

Natural Satellites Data Base User Guide

Data Deposit Guidelines for Astrometric Positions Data

To submit observations in a dataset file (describe below) you must go this web page: <http://nsdb.imcce.fr/>

1. Definition of dataset, observation, data and metadata [Important]

- A **dataset** contains a series of **observations** produced by the same person and with the exact same metadata. This include all the fields describe in section 2.
- An **observation** consists of at least one coordinate of an astronomical object – a natural satellite in our case – at a given date and associated with complementary **data** and **metadata**.
- **Data** (see section 3) can be **specific** to an observation while **metadata** (see section 2) are **common** to the whole **dataset**. Metadata must be set at the beginning of the file, followed by the data columns, as shown in the example below.

Example of dataset file:

```
"CONTACT = John Doe"
"EMAIL = john.doe@lab.io"
"OBSTYPE = CCD"
"OBSERVATORY = -41"
"INSTRUMENT = HRSC/SRC camera"
"PUBLIREF = 10.1052/0005-6461:20054928"
"PUBLISRC = DOI"
"FRAME = 7"
"FRAME_CENTER = -41"
"MEASUREMENT_TYPE = Absolute"
"UNCERTAINTY_TYPE = Absolute"
"OBSPPOS_FRAME = 7"
"OBSPPOS_FRAME_CENTER = MARS"
2453143.857141800 || PHOBOS | 89.2271 | -3.1065 | 0.0200 | 0.0200 || h0413_0002
2453143.857173400 || PHOBOS | 89.2925 | -2.8708 | 0.0200 | 0.0200 || h0413_0003
2453143.857198500 || PHOBOS | 89.2908 | -2.6395 | 0.0200 | 0.0200 || h0413_0004
2453143.857230200 || PHOBOS | 89.3506 | -2.3850 | 0.0200 | 0.0200 || h0413_0005
2453210.027934900 || PHOBOS | 228.9619 | -40.7812 | 0.0200 | 0.0200 || h0649_0002
2453210.027998100 || PHOBOS | 228.8039 | -41.2716 | 0.0200 | 0.0200 || h0649_0003
2453219.274337200 || PHOBOS | 206.2378 | -35.4993 | 0.0600 | 0.0600 || h0682_0001
2453219.274368700 || PHOBOS | 205.9440 | -35.6029 | 0.0300 | 0.0300 || h0682_0002
2453219.274400300 || PHOBOS | 205.8478 | -35.8209 | 0.0300 | 0.0300 || h0682_0003
2453228.521043700 || PHOBOS | 173.1214 | -25.6504 | 0.0200 | 0.0200 || h0715_0002
2453228.521069000 || PHOBOS | 174.9476 | -25.8920 | 0.0300 | 0.0300 || h0715_0003
2453228.521113100 || PHOBOS | 174.8050 | -26.3397 | 0.0400 | 0.0400 || h0715_0005
2453237.767850700 || PHOBOS | 158.5665 | -10.1882 | 0.0600 | 0.0600 || h0748_0003
2453237.767894800 || PHOBOS | 159.2351 | -10.5536 | 0.0300 | 0.0300 || h0748_0005
2453326.098392800 || PHOBOS | 122.1568 | -32.4503 | 0.0500 | 0.0500 || h1064_0004
2453353.837015600 || PHOBOS | 156.9916 | -25.3078 | 0.0100 | 0.0100 || h1163_0004
2453464.493165300 || PHOBOS | 237.2318 | 14.0733 | 0.0100 | 0.0100 || h1558_0005
2453464.493247300 || PHOBOS | 237.2428 | 14.6478 | 0.0300 | 0.0300 || h1558_0006
2453468.972610600 || PHOBOS | 271.4145 | -0.7930 | 0.0100 | 0.0100 || h1574_0005
2453478.218975500 || PHOBOS | 261.0145 | -0.4927 | 0.0100 | 0.0100 || h1607_0005
2453478.219070100 || PHOBOS | 269.9891 | -0.9145 | 0.0100 | 0.0100 || h1607_0006
2453300.837533700 || DEIMOS | 228.7077 | -9.5856 | 0.0040 | 0.0040 || h0973_0001
2453300.837666100 || DEIMOS | 228.7234 | -9.6893 | 0.0040 | 0.0040 || h0973_0002
2453300.837798700 || DEIMOS | 228.7409 | -9.7938 | 0.0040 | 0.0040 || h0973_0003
2453300.837937400 || DEIMOS | 228.7597 | -9.9028 | 0.0040 | 0.0040 || h0973_0004
2453310.927174600 || DEIMOS | 212.9086 | -4.0287 | 0.0040 | 0.0040 || h1010_0001
2453310.927307200 || DEIMOS | 212.9270 | -5.1325 | 0.0040 | 0.0040 || h1010_0002
2453310.927439600 || DEIMOS | 212.9475 | -5.2364 | 0.0040 | 0.0040 || h1010_0003
2453310.927578300 || DEIMOS | 212.9705 | -5.3441 | 0.0040 | 0.0040 || h1010_0004
2453370.315009800 || DEIMOS | 260.8960 | -8.7569 | 0.0040 | 0.0040 || h1222_0003
2453370.315356800 || DEIMOS | 260.9535 | -8.0190 | 0.0040 | 0.0040 || h1222_0004
```

2. Common informations = Metadata

Informations below are common to the whole dataset. They must be defined only one time and at the beginning of the file with a “key = value” format (**quotes are important but not the case!**) and one information per line. Replace the “<Format>” by the actual value.

For **optional** or **not required** values : put an empty string or space(s) character(s)

“CONTACT = <String (max=32 char.)>” (**required**)

- Description: **Name** of the person to contact if more informations are needed about the observation and data reduction.
- Example: The final data producer i.e. the person who make the reduction of **all** the data presents in the dataset file, or who make the observations if it is the same person.

“EMAIL = <String (max=64 char.)>” (**required**)

- Description: **Email** of the contact.

“PUBLIREF = <String (max=64 char.)>” (**required**)

- Description: **To be validated and published in the database, an observation must contain a reference to the publication that refers to the observations.** We strongly recommend providing Digital Object Identifier (DOI) or Astrophysics Data System (ADS) reference. Others publication sources may be accepted, but only after validation by the data base administrator.

“PUBLISRC = <String (max=64 char.)>” (**required**)

- Description: Specify the origin of the publication's reference.
- Examples: DOI, ADS, etc.

“OBSTYPE = <Enumeration (string)>” (**required**)

- Description: Support used to make the observation
- Accepted values: **CCD** ; **Plate** ; **Visual** ; **Photometry**

“OBSEVENT = <Enumeration (string)>” (**required if “OBSTYPE” is set to “PHOTOMETRY”**)

- Description: Type of photometry event observed.
- Accepted values: **Mutual event**, **Occultation**, **Eclipse**

“OBSERVATORY = <Positive or negative integer value>” (**required**)

- Description: Available standard code. See Minor Planet Center for ground Observatory and NASA's NAIF integer ID codes for spacecrafts.

“INSTRUMENT = <String (max=255 char.)>” (**required**)

- Description: Description of the instrument used (telescope, camera, etc.)
- Examples: “ISSNA”, “20inch refractor”...

“TIME_SCALE = <Enumeration (string)>” (**required**)

- Description: Describe the scale used for the **DATETIME** column. See [Astropy.Time](#) documentation.
- Accepted values: **utc**, **tai**, **tt**, **tcg** (, **tdb**, **tcb**, **ut1**, **sidereal**)

“TIME_FORMAT = <Enumeration (string)>” (**required**)

- Description: Describe the format used for the **DATETIME** column. See [Astropy.Time](#) documentation.
- Accepted values: **iso**, **isot**, **jd**, **mjd**, **yday**

“FRAME = <Enumeration (string)>” (**required**)

- Description: Define direction of the coordinates frame's axes used for “COORDI” & “SIGMAi”
- Accepted values:
 - ▶ **1** → True equator and equinox of date of observation
 - ▶ **2** → True equator and equinox of the planet of date of observation
 - ▶ **3** → Mean equator and equinox at the nearest beginning of a year
 - ▶ **4** → Mean equator and equinox at 1st January of the date of observation
 - ▶ **5** → Mean equator and equinox B1900
 - ▶ **6** → Mean equator and equinox B1950
 - ▶ **7** → Mean equator and equinox J2000
 - ▶ **8** → Other

“FRAME_CENTER = <String (max=64 char.)>” (**required**)

- Description: IAU nomenclature for the centre of the coordinates frame.
- Examples: “SUN”, “EARTH”, “CASSINI”

“COORD_TYPE = <Enumeration (string)>” (required)

- Description: Describe types and units of the measured coordinates.
- Accepted values:
 - ▶ **Absolute** → RA [heure] / dec [degree]
 - ▶ **Relative** → DRA [arcsec] / Ddec [arcsec]
 - ▶ **Position angle** [degree] (first coordinate)
 - ▶ **Separation** [arcsec] (second coordinate)
 - ▶ **Differential** → DRA*cos(dec) [arcsec] / Ddec [arcsec]
 - ▶ **Tangential** → X [arcsec] / Y [arcsec]
 - ▶ **Pixel** → sample [pixel] / line [pixel]
 - ▶ **Millimeter** → x [mm] / y [mm]

“SIGMA_TYPE = <Enumeration (string)>” (optional)

- Description: Describe types and units of the measured coordinates uncertainty
- Accepted values:
 - ▶ **Absolute** → RA [arcsec] / dec [arcsec]
 - ▶ **Relative** → DRA [arcsec] / Ddec [arcsec]
 - ▶ **Position angle** [degree] (first coordinate)
 - ▶ **Separation** [arcsec] (second coordinate)
 - ▶ **Differential** → DRA*cos(dec) [arcsec] / Ddec [arcsec]
 - ▶ **Tangential** → X [arcsec] / Y [arcsec]
 - ▶ **Pixel** → sample [pixel] / line [pixel]
 - ▶ **Millimeter** → x [mm] / y [mm]

“CATALOGUE = <String (max=64 char.)>” (optional)

- Description: The name(s) of the stars catalogue(s) used to make the reduction. For multiple catalogues input, separate them by a coma.

“REFRACTION_CORR = <Enumeration (string)>” (optional)

- Description: Allow to specify if the correction of the refraction have been applied. Not relevant for space observation! If not set, default value in the database is “Unknown”.
- Accepted values: **Done, None, Unknown**

“DIFF_REF_CORR = <Enumeration (string)>” (optional)

- Description: Allow to specify if the correction of the differential refraction have been applied. Not relevant for space observation! If not set, default value in the database is “Unknown”.
- Accepted values: **Done, None, Unknown**

“LIGHT_TIME_CORR = <Enumeration (string)>” (optional)

- Description: Allow to specify if the correction for the light-time have been applied.
- Accepted values: **Done, None, Unknown**

“OBSPoS_FRAME = <Enumeration (string)>” (required if “OBSPoSxyz” is set)

- Description: Define direction of the coordinates frame's axes used for “OBSPoSx”
- Accepted values:
 - ▶ **1** → True equator and equinox of date of observation
 - ▶ **2** → True equator and equinox of the planet of date of observation
 - ▶ **3** → Mean equator and equinox at the nearest beginning of a year
 - ▶ **4** → Mean equator and equinox at 1st January of the date of observation
 - ▶ **5** → Mean equator and equinox B1900
 - ▶ **6** → Mean equator and equinox B1950
 - ▶ **7** → Mean equator and equinox J2000
 - ▶ **8** → Other

“OBSPoS_FRAME_CENTER = <String (max=64 char.)>” (required if “OBSPoSxyz” is set)

- Description: IAU nomenclature for the centre of the coordinates frame used for “OBSPoSx”
- Examples: “SUN”, “EARTH”

“OBSPoS_THEORY = <String (max=64 char.)>” (optional if OBSPoSxyz is set)

- Description: Theory used to get the position of the observatory/spacecraft.
- Example: Spice kernels, etc.

3. Informations specific to the position of one target at one date = Data

Informations below are specific to one observation (position). They must be defined in row/column format separated by a pipe "|". One row for one position and one column for one information.

For **optional** or **not required** values : put an empty string or space(s) character(s) between pipes ("|").

Column 1: DATETIME: <Double precision value> (required)

- Description: **Mid-time** of the observation with the scale specified by the "TIME_SCALE" field and with the format/unit specified by the "TIME_FORMAT" field.

Column 2: ORIGIN: <String (max=64 char.)> (required except for MEASUREMENT_TYPE=ABSOLUTE)

- Description: IAU nomenclature for the origin of the measure (cf. www.iau.org).
- Examples: "SATURN", "IMAGE CENTER", "IMAGE LOWER LEFT CORNER", etc.

Column 3: TARGET: <String (max=64 char.)> (required)

- Description: IAU nomenclature for the measured target (cf. www.iau.org).
- Examples: "DIONE", "PHOBOS", etc.

Column 4: COORD1: <Double> (at least one coordinate is required)

Column 5: COORD2: <Double>

- Description: First and second measured coordinate (i.e. RA, DRA, Position, DRA*cos(dec), X, s, x, resp. dec, Ddec, Separation, Ddec, Y, l, y). An observation must contain at least one coordinate.
- Unit: Defined by "MEASURE_TYPE"

Column 6: SIGMA1: <Double> (optional)

Column 7: SIGMA2: <Double> (optional)

- Description: 1-Sigma estimated/computed uncertainty of the measured coordinates.
- Unit: Defined by "SIGMA_TYPE"

Column 8: NSTARS: <Integer> (optional)

- Description: Number of stars used to make the reduction.

Column 9: IMGNAME: <String (max=64 char.)> (optional but recommended)

- Description: Name of the image.

Column 10: EXPOSURE: <Double> (optional)

- Description: Time of exposure of the image between shutter open and shutter close.
- Unit: second

Column 11: FILTERS: <String (max=16 char.)> (optional)

- Description: Filter used to take the image.

Column 12: BINNING: <Integer> (optional)

- Description: Number of pixels combined to make the image.

Column 13: OBSPOSX: <Double> (optional)

Column 14: OBSPOSY: <Double> (optional)

Column 15: OBSPOSZ: <Double> (optional)

- Description: x,y,z coordinates of the observatory/spacecraft location in "OBSPOS_FRAME"
- Unit: km

Column 16: INFOQUAL: <Enumeration (string)> (optional)

- Description: Confidence on the quality of the observation data and metadata.
- Accepted values: BAD ; MEDIUM ; GOOD

Column 17: COMMENTS: <String (max="reasonable")> (optional)

- Description: Observer comments on the provided data, etc.

Dataset file can be completed by separate metadata file...