History on Demand (HoD) - Common Information

Domain Portfolio: Conditions | Domain: Historical | Usage Classification: **Restricted**

Geography: Global **Attribution Required:** No **Attribution Requirements:** N/A

Overview

This document contains information common to the HoD Archive and HoD Direct APIs, and is referenced from each of those documents.

Data Elements & Definitions

Gridded Currents on Demand (gCOD)

Field Name	Description	Type	Range	Sample	Nulls Allowed
requestedLatitude	Latitude specified in the original request. Only included in POINT and MULTIPOINT query results.	[decimal]	-90<=latitude<=90	43.441	N
requestedLongitude	Longitude specified in the original request. Only included in POINT and MULTIPOINT query results.	[decimal]	-180<=longitude<=180	89.591	N
latitude	Latitude of retrieved gCOD grid point	[decimal]	-90<=latitude<=90	43.441	N
longitude	Longitude of retrieved gCOD grid point	[decimal]	-180<=longitude<=180	89.591	N
gridpointId	Geohashed id unique to each gCOD grid point	[string]	base32 encoded geohash of the gridpoint location	**lat:** 43.05494505494505 **lon:** -89.38478115418536 is represented by **gridpoint_id:** dp8kvvzvpxkrk	N
validTimeUtc	The UTC timestamp of the gCOD observation data in ISO-8601 format	[ISO]	n/a	2017-02-20T10:47:59+0000	N
drivingDifficultyIndex	0-100 value taking into account wind and precipitation (including fog), representing the difficulty the weather presents to a driver. 0 is None / No Data, 1-4 is Windy, 16 is Foggy, 32-43 is Wet, 48-59 is Ponding, 64-75 is Snowy, and 80-91 is Icy; within each range of values, larger numbers indicate an increasing intensity for that particular condition	[integer]	0-100 (enumeration)	25	Y
iconCode	This number is the key to the weather icon lookup. The data field shows the icon number that is matched to represent the observed weather conditions.	[integer]	0 - 47	30	Y
iconCodeExtend	A four digit code representing the full set of sensible weather icons. These codes are companions to iconCode with more specificity.	[integer]	400-4490 (enumeration)	470	Y
precip1Hour	Rolling one-hour liquid precip amount.	[decimal]	Positive floating point	1.21	Y
precip6Hour	Rolling six-hour liquid precip amount.	[decimal]	Positive floating point	1.21	Y
precip24Hour	Rolling twenty-four hour liquid precip amount.	[decimal]	Positive floating point	1.21	Y
precip2Day	Rolling 2-Day liquid precip amount.	[decimal]	Positive floating point	1.21	Y
precip3Day	Rolling 3-Day liquid precip amount.	[decimal]	Positive floating point	1.21	Y

precip7Day	Rolling 7-Day liquid precip amount.	[decimal]	Positive floating point	1.21	Y
precipMtd	Month to Date liquid precip amount.	[decimal]	Positive floating point	1.21	Y
precipYtd	Calendar Year to Date liquid precip amount.	[decimal]	Positive floating point	1.21	Y
pressureChange	The change in the barometric pressure reading over the last three hours.	[decimal]	Floating point (pos or neg delta value)	-15.6	Y
pressureMeanSeaLevel	Mean sea level pressure in millibars. In other words, the average barometric pressure at sea level.	[decimal]	Positive floating point	1022.4	Y
relativeHumidity	The relative humidity of the air, which is defined as the ratio of the amount of water vapor in the air to the amount of vapor required to bring the air to saturation at a constant temperature. Relative humidity is always expressed as a percentage.	[decimal]	0.0-100.0	84.1	Y
snow1Hour	Rolling one-hour snowfall amount.	[decimal]	Positive floating point	1.2	Y
snow6Hour	Rolling six-hour snowfall amount.	[decimal]	Positive floating point	1.2	Y
snow24Hour	Rolling twenty-four hour snowfall amount.	[decimal]	Positive floating point	1.2	Y
snow2Day	Rolling 2-Day snowfall amount.	[decimal]	Positive floating point	1.2	Y
snow3Day	Rolling 3-Day snowfall amount.	[decimal]	Positive floating point	1.2	Y
snow7Day	Rolling 7-Day snowfall amount.	[decimal]	Positive floating point	1.2	Y
snowMtd	Month to Date snowfall amount.	[decimal]	Positive floating point	1.2	Y
snowSeason	Season to Date snowfall amount. Seasons are defined by 3 full month meteorological seasons which are December 1 - February 28/29, March 1 - May 31, June 1 - August 31, September 1 - November 31.	[decimal]	Positive floating point	1.2	Y
snowYtd	Calendar Year to Date snowfall amount.	[decimal]	Positive floating point	1.2	
temperature	Ambient temperature 2 meters off the ground.	[decimal]	Floating point (pos or neg)	76.1	Y
temperatureChange24Hour	Change in temperature compared to the report 24 hours ago.	[decimal]	Floating point (pos or neg delta value)	-15.8	Y
temperatureDewPoint	The temperature which air must be cooled at constant pressure to reach saturation. The Dew Point is also an indirect measure of the humidity of the air. The Dew Point will never exceed the Temperature. When the Dew Point and Temperature are equal, clouds or fog will typically form. The closer the values of Temperature and Dew Point, the higher the relative humidity.	[decimal]	Floating point (pos or neg)	60.5	Y
temperatureFeelsLike	Hourly feels like temperature. An apparent temperature. It represents what the air temperature “feels like” on exposed human skin due to the combined effect of the wind chill or heat index.	[decimal]	Floating point (pos or neg)	91.4	Y
temperatureMax24Hour	Max temperature in the last 24 hours	[decimal]	Floating point (pos or neg)	98.2	Y
temperatureMin24Hour	Min temperature in the last 24 hours	[decimal]	Floating point (pos or neg)	-45.8	Y
uvIndex	Enumerated value: -2 = Not Available, -1 = No Report, 0-2 = Low, 3-5 = Moderate, 6-7 = High, 8-10 = Very High, 11-16 = Extreme	[integer]	(-2) to 16	7	Y
visibility	The horizontal visibility at the observation point. Visibilities can be reported as fractional values particularly when visibility is less than 2 miles. Visibilities greater than 10 statute miles(16.1 kilometers) which are considered “unlimited” are reported as “999” in your feed. You can also find visibility values that equal zero. This occurrence is not wrong. Dense fogs and heavy snows can produce values near zero. Fog, smoke, heavy rain and other weather phenomena can reduce visibility to near zero miles or kilometers.	[decimal]	0 to 999	5.2	Y
windDirection	The magnetic wind direction from which the wind blows expressed in degrees. The magnetic direction varies from 0 to 359 degrees, where 0° indicates the North, 90° the East, 180° the South, 270° the West, and so forth.	[integer]	0 to 350	270	Y

	Range - 0<=wind_dire_deg<=350, in 10 degree intervals				
windGust	This data field contains information about sudden and temporary variations of the average Wind Speed. The report always shows the maximum wind gust speed recorded during the observation period. It is a required display field if Wind Speed is shown. The speed of the gust can be expressed in miles per hour or kilometers per hour.	[decimal]	0.0 or positive floating point	65.2	Y
windSpeed	The wind is treated as a vector; hence, winds must have direction and magnitude (speed). The wind information reported in the hourly current conditions corresponds to a 10-minute average called the sustained wind speed. Sudden or brief variations in the wind speed are known as “wind gusts” and are reported in a separate data field.	[decimal]	0.0 or positive floating point	8.2	Y

Agriculture and Energy (AgE)

Field Name	Description	Type	Range	Sample	Nulls Allowed
evapotranspiration	Evapotranspiration rate from a reference surface (non-crop-specific)	[decimal]	0.0 or positive floating point	2.3	Y
globalHorizontalIrradiance	The total amount of shortwave (solar) radiation received by a horizontal surface on the Earth	[decimal]	0.0 or positive floating point	360.2	Y

Datasets

Information on the datasets included in the History on Demand APIs

gCOD - Gridded Currents On Demand

Meteorological / Scientific Commentary

Current conditions are generated on demand from The Weather Company Currents On Demand (CoD) system. CoD is a system that, at request time, assimilates a variety of meteorological inputs to derive a current condition value precise to the requested location on the Earth's surface. The meteorological inputs include physical surface observations, radar, satellite, lightning and short-term forecast models. The CoD system spatially and temporally blends each input appropriately at request-time, producing a result that improves upon any individual input used on its own. The CoD data feed returns a similar set of data elements as traditional site-based observations, listed in the Data Elements and Definitions section below. The CoD system is gridded across the globe at a 4km* geocode resolution, producing the gridded Currents on Demand (gCOD) dataset used in HoD Archive.

* 4km is an approximate grid resolution, as it is easier for most users to understand. The gCOD/HOD dataset uses an equidistant cylindrical map projection, which treats latitude and longitude like Cartesian coordinates. Grid spacing is therefore actually best defined in degrees, not kilometers. In the case of gCOD/HOD, the grid spacing is roughly 0.04° latitude or longitude. At the equator, this translates to approximately a 4km grid spacing. As you move poleward, the longitudinal, or horizontal, distance between points will decrease, while latitudinally the spacing will remain the same.

Special Discussion: Accum Precip Values in gCOD

HoD Archive's gCOD dataset is populated by 1x/hour gCOD grids. The behavior of the past precip fields in these gCOD grids is the same as the behavior in the COD point APIs. COD incorporates multiple sources of data to estimate past precipitation. Some of these sources become available in a latent manner, hours after the event. The end result is that larger time aggregation values may differ from the smaller time aggregations that cover the same time period. For example, the **`precip_1hour`** value generated for a given hour is not using all of the data sources that are eventually available for that hour. Twenty-four hours later, additional sources have become available and have been incorporated in the **`precip_24hour`** amount ... and no correction to the previously published **`precip_1hour`** amounts is made. In this manner, the **`precip_1hour`** amounts are best thought of as a close-to-real time estimate.

Temporal Characteristics

- Source data is hourly, sampled at :20 past the hour
- Given that startDateTime is inclusive and endDateTime is exclusive, a query for 2020-12-20T16 ● ---> ○ 2020-12-20T17 will yield the hourly data for 12-20 T16:20
- Data is usually available within the hour, but can in some rare and extenuating circumstances, lag up to 24 hours

Variables

Temperature	1-hr precipitation	1-hr snowfall	Wind speed	2-digit sensible weather icon code
Dew point	6-hr precipitation	6-hr snowfall	Wind gust	4-digit sensible weather icon code
Relative humidity	24-hr precipitation	24-hr snowfall	Wind direction	UV Index
Feels like	2-day precipitation	2-day snowfall		Visibility
24-hr max temperature	3-day precipitation	3-day snowfall		Driving Difficulty Index
24-hr min temperature	7-day precipitation	7-day snowfall		
24-hr temperature change	Month-to-date precipitation	Month-to-date snowfall		
Mean sea level pressure	Year-to-date precipitation	Seasonal snowfall		
Pressure change		Year-to-date snowfall		

Varying Start Dates for Vars

Data set start date: **2015-06-29**
Exceptions:

Weather Variable	Start Date
Driving Difficulty Index	2015-12-15 T 17
Pressure Mean Sea Level	2017-07-17 T 15
Wind Direction	2017-07-17 T 15
precip2Day precip3Day precip7Day precipMtd precipYtd snow2Day snow3Day snow7Day snowMtd snowSeason snowYtd	2018-03-14 T 16 initial release then briefly rolled back and not present from 2018-03-18 T 05 to 2018-03-22 T 17 resumed as of 2018-03-22 T 18

Precision

Only variables where precision is measured are listed below. For example, enumerated values such as drivingDifficultyIndex, iconCode, iconCodeExtend, and uvIndex are removed.

	Imperial			SI			Metric		
Weather Variable	**Units Description**	**Abbr**	**Precision**	**Units Description**	**Abbr**	**Precision**	**Units Description**	**Abbr**	**Precision**
precip1Hour	Inches	in	0.01	Millimeters	mm	0.1	Millimeters	mm	0.1
precip6Hour	Inches	in	0.01	Millimeters	mm	0.1	Millimeters	mm	0.1
precip24Hour	Inches	in	0.01	Millimeters	mm	0.1	Millimeters	mm	0.1
precip2Day	Inches	in	0.01	Millimeters	mm	0.1	Millimeters	mm	0.1
precip3Day	Inches	in	0.01	Millimeters	mm	0.1	Millimeters	mm	0.1
precip7Day	Inches	in	0.01	Millimeters	mm	0.1	Millimeters	mm	0.1
precipMtd	Inches	in	0.01	Millimeters	mm	0.1	Millimeters	mm	0.1

precipYtd	Inches	in	0.01	Millimeters	mm	0.1	Millimeters	mm	0.1
pressureChange	Inches of Mercury	inHg	0.1	Millibars	mbar	0.1	Millibars	mbar	0.1
pressureMeanSeaLevel	Inches of Mercury	inHg	0.1	Millibars	mbar	0.1	Millibars	mbar	0.1
relativeHumidity	Percentage	%	0.1	Percentage	%	0.1	Percentage	%	0.1
snow1Hour	Inches	in	0.1	Centimeters	cm	0.1	Centimeters	cm	0.1
snow6Hour	Inches	in	0.1	Centimeters	cm	0.1	Centimeters	cm	0.1
snow24Hour	Inches	in	0.1	Centimeters	cm	0.1	Centimeters	cm	0.1
snow2Day	Inches	in	0.1	Centimeters	cm	0.1	Centimeters	cm	0.1
snow3Day	Inches	in	0.1	Centimeters	cm	0.1	Centimeters	cm	0.1
snow7Day	Inches	in	0.1	Centimeters	cm	0.1	Centimeters	cm	0.1
snowMtd	Inches	in	0.1	Centimeters	cm	0.1	Centimeters	cm	0.1
snowSeason	Inches	in	0.1	Centimeters	cm	0.1	Centimeters	cm	0.1
snowYtd	Inches	in	0.1	Centimeters	cm	0.1	Centimeters	cm	0.1
temperature	Degrees Fahrenheit	F	0.1	Degrees Kelvin	K	0.1	Degrees Celsius	C	0.1
temperatureChange24Hour	Degrees Fahrenheit	F	0.1	Degrees Kelvin	K	0.1	Degrees Celsius	C	0.1
temperatureDewPoint	Degrees Fahrenheit	F	0.1	Degrees Kelvin	K	0.1	Degrees Celsius	C	0.1
temperatureFeelsLike	Degrees Fahrenheit	F	0.1	Degrees Kelvin	K	0.1	Degrees Celsius	C	0.1
temperatureMax24Hour	Degrees Fahrenheit	F	0.1	Degrees Kelvin	K	0.1	Degrees Celsius	C	0.1
temperatureMin24Hour	Degrees Fahrenheit	F	0.1	Degrees Kelvin	K	0.1	Degrees Celsius	C	0.1
visibility	Miles	mi	0.01	Kilometers	km	0.01	Kilometers	km	0.01
windDirection	Compass Degrees (Emanation)	°	10	Compass Degrees (Emanation)	°	10	Compass Degrees (Emanation)	°	10
windGust	Miles per Hour	mph	0.1	Meters per Second	m/s	0.1	Kilometers per Hour	km/h	0.1
windSpeed	Miles per Hour	mph	0.1	Meters per Second	m/s	0.1	Kilometers per Hour	km/h	0.1

Known Source Data Gaps

2015
2015-07-04T12:20Z
2015-07-04T21:20Z
2015-07-08T14:20Z
2015-07-10T03:20Z
2015-07-10T06:20Z
2015-07-27T11:20Z
2015-07-29T09:20Z
2015-08-05T11:20Z
2015-08-06T05:20Z
2015-08-07T08:20Z
2015-08-09T09:20Z
2015-08-11T19:20Z
2015-08-12T08:20Z
2015-08-12T20:20Z
2015-08-13T21:20Z
2015-08-14T06:20Z
2015-08-15T13:20Z
2015-08-17T03:20Z
2015-08-17T12:20Z
2015-08-18T17:20Z
2015-08-24T04:20Z
2015-08-25T03:20Z
2015-08-26T15:20Z
2015-08-26T21:20Z
2015-08-27T03:20Z
2015-08-27T08:20Z
2015-08-27T16:20Z
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2015-10-19T21:20Z
2015-11-03T06:20Z
2015-11-04T09:20Z
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2015-12-30T11:20Z

2016
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2016-01-19T13:20Z
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2016-01-28T02:20Z
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2016-02-03T05:20Z
2016-02-03T06:20Z
2016-02-04T09:20Z
2016-02-04T10:20Z
2016-02-04T11:20Z
2016-02-04T12:20Z
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2016-02-05T19:20Z
2016-02-11T15:20Z
2016-02-14T03:20Z
2016-02-14T19:20Z
2016-02-20T12:20Z
2016-03-01T11:20Z
2016-03-01T12:20Z
2016-03-01T17:20Z
2016-03-03T21:20Z
2016-03-03T22:20Z
2016-03-08T11:20Z
2016-03-09T11:20Z
2016-03-09T12:20Z
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2017-04-12T15:20Z
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2017-05-13T07:20Z
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2017-05-15T02:20Z
2017-05-15T03:20Z
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2017-06-26T15:20Z
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2017-11-15T09:20Z
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2017-11-27T07:20Z
2017-11-27T08:20Z
2017-11-27T09:20Z
2017-11-28T21:20Z

2018
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2018-10-11T09:20Z
2018-10-11T10:20Z
2018-10-11T11:20Z

2019
2019-03-07T05:20Z
2019-03-07T06:20Z
2019-03-07T07:20Z
2019-05-12T00:20Z
2019-05-12T01:20Z
2019-06-25T12:20Z
2019-06-25T15:20Z

2020
2020-05-15T13:20Z
2020-05-19T03:20Z
2020-05-19T04:20Z
2020-06-04T14:20Z
2020-06-04T15:20Z
2020-07-01T20:20Z
2020-12-01T14:20Z

2021
2021-01-07T17:20Z
2021-01-07T21:20Z
2021-01-14T20:20Z
2021-02-26T10:20Z
2021-11-10T20:20Z

2022
2022-06-08T17:20Z

AgE - Agriculture and Energy

Meteorological / Scientific Commentary

The Weather Company | An IBM Business (TWC) uses proprietary WxMix technology to support the Solar and Agriculture forecast APIs. These calculations are used to create grids of values for historical analysis.

Temporal Characteristics

- Source data is hourly and time-stamped with :00 minutes
- Given that startDateTime is inclusive and endDateTime is exclusive, a query for 2020-12-20T16 ● ---> ○ 2020-12-20T17 will yield the hourly data for 12-20 T16:00
- Data is usually available within the hour, but can in some rare and extenuating circumstances, lag up to 24 hours

Variables

Reference Evapotranspiration

- The evapotranspiration rate from a reference surface (non-crop-specific), not short of water, is called the reference crop evapotranspiration (ET0) or reference evapotranspiration.
- Product identifier in the API is "**`evapotranspiration`**"

Global Horizontal Irradiance:

- The total amount of shortwave solar radiation received from above by a surface horizontal to the ground.
- Product identifier in the API is "**`globalHorizontalIrradiance`**"

Data Start Date

Data set start date: **2020-03-04 T17 Z**
Exceptions:

- intermittent production problems, particularly in the early days of the dataset, are evident in missing hours of data.

Precision

	Imperial			SI			Metric		
Weather Variable	**Units Description**	**Abbr**	**Precision**	**Units Description**	**Abbr**	**Precision**	**Units Description**	**Abbr**	**Precision**
evapotranspiration	Inches / Hour	in/hr	0.1	Millimeters / Hour	mm/hr	0.1	Millimeters / Hour	mm/hr	0.1
globalHorizontalIrradiance	Watts / Meter^2	W/m^2	0.1	Watts / Meter^2	W/m^2	0.1	Watts / Meter^2	W/m^2	0.1

Known Source Data Gaps

(updated soon)

Date / Time Inputs and Interpretation

Format, using the Java DateTimeFormatter spec: yyyy-MM-dd'T'HH:mm:ssZ
All HoD data is stored in UTC+00:00 and this is how it will be stored in text based results (csv and json).

However the API is more flexible in what it accepts in a request, automatically translating given times to UTC+00:00 prior to querying the data to retrieve the results.
Anything more precise than an hour will be ignored.

Requested Date Time		Results Date Time
2016-04-16	→	2016-04-16T00:00:00+0000
20160416	→	2016-04-16T00:00:00+0000
2016-04-16T12	→	2016-04-16T12:00:00+0000
20160416T12	→	2016-04-16T12:00:00+0000
2016-04-16T12Z	→	2016-04-16T12:00:00+0000
20160416T12Z	→	2016-04-16T12:00:00+0000
2016-04-16T18:30:55	→	2016-04-16T18:00:00+0000
20160416T183055	→	2016-04-16T18:00:00+0000
2016-04-16T18:00:00+09:00	→	2016-04-16T09:00:00+0000
20160416T180000+0900	→	2016-04-16T09:00:00+0000

Location Specification

Rounding on geocode parameter

Please note that when point locations are specified via the **geocode** parameter, they are rounded to 2 decimal places before the query is executed.
This is a standardized approach across all TWC APIs. To achieve greater precision, utilize the **WKT** mode of point specification. **WKT** values are rounded to 6 decimal places.

Geoshape WKT for Geometries Standard

External Documentation

Point

```
POINT (lat lon)
```

Point list

```
MULTIPOINT (lat_0 lon_0, lat_1 lon_1, ..., lat_n lon_n)
MULTIPOINT ((lat_0 lon_0), (lat_1 lon_1), ..., (lat_n lon_n))
```

Bounding box

```
BBOX (southwest_lat southwest_lon, northeast_lat northeast_lon)
BBOX ((southwest_lat southwest_lon), (northeast_lat northeast_lon))
```

It is **important to note** here that the points used to specify a bounding box are different than they were in the predecessor application.

- they are different **points** (SW,NE rather than SE,NW)
- and are stated in a different longitudinal order (W → E rather than E → W)

Polygon

```
POLYGON ((outer_pt1_lat outer_pt1_lon, outer_pt2_lat outer_pt2_lon, . . . , outer_pt1_lat outer_pt1_lon),
(inner_pt1_lat inner_pt1_lon, inner_pt2_lat inner_pt2_lon, . . . , inner_pt1_lat inner_pt1_lon))
```

Polygon WKT must follow the following rules:

- **all** rings must start and end with the same point, verifying closure
- the outer ring is specified first, with vertices listed in counter-clockwise order
- 0 or more inner rings follow, each with vertices specified in clockwise order
    - these define holes in the polygon created by the outer ring
- no two rings may share a common edge, nor may two edges cross one another

The determination of gridpoint containment within a specified polygon is done in an ellipsoidal coordinate space (lat/lon), where polygon edges are treated as curves on the surface of a sphere (geodesic) and not lines projected on a plane. This is only relevant when drawing a polygon with very long edges.

Usage

Calculation

Usage for **HoD Archive jobs** and **HoD Direct queries** is calculated as:

$$usage = ceil((rows\ returned \div grid\ points\ queried) \div 24) \times grid\ points\ queried$$

or, stated differently:

$$usage = the\ \#\ of\ 24hr\ periods\ your\ query\ touched,\ accounting\ for\ missing\ data \times the\ \#\ of\ points\ you\ queried*$$

*For nearest neighbor point queries, "points queried" is clearly 1. As new query types are introduced, points queried will become a more pertinent consideration.

Granularity

For efficiency reasons, it is not possible to physically retain an individual usage record for each of the billions of **HoD Archive** and **HoD Direct** calls made regularly. Instead, usage records are condensed into "UTC daily" records. In other words, the HoD Archive jobs and HoD Direct queries recorded for any given API key will be grouped by UTC 24-hour periods. While this means that there is some offset between the daily divisions of usage data and the daily clock anywhere but the UTC time zone, most usage analyses are performed over longer periods of time where small discrepancies like this are negligible.

It is for this reason that Usage API calls have a **startDate** and **endDate**, rather than including a "time" element like most other weather API calls. Also note that the **endDate** is **exclusive**. So, if you want to examine the **HoD Direct** usage for a given API Key, for the month of "UTC September 2021", you would call:
`https://api.weather.com/v3/wx/hod/r1/usage?startDate=09-01-2021&endDate=10-01-2021&type=direct&apiKey=[your key]`

Inspecting the Usage recorded for your API key

HoD Archive

If you are a **HoD Archive** user, you will note that usage is reported for each job you run, in the response to the **`/activity`** endpoint. Usage is also summarized and available at the **`/usage`** endpoint described below.

HoD Direct

If you are a **HoD Direct** user, your queries are synchronous, so there is no means of immediately inspecting the usage details for any given query. Those details *are* retained in long-term storage so that, should there ever be a reason to examine them, we will have access to them. To examine summarized usage, use the **`/usage`** endpoint described below.

Usage URL Construction

Request Usage **Method: GET** **Required Request Parameters:** startDate, endDate, apiKey **Optional Request Parameters:** type (defaults to "all") https://api.weather.com/v3/wx/hod/r1/usage?type=<**usageType**>&startDate=<**startDate**>&endDate=<**endDate**>&apiKey**=yourApiKey**
https://api.weather.com/v3/wx/hod/r1/usage?type=direct&startDate=2021-09-01&endDate=2021-10-01&apiKey**=yourApiKey** https://api.weather.com/v3/wx/hod/r1/usage?type=archive&startDate=2021-09-01&endDate=2021-10-01&apiKey**=yourApiKey** https://api.weather.com/v3/wx/hod/r1/usage?type=all&startDate=2021-09-01&endDate=2021-10-01&apiKey**=yourApiKey** https://api.weather.com/v3/wx/hod/r1/usage?startDate=2021-09-01&endDate=2021-10-01&apiKey**=yourApiKey**

Valid Usage Parameter Definitions

Parameter	Description	Example
startDate	The UTC beginning of the usage period. Must be before endDate. **Inclusive. Accepted formats:** yyyy-MM-dd, yyyyMMdd	**startDate**=2021-09-01
endDate	The UTC end of the usage period. Must be after startDate. **Exclusive. Accepted formats:** yyyy-MM-dd, yyyyMMdd	**endDate**=20211001
type	The type of HoD usage to be examined. **Accepted values:** archive, direct, all (default if omitted)	**type**=direct

Usage Data Elements & Definitions

Field Name	Description	Type	Range	Sample	Nulls Allowed
startDate	UTC Start date specified in the usage query. Inclusive.	[string]	based on usage data	2021-09-01	N
endDate	UTC End date specified in the usage query. Exclusive.	[string]	based on usage data	2021-10-01	N
type	Type of usage data requested.	[string]	archive, direct, all	direct	N
count	Number of billable API calls included in the range specified	[integer]	> 0	6	N
usage	Usage for the range specified, calculated as: usage = ceil((rowsReturned / gridpointsQueried) / 24) * gridpointsQueried	[integer]	> 0	32	N

Example Usage API Interaction

REQUEST GET **/v3/wx/hod/r1/usage?type=direct&startDate=20210901&endDate=20211001&apiKey=**	**RESPONSE Body**

	{
	"startDate": "2021-09-01",
	"endDate": "2021-10-01",
	"type": "archive",
	"count": 6,
	"usage": 32
	}

The HoD Utility API

Overview

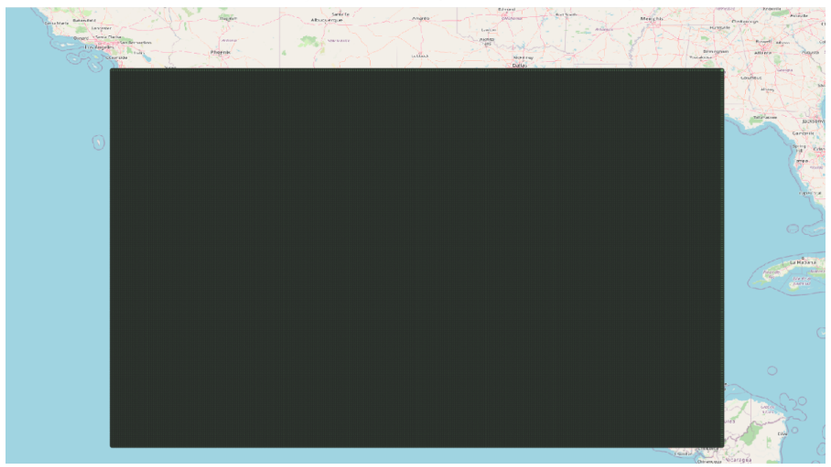
An important part of efficiently and effectively working with the HoD APIs is understanding the datasets they serve. The sheer vastness of the data makes it difficult to understand how we might, for example, economize our calling strategy so that only the essential calls are made. Similarly, if we intended to issue a bounding box query, how could we ascertain how many grid points would be included? What degree of waste (extra grid points) exists in the specification of a polygon? The HoD Utility API is the beginning of the answers to questions like these and many more.

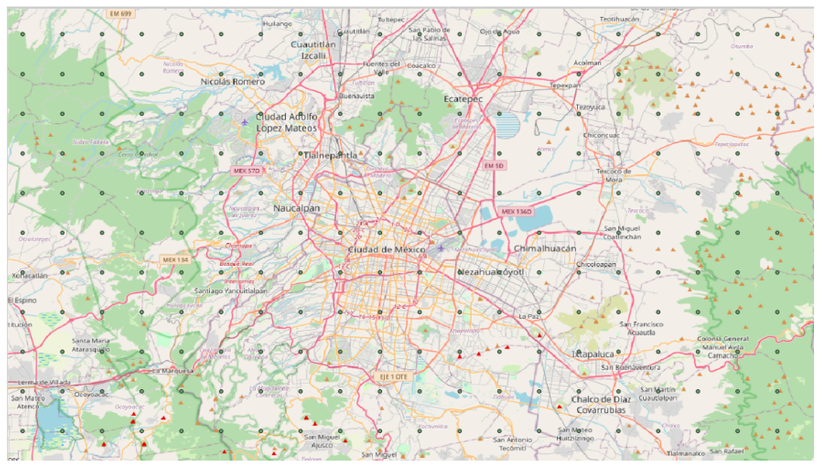
The Grids

As an example of the density of the gridded data, let's briefly examine the gCOD grid. As it happens, the gCOD grid and the AgE grid are the same "shape":

- Grid resolution is 0.043945 degrees in the i-direction (x axis) and 0.043956 degrees in the j-direction (y axis), which is about 4.88km at the equator.
- The projection is Cylindrical Equidistant (CE) projection, aka “lat/lon” projection.
- This means that the physical reality of the grid when projected on the ellipsoid Earth is that, as we move poleward, lines of longitude converge, as do the points on the grid.
- The gCOD grid therefore has 8,192 points horizontally by 4,096 points vertically, for a total of 33,554,432 points

To put this in perspective, even at a reasonable zoom level, a bounding box over Mexico renders with the grid points indistinguishable from one another.
We have to zoom in significantly before their positions become apparent.





This information makes developing a query strategy quite important. For example, in HoD Direct, the default point query type is "Nearest Neighbor," meaning when you query the data for a geolocation, the data you get is from the nearest grid point, said to be representative of the region surrounding it. What if the geolocations of your business assets are in sufficient proximity to one another that querying the geolocation of many of them might actually result in the same grid neighbor? What if you would like to run a polygon query, encasing multiple assets, but aren't certain how many extra grid points will be in the response, or whether that strategy is appropriate? The HoD Utility API has been created to help you answer these questions, mitigate your call count, and be efficient with your usage.

The HoD Utility API Functions

Neighbor Map

The "**neighborMap**" function is a **POST request** that allows you to pass in a list of up to approximately 5,000 points as a POST body, and get back a map of grid points to your points (for which that grid point is the nearest grid neighbor). Let's look at an example. We will send a few points in Illinois, USA, and a few in northern Africa.

REQUEST

POST
/v3/wx/hod/utility?function=neighborMap&apiKey=

POST BODY

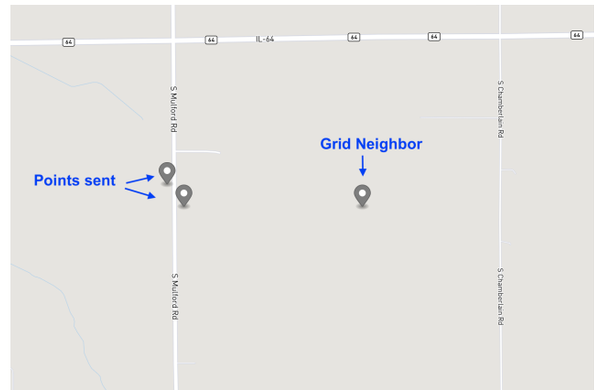

```
[
   {
      "latitude" : 42.000,
      "longitude" : -89.000
   },
   {
      "latitude" : 42.001,
      "longitude" : -89.001000000000
   },
   {
      "latitude" : 21.340,
      "longitude" : 15.680
   },
   {
      "latitude" : 21.342,
      "longitude" : 15.681
   },
   {
      "latitude" : 21.346,
      "longitude" : 15.687
   }
]
```


RESPONSE Body

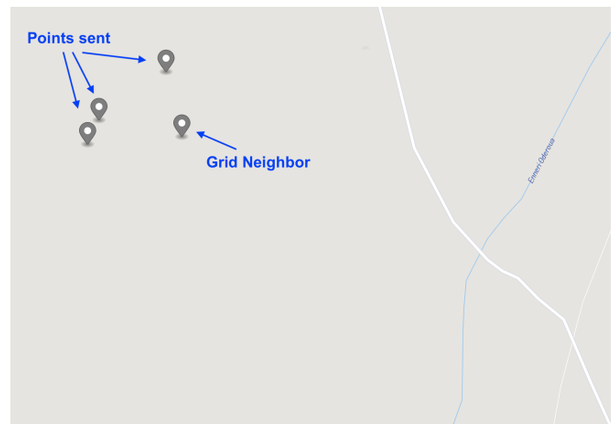

```
[
   {
      "gridNeighbor": {
         "latitude": 41.99999999999999,
         "longitude": -88.98927340946551,
         "gridpointId": "dp2wyvzgxxkqg"
      },
      "requestedPoints": [
         {
            "latitude": 42.000,
            "longitude": -89.000
         },
         {
            "latitude": 42.001,
            "longitude": -89.001000000000
         }
      ]
   },
   {
      "gridNeighbor": {
         "latitude": 21.34065934065933,
         "longitude": 15.688443026388256,
         "gridpointId": "s7g1kuzyr5nzx"
      },
      "requestedPoints": [
         {
            "latitude": 21.340,
            "longitude": 15.680
         },
         {
            "latitude": 21.342,
            "longitude": 15.681
         },
         {
            "latitude": 21.346,
            "longitude": 15.687
         }
      ]
   }
]
```


Interpretation

This response tells you that, for the 5 points you sent in, you could get representative grid data with calls for only two grid points. If we visualize this, the points in Illinois look like:



And the ones in Africa:

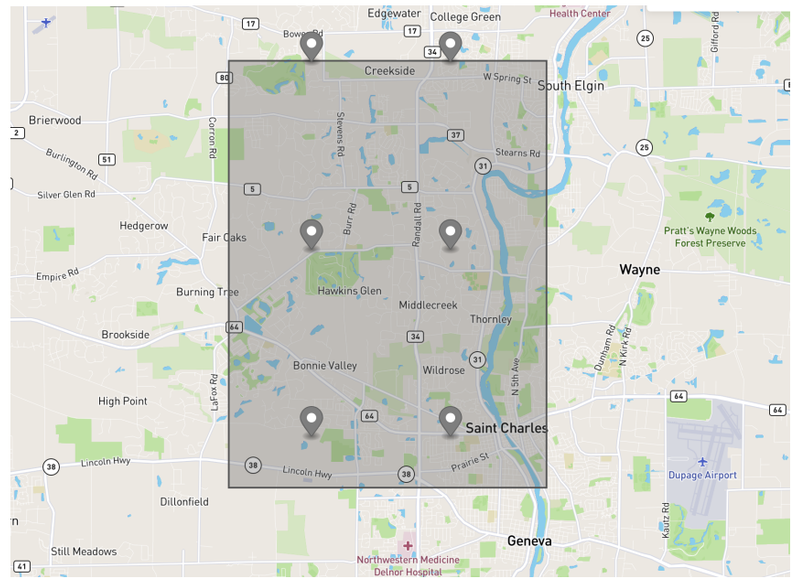


Using the Neighbor Map function, you can develop and maintain a local association between your relevant geolocations and the points on the grid. This allows you to run queries for specific grid point lat/lons, and locally distribute that data to the relevant assets. As seen in the response, each grid point also has a `gridpointId` property. We plan to add the ability to query by that value, making this process even easier.

PointsContained

The "**pointsContained**" function is a **GET request** that allows you to specify a geoshape in WKT (well-known-text), and determine the grid points that would be contained in a data request using the same geoshape.

REQUEST **GET /v3/wx/hod/utility?function=pointsContained&format=json&wkt=BBOX (41.9 -88.4, 42.0 -88.3)&apiKey=**	**RESPONSE Body**	**Interpretation**

	[
	{
	"latitude": 41.912087912087905,
	"longitude": -88.3740391399013,
	"gridpointId": "dp3nkvzgxekqc"
	},
	{
	"latitude": 41.912087912087905,
	"longitude": -88.33009383493243,
	"gridpointId": "dp3nmvzgxekqc"
	},
	{
	"latitude": 41.95604395604395,
	"longitude": -88.3740391399013,
	"gridpointId": "dp3nsvzgxtkqc"
	},
	{
	"latitude": 41.95604395604395,
	"longitude": -88.33009383493243,
	"gridpointId": "dp3ntvzgxtkqc"
	},
	{
	"latitude": 41.99999999999999,
	"longitude": -88.3740391399013,
	"gridpointId": "dp3nuvzgxxkqc"
	},
	{
	"latitude": 41.99999999999999,
	"longitude": -88.33009383493243,
	"gridpointId": "dp3nvvzgxxkqc"
	}
	]
		This response tells you that the specified bounding box contains 6 gridpoints. Rendered as geojson, this looks like:
		 

This enables you to make a decision on whether that geoshape serves your purpose, and understand how much data you will receive when you make the data call.