

Obtaining weather data from wunderground API

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1 Applying for API key

- Source: (<https://www.wunderground.com/weather/api/?MR=1>)
- Github: (<https://github.com/ALShum/rwunderground>)

To improve our services and enhance our relationship with our users, **we will no longer provide free weather API keys as part of our program**. If you have been directed to download our Weather Underground free API key by a third party provider, please contact your vendor for resolution.

2 Data sources in wunderground

- **Data Core** – This data package includes many of the most essential weather APIs, ranging from current conditions and forecasts, radar and satellite data, including imagery for current conditions and forecasts.
- **Enhanced Current Conditions** – This package includes one of the highest-resolution weather observation networks that is available in the field based on over 200,000 personal weather stations in addition to traditional sources.
- **Enhanced Forecast** – The Weather Company’s forecast engine includes leading-edge ensemble model forecasting, 200 meteorologists and related scientists, The Weather Company’s network of observations, and radar and satellite assimilation and modelling capabilities.
- **Severe Weather** – This data package includes forecasted, real-time, and trailing estimates of severe weather data, protecting a company’s assets by staying one step ahead of adverse weather conditions, such as hail, lightning, severe wind, and tornadoes.
- **Lifestyle Indices** – This set of lifestyle indices helps organizations use weather events to better serve their customers, including health indices such as air quality, pollen, flu outbreak, aches and pains, breathing, dry skin, and more.
- **Historical Weather Data** - Provides businesses with historical weather observations to help better understand how weather has impacted critical business processes in the past, allowing them to anticipate the influence that similar weather events may have in the future. In this package we offer access to hourly values for surface temperature, wind speed and direction, relative humidity, atmospheric pressure, and dew point. The data covers a 35 km worldwide grid and traces back to July of 2011 (Figure 1).
- **Seasonal and Subseasonal Forecast** – Provides a comprehensive view of the anticipated temperature and precipitation patterns for the 3- to 5-weeks, 1- to 4-months, and now 5- to 7-months.
- **Traffic Data** - Traffic, road, and incident data from more than 300 million sources that cover more than 8 million kilometers of roads in 50 countriesb (Figure 2).

3 Other options

- **DarkSky**. It has APIs supported by both [Python](#) and [R](#)
- **Aeris**. It has API supported by [Python](#) only.
- **WorldWeatherOnline**. Our historical weather API provides hourly past weather for worldwide locations since July 2008. It would be ideal for those with a focus on outdoor activities. Holiday goers and general fans of the outdoors will be interested in previous weather conditions at respective times of the year if they are set to visit that location in the future. API supported by JSON only.

- [OpenWeatherMap](#). API only supported by JSON only.
- [Yahoo](#). API supported by JSON only.
- [National Weather Service](#)
- [NOAA](#)

The Weather Company History on Demand

Learn from the past's data to prepare for the future's business demands.

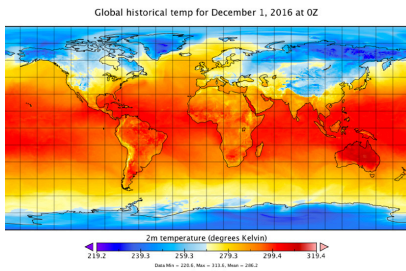


Anecdotes are great for telling stories, but they lose credibility when your real-time business decisions depend on them for actionable data. History on Demand (HoD), from The Weather Company, an IBM Business, provides the historical context you need to extrapolate relationships and make correlations with your past business and operational results to predict future business needs and outcomes.

HoD offers competitively priced and accurate historical weather information, featuring a 35 km worldwide grid and hourly historical information dating back to July 2011.

Make Global Decisions Locally

HoD provides a worldwide, consistent dataset of the most important and commonly used weather parameters accessible via web API. You can obtain large historical datasets specific to your geography and time without having to rummage through poorly organized public datasets offering inferior data quality and coverage. Couple the historical data with your analysis and our forecast products, and you'll have the tools to manage and leverage significant weather impacts on your business and better plan for them in the future.



HoD Highlights

- ✓ Precision
- ✓ Accuracy
- ✓ Speed at scale
- ✓ Competitive pricing
- ✓ 35 km grid
- ✓ 5+ years historical data

Convenient Access in One Package

HoD offers a comprehensive dataset spanning July 2011 to the present, and new data is regularly added as it becomes available. HoD contains hourly values for surface temperature, wind speed, wind direction, relative humidity, atmospheric pressure, and dewpoint. Access can be gained by latitude/longitude and is supported for a list of latitudinal/longitudinal points, as well as a bounding box specification. Helper APIs are available to translate coordinates to common location identifiers.

HoD synthesizes multiple historical observational datasets to create a worldwide, high-resolution, gridded representation of past weather conditions. Other publicly available archives are based on sparsely populated airport observational data. Coupled with The Weather Company's most accurate worldwide forecasts*, HoD will help you build out robust analysis and prediction capabilities for your business. Our Cloud Native platform efficiently processes billions of observations and forecasts to build the industry's most precise and accurate historical record of weather data.

*According to [ForecastWatch](#)

business.weather.com



The Weather Company
An IBM Business

Figure 1: History of weather brochure

Ground Transportation Traffic Solutions

No need to pump the brakes on these proactive traffic products



While weather is perhaps the largest external swing factor in business performance across nearly all industries, traffic also has a substantial, direct impact. It's estimated that the average person spends at least 50 hours annually in traffic-related delays, resulting in over \$250 B of the global economy wasted in traffic delays every year.

The Weather Company now offers traffic, road, and incident data from more than 300 million sources that cover more than 8 million kilometers of roads in 50 countries. The following products are deployed in a cloud service model to provide access to traffic services derived from over 300 million data sources worldwide:

- **The Weather Company's Ground – Traffic Services** is an essential API service that provides real-time traffic flow information for all functional road classifications in 50 countries worldwide. The data is provided in eXtreme definition (XD) segments that range from 100 to 350 meters long and updated every five minutes. This data can also be accessed and used for a wide variety of use cases including route planning, operational decision support, and predictive traffic analysis.
- **The Weather Company's Ground – In-Vehicle Traffic Services** delivers both traffic flow and incident services to satellite navigation system displays installed in vehicles. The rich feature set augments solutions for both consumers and long-haul freight providers and also provides data on accidents; construction; and weather, congestion, crowdsourced, and police-reported alerts.

Green Light Traffic Features

- ✓ XD segment code
- ✓ Roadway name and cross streets of roadway
- ✓ Current speed
- ✓ Typical speed
- ✓ Free flow speed
- ✓ Difference between the average and current speed
- ✓ Travel time along the segment
- ✓ Level of congestion, on a scale of 0 to 3

These Weather Company Ground Transportation solutions enable companies across a multitude of industries to combine traffic flows and incidents with weather data. This drives insights to help companies protect their people and assets, increase situational awareness, drive operational efficiency, and improve their bottom line:

- **Freight and logistics:** Optimize routing decisions to avoid congested roadways using related historical data.
- **Retail:** Improve just-in-time distribution by understanding routing and delivery constraints caused by traffic and weather.
- **Automotive:** Improve routing decisions and give visibility to incidents that can be viewed on in-dash nav systems.
- **Insurance:** Reduce claims fraud and deliver greater insight for usage-based insurance rates.
- **Cities and infrastructure:** Improve traffic flows and increase safety with real-time data for intelligent traffic light systems.

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The Weather Company
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Figure 2: History of transportation brochure

4 Darksky API

According to Mohammad's table, sheet 3 (all combinations of longitude, latitude and time), the total cost will be $112866 * 0.0001 = 11.2866$ USD.

I randomly sampled 800 observations from that table. Then I obtained weather data from the darksky API. It took 162 seconds (2 minutes and 40 seconds) to get weather data from these 800 observations. If this time is scalable, then it will take 6.35 hours to get weather data for the whole table.

The weather data provided by darksky API includes 3 parts:

- hourly (see Table 1). 24 hourly observations for each 15 weather variables in that day.
- daily (see Table 2). 1 observations for each 34 weather variables in that day.
- currently (see Table 3). 1 observations for each 15 weather variables at that specific time point.

With regard to the demo data (800 randomly sampled observations), the number of missing values for each time specific column (part 3 of darksky API) is shown in Table 4.

Table 1: Weather data from dark sky API part 1: hourly

time	summary	icon	precipIntensity	precipProbability	temperature	apparentTemperature	dewPoint	humidity	pressure	windSpeed	windGust	windBearing	cloudCover	visibility
2015-06-02 02:00:00	Clear	clear-night	0	0	61.04	61.04	51.31	0.70	1015.19	1.62	4.73	289	0.01	9.93
2015-06-02 03:00:00	Clear	clear-night	0	0	59.90	59.90	51.21	0.73	1014.86	1.04	3.35	269	0.01	9.91
2015-06-02 04:00:00	Clear	clear-night	0	0	58.30	58.30	50.49	0.75	1014.84	0.44	3.26	147	0.01	9.91
2015-06-02 05:00:00	Clear	clear-night	0	0	57.14	57.14	50.31	0.78	1014.30	0.53	3.02	192	0.07	8.92
2015-06-02 06:00:00	Clear	clear-night	0	0	55.98	55.98	49.64	0.79	1014.50	0.44	2.60	229	0.00	9.86
2015-06-02 07:00:00	Clear	clear-night	0	0	55.38	55.38	49.38	0.80	1014.52	0.50	2.90	232	0.00	9.46
2015-06-02 08:00:00	Clear	clear-day	0	0	54.41	54.41	49.12	0.82	1014.72	0.21	2.49	234	0.01	7.22
2015-06-02 09:00:00	Clear	clear-day	0	0	57.23	57.23	51.17	0.80	1014.88	0.41	2.63	129	0.01	9.32
2015-06-02 10:00:00	Clear	clear-day	0	0	61.81	61.81	52.06	0.70	1014.99	0.54	4.36	132	0.00	9.48
2015-06-02 11:00:00	Clear	clear-day	0	0	66.00	66.00	51.90	0.60	1014.96	1.16	5.77	181	0.00	9.51
2015-06-02 12:00:00	Clear	clear-day	0	0	70.23	70.23	50.95	0.50	1014.60	1.48	7.74	201	0.00	9.64
2015-06-02 13:00:00	Clear	clear-day	0	0	74.31	74.31	50.28	0.43	1014.21	2.40	9.82	230	0.00	9.63
2015-06-02 14:00:00	Clear	clear-day	0	0	77.21	77.21	49.04	0.37	1013.71	2.94	10.51	231	0.01	9.71
2015-06-02 15:00:00	Clear	clear-day	0	0	79.62	79.62	49.55	0.35	1013.37	3.02	12.67	264	0.17	10.00
2015-06-02 16:00:00	Clear	clear-day	0	0	80.91	80.91	49.01	0.33	1012.77	4.29	14.06	254	0.00	9.72
2015-06-02 17:00:00	Clear	clear-day	0	0	81.33	81.33	50.30	0.34	1012.50	5.38	16.35	248	0.01	9.72
2015-06-02 18:00:00	Clear	clear-day	0	0	80.33	80.33	50.46	0.35	1012.14	4.66	16.81	263	0.01	9.72
2015-06-02 19:00:00	Clear	clear-day	0	0	79.41	79.41	50.37	0.36	1011.93	4.97	15.53	256	0.00	9.72
2015-06-02 20:00:00	Clear	clear-day	0	0	77.58	77.58	49.50	0.37	1011.92	4.91	14.84	254	0.00	10.00
2015-06-02 21:00:00	Clear	clear-day	0	0	74.28	74.28	50.39	0.43	1012.12	4.93	13.15	265	0.00	10.00
2015-06-02 22:00:00	Clear	clear-night	0	0	69.50	69.50	51.84	0.53	1012.51	4.11	11.54	266	0.00	10.00
2015-06-02 23:00:00	Clear	clear-night	0	0	65.76	65.76	52.88	0.63	1012.89	1.76	8.52	249	0.00	10.00
2015-06-03 00:00:00	Clear	clear-night	0	0	63.00	63.00	52.81	0.69	1013.51	0.75	6.27	210	0.00	10.00
2015-06-03 01:00:00	Clear	clear-night	0	0	61.31	61.31	52.71	0.73	1013.51	0.83	5.59	209	0.00	9.96

Table 2: Weather data from dark sky API part 2: daily

variable	V1
time	2015-06-02 02:00:00
summary	Clear throughout the day.
icon	clear-day
sunriseTime	2015-06-02 07:40:27
sunsetTime	2015-06-02 21:56:40
moonPhase	0.51
precipIntensity	0
precipIntensityMax	0
precipProbability	0
temperatureHigh	81.33
temperatureHighTime	1433282400
temperatureLow	56.12
temperatureLowTime	1433329200
apparentTemperatureHigh	81.33
apparentTemperatureHighTime	1433282400
apparentTemperatureLow	56.12
apparentTemperatureLowTime	1433329200
dewPoint	50.69
humidity	0.58
pressure	1013.73
windSpeed	2
windGust	16.81
windGustTime	1433286000
windBearing	249
cloudCover	0.01
visibility	9.64
temperatureMin	54.41
temperatureMinTime	2015-06-02 08:00:00
temperatureMax	81.33
temperatureMaxTime	2015-06-02 17:00:00
apparentTemperatureMin	54.41
apparentTemperatureMinTime	2015-06-02 08:00:00
apparentTemperatureMax	81.33
apparentTemperatureMaxTime	2015-06-02 17:00:00

Table 3: Weather data from dark sky API part 3: currently

variable	V1
time	2015-06-02 02:00:00
summary	Clear throughout the day.
icon	clear-day
sunriseTime	2015-06-02 07:40:27
sunsetTime	2015-06-02 21:56:40
moonPhase	0.51
precipIntensity	0
precipIntensityMax	0
precipProbability	0
temperatureHigh	81.33
temperatureHighTime	1433282400
temperatureLow	56.12
temperatureLowTime	1433329200
apparentTemperatureHigh	81.33
apparentTemperatureHighTime	1433282400
apparentTemperatureLow	56.12
apparentTemperatureLowTime	1433329200
dewPoint	50.69
humidity	0.58
pressure	1013.73
windSpeed	2
windGust	16.81
windGustTime	1433286000
windBearing	249
cloudCover	0.01
visibility	9.64
temperatureMin	54.41
temperatureMinTime	2015-06-02 08:00:00
temperatureMax	81.33
temperatureMaxTime	2015-06-02 17:00:00
apparentTemperatureMin	54.41
apparentTemperatureMinTime	2015-06-02 08:00:00
apparentTemperatureMax	81.33
apparentTemperatureMaxTime	2015-06-02 17:00:00

Table 4: Missing numbers of weather data for 800 random sampled observations

variable	missing_num
summary	0
icon	0
precipIntensity	0
precipProbability	0
temperature	0
apparentTemperature	0
dewPoint	0
humidity	0
pressure	0
windSpeed	0
windGust	3
windBearing	2
cloudCover	0
visibility	5