



SBDB Close-Approach Data API

Version: 1.1 (2016 September)

[change log](#)

This API provides access to current close-approach data for all asteroids and comets in JPL's SBDB (<http://ssd.jpl.nasa.gov/sbdb.cgi>) (Small-Body DataBase). Defaults for query parameters are setup for a typical CNEOS web-site search: NEO Earth close-approaches less than 0.05 au in the next 60 days sorted by date.

HTTP Request

```
GET https://ssd-api.jpl.nasa.gov/cad.api
```

Example Queries

- get all close-approach data for asteroid 433 Eros:
 - `https://ssd-api.jpl.nasa.gov/cad.api?des=433`
- get Earth close-approach data for NEOs within 10 lunar distances on or after 2018-Jan-01 sorted by distance
 - `https://ssd-api.jpl.nasa.gov/cad.api?dist-max=10LD&date-min=2018-01-01&sort=dist`

Query Parameters

Most query parameters are filters effectively limiting the data to those matching the constraints, a few are object selectors (limit data to those matching the specified object), and one is a sort key. Filter-type query parameters are "additive" in that they are combined with logical AND when applied to the data. Boolean-type filter parameters are only applied when true. For example, setting "neo=false" simply disables that filter (it does not select non-NEOs).

Parameter	Type	Default	Function	Description
-----------	------	---------	----------	-------------

Parameter	Type	Default	Function	Description
date-min	string	"now"	filter	exclude data <i>earlier than</i> this date <code>YYYY-MM-DD</code> or date/time <code>YYYY-MM-DDThh:mm:ss</code> or <code>now</code> for the current date
date-max	string	" +60"	filter	exclude data <i>later than</i> this date <code>YYYY-MM-DD</code> or date/time <code>YYYY-MM-DDThh:mm:ss</code> or <code>now</code> for the current date or <code>+D</code> for "D" days after now
dist-min	string	none	filter	exclude data with an approach distance less than this, e.g., <code>0.05</code> , <code>10LD</code> (default units: au)
dist-max	string	"0.05"	filter	exclude data with an approach distance greater than this (see dist-min)
h-min	number	none	filter	exclude data from objects with H-values <i>less than</i> this (e.g., <code>22</code> meaning objects <i>smaller</i> than this)
h-max	number	none	filter	exclude data from objects with H-value <i>greater than</i> this (e.g., <code>17.75</code> meaning <i>objects larger</i> than this)
v-inf-min	number	none	filter	exclude data with V-infinity <i>less than</i> this positive value in km/s (e.g., <code>18.5</code>)
v-inf-max	number	none	filter	exclude data with V-infinity <i>greater than</i> this positive value in km/s (e.g., <code>20</code>)
v-rel-min	number	none	filter	exclude data with V-relative <i>less than</i> this positive value in km/s (e.g., <code>11.2</code>)
v-rel-max	number	none	filter	exclude data with V-relative <i>greater than</i> this positive value in km/s (e.g., <code>19</code>)
class	string	none	filter	limit data to objects with the specified orbit-class (e.g., <code>ATE</code> ; see list of valid class values below)
pha	boolean	false	filter	limit data to PHAs
nea	boolean	false	filter	limit data to NEAs
comet	boolean	false	filter	limit data to comets
nea-comet	boolean	false	filter	limit data to NEAs and comets
neo	boolean	true	filter	limit data to NEOs

Parameter	Type	Default	Function	Description
kind	string	none	filter	limit data to objects of the specified kind (<code>a</code> =asteriod, <code>an</code> =numbered-asteroids, <code>au</code> =unnumbered-asteroids, <code>c</code> =comets, <code>cn</code> =numbered-comets, <code>cu</code> =unnumbered-comets, <code>n</code> =numbered-objects, and <code>u</code> =unnumbered-objects)
spk	int	none	selector	only data for the object matching this SPK-ID (e.g., <code>2000433</code>)
des	string	none	selector	only data for the object matching this designation (e.g., <code>2015 AB</code> or <code>141P</code> or <code>433</code>) [NOTE: when submitting a des containing a space in your query string, you must replace the space with <code>%20</code> , for example <code>2015%20AB</code>]
body	string	"Earth"	selector	limit data to close-approaches to the specified body (e.g., <code>Earth</code>) or allow all bodies with <code>ALL</code> or <code>*</code>
sort	string	"date"	sorter	sort data on the specified field: "date", "dist", "dist-min", "v-inf", "v-rel", "h", or "object" (default sort order is ascending: prepend "-" for descending)
limit	number	none	filter	limit data to the first N results (where N is the specified number and must be an integer value greater than zero)
fullname	boolean	false	output	include the full-format object name/designation

Data Output

Please **always** check the JSON payload "signature" object for the "version". If the version does not match the version in this document (at the top), there is no guarantee that the format has not changed.

Successful query requests result in a JSON-format data payload. The specific content depends on the query mode. If a search is too restrictive, it is possible for a zero-count result (see below).

Each CAD record is packaged as an array of fields (corresponding to those listed) in the following order: * **des** - primary designation of the asteroid or comet (e.g., 443, 2000 SG344) * **orbit_id** - orbit ID * **jd** - time of close-approach (JD Ephemeris Time) * **cd** - time of close-approach (formatted calendar date/time) * **dist** - nominal approach distance (au) * **dist_min** - minimum (3-sigma) approach distance (au) * **dist_max** - maximum (3-sigma) approach distance (au) * **v_rel** - velocity relative to the approach body at close approach (km/s) * **v_inf** - velocity relative to a massless body (km/s) * **t_sigma_f** - 3-sigma uncertainty in the time of close-approach (formatted in days, hours, and minutes; days are not included if zero; example "13:02" is 13 hours 2 minutes; example "2_09:08" is 2 days 9 hours 8 minutes) * **body** - name of the close-approach body (e.g., Earth) * only output if the body query parameters is set to ALL * **h** - absolute magnitude H (mag) * **fullname** - formatted full-name/designation of the asteroid or comet * optional - only output if requested with the appropriate query flag * formatted with leading spaces for column alignment in monospaced font tables

Sample Data Output

Here is an example of the JSON-format output for a query resulting in 2 records for close-approaches to the Earth with a minimum distance of 1LD.

```
{
  "signature":{"version":"1.1","source":"NASA/JPL SBDB Close Approach Data API"},
  "count":"2",
  "fields":["des","orbit_id","jd","cd","dist","dist_min","dist_max","v_rel","v_inf","t_sigma_f","body","h","fullname"],
  "data":[
    ["2007 JB21","9","2418800.878283280","1910-May-09 09:05","0.0020925812637796","0.0020925812637796","0.0020925812637796","0.0020925812637796","0.0020925812637796","0.0020925812637796","0.0020925812637796","0.0020925812637796","0.0020925812637796","0.0020925812637796","0.0020925812637796"],
    ["2012 BX34","16","2419429.176816497","1912-Jan-27 16:15","0.0022444587755823","0.0022444587755823","0.0022444587755823","0.0022444587755823","0.0022444587755823","0.0022444587755823","0.0022444587755823","0.0022444587755823","0.0022444587755823","0.0022444587755823","0.0022444587755823"]
  ]
}
```

Here's an example of a zero-count result (e.g., a query is too restrictive).

```
{
  "signature":{"version":"1.1","source":"NASA/JPL SBDB Close Approach Data API"},
  "count" : "0"
}
```

SBDB Orbit Class Values

Class	Description
IEO	Atira An asteroid orbit contained entirely within the orbit of the Earth ($Q < 0.983$ AU). Also known as an Interior Earth Object.
ATE	Aten Near-Earth asteroid orbits similar to that of 2062 Aten ($a < 1.0$ AU; $Q > 0.983$ AU).
APO	Apollo Near-Earth asteroid orbits which cross the Earth's orbit similar to that of 1862 Apollo ($a > 1.0$ AU; $q < 1.017$ AU).
AMO	Amor Near-Earth asteroid orbits similar to that of 1221 Amor (1.017 AU $< q < 1.3$ AU).
MCA	Mars-crossing Asteroid Asteroids that cross the orbit of Mars constrained by (1.3 AU $< q < 1.666$ AU; $a < 3.2$ AU).
IMB	Inner Main-belt Asteroid Asteroids with orbital elements constrained by ($a < 2.0$ AU; $q > 1.666$ AU).
MBA	Main-belt Asteroid Asteroids with orbital elements constrained by (2.0 AU $< a < 3.2$ AU; $q > 1.666$ AU).
OMB	Outer Main-belt Asteroid Asteroids with orbital elements constrained by (3.2 AU $< a < 4.6$ AU).
TJN	Jupiter Trojan Asteroids trapped in Jupiter's L4/L5 Lagrange points (4.6 AU $< a < 5.5$ AU; $e < 0.3$).
CEN	Centaur Objects with orbits between Jupiter and Neptune (5.5 AU $< a < 30.1$ AU).
TNO	TransNeptunian Object Objects with orbits outside Neptune ($a > 30.1$ AU).
PAA	Parabolic Asteroid Asteroids on parabolic orbits ($e = 1.0$).
HYA	Hyperbolic Asteroid Asteroids on hyperbolic orbits ($e > 1.0$).
HYP	Hyperbolic Comet Comets on hyperbolic orbits ($e > 1.0$).
PAR	Parabolic Comet Comets on parabolic orbits ($e = 1.0$).
COM	Comet Comet orbit not matching any defined orbit class.
JFC	Jupiter-family Comet* Jupiter-family comet, classical definition ($P < 20$ y).
HTC	Halley-type Comet* Halley-type comet, classical definition (20 y $< P < 200$ y).
ETc	Encke-type Comet Encke-type comet, as defined by Levison and Duncan ($T_j > 3$; $a < a_j$).
CTc	Chiron-type Comet Chiron-type comet, as defined by Levison and Duncan ($T_j > 3$; $a > a_j$).
JFc	Jupiter-family Comet Jupiter-family comet, as defined by Levison and Duncan ($2 < T_j < 3$).

Close Approach Bodies

The following bodies may be selected via the `body` query parameter.

Value	Body
Merc	Mercury
Venus	Venus
Earth	Earth
Mars	Mars
Juptr	Jupiter
Satrn	Saturn
Urnus	Uranus
Neptn	Neptune
Pluto	Pluto
Moon	Moon

HTTP Response Codes

All errors are returned via appropriate HTTP response codes. Note that it is possible to submit query parameters resulting in no matching data. In such cases, a non-error code of 200 is returned so the user is responsible for checking the payload if they wish to detect a null-result.

HTTP Code	Description	Typical Usage
200	OK	normal successful result: array of CA data returned (may be empty)
400	Bad Request	the request contained invalid keywords and/or content or used a request-method other than GET or POST (details returned in the JSON payload)
500	Internal Server Error	the database is not available at the time of the request

Change Log

Version 1.1 (2016 September)

- Updated default values for many query parameters such that the default query (i.e., with no query parameters set) results in data of typical interest (as opposed to dumping the entire data set).

Version 1.0 (2016 August)

- Initial release

[Privacy \(http://www.jpl.nasa.gov/copyrights.php\)](http://www.jpl.nasa.gov/copyrights.php) |

[Image Policy \(http://www.jpl.nasa.gov/imagepolicy\)](http://www.jpl.nasa.gov/imagepolicy)

[Privacy \(http://www.jpl.nasa.gov/copyrights.php\)](http://www.jpl.nasa.gov/copyrights.php)

[Image Policy \(http://www.jpl.nasa.gov/imagepolicy\)](http://www.jpl.nasa.gov/imagepolicy)

Site Manager : Ryan Park

Webmaster : Alan Chamberlin

Contact : contact-ssd-api@jpl.nasa.gov