```
****************************************************************************
JPL/HORIZONS                ATLAS (C/2025 N1)          2025-Dec-19 15:29:50
Rec #:90004922 (+COV) Soln.date: 2025-Dec-17_07:57:07    # obs: 763 (214 days)

IAU76/J2000 helio. ecliptic osc. elements (au, days, deg., period=Julian yrs):

  EPOCH=  2460894.5 ! 2025-Aug-07.0000000 (TDB)    RMSW= n.a.
   EC= 6.139422831829797   QR= 1.356418761995381   TP= 2460977.9822178655
   OM= 322.1566239181344   W= 128.0096924001076    IN= 175.1130917268881
   A= -.2639243367163182   MA= 113.1534403848549   ADIST= 9.999999E99
   PER= 9.999999E99         N= 7.269171509          ANGMOM= .053531559
   DAN= -3.48269            DDN= 2.02569            L= 194.0456468
   B= 3.848654             MOID= .365841           TP= 2025-Oct-29.4822178655

Comet physical (GM= km^3/s^2; RAD= km):
  GM= n.a.                 RAD= n.a.
  M1= 12.5      M2= n.a.     k1= 4.5    k2= n.a.     PHCOF= n.a.
Comet non-gravitational force model (AMRAT=m^2/kg;A1-A3=au/d^2;DT=days;R0=au):
  AMRAT= 0.                                 DT= 0.
  A1= 4.572104930878E-8   A2= 1.862444758415E-8   A3= -5.019464492798E-9
 Non-standard or simulated/proxy model:
  ALN= 1.            NK= 0.        NM= 2.        NN= 0.        R0= 1.


COMET comments
1: soln ref.= JPL#44, data arc: 2025-05-15 to 2025-12-15
2: k1=4.5;Nongravitational accels. using g(r) = (1 au/ r)^2 for CO2
****************************************************************************


****************************************************************************
Ephemeris / WWW_USER Fri Dec 19 15:29:50 2025 Pasadena, USA      / Horizons
****************************************************************************
Target body name: ATLAS (C/2025 N1)                {source: JPL#44}
Center body name: Mars (499)                       {source: mar099}
Center-site name: BODYCENTRIC
****************************************************************************
Start time      : A.D. 2025-Oct-01 00:00:00.0000 UT
Stop  time      : A.D. 2025-Oct-05 00:00:00.0000 UT
Step-size       : 60 minutes
****************************************************************************
Target pole/equ : undefined
Target radii    : undefined
Center geodetic : 0.0, 0.0, -3396.19              {W-lon(deg),Lat(deg),Alt(km)}
Center cylindric: 0.0, 0.0, 0.0                   {W-lon(deg),Dxy(km),Dz(km)}
Center pole/equ : IAU_MARS                        {West-longitude positive}
Center radii    : 3396.19, 3396.19, 3376.2 km     {Equator_a, b, pole_c}
Target primary  : Sun
Vis. interferer : PHOBOS (R_eq= 13.000) km        {source: mar099}
Rel. light bend : Sun                             {source: DE441}
Rel. lght bnd GM: 1.3271E+11 km^3/s^2
Small-body perts: Yes                             {source: SB441-N16}
Atmos refraction: NO (AIRLESS)
RA format       : HMS
Time format     : CAL
Calendar mode   : Mixed Julian/Gregorian
EOP file        : eop.251219.p260317
EOP coverage    : DATA-BASED 1962-JAN-20 TO 2025-DEC-19. PREDICTS-> 2026-MAR-16
Units conversion: 1 au= 149597870.700 km, c= 299792.458 km/s, 1 day= 86400.0 s
Table cut-offs 1: Elevation (-90.0deg=NO ),Airmass     n.a.    , Daylight (NO )
Table cut-offs 2: Solar elongation (  0.0,180.0=NO ),Local Hour Angle( 0.0=NO )
Table cut-offs 3: RA/DEC angular rate (     0.0=NO )
****************************************************************************
Initial IAU76/J2000 heliocentric ecliptic osculating elements (au, days, deg.):
  EPOCH=  2460894.5 ! 2025-Aug-07.0000000 (TDB)    RMSW= n.a.
```

```
   EC= 6.139422831829797    QR= 1.356418761995381    TP= 2460977.9822178655
   OM= 322.1566239181344    W= 128.0096924001076     IN= 175.1130917268881
    Equivalent ICRF heliocentric cartesian coordinates (au, au/d):
    X=-2.378747297356065E-01  Y=-3.102759005720133E+00  Z=-1.090203350456866E+00
   VX=-1.384709488604957E-02 VY= 3.112560878097644E-02 VZ= 1.183817971407601E-02
Comet physical (GM= km^3/s^2; RAD= km):
   GM= n.a.                  RAD= n.a.
   M1=  12.5      M2=  n.a.     k1=  4.5    k2= n.a.     PHCOF= n.a.
Comet non-gravitational force model (AMRAT=m^2/kg;A1-A3=au/d^2;DT=days;R0=au):
   AMRAT=  0.                                  DT=  0.
   A1= 4.572104930878E-8   A2= 1.862444758415E-8   A3= -5.019464492798E-9
 Non-standard or simulated/proxy model:
   ALN=  1.          NK=  0.         NM=  2.        NN=  0.        R0=  1.
****************************************************************************
 Date__(UT)__HR:MN              delta      deldot   RNG_3sigma RNGRT_3sig
****************************************************************************
$$SOE
 2025-Oct-01 00:00      0.22229434452105 -42.3008514     345.2816  0.0001401
 2025-Oct-01 01:00      0.22128364199795 -41.6861498     346.0196  0.0001402
 2025-Oct-01 02:00      0.22028783635338 -41.0630491     346.7461  0.0001403
 2025-Oct-01 03:00      0.21930713001868 -40.4315248     347.4604  0.0001404
 2025-Oct-01 04:00      0.21834172595140 -39.7915575     348.1619  0.0001405
 2025-Oct-01 05:00      0.21739182750564 -39.1431334     348.8501  0.0001405
 2025-Oct-01 06:00      0.21645763829571 -38.4862447     349.5243  0.0001406
 2025-Oct-01 07:00      0.21553936205426 -37.8208893     350.1838  0.0001407
 2025-Oct-01 08:00      0.21463720248448 -37.1470715     350.8280  0.0001407
 2025-Oct-01 09:00      0.21375136310664 -36.4648021     351.4562  0.0001408
 2025-Oct-01 10:00      0.21288204709941 -35.7740986     352.0678  0.0001409
 2025-Oct-01 11:00      0.21202945713536 -35.0749854     352.6621  0.0001409
 2025-Oct-01 12:00      0.21119379521147 -34.3674941     353.2385  0.0001409
 2025-Oct-01 13:00      0.21037526247382 -33.6516637     353.7962  0.0001410
 2025-Oct-01 14:00      0.20957405903701 -32.9275407     354.3346  0.0001410
 2025-Oct-01 15:00      0.20879038379836 -32.1951797     354.8531  0.0001410
 2025-Oct-01 16:00      0.20802443424767 -31.4546429     355.3509  0.0001411
 2025-Oct-01 17:00      0.20727640627267 -30.7060009     355.8273  0.0001411
 2025-Oct-01 18:00      0.20654649396047 -29.9493327     356.2818  0.0001411
 2025-Oct-01 19:00      0.20583488939515 -29.1847256     356.7136  0.0001411
 2025-Oct-01 20:00      0.20514178245189 -28.4122757     357.1221  0.0001411
 2025-Oct-01 21:00      0.20446736058761 -27.6320877     357.5066  0.0001410
 2025-Oct-01 22:00      0.20381180862840 -26.8442752     357.8665  0.0001410
 2025-Oct-01 23:00      0.20317530855487 -26.0489610     358.2011  0.0001410
 2025-Oct-02 00:00      0.20255803928564 -25.2462765     358.5098  0.0001409
 2025-Oct-02 01:00      0.20196017645962 -24.4363627     358.7921  0.0001409
 2025-Oct-02 02:00      0.20138189221747 -23.6193692     359.0472  0.0001408
 2025-Oct-02 03:00      0.20082335498283 -22.7954550     359.2746  0.0001408
 2025-Oct-02 04:00      0.20028472924344 -21.9647880     359.4737  0.0001407
 2025-Oct-02 05:00      0.19976617533261 -21.1275453     359.6441  0.0001406
 2025-Oct-02 06:00      0.19926784921191 -20.2839129     359.7850  0.0001405
 2025-Oct-02 07:00      0.19878990225599 -19.4340858     359.8961  0.0001404
 2025-Oct-02 08:00      0.19833248103989 -18.5782677     359.9769  0.0001403
 2025-Oct-02 09:00      0.19789572712981 -17.7166710     360.0268  0.0001402
 2025-Oct-02 10:00      0.19747977687789 -16.8495163     360.0454  0.0001401
 2025-Oct-02 11:00      0.19708476122121 -15.9770327     360.0323  0.0001399
 2025-Oct-02 12:00      0.19671080548564 -15.0994574     359.9871  0.0001398
 2025-Oct-02 13:00      0.19635802919515 -14.2170351     359.9094  0.0001397
 2025-Oct-02 14:00      0.19602654588743 -13.3300182     359.7990  0.0001395
 2025-Oct-02 15:00      0.19571646293670 -12.4386665     359.6555  0.0001393
 2025-Oct-02 16:00      0.19542788138423 -11.5432463     359.4785  0.0001391
 2025-Oct-02 17:00      0.19516089577735 -10.6440307     359.2680  0.0001390
 2025-Oct-02 18:00      0.19491559401716  -9.7412987     359.0237  0.0001388
 2025-Oct-02 19:00      0.19469205721552  -8.8353354     358.7454  0.0001385
 2025-Oct-02 20:00      0.19449035956149  -7.9264308     358.4329  0.0001383
 2025-Oct-02 21:00      0.19431056819799  -7.0148803     358.0862  0.0001381
 2025-Oct-02 22:00      0.19415274310944  -6.1009833     357.7053  0.0001379
 2025-Oct-02 23:00      0.19401693702074  -5.1850434     357.2900  0.0001376
```

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2025-Oct-03 00:00    0.19390319530820   -4.2673676    356.8404   0.0001374
2025-Oct-03 01:00    0.19381155592250   -3.3482658    356.3565   0.0001371
2025-Oct-03 02:00    0.19374204932405   -2.4280506    355.8385   0.0001368
2025-Oct-03 03:00    0.19369469843054   -1.5070360    355.2864   0.0001366
2025-Oct-03 04:00    0.19366951857696   -0.5855380    354.7005   0.0001363
2025-Oct-03 05:00    0.19366651748854    0.3361270    354.0808   0.0001360
2025-Oct-03 06:00    0.19368569526688    1.2576420    353.4277   0.0001357
2025-Oct-03 07:00    0.19372704438938    2.1786904    352.7414   0.0001353
2025-Oct-03 08:00    0.19379054972187    3.0989564    352.0222   0.0001350
2025-Oct-03 09:00    0.19387618854447    4.0181255    351.2705   0.0001347
2025-Oct-03 10:00    0.19398393059015    4.9358850    350.4866   0.0001344
2025-Oct-03 11:00    0.19411373809582    5.8519246    349.6710   0.0001340
2025-Oct-03 12:00    0.19426556586569    6.7659369    348.8240   0.0001337
2025-Oct-03 13:00    0.19443936134722    7.6776180    347.9463   0.0001333
2025-Oct-03 14:00    0.19463506471910    8.5866678    347.0383   0.0001329
2025-Oct-03 15:00    0.19485260899126    9.4927906    346.1004   0.0001326
2025-Oct-03 16:00    0.19509192011621   10.3956955    345.1334   0.0001322
2025-Oct-03 17:00    0.19535291711144   11.2950970    344.1378   0.0001318
2025-Oct-03 18:00    0.19563551219177   12.1907152    343.1142   0.0001314
2025-Oct-03 19:00    0.19593961091141   13.0822765    342.0633   0.0001310
2025-Oct-03 20:00    0.19626511231535   13.9695134    340.9856   0.0001306
2025-Oct-03 21:00    0.19661190909967   14.8521657    339.8821   0.0001302
2025-Oct-03 22:00    0.19697988778037   15.7299799    338.7532   0.0001298
2025-Oct-03 23:00    0.19736892887006   16.6027104    337.5998   0.0001293
2025-Oct-04 00:00    0.19777890706166   17.4701192    336.4227   0.0001289
2025-Oct-04 01:00    0.19820969141871   18.3319762    335.2225   0.0001285
2025-Oct-04 02:00    0.19866114557072   19.1880597    334.0001   0.0001280
2025-Oct-04 03:00    0.19913312791382   20.0381564    332.7562   0.0001276
2025-Oct-04 04:00    0.19962549181563   20.8820615    331.4917   0.0001272
2025-Oct-04 05:00    0.20013808582444   21.7195791    330.2073   0.0001267
2025-Oct-04 06:00    0.20067075388172   22.5505222    328.9039   0.0001263
2025-Oct-04 07:00    0.20122333553728   23.3747125    327.5822   0.0001258
2025-Oct-04 08:00    0.20179566616658   24.1919812    326.2432   0.0001254
2025-Oct-04 09:00    0.20238757718917   25.0021682    324.8877   0.0001249
2025-Oct-04 10:00    0.20299889628744   25.8051227    323.5164   0.0001244
2025-Oct-04 11:00    0.20362944762553   26.6007030    322.1303   0.0001240
2025-Oct-04 12:00    0.20427905206820   27.3887763    320.7300   0.0001235
2025-Oct-04 13:00    0.20494752739871   28.1692191    319.3166   0.0001231
2025-Oct-04 14:00    0.20563468853580   28.9419167    317.8907   0.0001226
2025-Oct-04 15:00    0.20634034774890   29.7067633    316.4532   0.0001221
2025-Oct-04 16:00    0.20706431487073   30.4636619    315.0050   0.0001217
2025-Oct-04 17:00    0.20780639750713   31.2125243    313.5467   0.0001212
2025-Oct-04 18:00    0.20856640124330   31.9532706    312.0793   0.0001207
2025-Oct-04 19:00    0.20934412984670   32.6858293    310.6034   0.0001203
2025-Oct-04 20:00    0.21013938546610   33.4101371    309.1199   0.0001198
2025-Oct-04 21:00    0.21095196882683   34.1261389    307.6295   0.0001193
2025-Oct-04 22:00    0.21178167942175   34.8337871    306.1331   0.0001189
2025-Oct-04 23:00    0.21262831569763   35.5330420    304.6312   0.0001184
2025-Oct-05 00:00    0.21349167523616   36.2238713    303.1246   0.0001180
$$EOE
*******************************************************************************
```

Column meaning:

TIME

   Times PRIOR to 1962 are UT1, a mean-solar time closely related to the
prior but now-deprecated GMT. Times AFTER 1962 are in UTC, the current
civil or "wall-clock" time-scale. UTC is kept within 0.9 seconds of UT1
using integer leap-seconds for 1972 and later years.

   Conversion from the internal Barycentric Dynamical Time (TDB) of solar
system dynamics to the non-uniform civil UT time-scale requested for output
has not been determined for UTC times after the next July or January 1st.
Therefore, the last known leap-second is used as a constant over future
intervals.

Time tags refer to the UT time-scale conversion from TDB on Earth
regardless of observer location within the solar system, although clock
rates may differ due to the local gravity field and no analog to "UT"
may be defined for that location.

Any 'b' symbol in the 1st-column denotes a B.C. date. First-column blank
(" ") denotes an A.D. date.

CALENDAR SYSTEM

Mixed calendar mode was active such that calendar dates after AD 1582-Oct-15
(if any) are in the modern Gregorian system. Dates prior to 1582-Oct-5 (if any)
are in the Julian calendar system, which is automatically extended for dates
prior to its adoption on 45-Jan-1 BC. The Julian calendar is useful for
matching historical dates. The Gregorian calendar more accurately corresponds
to the Earth's orbital motion and seasons. A "Gregorian-only" calendar mode is
available if such physical events are the primary interest.

NOTE: "n.a." in output means quantity "not available" at the print-time.

STATISTICAL UNCERTAINTIES

Output includes formal +/- 3 standard-deviation statistical orbit uncertainty
quantities. There is a 99.7% (1-D) or 98.9% (2-D) chance the actual value is
within given bounds. These statistical calculations assume observational data
errors are random. If there are systematic biases (such as timing, reduction or
star-catalog errors), results can be optimistic. Because the epoch covariance
is mapped using linearized variational partial derivatives, results can also
be optimistic for times far from the solution epoch, particularly for objects
having close planetary encounters.

 'delta   deldot' =
   Apparent range ("delta", light-time aberrated) and range-rate ("delta-dot")
of the target center relative to the observer. A positive "deldot" means the
target center is moving away from the observer, negative indicates movement
toward the observer. Units: AU and KM/S

 'RNG_3sigma RNGRT_3sig' =
  Range and range rate (radial velocity) formal 3-standard-deviation
uncertainties. Units: KM, KM/S

Computations by ...

    Solar System Dynamics Group, Horizons On-Line Ephemeris System
    4800 Oak Grove Drive, Jet Propulsion Laboratory
    Pasadena, CA 91109   USA

    General site: https://ssd.jpl.nasa.gov/
    Mailing list: https://ssd.jpl.nasa.gov/email_list.html
    System news : https://ssd.jpl.nasa.gov/horizons/news.html
    User Guide : https://ssd.jpl.nasa.gov/horizons/manual.html
    Connect   : browser   https://ssd.jpl.nasa.gov/horizons/app.html#/x
                  API   https://ssd-api.jpl.nasa.gov/doc/horizons.html
                  command-line   telnet ssd.jpl.nasa.gov 6775
                  e-mail/batch   https://ssd.jpl.nasa.gov/ftp/ssd/horizons_batch.txt
                  scripts   https://ssd.jpl.nasa.gov/ftp/ssd/SCRIPTS
    Author   : Jon.D.Giorgini@jpl.nasa.gov

****

!$$SOF
COMMAND = '3I'
CENTER = '500@499'
START_TIME = '2025-10-01'

```
STOP_TIME = '2025-10-05'
STEP_SIZE = '1 hour'
QUANTITIES = '20,39'
```