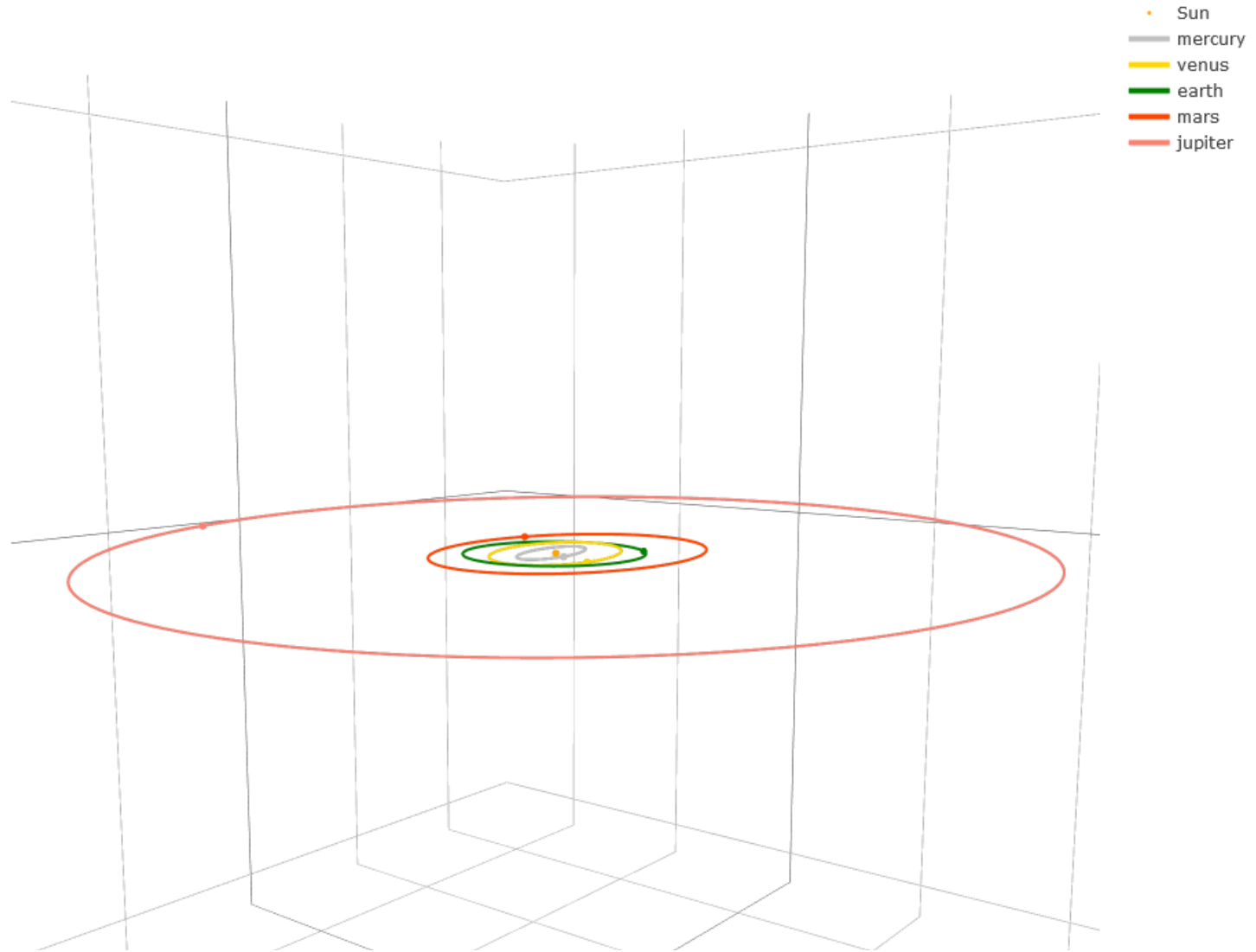
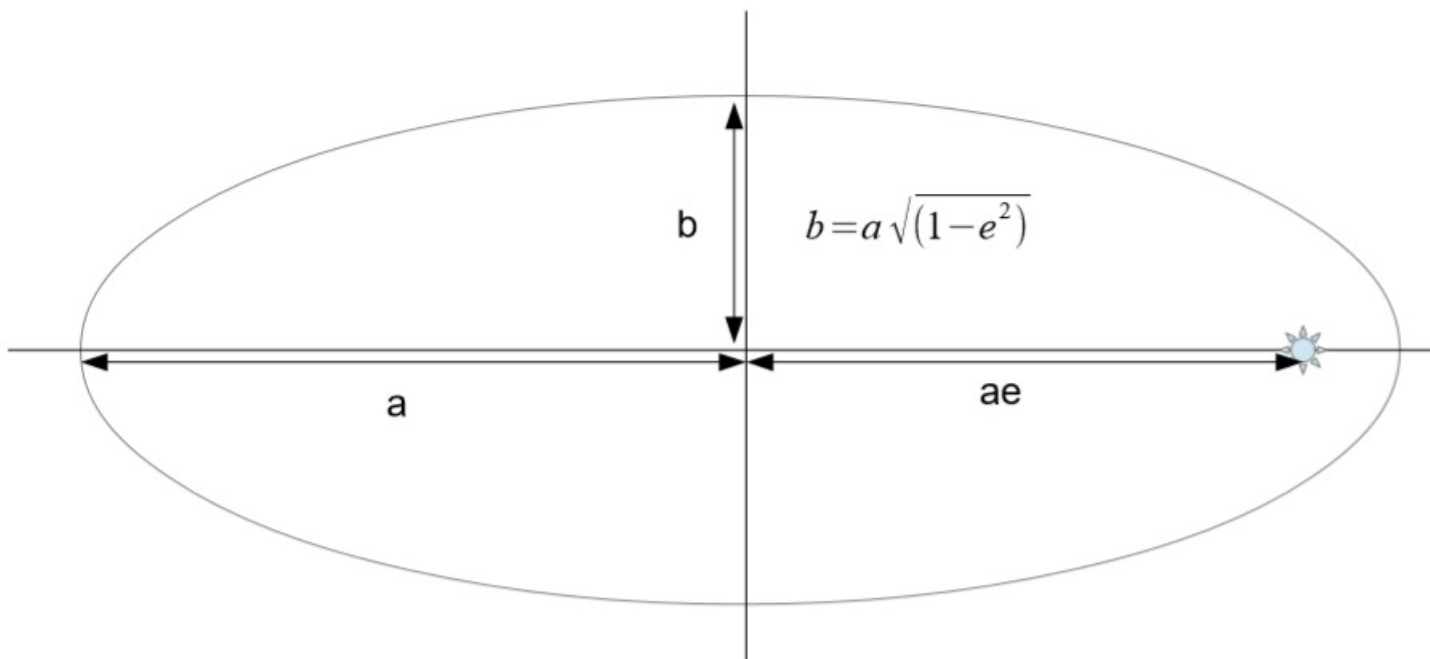
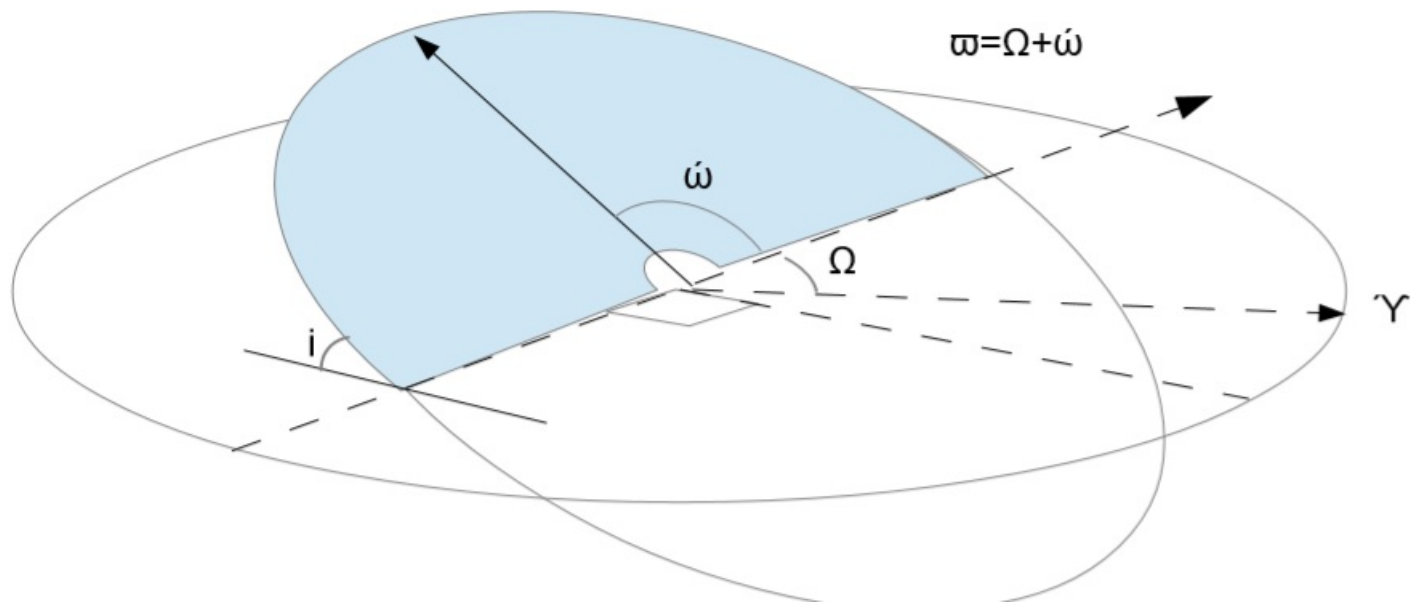
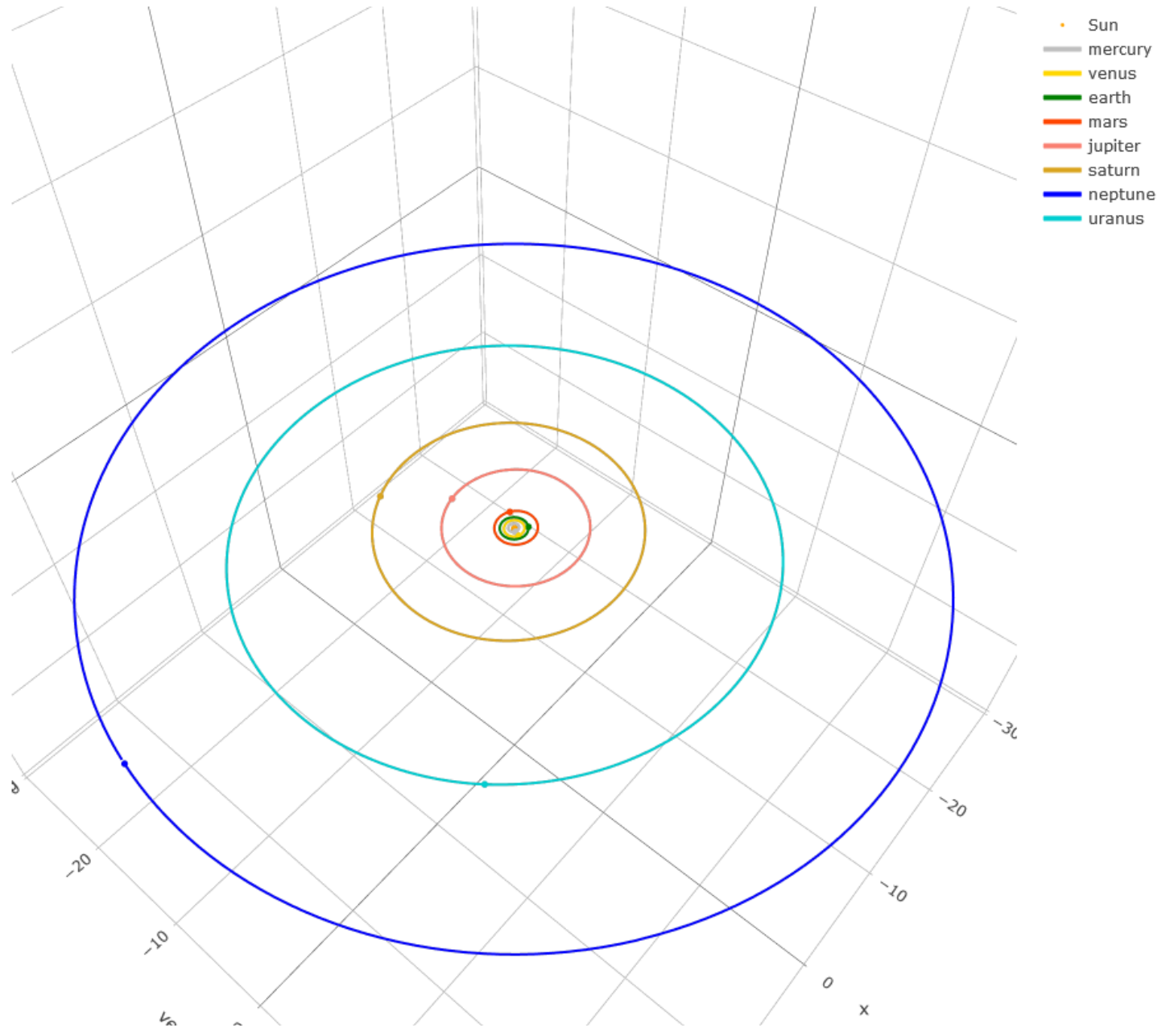


Aktuellit rataelementit







	a	e	I	L	long.peri.	long.node.
	AU, AU/Cy	rad, rad/Cy	deg, deg/Cy	deg, deg/Cy	deg, deg/Cy	deg, deg/Cy
Mercury	0.38709927	0.20563593	7.00497902	252.25032350	77.45779628	48.33076593
	0.00000037	0.00001906	-0.00594749	149472.67411175	0.16047689	-0.12534081
Venus	0.72333566	0.00677672	3.39467605	181.97909950	131.60246718	76.67984255
	0.00000390	-0.00004107	-0.00078890	58517.81538729	0.00268329	-0.27769418
EM Bary	1.00000261	0.01671123	-0.00001531	100.46457166	102.93768193	0.0
	0.00000562	-0.00004392	-0.01294668	35999.37244981	0.32327364	0.0
Mars	1.52371034	0.09339410	1.84969142	-4.55343205	-23.94362959	49.55953891
	0.00001847	0.00007882	-0.00813131	19140.30268499	0.44441088	-0.29257343
Jupiter	5.20288700	0.04838624	1.30439695	34.39644051	14.72847983	100.47390909
	-0.00011607	-0.00013253	-0.00183714	3034.74612775	0.21252668	0.20469106
Saturn	9.53667594	0.05386179	2.48599187	49.95424423	92.59887831	113.66242448
	-0.00125060	-0.00050991	0.00193609	1222.49362201	-0.41897216	-0.28867794
Uranus	19.18916464	0.04725744	0.77263783	313.23810451	170.95427630	74.01692503
	-0.00196176	-0.00004397	-0.00242939	428.48202785	0.40805281	0.04240589
Neptune	30.06992276	0.00859048	1.77004347	-55.12002969	44.96476227	131.78422574
	0.00026291	0.00005105	0.00035372	218.45945325	-0.32241464	-0.00508664
Pluto	39.48211675	0.24882730	17.14001206	238.92903833	224.06891629	110.30393684
	-0.00031596	0.00005170	0.00004818	145.20780515	-0.04062942	-0.01183482

	1800 -- 2050			3000 BC to 3000 AD		
	<i>RA</i>	<i>Dec.</i>	<i>r</i>	<i>RA</i>	<i>Dec.</i>	<i>r</i>
	(arcsec)	(arcsec)	(1000 km)	(arcsec)	(arcsec)	(1000 km)
Mercury	15	1	1	20	15	1
Venus	20	1	4	40	30	8
Earth-Moon Barycenter	20	8	6	40	15	15
Mars	40	2	25	100	40	30
Jupiter	400	10	600	600	100	1000
Saturn	600	25	1500	1000	100	4000
Uranus	50	2	1000	2000	30	8000
Neptune	10	1	200	400	15	4000
Pluto	5	2	300	400	100	2500



Solar System Dynamics

BODIES

ORBITS

EPHEMERIDES

TOOLS

PHYSICAL DATA

DISCOVERY

FAQ

SITE MAP

HORIZONS Web-Interface

This tool provides a web-based *limited* interface to JPL's [HORIZONS system](#) which can be used to generate ephemerides for solar-system bodies. Full access to [HORIZONS](#) features is available via the primary [telnet interface](#). [HORIZONS system news](#) shows recent changes and improvements. A [web-interface tutorial](#) is available to assist new users.

Current Settings

Ephemeris Type [\[change\]](#) : **ELEMENTS**

Target Body [\[change\]](#) : **Mars** [499]

Center [\[change\]](#) : **Solar System Barycenter (SSB)** [500@0]

Time Span [\[change\]](#) : Start=**2000-01-01**, Stop=**2020-01-01**, Step=**1 Y**

Table Settings [\[change\]](#) : *defaults*

Display/Output [\[change\]](#) : **plain text**

[Generate Ephemeris](#)

```
https://ssd.jpl.nasa.gov/horizons_batch.cgi?batch=1&COMMAND=%27301%27&MAKE_EPHEM=%27YES%27&TABLE_TYPE=%27E%27&START_TIME=%272000-01-01%27&STOP_TIME=%272000-01-02%27&STEP_SIZE=%271%20d%27&QUANTITIES=%27?%27&CSV_FORMAT=%27YES%27
```

[LINKKI!](#)

```

Revised: July 31, 2013 Moon / (Earth)
GEOPHYSICAL DATA (updated 2018-Aug-15):
Vol. mean radius, km = 1737.53+-0.03
Radius (gravity), km = 1738.0
Radius (IAU), km = 1737.4
Density, g/cm^3 = 3.3437
V(1,0) = 40.21
Earth/Moon mass ratio = 81.3005690769
Mean crustal density = 2.97+-0.07 g/cm^3
Heat flow, Apollo 15 = 3.1+-0.6 mW/m^2
Heat flow, Apollo 17 = 2.2+-0.5 mW/m^2
Geometric Albedo = 0.12
Obliquity to orbit = 6.67 deg
Semi-major axis, a = 384400 km
Mean motion, rad/s = 2.6616995x10^-6
Apsidal period = 3231.50 d
Mass, x10^22 kg = 7.349
Surface emissivity = 0.92
GM, km^3/s^2 = 4902.800066
GM 1-sigma, km^3/s^2 = +0.0001
Surface accel., m/s^2 = 1.62
Farside crust. thick. = -80 - 90 km
Nearside crust. thick. = 58-8 km
Mean angular diameter = 31'05.2"
Sid. rot. rate, rad/s = 0.0000026617
Mean solar day = 29.5306 d
Orbit period = 27.321582 d
Eccentricity = 0.05490
Inclination = 5.145 deg
Nodal period = 6798.38 d
Solar Constant (W/m^2) Perihelion Aphelion Mean
1414+-7 1323+-7 1368+-7
Maximum Planetary IR (W/m^2) 1314 1226 1268
Minimum Planetary IR (W/m^2) 5.2 5.2 5.2

```

Haetun kohteen
geofysikaalisia
arvoja.

```

Ephemeris / WWW for Sun Jan 26 01:36:49 2020 Pasadena, USA / Horizons
*****
Target body name: Moon (301) (source: DE431mx)
Center body name: Earth (399) (source: DE431mx)
Center-site name: BODY CENTER
*****
Start time : A.D. 2000-Jan-01 00:00:00.0000 TDB
Stop time : A.D. 2000-Jan-02 00:00:00.0000 TDB
Step-size : 1440 minutes
Center geodetic : 0.00000000, 0.00000000, 0.00000000 (E-lon(deg), Lat(deg), Alt(km))
Center cylindrical : 0.00000000, 0.00000000, 0.00000000 (E-lon(deg), Dxy(km), Dz(km))
Center radii : 6378.1 x 6378.1 x 6356.8 km (Equator, meridian, pole)
Keplerian GM : 4.0350323550225975E+05 km^3/s^2
Output units : KM-S, deg, Julian Day Number (Tp)
Output type : GEOMETRIC osculating elements
Output format : 10
Reference frame : ICRF/J2000.0
Coordinate system: Ecliptic and Mean Equinox of Reference Epoch

```

Referenssikoordi-
aatiston tietoja

```

QR, JD, IN, OM, EC,
Tp, N, D, MA, IA,
A, D, PR,
*****
$$$$$
251544.500000000, A.D. 2000-Jan-01 00:00:00.0000, 6.476694137484437E-02,
3.565283198547187E+05, 5.240010960709354E+00, 1.239837037681769E+02,
3.081359025079810E+02, 2.451533965359302E+06, 1.546268359098212E-04,
1.40740256894268E+02, 1.451550309247256E+02, 3.812186882902056E+05,
4.059090567256924E+05, 2.320185776303106E-06,
2481548.500000000, A.D. 2000-Jan-02 00:00:00.0000, 6.138230563029399E-02,
3.591144037611672E+05, 5.240851191817668E+00, 1.239292312630003E+02,
3.098177076259642E+02, 2.451534025990783E+06, 1.537906780756458E-04,
1.524610648223960E+02, 1.555041368449979E+02, 3.825992264106178E+05,
4.06094049060606E+05, 2.340844090842261E+06,
$$$$$

```

Haetut elementit

```

*****
Coordinate system description:
Ecliptic and Mean Equinox of Reference Epoch
Reference epoch: J2000.0
XY-plane: plane of the Earth's orbit at the reference epoch
Note: obliquity of 84381.448 arcseconds wrt ICRF equator (IAU76)
X-axis : cut along ascending node of instantaneous plane of the Earth's
orbit and the Earth's mean equator at the reference epoch
Z-axis : perpendicular to the xy-plane in the directional (+ or -) sense
of Earth's north pole at the reference epoch.

```

Kenttien selitykset

```

Symbol meaning:
JD TDB Julian Day Number, Barycentric Dynamical Time
EC Eccentricity, e
QR Perispsis distance, q (km)
IN Inclination w.r.t XY-plane, i (degrees)
OM Longitude of Ascending Node, OMEGA, (degrees)
W Argument of Perifocus, w (degrees)
Tp Time of perispsis (Julian Day Number)
N Mean motion, n (degrees/sec)
MA Mean anomaly, M (degrees)
TA True anomaly, nu (degrees)
A Semi-major axis, a (km)
AD Apocapsis distance (km)
PR Sidereal orbit period (sec)

```

```

Geometric states/elements have no aberrations applied.
Computations by ...
Solar System Dynamics Group, Horizons On-Line Ephemeris System
4800 Oak Grove Drive, Jet Propulsion Laboratory
Pasadena, CA 91109 USA
Information: http://ssd.jpl.nasa.gov/
Connect : telnet://ssd.jpl.nasa.gov:6775 (via browser)
http://ssd.jpl.nasa.gov/horizons
telnet ssd.jpl.nasa.gov 6775 (via command-line)
Author : Jon.D.Giorgi@jpl.nasa.gov

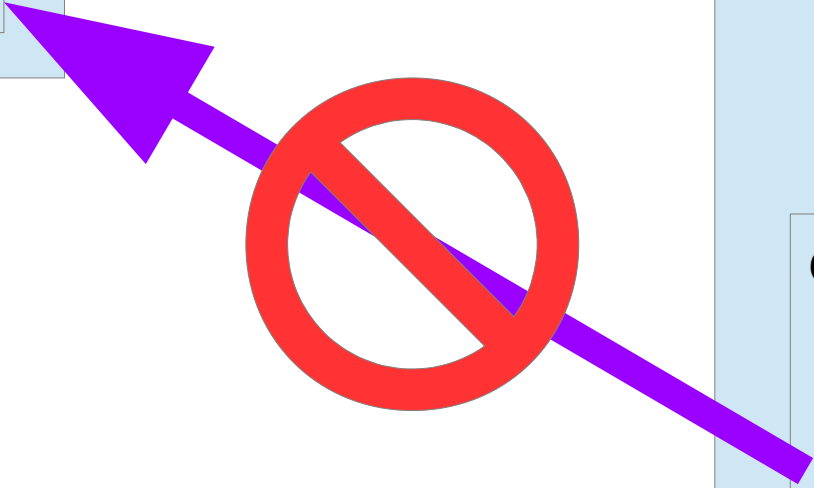
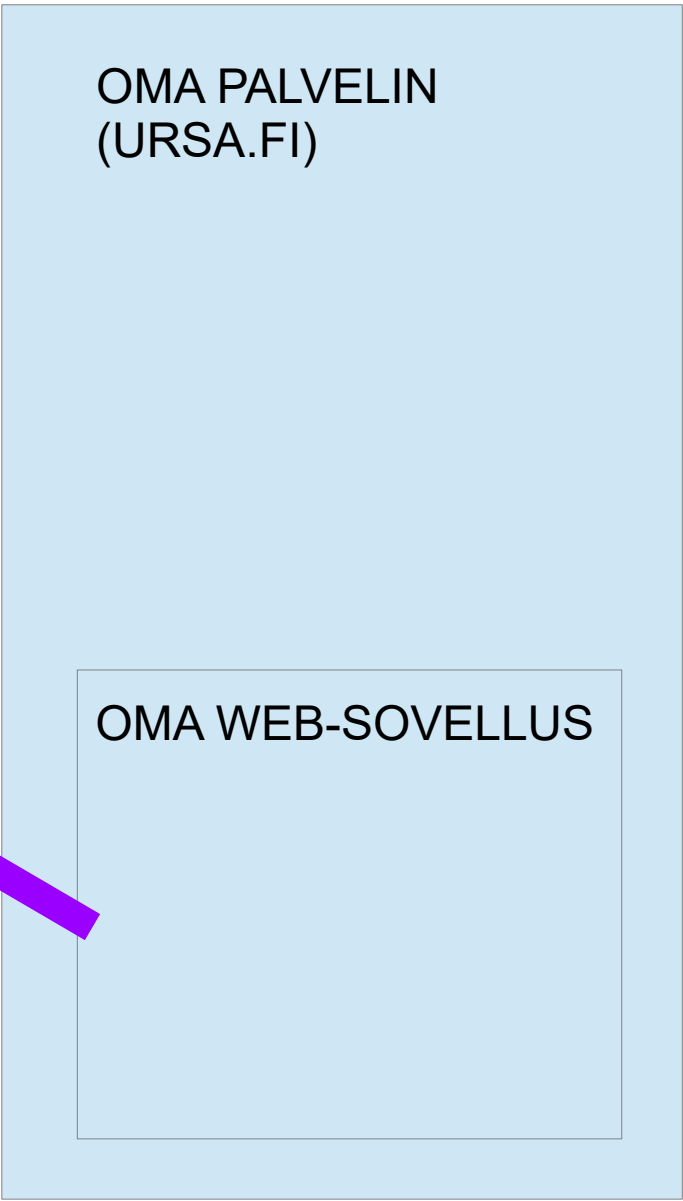
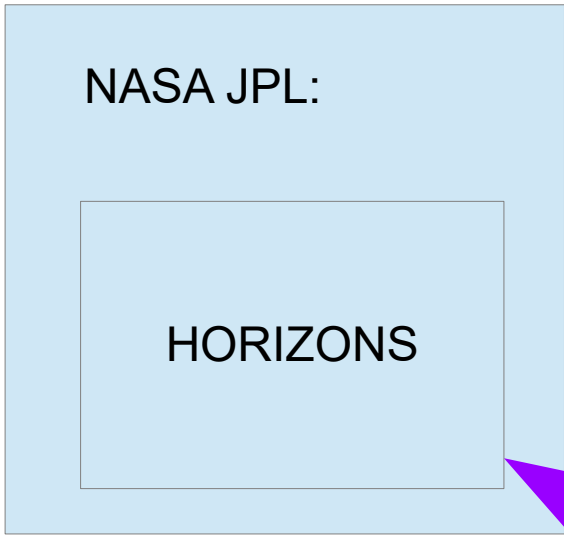
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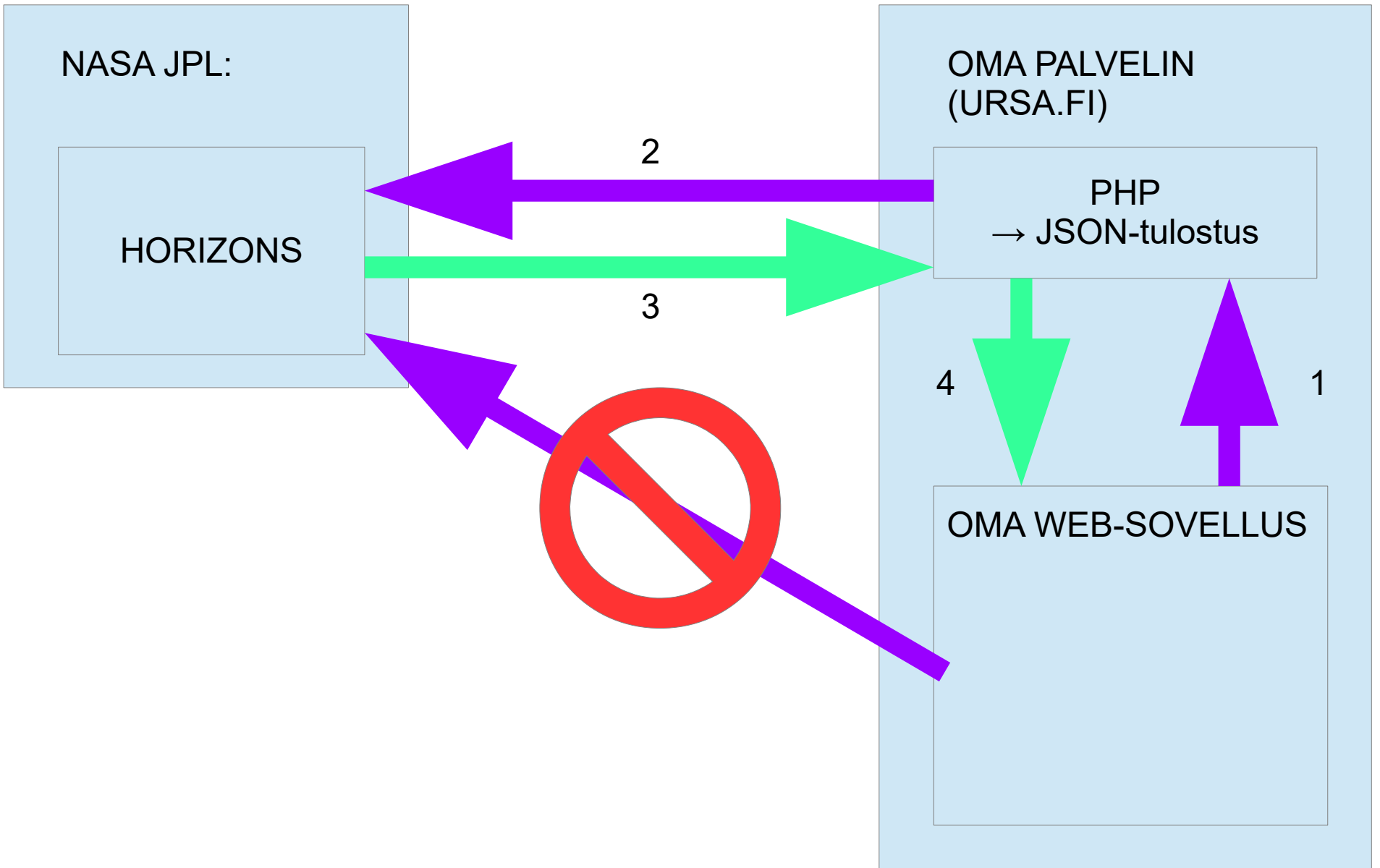
```

$$$$$
COMMAND = '301'
MAKE_EPHEM = 'YES'
TABLE_TYPE = 'E'
START_TIME = '2000-01-01'
STOP_TIME = '2000-01-02'
STEP_SIZE = '1 d'
QUANTITIES = '?'
CSV_FORMAT = 'YES'

```

Hakuparametrit selain version





1: "omaURL"/horizons_call.php?OBJECT=499&START=2000-01-01&END=2020-01-01&STEP_SIZE=1y

4:

▼ 0:

jd: "2451544.500000000"
a: " 2.248042753115034E+08"
e: " 8.524386555618386E-02"
i: " 1.847416312604673E+00"
om: " 4.947466116865789E+01"
w: " 2.857444775274569E+02"
M: " 2.006149192584404E+01"

▼ 1:

jd: "2451910.500000000"
a: " 2.290416597634748E+08"
e: " 9.052348250075551E-02"
i: " 1.852889275664647E+00"
om: " 4.968069352735903E+01"
w: " 2.869810859732777E+02"
M: " 2.102402895707165E+02"