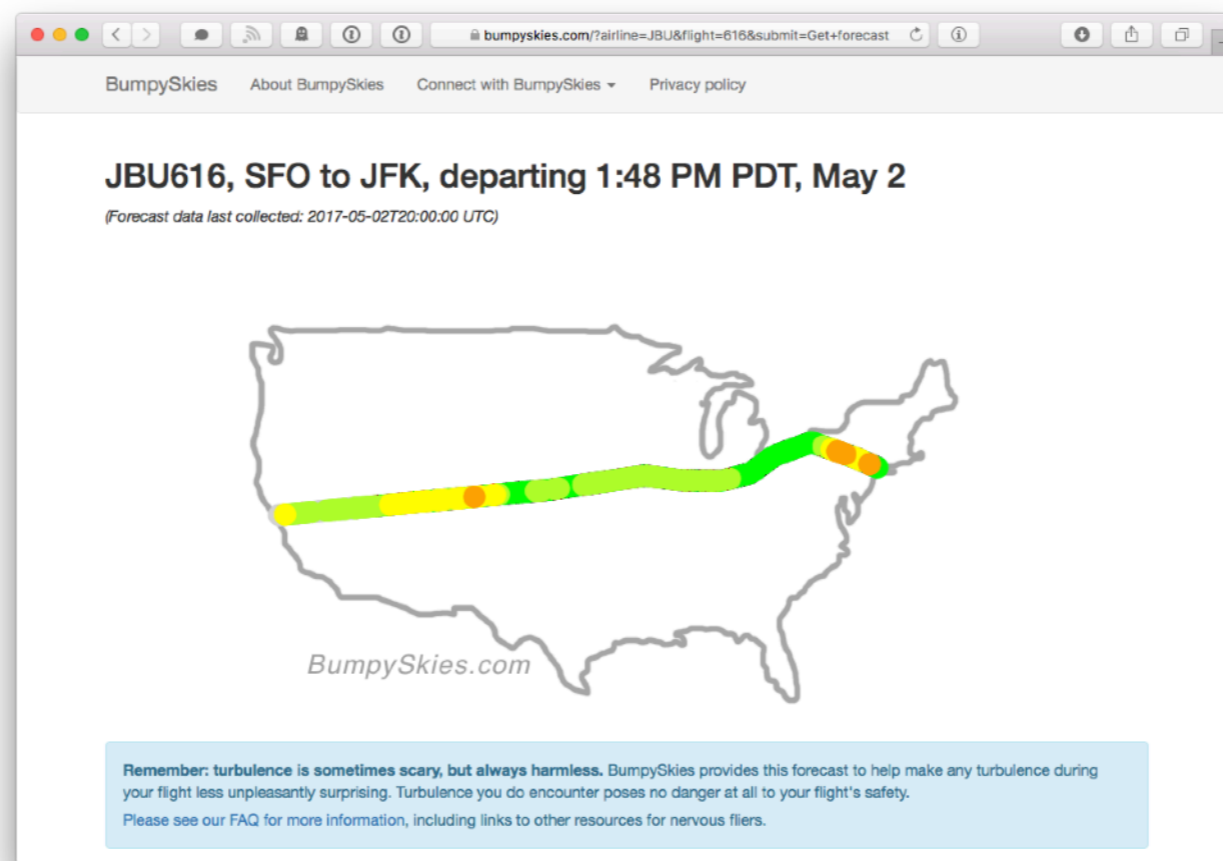
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And here began a months-long adventure of personal growth both as a hacker and as an entrepreneur



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that lies far outside the bounds of this talk. At the end of it, and indeed at the end of last year, I launched



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BumpySkies.com, braiding together all this work. This service feels like a stub to me, full of potential, and I don't know where it'll go next. But I do now that it wouldn't have gone anywhere had I not forced myself, needing access to tools, to



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just ask for them. It is a trick I look forward to repeating sometime, and I hope that someday you can make use of it as well.

Thank you.
Enjoy your lunch.

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Thank you.