

AE673A

Group Number- 3

- Mataria Pence Jagatkumar (170382)
- Amrendra Pratap Singh (170097)
- Aditya Raghuwanshi (170052)

Type: star Magnitude: -26.76 Absolute Magnitude: 4.83 RA/Dec (J2000.0): 14h16m11.04s/-13°38'40.5" RA/Dec (on date): 14h16m09.58s/-13°38'29.5" HA/Dec: 22h59m28.30s/-13°38'29.5" Az./Alt.: +156°09'32.4"/+51°07'32.7" Gal. long./lat.: -27°39'40.0"/+44°20'04.6"

Supergal. long./lat.: +135°42'08.4"/+15°06'11.4' Ecl. long./lat. (J2000.0): +216°22'12.1"/-0°00'03.9" Ecliptic obliquity (on date): +23°26'15.9' Mean Sidereal Time: 13h15m38.8s

Set: 18h10m

Sun

Parallactic Angle: -22°37'59.1"

Apparent Sidereal Time: 13h<u>15m37.9s</u>

IAU Constellation: Vir Hourly motion: +0°02'28" towards 109.1°

Hourly motion: da=+0°02'24" dδ=-0°00'50" Distance: 0.993 AU (148.563 M km) Light time: OhO8m15.6s Sidereal period: 1.00 days (0.003 a)

Apparent diameter: +0°32'12.64" Diameter: 1392000.0 km

Sidereal day: 654h36m35.9s Equatorial rotation velocity: 1.856 km/s

MATLAB Values

RA = -2.543392 rad

dec = -0.239485 rad

Upon Conversion of Sterillium values, RA = -2.6226 raddeclination = -0.2381 rad

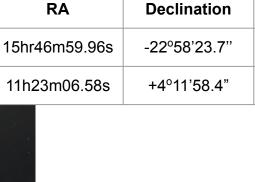
RA and Declination values from both the sources are nearly same. Hence our MATLAB code is perfectly good for this

Solar Objects	RA	Declination	Altitude	Azimuth
Sun	14h16m09.58s	-13°38'29.5"	+51°07'32.5"	+156°09'32.4"

Mercury			
Mercury			
Type: planet Magnitude: -0.00 Absolute Magnitude: -0.60 Absolute Magnitude: -0.60 Absolute Magnitude: -0.60 Ab/Dec (2000): 15h4rm01.54s/- 84/Dec (2000): 15h4sm59 96s/- 44/Dec: 21h2em37.33s/-2258033. 4z/Abt: -13092859.77/+31*20449. Sal. long /lat: -12594553/*/+24*2. Long /lat: (2000): -23993931 Eel. long /lat: (32000): -23993931	22°58'23.7" 7" 4" 1"31.2" /+29°55'10.0" 13.8"/-2°58'19.1" .0.2"/-2°58'19.0"		
Ecliptic obliquity (on date): +23°26 Mean Sidereal Time: 13h15m38.8s Apparent Sidereal Time: 13h15m37			
Rise: 8h41m Transit: 14h02m			
Set: 19h23m Parallactic Angle: -41°48'44.2" LAU Constellation: Lib Hourly motion: -0°01'37" towards: Hourly motion: do=+0°01'43" db=-0 Elongation: +23°26'43.5" Phase angle: +90°04'10.8" [lluminated: 49.9%			
Distance from Sun: 0.395 AU (59.1 Distance: 0.911 AU (136.225 M km Light time: 0h07m34.4s Orbital velocity: 46.890 km/s			
Synodic period: 115.88 days (0.31) Apparent diameter: +0°00'07.39" Equatorial diameter: 487.4 km Sidereal day: 1407h30m33.8s Mean solar day: 4222h27m52.5s Albedo: 0.060			

Solar Objects Mercury

Venus



RA

11h23m06.58s



Altitude

+138°25'59.7"



Azimuth



Mars Type: planet Magnitude: 0.72		Solar Objects	RA	Declination	Altitude	Azimuth
Absolute Magnitude: -1.52 Mean Opposition Magnitude: -2.01 RA/Dec (2000.0); 18h42m29.88s/-24°46'52.4* RA/Dec (2000.0); 18h42m29.88s/-24°46'48.6* HA/Dec: 18h33m99.77s/-24°46'48.6* Az./Alt.: +115°57'46.0'/-291009.7* Gal. long/.lat.: +99424'76.7'-9910'9.5*		Mars	18h42m28.12s	-24°46'48.6"	-02°10'09.7"	+115°57'46.0"
Supergal. long,/lat.; -157*55'03.0"/+499'23'41.9" Ecl. long,/lat. ()2000.0): +279'38'02.6"/-1'241'48.4" Ecl. long,/lat. (on date): +279'38'02.4"/-1'41'48.4" Ecliptic obliquity (on date): +23°26'15.9" Mean Sidereal Time: 13h15m38.8s Apparent Sidereal Time: 13h15m37.9s		Jupiter	01h50m13.03s	+09°42'15.2"	-56°54'01.0"	+344°15'18.6"
Apparent Sidereal Time: 15h15m37.9s Rise: 11h15m Transit: 16h5m Set: 22h15m Parallactic Higher: 66904'85.4* Hourly motion: 4091'81* towards 86.0e Dictance: 1531'83.0* Dictance: 1531'83.0* Light time: 6h12m34.6s Orbital velopity: 26.409 km/s Sidereal period: 886.97 days (2.181 a) Synodic pendio: 779.95 days (2.181 a) Synodic pendio: 779.95 days (2.181 a) Apparent diameter: 40900'05.19* Equatorial days: 24h37m22.7s Sidereal days: 24h37m23.7s Altair Mean solar days: 24h37m35.2s Equatorial rotation velocity: 0.241 km/s Albedo: 0.150	E	Mars Nunki	Jupiter Type: planet Magnitude: -9.92 Absolute Magnitude: -9.40 Mean Opposition Magnitude: -2.70 RA/Dec (2000.0): 1.550m14.475/429- RA/Dec (1000.0): 1.550m14.475/429- RA/Dec (1000.0): 1.550m14.475/429- RA/Dec (1000.0): 1.299.485/45.29 HA/Dec: 1112.579.4856/47942/15-29 Log. 112.579.4856/47942/15-29 Log. 13.579.485/47942/15-29 Log. 13.579.485/47942/15-29 Log. 13.579.485/47942/15-29 Log. 13.579.485/47942/15-29 Log. 17.4600 Transit: Ohigam Set: 61.200 Transit: Ohigam Set: 61.200 Log. 13.579.48600	#215.2* Aldebargn 105.9* - Aldebargn 105.9* - 10	Northern Taurids Southern Taurids Saturn	Andromed Hamal

Saturn Type: planet Mejoritude: -0.20	Solar Objects	RA	Declination	Altitude	Azimuth
Absolute Magnitude: -9.88 Mean Opposition Magnitude: 0 6: Betelgeuse RA/Dec (J2000.0): 2h50m30.695/+13°37'26.9" RA/Dec (on date): 2h50m29.21s/+13°37'16.2" AL/Alco: 10h50m8.685/+13°37'16.2" AZ/Alt.: +324951'56.37'-47°13'17.1" Call Inon Jat.: +15690'018 8'/-440972'44.7"	Saturn	2h50m29.21s	+13°37'16.2"	-47°02'44.7"	+324°51'56.3"
##UJUBEL DIRESHOUSDS-13-97-91-917-1 ### A	Neptune	20h15m23.37s	-19°32'31.1"	-20°35'23.1"	+103°25'30.3"
See: 184399 Aintianiam Transit: 1002m Set: 7h27m Parallactic Angle: +3391272.2° IAU Constellation: Ari Hourly motion: +9301212 towards 252.9° Hourly motion: +930121 dowards 252.9° Hourly motion: +930121 dowards 252.9° Phase angle: +905348.2° Illuminated: 100.0% Distance: Form Sun: 91.98 AU (1375.057 M km) Distance: 8214 AU (1222.764pl km) Light time: 1008n18.8s Orbital viaolocity: 10.018 km/s Sidereal period: 10700.00 days (29.459 a) Synodic period: 378.00 days (1.035 a) Apparent dismater: 4400020.28, with inigs: +0900'47.13° Sidereal day: 10h39022.0 Km Mean solar day: 10h39024 0s Equatorial rotation velocity: 9.871 km/s Albedo: 0.500	Southern Taurids Saturn	Neptune Type: planet Magnitude: 7.92 Absolute Magnitude: 7.637 Mean Opposition Magnitude: 7.84 RA/Dec (2000.0): 20h15mg5.07s/-1 RA/Dec (12000.0): 20h15mg5.07s/-1 RA/Dec (12000.0): 20h15mg5.07s/-1 RA/Dec (12000.0): 40h148.28s/-1993/21/-2095/63.1] AZ./Alt.: +103°25/30.3*/-2095/63.1] Gal. long:/lat.: -23°39/31.3*/-2095/65 Supergal. long./lat.: -123°93/44.3*/+ Ecl. long./alt. (1000.0): +301*49.3*/-94 Ecliptic obliquity (on date): +23°26/1 Mean Sidereal Time: 13h15m36.8 Spparent: Sidereal Time: 13h15m36.8 Spparent: Sidereal Time: 13h15m37.9 Rise: 13h03m1 Set: 23h53m Parallactic Angle: -72°44*40.9* LAU Constellation: Cap Hourly motion: -64=0°00′01* towards 80 Hourly motion: -64=0°00′01* doa=0°00′01* doa	9932'31.1' 16.9' 49°35'09.2' 49°35'07.2' 49°35'07.7' 52'/40°15'10.7' 5 Altair 1.9° 00°00' .301 M km) 1) 799 a) 8) th rings: +0°00'05.75'	E	

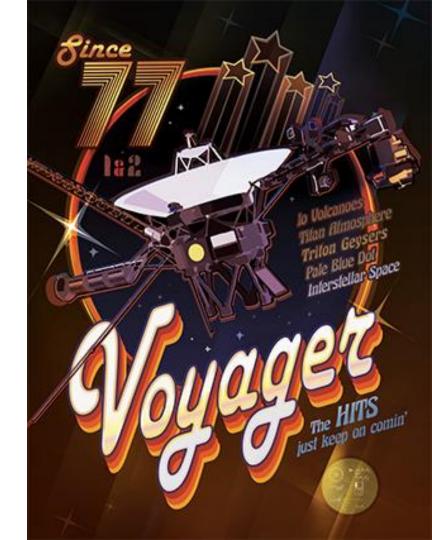
Uranus Type: planet Magnitude: 5.79	Solar Objects	RA	Declination	Altitude	Azimuth
Absolute Magnitude: -7.13 Altelf Mean Opposition Magnitude: 5.52 17939'04.4* RA/Dec ((2000.0)): 21h02m13.995/-17939'04.4* RA/Dec ((nd atel): 21h02m12.335/-17939'07.2* HA/Dec: 16h13m25.565/-17939'07.2* Az,/Alt.: +9759'14-82/-9.09'039.0'	Moon	07h22m36.66s	+20°00'27.9"	+8°59'23.0	+288°01'50.3"
Gal. long,/Jat.: +30°228'54.2"/-36°25'45.4" Supargal. long,/Jat.: -109°00'23.7"/+44°15'42.7" Ecl. long,/Jat. (2000.0): +312°35'22.3"/-0°41'06.9" Ecl. long,/Jat. (on date): +312°35'35.7"/-0°41'06.9" Ecliptic obliquity (on date): +23°26'15.9" Mean Sidereal Time: 13h15m38.8s	Uranus	21h02m12.33s	-17°36'07.2"	-30°40'39.0"	+97°51'48.2"
Apparent Sidereal Time: 13h15m37.9s Rse: 13h47m Transit: 19h18m Sat: 04h97m Parallactic Angle: -74°04'03.5" 1AU Constellation: Cap Hourly motion: de=0°00'01" do=+0°00'00" Elongation: +96°00'47.9" Phase angle: +2°50'21.9" Illiuminated: 99.9% Distance from Sun: 19.918 %U (2979.660 M km) Distance: 19.781 AU (2959.149 M km) Light time: 24h4m30.7s Orbital velocity: 6.855 km/s Sidereal peniod: 3068.50 days (84'011 a) Synolic peniod: 3668.66 days (1.012 a) Synolic peniod: 3678.67 days (1.014 a) Synolic peniod: 3678.67 days (1.	Uranus	Moon Type: moon Magnitude: -11.57 Absolute Magnitude: 0.21 Mean Opposition Magnitude: -12.7 RA/Dec (1200.0): 7hz2ma3.875/+ RA/Dec (on date): 7hz2ma3.665/+ RA/Dec (on date): 7hz8ma3.7k=5°92/15/- Supergal. long,/lat: -161°85/27.0/15/- Supergal. long,/lat: -161°85/27.0/15/- Supergal. long,/lat: -161°85/27.0/15/- Ray (and the date): 101°22/28/- Mean Sidereal Time: 13h15m38.8s Apparent Sidereal Time: 14h15m38.8s Apparent Sidereal Time: 14h15m38.8s Apparent Sidereal Time: 14h15m38.8s Hourly motion: 40°23′28/* de- Elongation: +106°59′24.9° Phase angle: +7e°26′25.4° Illuminated: 64.7% Moon age: 20.3 days old (Waning Position angle of bright limb: +9e.0 bistance from Sum: 0.994 AU (148) Oistance from Sum: 0.994 AU (148) O	20°00'29.8" 20°00'27.9" "" "38°08.1" -593°33'37.2" 27.3"/-203'07.9" 36.6"/-203'08.0" 6'15.9" 101.0° 0°06'53" Gibbous) 99800 671 M km) 28 km)	Procyon	Pollux

```
[RA, delta] = SolarAzElq('1999-10-30 11:30:00',22.2913,70.7930,140);
                                                                          e = 0.016709 - 1.151e - 9 * day;
fprintf('RA = %f rad \n', RA)
                                                                          M = mod(356.0470 + 0.9856002585 * day, 360);
fprintf('dec = %f rad \n', delta)
                                                                          L = W + M;
                                                                          oblecl = (23.4393 - 3.563e-7 * day)*d2r;
function [RA, delta] = SolarAzElq(UTC, Lat, Lon, Alt)
                                                                          E = M + r2d*e.*sin(M*d2r).*(1+e.*cos(M*d2r));
if nargin<4 || isempty(Alt), Alt = 0;end</pre>
                                                                          x = cos(E*d2r) -e;
d2r = pi/180; %radiance to degrees conversion factor
                                                                          year = sin(E*d2r).*sqrt(1-e.^2);
r2d = 180/pi; %radiance to degrees conversion factor
                                                                          r = sqrt(x.^2 + year.^2);
if ischar(UTC)
                                                                          v = atan2(year, x) * r2d;
UTC = cellstr(UTC);
                                                                          lon = v + w;
end
                                                                          xeclip = r.*cos(lon*d2r);
if iscell(UTC)
                                                                          yeclip = r.*sin(lon*d2r);
UTC = reshape(datenum(UTC(:),'yyyy-mm-dd HH:MM:SS'), size(UTC));
                                                                          zeclip = 0;
end
                                                                          xequat = xeclip;
[year, month, day, hour, min, sec] = datevec(UTC);
                                                                          yequat = yeclip.*cos(oblecl) +
if ndims(UTC)>2 %#ok<ISMAT>
                                                                          zeclip*sin(oblecl);
year = reshape(year , size(UTC));
                                                                          zeguat = yeclip.*sin(0.409115648642983) +
month = reshape(month, size(UTC));
                                                                          zeclip*cos(oblecl);
day = reshape(day , size(UTC));
                                                                          r = sqrt(xequat.^2 + yequat.^2 + zequat.^2) -
hour = reshape(hour , size(UTC));
                                                                          (Alt/149598000);
min = reshape(min , size(UTC));
                                                                          RA = atan2(yequat, xequat); % in radians
sec = reshape(sec , size(UTC));
                                                                          delta = asin(zequat./r); % in radians
end
                                                                          end
[jd,UTH] = juliandate(year, month, day, hour, min, sec);
day = jd - 2451543.5;
                                                                          function [jd,UTH] =
w = 282.9404 + 4.70935e-5 * day;
                                                                          juliandate(year, month, day, hour, min, sec)
```



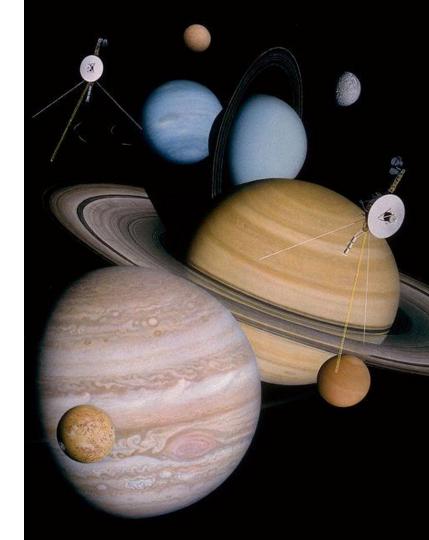
The Mission

- The initial mission was launched in 1977 to study Jupiter, Uranus, Saturn, Neptune.
- The mission was a part of "The Grand Tour".
- The original mission got extended to "Voyager Interstellar Mission".
- They are the only and the farthest interstellar man made probes in the history.
- Expected to cross the realms of Milky way.

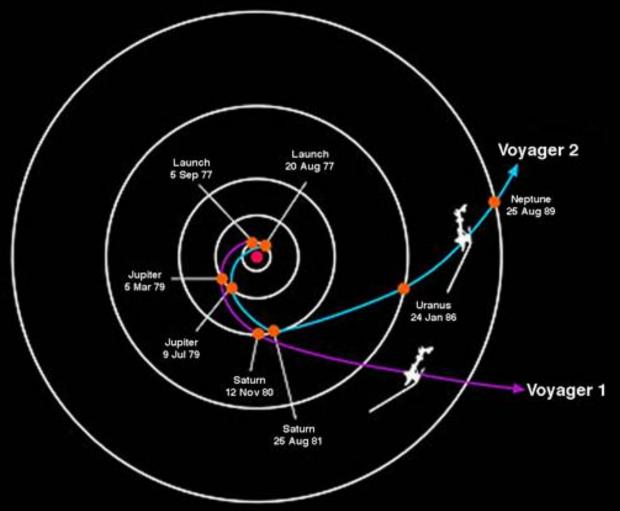


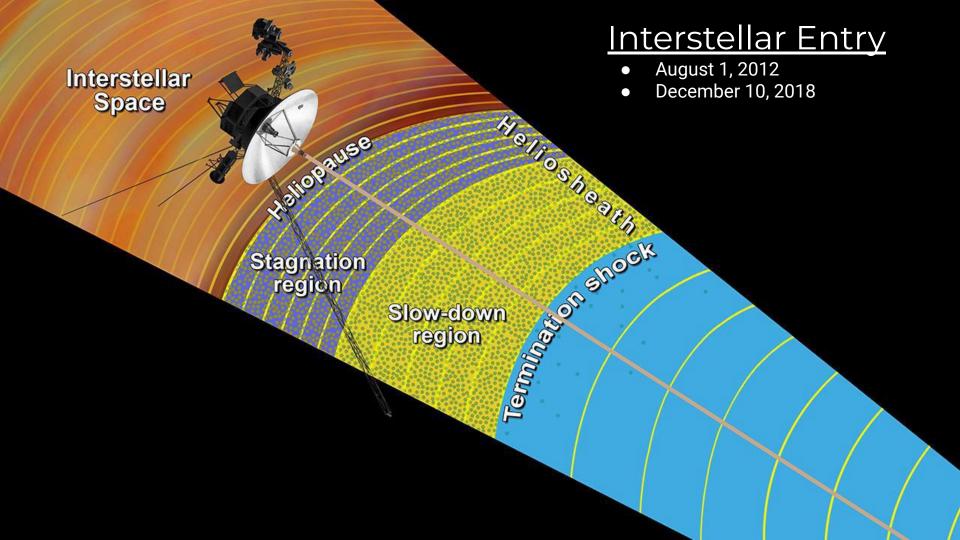
<u>Astonishing Discoveries</u>

- Active Volcanoes on Jupiter's moon lo.
- V1 Discovered the Rings and moons of Jupiter.
- Various data on Saturn surface and its moons.
- V2 revealed the Great Red Spot on Jupiter to be a complex storm system, and also imaged several smaller storms.
- All our knowledge of Uranus and Neptune comes from V2.
- On Uranus, V 2 found evidence of an ocean of boiling water about 500 miles (800 kilometers) below its cloud tops.
- In October 2020, Voyagers confirmed high density of space outside the solar system.



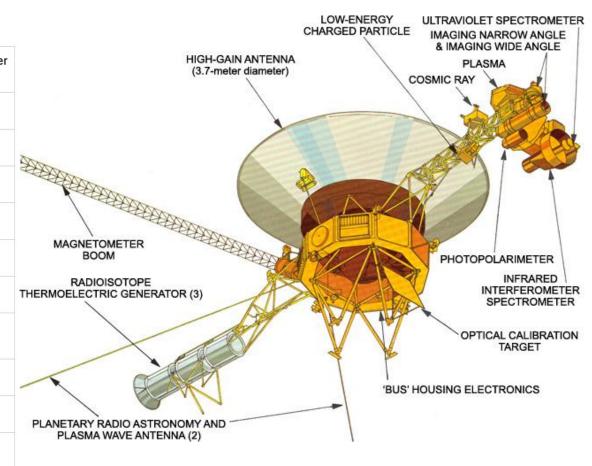
Timeline





<u>Instruments</u>

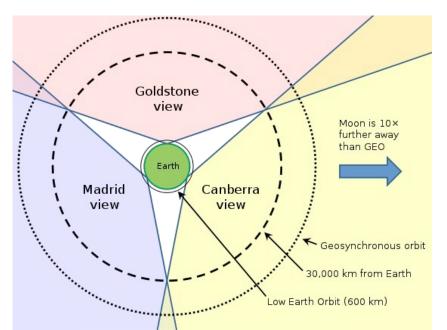
Instrument	Voyager 1	Voyager 2
Cosmic Ray Subsystem (CRS)	ON	ON
Low-Energy Charged Particles (LECP)	ON	ON
Magnetometer (MAG)	ON	ON
Plasma Wave Subsystem (PWS)	ON	ON
Plasma Science (PLS)	OFF	ON
Imaging Science Subsystem (ISS)	OFF	OFF
Infrared Interferometer Spectrometer and Radiometer (IRIS)	OFF	OFF
Photopolarimeter Subsystem (PPS)	OFF	OFF
Planetary Radio Astronomy (PRA)	OFF	OFF
Ultraviolet Spectrometer (UVS)	OFF	OFF

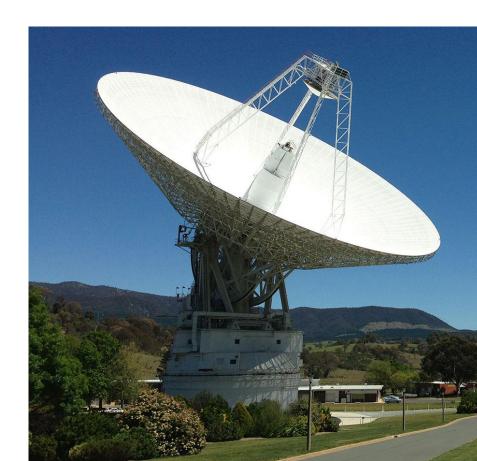


Communication

20KW Uplink 20W Downlink







The Golden Record

- Variety of natural sounds, such as those made by surf, wind and thunder, birds, whales, and other animals
- 115 images (encoded in analog form)
- Music (total duration of 90min)
- Spoken greetings from Earth-people (in fifty-five languages)

