The Professor Comet's Report



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Welcome to the comet report which is a monthly article on the observations of comets by the amateur astronomy community and comet hunters from around the world! This article is dedicated to the latest reports of available comets for observations, current state of those comets, future predictions, & projections for observations in comet astronomy!



C/2012 V2 (LINEAR)

14 September 2013

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Autumnal Season - October 2013



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The Current Status of the Predominant Comets for Late - Spring 2013!

Comets	Designation (IAU – MPC)	Orbital Status	Magnitude Visual	Trend (Brightness Or Dimming)	Observation (Range in Lat.) (Alt. > 10°)	Constellations (Night Sky Location)	Visibility Period (July & August) (Alt. ≥ 15°)
LINEAR	C/2012 V2	C	8.4* (4 Oct)	*Peaked in Brightness*	N/A	*Moving SE thru the N region of Pyxis towards Antlia & Vela*	*Not Visible in the daytime glare!*
ISON	C/2012 S1	C	9.8* (7 Oct)	**Gradual Brightening**	39°S - 75°N	Moving SE from Cancer to Leo!	***(4:30 – 6:30) am CDT***
Lovejoy	C/2013 R1	C	10.0* (4 Oct)	***Rapid rate of Brightening***	77°S - 70°N	*Slow movement ESE in Scorpius in close proximity to Antares!*	***(2:15 – 6:30) am CDT***
Encke	2P	P	10.5* (5 Oct)	***Brightening prior to perihelion***	29°S - 85°N	*Rapidly moving eastwards from Auriga to Leo Minor by Mid - October*	***(2:00 – 6:30) am CDT***
Brewington	154P	P	11.4* (3 Oct)	**Slow yet persistence rate of brightening**	69°S - 74°N	Undergoing a very wide S to N retrograde loop moving NW to N thru the NW region of Aquarius	***(8:00 pm – 2:45 am) CDT***
Borisov	C/2013 N4	C	11.7* (18 Sept)	**Fading from peak brightness**	16°S - 40°N	Progressing SSE from S region of Leo towards Crater	***Soon to be lost in the morning twilight!***
LEMMON	C/2012 F6	C	12.0* (4 Oct)	*Diminishing in brightness*	21°S - 80°N	Partial Retrograde effect moving W then S towards Cygnus	***(8:00 pm – 2:15 am) CDT***
LINEAR	C/2010 S1	C	12.4* (3 Oct)	**Peak oscillation period in brightness**	60°S - 85°N	Moving E then SE thru the N & W region of Aquila prior to retrograding in Spring 2014!	***(8:00 pm – 1:00 am) CDT***
Schwassmann – Wachmann 1	29P	P	13.0* (28 Aug)	*Fading in its current oscillation period*	65°S - 10°S	Between retrograde loops while moving Eastward between Libra and Hydra	*Not Visible in the daytime glare!*

*Visual Magnitude determined from last known field observation report!

Comets with visual magnitudes fainter than 13.0 , more suitable for observing in the Southern hemisphere , or in the tropics are not reported on this list!

Autumnal Season - October 2013

Ephemeris Data Terminology

Ephemeris Term	*Definition (plus additional comments)*
Date	Month and Year using the standard Gregorian calendar.
TT	Terrestrial Time (Day of the Month) as a substitute for the astronomical Julian date.
RA (2000)	Right Ascension based on the Epoch J2000 (longitudinal coordinate for the celestial sky) measured in hours, minutes, and seconds.
Dec (2000)	Declination based on the Epoch J2000 (latitudinal coordinate for the night sky) measured in degrees, arcminutes, and arcseconds.
Delta	The distance from Earth measured in AUs (1 AU = 1 Astronomical Unit = 92 955 807 mi = 149 597 871 km as the mean distance between the Earth and Sun).
R	The solar distance measured in AUs (the distance between the comet or comet – like body and the Sun)!
Elongation {El. (˚)}	Solar elongation which is the angle of separation between the observed object and the Sun as measured across the night sky as measured in degrees.
Phase (Ph.)	Phase angle between the Sun, the celestial object, and the observer on the surface of the Earth. Also known as the Sun – Object – Observer angle.
M1	M1: The visual magnitude of the celestial object as observed on the surface of the Earth at sea level. *(Note M1 values predicted by the Minor Planet Center can differ from actual visual reports obtain in the field!)*
M_{pred}	*The predicted absolute magnitude which is calculated from a series of initial observations upon the discovery or recapture of a periodic comet which can change if the comet gets brighter or fainter as the internal conditions of the comet's nucleus changes during it's close approach around the Sun!*
M2	The nuclear magnitude of the Comet which is also the visual magnitude of the false nucleus. *(Rarely shown on a Comet's ephemeris data spreadsheet unless all values show a visual brightness value above 19th magnitude!)*
"/min	The progression or motion across the sky as measured in arcseconds per minute.
P.A.	Position angle while undergoing motion in the celestial sky. *(P.A. is the same method applied to binary stars with starts at N goes counterclockwise in an easterly direction!)*
Moon Phase	*A Numerical value for designating the phases of the Moon on a scale of (0.00 – 1.00): A New Moon = 0.00, Waxing or Waning Crescent = (0.01 - 0.49), Half Moon (1st or Last Quarter = 0.50), Waxing or Waning Gibbous = (0.50 – 0.99), & Full Moon = 1.00*
Foreshortening (% Fore.)	The appearance of the comet's tail due to the geometric orientation between the Earth and a Comet. *(100% means the comet's tail is parallel with the face of the Earth where as 0% means the tail is exactly perpendicular with respect to the face of the Earth!)*
Altitude {Alt. (˚)}	Altitude is the angle of position for any celestial object visible in the night sky with respect to the horizon regardless of cardinal direction . The angle has a range of only (0˚ to 90˚) although (0˚ to -90˚) can be applied to objects not visible. The altitude position will change throughout the sidereal day.
Azimuth {Azi. (˚)}	Azimuth is the establish angle of position for any celestial object visible in the night sky. The range starts at the North (0˚) heading clockwise eastward with the following cardinal positions: *NNE (22.5˚), NE (45˚), ENE (67.5˚), E (90˚), ESE (112.5˚), SE (135˚), SSE (157.5˚), S (180˚), SSW (202.5˚), SW (225˚), WSW (247.5˚), W (270˚), WNW (292.5˚), NW (315˚), & NNW (337.5˚)*

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Degree of Condensation (DC)

All observations of comets are broken down into three factors: estimating magnitudes for light curves to predict future brightness, coma observations, and observations that concern with a comet's tail(s). For the coma or a comet's head there two characteristic features that are important for study: Degree of condensation (DC) and coma size measured in arcminutes. The classification system for determining the DC is based on a positive integer system from 0 to 9 as shown below.

DC value	*Definition to numerical DC designation*
0	***Diffuse coma of uniform brightness***
1	***Diffuse coma with slight brightening towards center***
2	***Diffuse coma with definite brightening towards center***
3	***Centre of coma much brighter than edges, though still diffuse***
4	***Diffuse condensation at centre of coma***
5	***Condensation appears as a diffuse spot at centre of coma – described as moderately condensed***
6	***Condensation appears as a bright diffuse spot at centre of coma***
7	***Condensation appears like a star that cannot be focused – described as strongly condensed***
8	***Coma virtually invisible***
9	***Stellar or disk like in appearance***

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Morphology (Structure) of Comets

6 *As a comet approaches or recedes from the Sun within the planetary domain of the solar system the solar pressure and energy from the Solar Wind & its radiation pressure react with the comet nucleus. This in turn will form a variety of structures to the comet that give it its' distinctive structure thru the processes of sublimation, evaporation, ionization, pressure outflow, etc.*

Structural Component	*Definition of Component*
Nucleus	***Comets are essentially 'dirty snowballs' or asteroids covered in and containing internal cavities (reservoirs) of frozen volatiles (ex.: H20, frozen Oxygen, Carbon compounds, etc.) and originate from outside the solar system from the Kuiper Belt (short to medium period comets) to the Oort Cloud (up to extremely long period comets). The details in composition and overall structure internal and external vary considerably and they range in size from 100m to 40 km across! As of June 2013 there are about 4300 known so far, but they may number in the trillions!***
False Nucleus	***The central brightening of the coma showing the position of the nucleus, but only the extremely 'high pressured' jets are visible containing the escaping volatiles from such internal cavities breaking thru to the surface of the nucleus (the actual nucleus is not visible in most telescopes).***
Coma	***The trace atmosphere of dust particles, icy crystals, evaporated or sublimated molecules, ions, etc.) that surround the nucleus before being pushed away by the radiation pressure and solar wind producing the comet's tails. The re are two sub components (inner and outer comas) differing only by concentration of materials emanating from the nucleus. The most common compounds C2 & C3 (carbon compounds) along with (CN-) cyanogen compounds make the nucleus appear greenish or some combination of blue and green to the human eye.***
Ion Tail (Type I)	***The volatiles that can come from the nucleus are ionized by solar Ultraviolet radiation (UV photons) and the magnetic field of the Sun will drive the particles in a tail away from the Sun (Anti – Solar) direction at speeds up to 500 km/s. The most common ions (CO+) carbon monoxide appears blue to the human eye.***
Dust Tail (Type II)	***Nanoscopic to tiny mesoscopic (up to millimeter sized) dust particles that pushed away from the Coma via pressure from the Solar radiation within the solar wind and can very diffuse structurally and only reradiate back long wavelength or low energy light (appearing white, yellowish, or soft – pink). The particles will spread in individual orbits around the Sun kept away from the Sun's gravity due to its' radiation pressure giving the tail its' curved shape. Dust Tails can extend up to 100 million km (62.1 million mi) from the Nucleus and Coma!***
Sodium Trail (Type III)	***Visible only in very, large telescopes there tails are composed of neutral atoms of Sodium striking out from the coma and not the nucleus possibly from either collisions between dust particles, UV solar erosion of the dust particles, or some unknown mechanism all occurring within the coma. Sodium tails can reach up to 50 million km away from the Sun along a similar path to the ion tail!***
Dust trail (Anti – Tail)	***Larger dust particles that have enough mass to be more attracted to the Sun's gravity and are less likely to be influenced by the Sun's radiation pressure and are geometrically opposite to the Types I & II tails. They will form a dust disk along the orbital path of the comet that only visible from Earth as a spike heading towards the Sun, but only visible when the comet crosses the orbital plane of the Earth!***
Cometary Bow Shock	***Once the solar wind interacts with a comet plunging thru the solar wind a bow shock forms around the outer coma much the same way the magnetic field of a planet forms a bow shock. The solar wind forms a Hydrogen envelope just outside the frontal boundary of the outer coma creating a plasma layer of hydrogen ions that release Lyman – alpha radiation as a byproduct!***

Comet Morphology

Figure 1: Visual Morphological layout of a comet as shown by several diagrams and images!

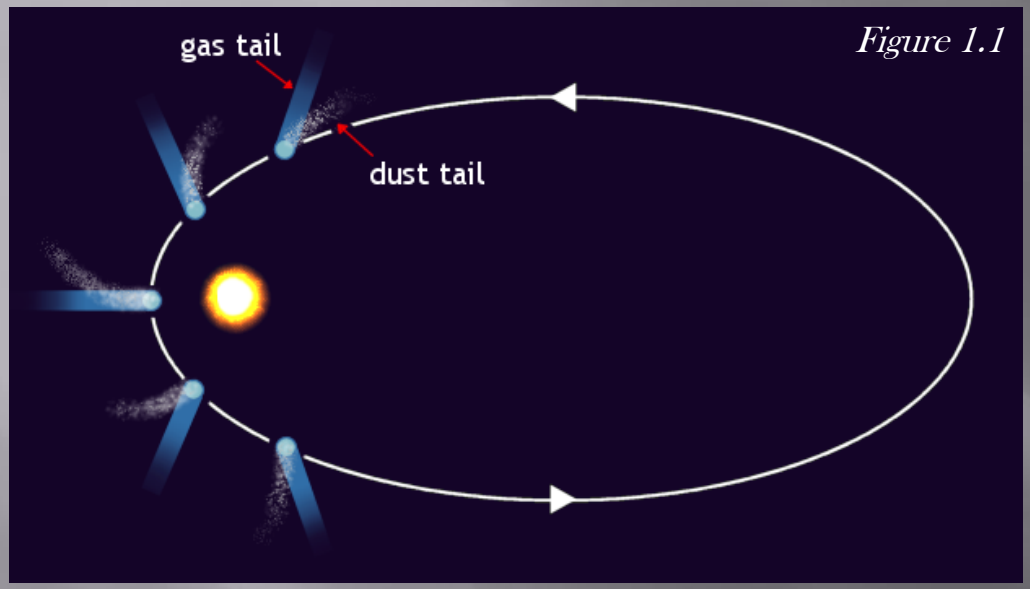


Figure 1.1

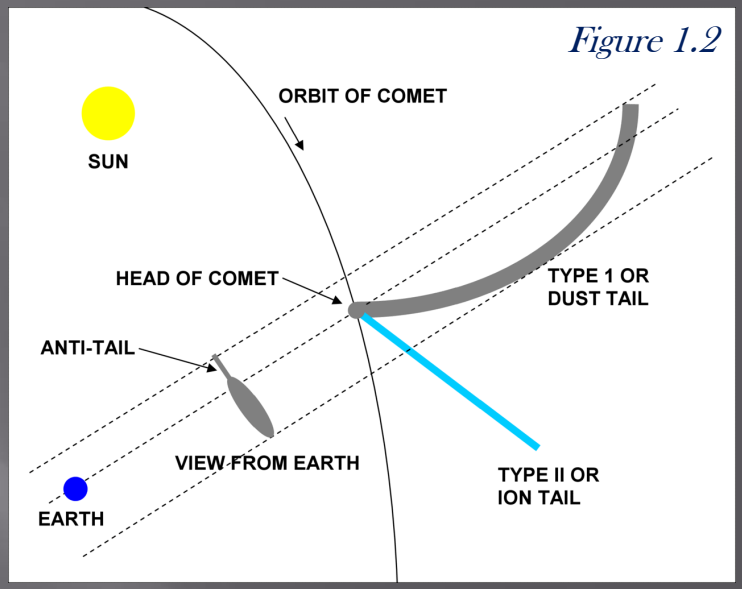


Figure 1.2

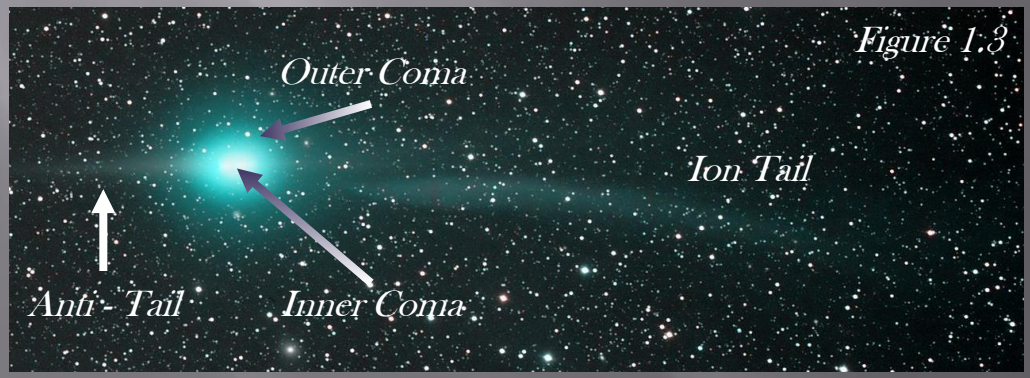


Figure 1.3

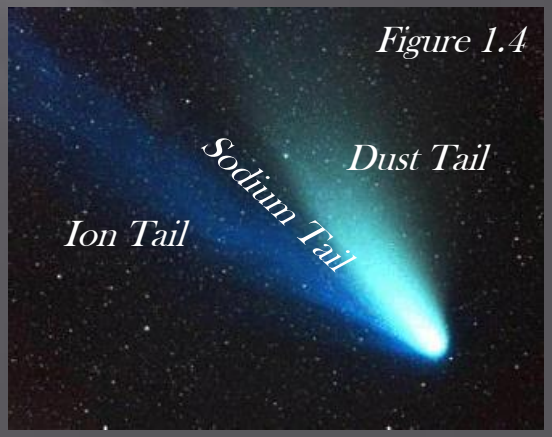


Figure 1.4

Comet Morphology

Figure 2: Morphology shown interaction between the Coma and the Solar Wind!

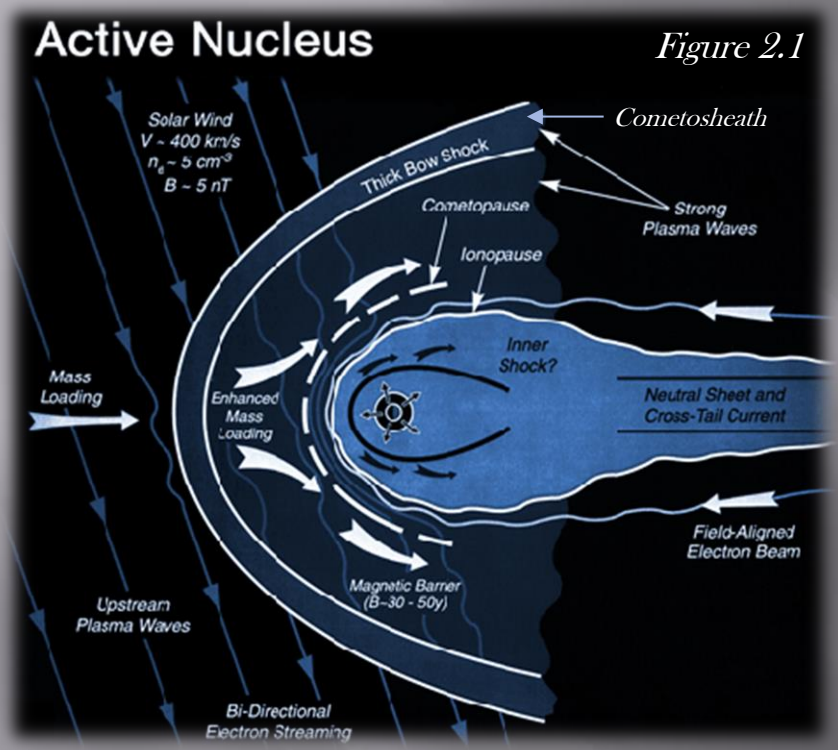


Figure 2.1

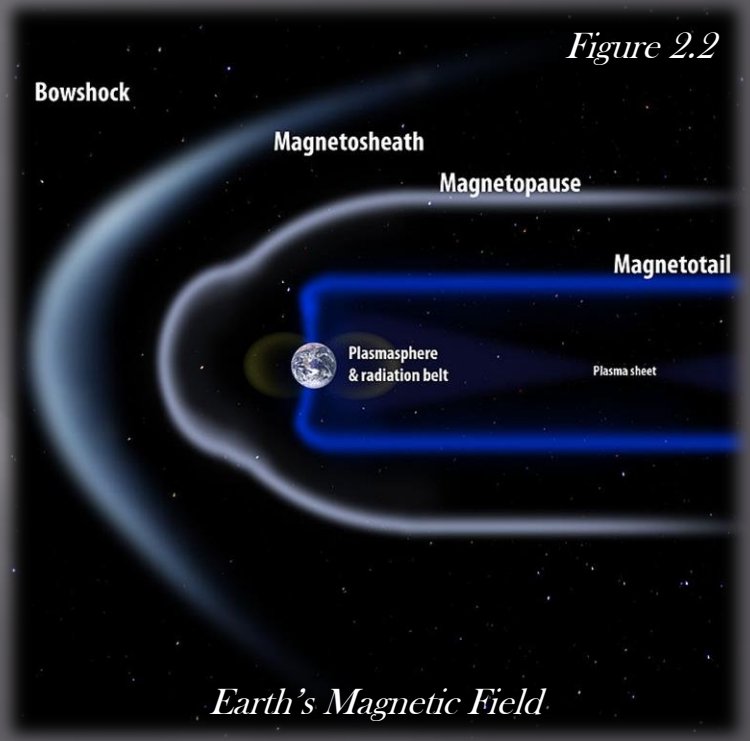


Figure 2.2

Earth's Magnetic Field

It is okay if you don't entirely understand what is going on here; the only important fact are the particles within the solar wind and the comet plunging thru it will force a massive buildup of particles between the bow shock and the cometopause (the boundary of the comet's induced magnetic field) forming the outer boundary of influence for the outer coma! This think bow shock that contains the Hydrogen plasma is also known as the cometosheath and works similar to that of planet's magnetosheath where the influence of the magnetic field is weaken and the behavior of the Sun's magnetic field propagating (moving) thru the solar wind begins to dominate going from the comet or planet outwards towards the solar wind! Figure 2.2 compared to Figure 2.1 shows similarities in the Earth's magnetic field to the behavior of the Coma and induced magnetic field of the Comet as a result of interaction with the charged particles and radiation of the solar wind!

A Short Synopsis of the Predominant Comets for Summer 2013!

The Autumn season of 2013 is here with only a few comets of visual magnitudes brighter than 12.0! The month of September had very little to show for in terms of visible comets although C/2013 N4 Borisov did reach a maximum brightness of 8.8 on August 18, but due to it's period of solar elongations it was only visible for a short while and now it is lost in the daytime glare. Other comets have become too far south to be visible for most observers in the northern hemisphere expect in the tropics or have become only accessible to astronomers in the southern hemisphere. The brightest of them all being C/2012 V2 (LINEAR) which peaked at 8.9 on 24 September was visible only to northern hemispheric observers in the morning hours before day break for 1 – 2 hrs and below 15˚ in altitude above the horizon during early September. Right now the current comets that are showing potential are the following: C/2013 R1 Lovejoy, 2P/Encke, and C/2012 S1 (ISON). These comets are our only hope for ending the 2013 year with a better note on observable comets for northern and southern hemispheric observers. Right now comet C/2013 R1 Lovejoy discovered by famous Australian, comet hunter Terry Lovejoy on 7 September at Visual Magnitude 14.4 currently progressing NE thru the constellations of Monoceros (early to mid October) and Canis Minor (mid to late October). The comet is currently at upper 10th magnitude and should pass within an Earth distance of 0.4 AU (37.16 million mi or 59.79 million km) on 19 – 20 November followed by it's perihelion passage of 0.8 AU (74.32 million mi or 119.58 million km) during the period of 21 – 24 December. Comet Lovejoy is predicted to reach 7th magnitude by mid November and a possible brightness of 6.45 on 25 November (see page 13 for further details). Its coma is currently showing an elongated shape with a DC of 2 - 3 and a diameter of 1.5 arcminutes (0.23% average full Moon). There is currently no reports of it's tail as of 4 - 5 October, but the coma is elongation to a PA of 190˚ placing the orientation towards the SSW. Lovejoy is moving E to ENE across the winter constellations south of the Winter Hexagon asterism and is currently visible this month starting from 15˚ and 30˚ altitudes at 2 am and 3:30 am respectfully. It will continue to be visible for most of the remaining year in the eastern skies before dawn as it moves into the constellations of the celestial Winter Sky (1 Oct – 11 Nov) and eventually the celestial Spring Sky (11 Dec thru the New Year 2014)! However, the comet will become more challenging to observe as it gets below 30˚ altitude, but should stay above 21˚ during the time of its perihelion passage.

Comet 2P/Encke has returned to it's journey from the main Asteroid belt to the inner solar system as it has done every 3 years while in a constant of being perturbed by the gravitational influence of the inner planets. This time around the comet will make the perigee passage during the period of 16 – 18 October at 0.478 AU (44.41 million mi or 71.45 million km) and perihelion passage on 21 – 22 November at 0.336 AU (31.21 million mi or 50.22 million km) peaking towards maximum brightness at visual magnitude of 7.12 on 19 November. Current status of comet Encke based on the latest visual observation reports have placed it's angular diameter at 3 arcminutes (0.94% o of average full Moon) with a DC of 2 with the coma being of an asymmetric shape at 0.4 magnitude brighter than the overall comet. No such reports either from visual observations or astroimages are showing a tail formation as of yet, but current reports describe the comet as a dark, greenish asymmetric coma with a slightly brighter green inner coma hard to distinguish in visual observations, but as of 6 October the coma has now taken on a purely whitish complexion without any changes to the coma morphology. The comet currently resides in the constellation of Lynx, but should move ESE towards Leo Minor by mid October and then take a more SE journey thru Leo; vanishing in the glow of the morning dawn by the end of the first week of November while moving thru the main body of the constellation of Virgo!

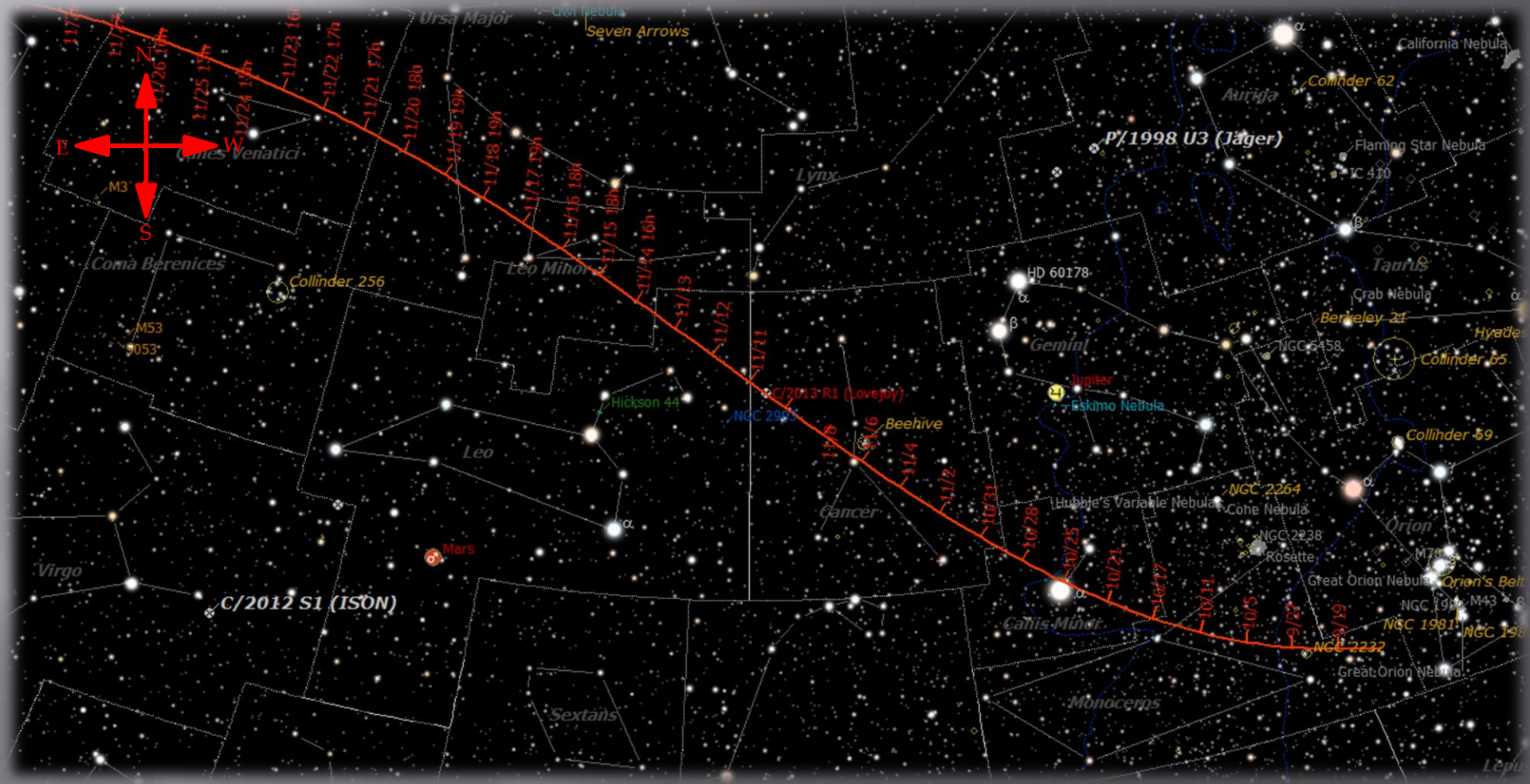
A Short Synopsis of the Predominant Comets for Summer 2013!

Comet ISON has now passed the orbit of Mars as of the evening of 1 October 2013 while reaching a periapsis of only 10.5 million km (6.5 million mi) from Mars while residing within the constellation of Leo in it's western region. The angular separation between Mars and ISON took place at approximately 1˚55′ during the 2 – 2.5 hours before sunrise. ISON first appeared again on 12 August 2013 by astronomer Bruce Gary at his observatory in New Mexico at 2 magnitudes fainter than expected and the brightest visual magnitude reported as of 8 October was 10.6 with a coma diameter of 3.9 arcminutes (1.58% average full Moon) and a tail of 14 arcminutes and a PA of 297˚ (WNW from the Sun). The current projections of this comet being the 'Comet of the Century' maybe premature since the comet is well below original brightness projections that originally had the comet between 3rd to 5th visual magnitude. The maximum predicted brightness for this comet has been downgraded from as high as -15 to -17 which would have surpassed the record of -10 for comet Ikeya – Seki, but recent observation reports have reduced the peak of the projected brightness curve of the comet from -13.6 to as low as -6.31 around the time of perihelion. ISON however could fizzle out as it approaches it's perihelion passage on 29 November at a solar distance of only 0.0124 AU (1.152 million mi or 1.854 million km) which means it will very susceptible to the Sun's inner gravity well and the intense conditions of the inner corona. The coma could even suffer the fate of C/2011 W3 Lovejoy with the central nucleus reduced to a very small size. Unlike C/2011 W3 Lovejoy this comet has failed to meet expectations exceed with the last Lovejoy comet and could be a very faint 6th to mid 9th magnitude object once it is visible again in early December.

Right now the comet can be tracked on a similar path across the western region of Leo heading eastwards towards the rising Sun that Mars is undertaking, but at a much slower pace. It will eventually overtake Mars the night of 19 October and move into Leo by early November with the eventual disappearance in the glare of the morning dawn around the last week of November with a small window for observing as a possible mid 2nd magnitude object the period of 25 – 26 November at altitudes greater than 10˚. This object is following a similar path to the great comet of 1680 although it is a sungrazer on a hyperbolic trajectory around the Sun never to return , but become an interstellar object. Comet ISON disappears for a short period from 27 November to 1 December and reappears in the morning skies before sunrise from 2 December onward at altitudes greater than 10˚. More information on the progression and condition of comet ISON will be reported later for the late Autumnal comet report.

C/2013 R1(Lovejoy)

Figure 3: Projected path of C/2013 R1 from the Winter to Autumn skies (19 Sept – 28 Nov) 2013!

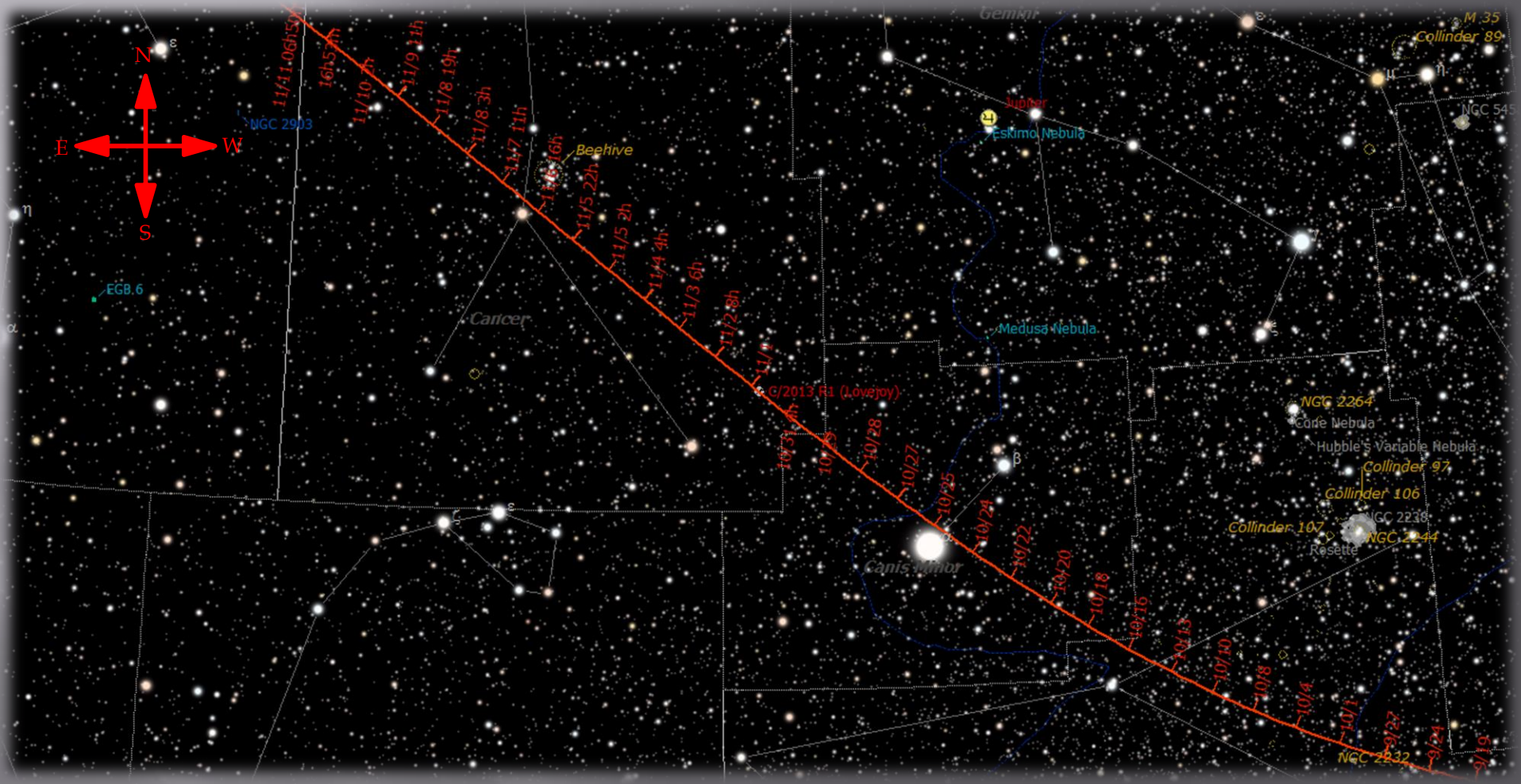


Courtesy of SkyTools 3 Profession Ed, 2012.

Snapshot @ 10 November 2013
(Angular FOV: 132.0˚)

C/2013 R1(Lovejoy)

Figure 4: Close Up Projection of the path of C/2013 R1 (24 Sept – 11 November) 2013!

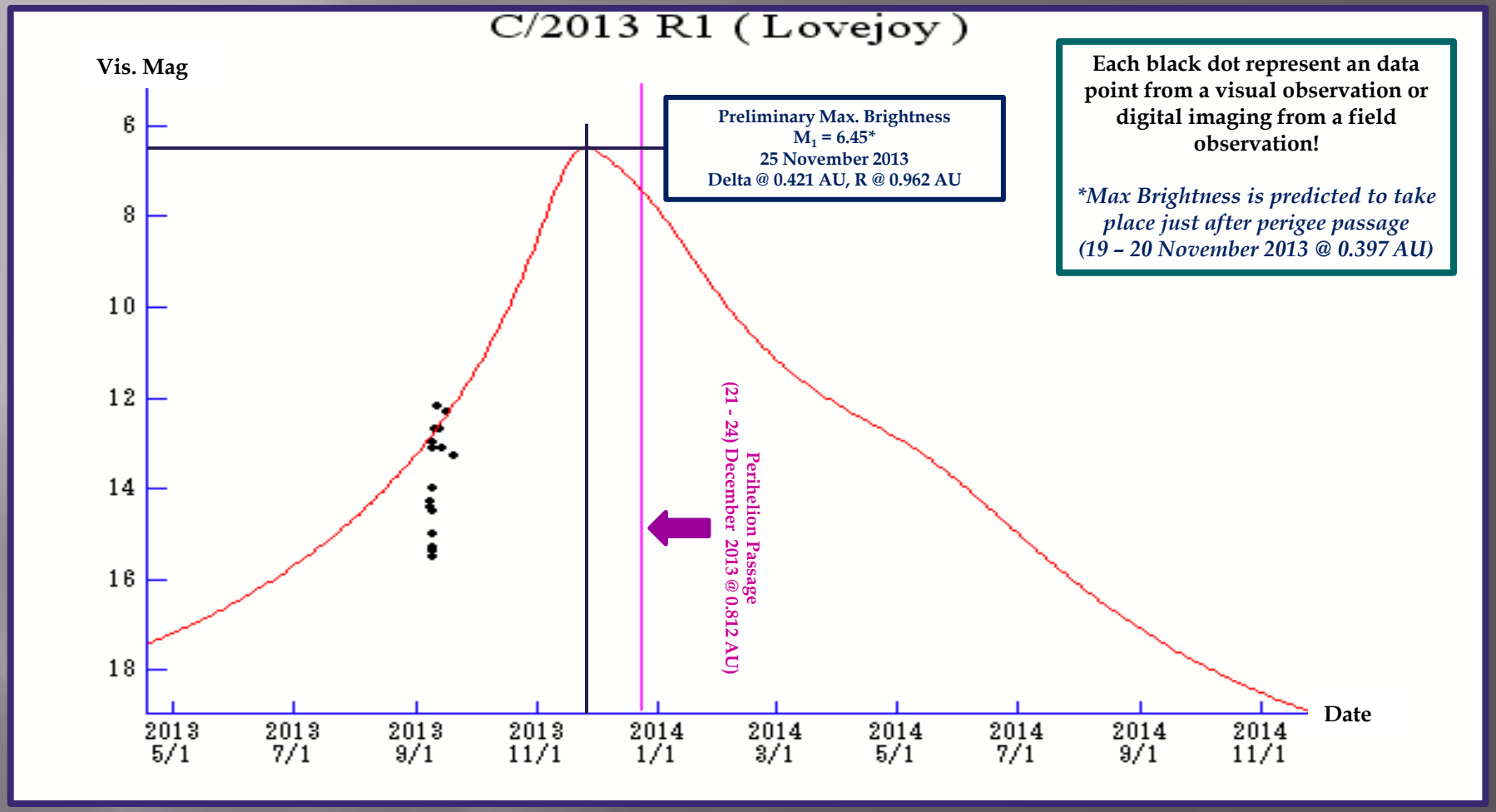


Courtesy of SkyTools 3 Profession Ed, 2012.

Snapshot @ 1 November 2013
(Angular FOV: 60.0˚)

C/2013 R1 (Lovejoy)

Photometry Graph of Comet Lovejoy of Visual Magnitude vs. Date: 1 May 2013 – 1 Nov 2014



Courtesy of Seiichi Yoshida's Home Page: http://www.aerith.net/comet/weekly/current.html, 4 October 2013.

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IAU MPC Ephemeris data for C/2013 R1 (Lovejoy): (1 October – 1 November) 2013

	CDT/CST	Epoch (J2000.0)		Basic Ephemeris						Sky Motion		Moon Phase	Moon Mag.
Date	hh:mm:ss	R.A.	Dec	Delta	R	El. (˚)	Ph.	M_1	% Fore.	"/min	P.A.	(0.00 - 1.00)	(Visual)
1-Oct-2013	00:00:00	06 36 36.1	03 23 57 S	1.352	1.654	88.0	37.2	11.34	40	1.26	066.8	0.15	-8.89
2-Oct-2013	00:00:00	06 38 27.5	03 11 44 S	1.327	1.641	88.4	37.6	11.27	39	1.29	066.2	0.09	-8.00
3-Oct-2013	00:00:00	06 40 20.8	02 59 01 S	1.303	1.627	88.9	37.9	11.19	39	1.31	065.7	0.04	-6.69
4-Oct-2013	00:00:00	06 42 15.8	02 45 45 S	1.278	1.614	89.3	38.3	11.11	38	1.34	065.1	0.01	-4.29
5-Oct-2013	00:00:00	06 44 12.8	02 31 55 S	1.254	1.600	89.7	38.7	11.03	38	1.37	064.6	0.00	-0.58
6-Oct-2013	00:00:00	06 46 11.9	02 17 28 S	1.230	1.587	90.1	39.1	10.96	37	1.40	064.0	0.02	-5.40
7-Oct-2013	00:00:00	06 48 13.2	02 02 22 S	1.205	1.573	90.5	39.4	10.87	37	1.43	063.4	0.06	-7.42
8-Oct-2013	00:00:00	06 50 16.9	01 46 34 S	1.181	1.560	91.0	39.8	10.79	36	1.47	062.8	0.12	-8.67
9-Oct-2013	00:00:00	06 52 23.1	01 30 02 S	1.157	1.546	91.4	40.2	10.71	36	1.51	062.2	0.21	-9.55
10-Oct-2013	00:00:00	06 54 32.2	01 12 42 S	1.132	1.533	91.8	40.6	10.62	35	1.55	061.6	0.31	-10.23
11-Oct-2013	00:00:00	06 56 44.1	00 54 31 S	1.108	1.519	92.2	41.0	10.54	34	1.60	061.0	0.42	-10.76
12-Oct-2013	00:00:00	06 58 59.3	00 35 27 S	1.084	1.506	92.5	41.5	10.45	34	1.65	060.4	0.53	-11.19
13-Oct-2013	00:00:00	07 01 17.9	00 15 25 S	1.060	1.492	92.9	41.9	10.36	33	1.70	059.8	0.64	-11.53
14-Oct-2013	00:00:00	07 03 40.1	00 05 38 N	1.036	1.479	93.3	42.3	10.28	33	1.76	059.2	0.75	-11.80
15-Oct-2013	00:00:00	07 06 06.4	00 27 48 N	1.012	1.466	93.7	42.8	10.19	32	1.82	058.6	0.84	-12.00
16-Oct-2013	00:00:00	07 08 37.0	00 51 08 N	0.988	1.452	94.0	43.2	10.09	32	1.89	058.0	0.91	-12.15
17-Oct-2013	00:00:00	07 11 12.3	01 15 43 N	0.964	1.439	94.4	43.7	10.00	31	1.96	057.5	0.96	-12.25
18-Oct-2013	00:00:00	07 13 52.6	01 41 39 N	0.941	1.425	94.7	44.2	9.91	30	2.03	056.9	0.99	-12.29
19-Oct-2013	00:00:00	07 16 38.3	02 09 02 N	0.917	1.412	95.0	44.6	9.81	30	2.12	056.4	1.00	-12.29
20-Oct-2013	00:00:00	07 19 30.0	02 37 57 N	0.894	1.399	95.4	45.1	9.71	29	2.21	055.8	0.98	-12.23
21-Oct-2013	00:00:00	07 22 28.1	03 08 31 N	0.870	1.385	95.7	45.6	9.61	29	2.31	055.3	0.95	-12.13
22-Oct-2013	00:00:00	07 25 33.3	03 40 53 N	0.847	1.372	95.9	46.2	9.51	28	2.41	054.8	0.90	-11.99
23-Oct-2013	00:00:00	07 28 46.0	04 15 09 N	0.824	1.359	96.2	46.7	9.41	27	2.53	054.3	0.83	-11.83
24-Oct-2013	00:00:00	07 32 07.0	04 51 28 N	0.801	1.346	96.5	47.3	9.31	27	2.65	053.9	0.75	-11.63
25-Oct-2013	00:00:00	07 35 37.1	05 30 00 N	0.779	1.333	96.7	47.8	9.21	26	2.78	053.5	0.67	-11.40
26-Oct-2013	00:00:00	07 39 17.2	06 10 54 N	0.756	1.319	96.9	48.4	9.10	25	2.93	053.1	0.57	-11.14
27-Oct-2013	00:00:00	07 43 08.0	06 54 21 N	0.734	1.306	97.1	49.0	8.99	25	3.09	052.7	0.48	-10.83
28-Oct-2013	00:00:00	07 47 10.8	07 40 32 N	0.712	1.293	97.2	49.7	8.88	24	3.26	052.4	0.39	-10.47
29-Oct-2013	00:00:00	07 51 26.7	08 29 38 N	0.691	1.280	97.3	50.3	8.77	23	3.44	052.1	0.29	-10.02
30-Oct-2013	00:00:00	07 55 56.9	09 21 53 N	0.669	1.267	97.4	51.0	8.65	22	3.65	051.8	0.21	-9.46
31-Oct-2013	00:00:00	08 00 43.1	10 17 30 N	0.648	1.254	97.5	51.7	8.54	22	3.86	051.6	0.13	-8.71
1-Nov-2013	00:00:00	08 05 46.7	11 16 42 N	0.628	1.241	97.5	52.4	8.43	21	4.10	051.5	0.07	-7.66

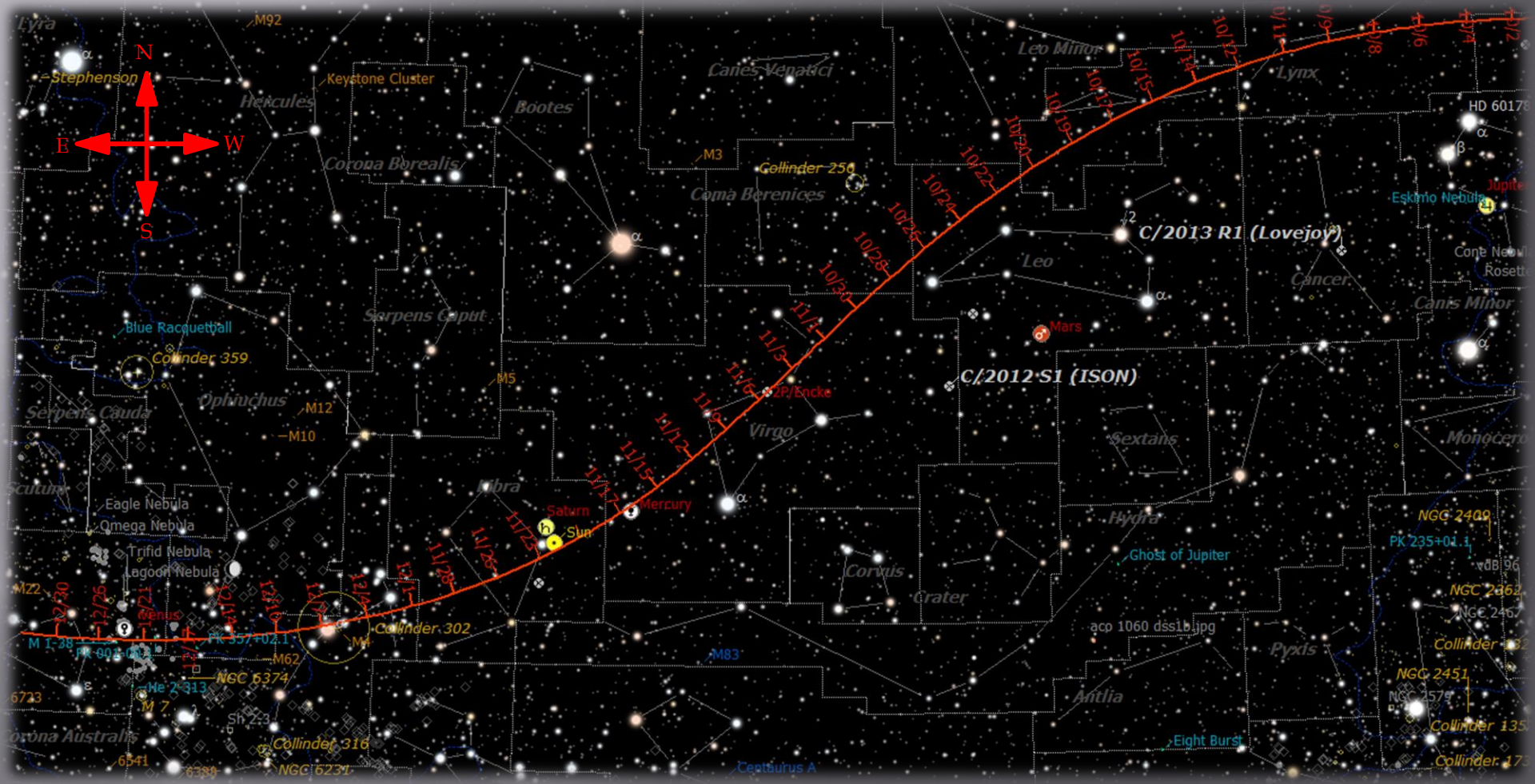
All ephemeris data is calculated based on the Geographical location of the George Observatory, SE Texas, United States.

29˚22'30" N, 95˚35'37" W

$M_1 = 8.5 + 5.0 \log d + 10.0 \log r$

2P/Encke

Figure 5: Future path of Comet Encke across the Summer, Spring, & Summer Skies (1 Oct 2013 – 1 Jan 2014)!

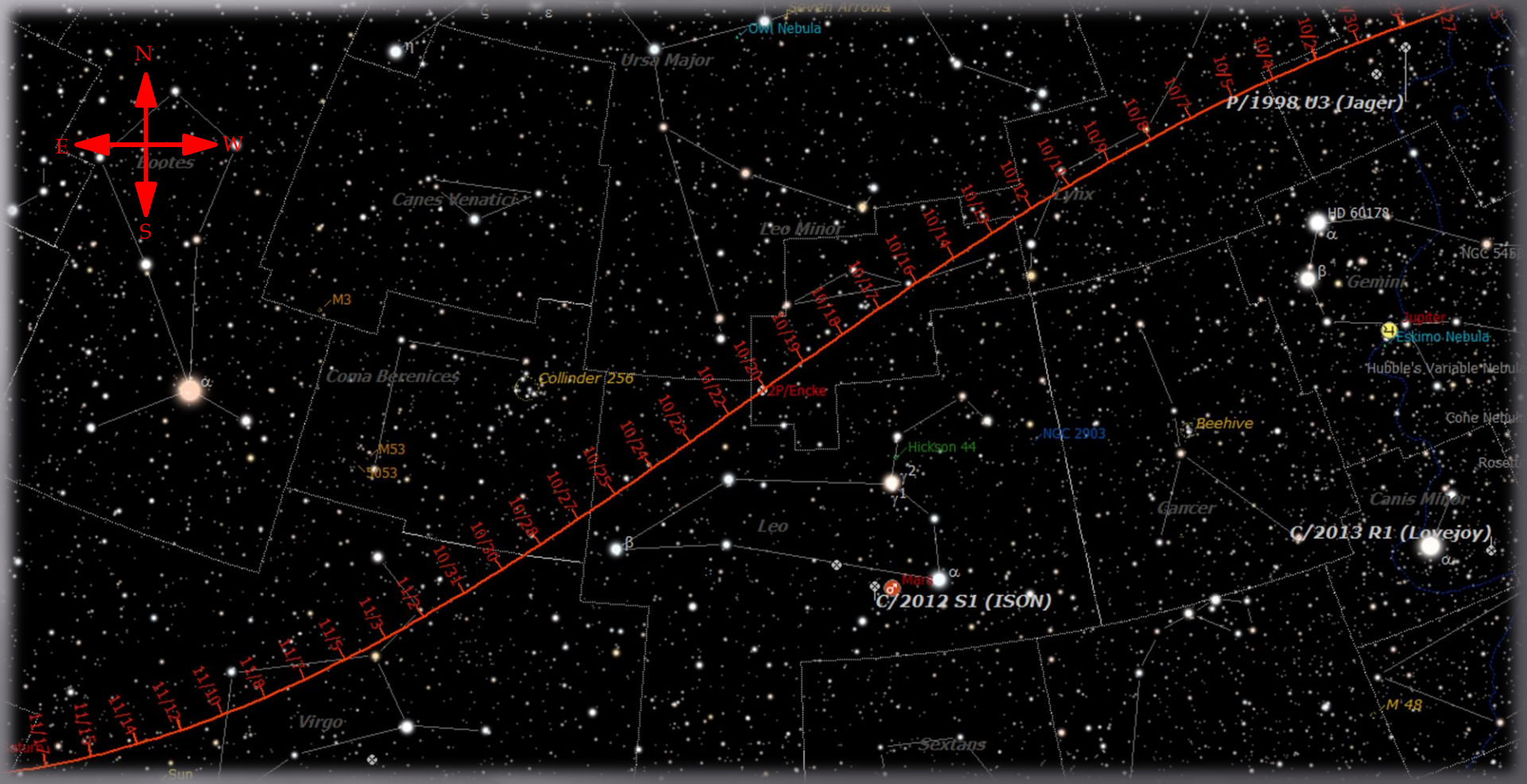


Courtesy of SkyTools 3 Profession Ed, 2012.

Snapshot @ 5 November 2013
(Angular FOV: 180.0˚)

2P/Encke

Figure 6: Projected path of 2P/Encke from Lynx to Virgo (1 Oct – 17 Nov) 2013!

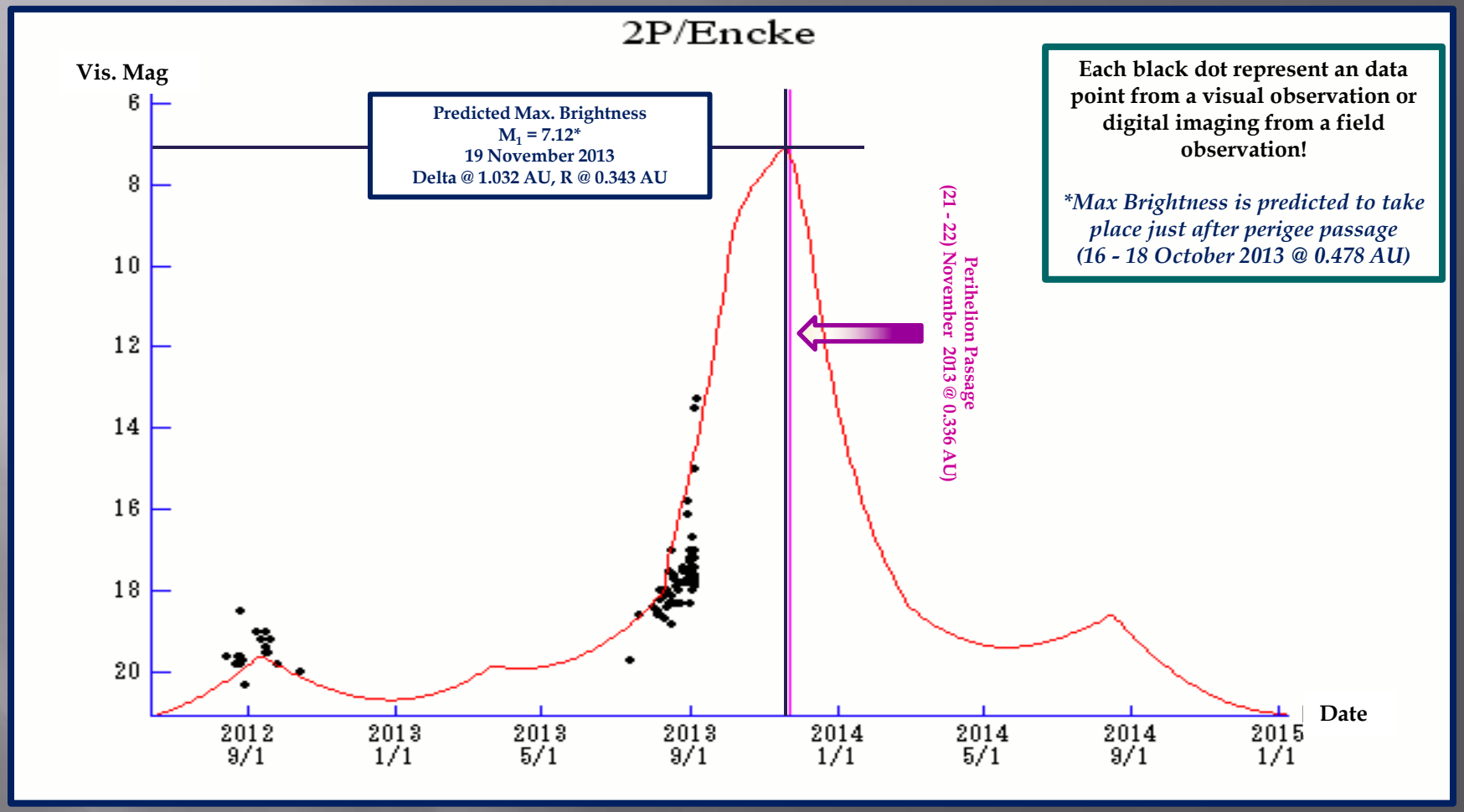


Courtesy of SkyTools 3 Profession Ed, 2012.

Snapshot @ 21 October 2013
(Angular FOV: 120.0˚)

2P/Encke

Photometry Graph of Comet Lovejoy of Visual Magnitude vs. Date: 1 Sept 2012 – 1 Jan 2015



Courtesy of Seiichi Yoshida's Home Page: http://www.aerith.net/comet/weekly/current.html, 4 October 2013.

The Professor Comet's Report

IAU MPC Ephemeris data for 2P/Encke: (1 October – 1 November) 2013

	CDT/CST	Epoch (J2000.0)		Basic Ephemeris						Sky Motion		Moon Phase	Moon Mag.
Date	hh:mm:ss	R.A.	Dec	Delta	R	El. (˚)	Ph.	M_1	% Fore.	"/min	P.A.	(0.00 - 1.00)	(Visual)
1-Oct-2013	00:00:00	06 53 20.4	43 27 04 N	0.601	1.148	87.8	60.6	9.61	13	4.76	085.9	0.15	-8.89
2-Oct-2013	00:00:00	07 03 59.3	43 32 41 N	0.587	1.132	86.9	62.0	9.52	12	4.96	087.7	0.09	-8.00
3-Oct-2013	00:00:00	07 15 05.7	43 34 41 N	0.574	1.117	85.8	63.2	9.43	11	5.16	089.6	0.04	-6.69
4-Oct-2013	00:00:00	07 26 39.0	43 32 34 N	0.562	1.101	84.6	64.8	9.34	10	5.37	091.5	0.01	-4.29
5-Oct-2013	00:00:00	07 38 38.0	43 25 50 N	0.551	1.085	83.4	66.3	9.25	9	5.57	093.6	0.00	-0.58
6-Oct-2013	00:00:00	07 51 01.0	43 13 57 N	0.540	1.069	82.1	67.9	9.16	8	5.79	095.7	0.02	-5.40
7-Oct-2013	00:00:00	08 03 45.4	42 56 27 N	0.530	1.053	80.7	69.5	9.08	7	6.00	097.9	0.06	-7.42
8-Oct-2013	00:00:00	08 16 48.2	42 32 49 N	0.520	1.036	79.2	71.3	8.99	6	6.20	100.1	0.12	-8.67
9-Oct-2013	00:00:00	08 30 05.9	42 02 40 N	0.512	1.020	77.6	73.0	8.91	5	6.41	102.3	0.21	-9.55
10-Oct-2013	00:00:00	08 43 34.2	41 25 40 N	0.504	1.004	76.0	74.9	8.82	4	6.60	104.5	0.31	-10.23
11-Oct-2013	00:00:00	08 57 08.9	40 41 35 N	0.497	0.987	74.2	76.8	8.74	3	6.78	106.8	0.42	-10.76
12-Oct-2013	00:00:00	09 10 45.0	39 50 16 N	0.491	0.970	72.4	78.7	8.66	2	6.95	109.0	0.53	-11.19
13-Oct-2013	00:00:00	09 24 17.9	38 51 44 N	0.487	0.953	70.6	80.7	8.59	1	7.10	111.1	0.64	-11.53
14-Oct-2013	00:00:00	09 37 42.9	37 46 10 N	0.483	0.937	68.6	82.7	8.52	1	7.22	113.2	0.75	-11.80
15-Oct-2013	00:00:00	09 50 55.7	36 33 50 N	0.480	0.919	66.7	84.7	8.45	0	7.33	115.2	0.84	-12.00
16-Oct-2013	00:00:00	10 03 52.4	35 15 10 N	0.478	0.902	64.6	86.7	8.38	0	7.40	117.2	0.91	-12.15
17-Oct-2013	00:00:00	10 16 29.7	33 50 43 N	0.478	0.885	62.6	88.8	8.33	0	7.45	119.0	0.96	-12.25
18-Oct-2013	00:00:00	10 28 44.8	32 21 08 N	0.478	0.868	60.6	90.8	8.27	0	7.47	120.7	0.99	-12.29
19-Oct-2013	00:00:00	10 40 35.6	30 47 09 N	0.480	0.850	58.5	92.7	8.21	0	7.46	122.3	1.00	-12.29
20-Oct-2013	00:00:00	10 52 00.6	29 09 31 N	0.483	0.833	56.4	94.6	8.16	0	7.42	123.7	0.98	-12.23
21-Oct-2013	00:00:00	11 02 58.9	27 29 03 N	0.487	0.815	54.4	96.5	8.12	1	7.35	125.0	0.95	-12.13
22-Oct-2013	00:00:00	11 13 30.1	25 46 32 N	0.492	0.797	52.4	98.3	8.07	1	7.26	126.2	0.90	-11.99
23-Oct-2013	00:00:00	11 23 34.3	24 02 42 N	0.499	0.779	50.5	99.9	8.03	1	7.15	127.3	0.83	-11.83
24-Oct-2013	00:00:00	11 33 12.1	22 18 17 N	0.506	0.761	48.6	101.5	7.99	2	7.01	128.3	0.75	-11.63
25-Oct-2013	00:00:00	11 42 24.0	20 33 53 N	0.515	0.743	46.7	103.0	7.96	2	6.86	129.2	0.67	-11.40
26-Oct-2013	00:00:00	11 51 11.2	18 50 05 N	0.524	0.725	44.9	104.3	7.92	3	6.70	129.9	0.57	-11.14
27-Oct-2013	00:00:00	11 59 34.8	17 07 21 N	0.535	0.706	43.2	105.5	7.88	4	6.53	130.6	0.48	-10.83
28-Oct-2013	00:00:00	12 07 36.1	15 26 06 N	0.547	0.688	41.6	106.6	6.11	4	6.35	131.1	0.39	-10.47
29-Oct-2013	00:00:00	12 15 16.6	13 46 37 N	0.560	0.670	40.0	107.5	7.82	5	6.17	131.6	0.29	-10.02
30-Oct-2013	00:00:00	12 22 37.7	12 09 10 N	0.573	0.651	38.5	108.2	7.79	5	6.00	132.0	0.21	-9.46
31-Oct-2013	00:00:00	12 29 40.9	10 33 55 N	0.588	0.633	37.1	108.8	7.76	5	5.82	132.3	0.13	-8.71
1-Nov-2013	00:00:00	12 36 27.8	09 00 59 N	0.604	0.614	35.8	109.2	7.72	6	5.65	132.6	0.07	-7.66

All ephemeris data is calculated based on the Geographical location of the George Observatory, SE Texas, United States.

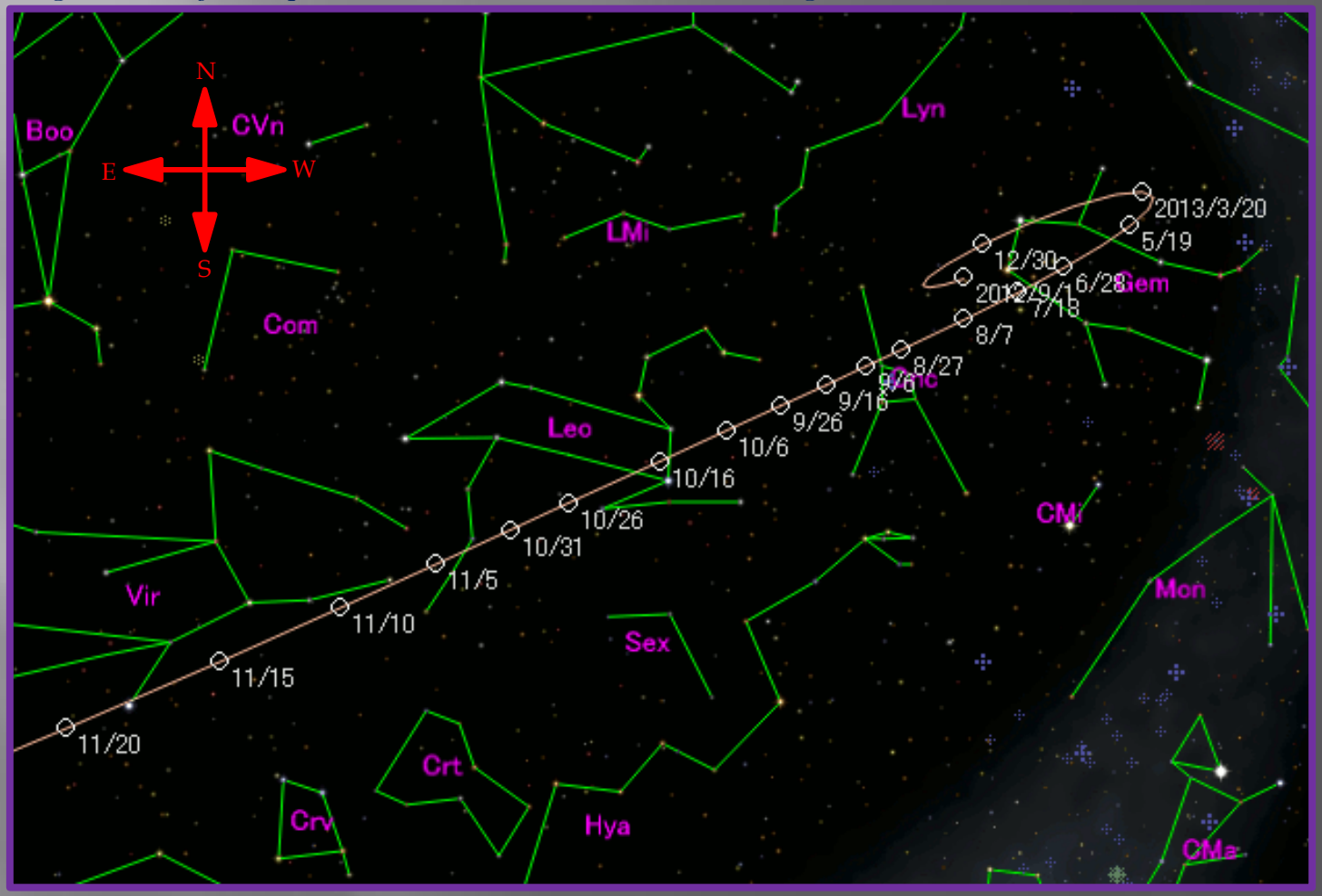
29˚22'30" N, 95˚35'37" W

(7 Oct – 11 Dec) 2013: $M_1 = 10.3 + 5.0 \log d + 7.0 \log r$

Autumnal Season - October 2013

C/2012 S1(ISON)

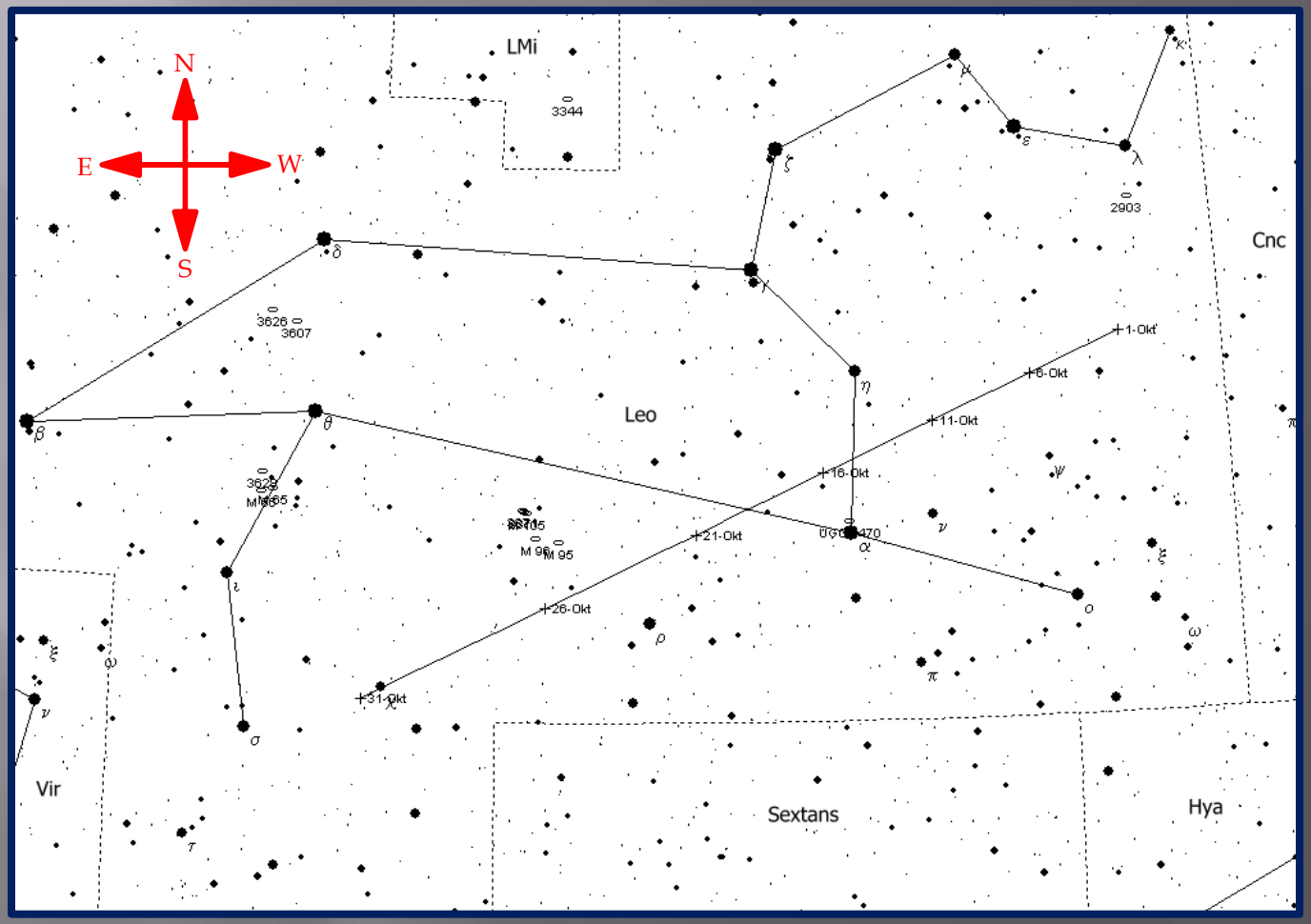
Figure 7: Projected path of C/2012 S1 from Gemini to Virgo (Autumn 2012 – Late Nov 2013)!



Courtesy of Seiichi Yoshida's Home Page:
http://www.aerith.net/comet/catalog/2012S1/2012S1.html, 4 October 2013.

C/2012 S1(ISON)

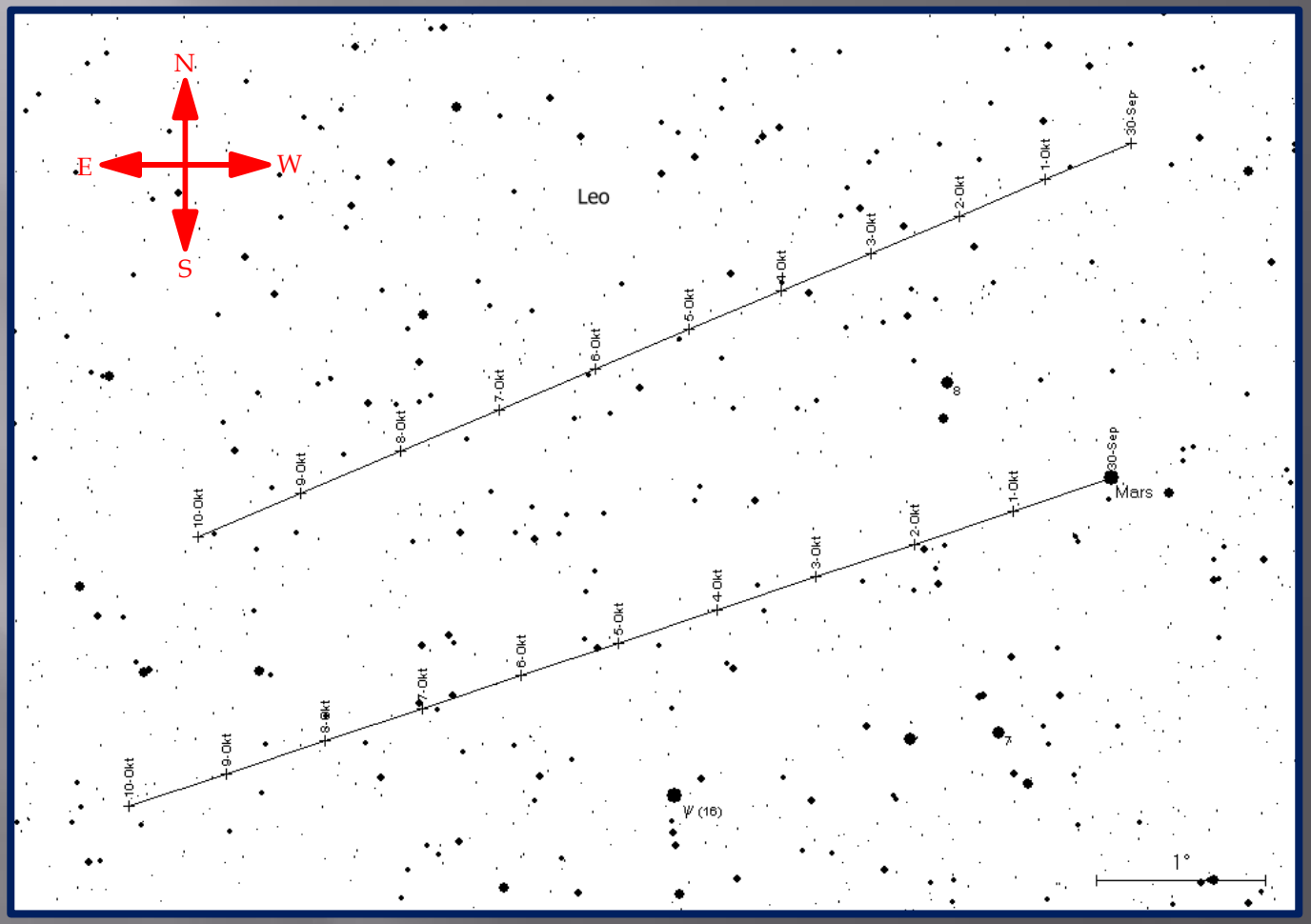
Figure 8: Projected path of C/2012 across the W and S regions of Leo for October 2013!



Courtesy of Winnie's Comet Page: http://www.ki.tng.de/~winnie/kometen/aktuell.html, 4 October 2013.

C/2012 S1(ISON) & Mars

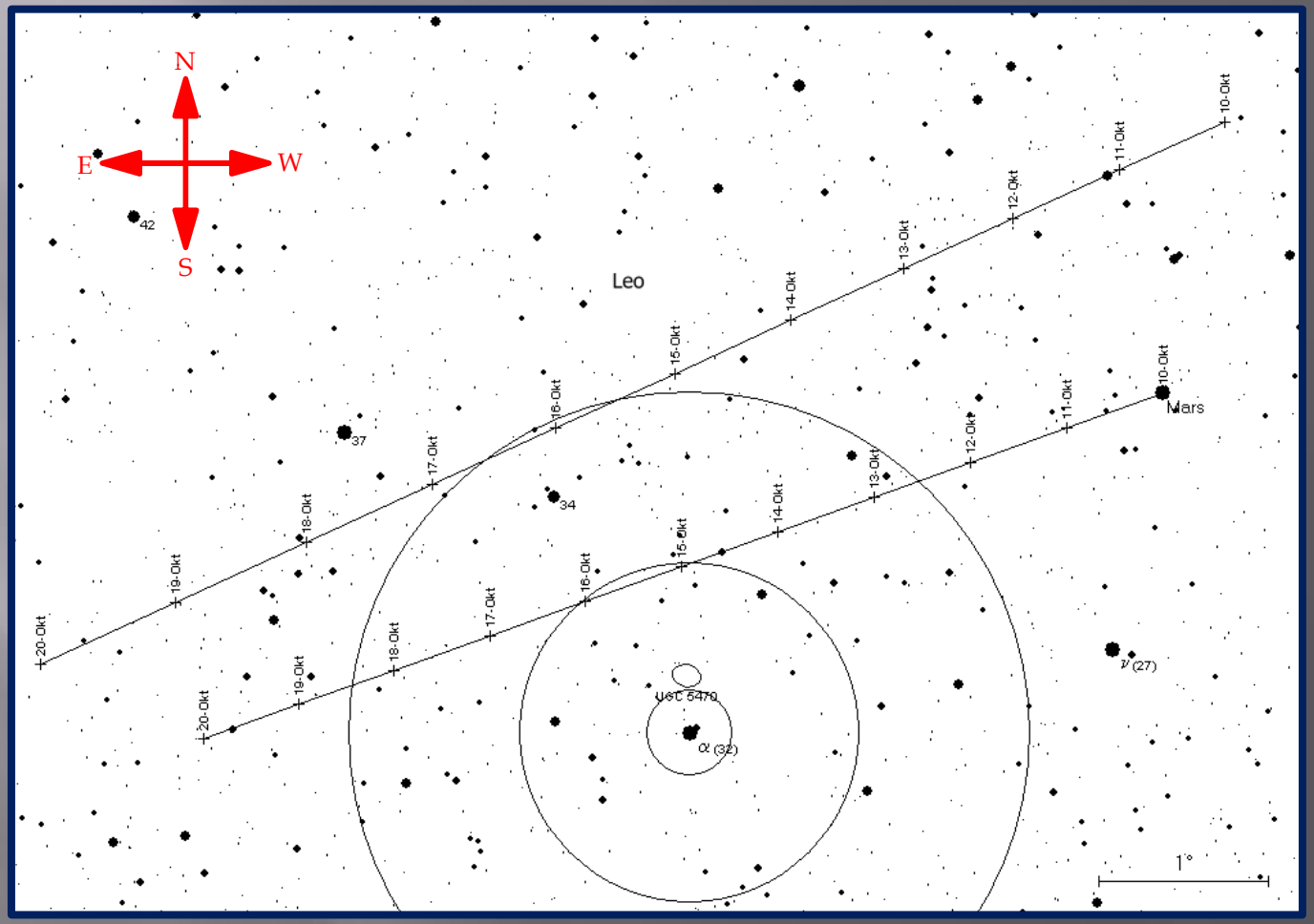
Figure 9: Co motion of ISON & Mars in W central of Leo from (1 – 10)October 2013!



Courtesy of Winnie's Comet Page: http://www.ki.tng.de/~winnie/kometen/aktuell.html, 4 October 2013.

C/2012 S1(ISON) & Mars

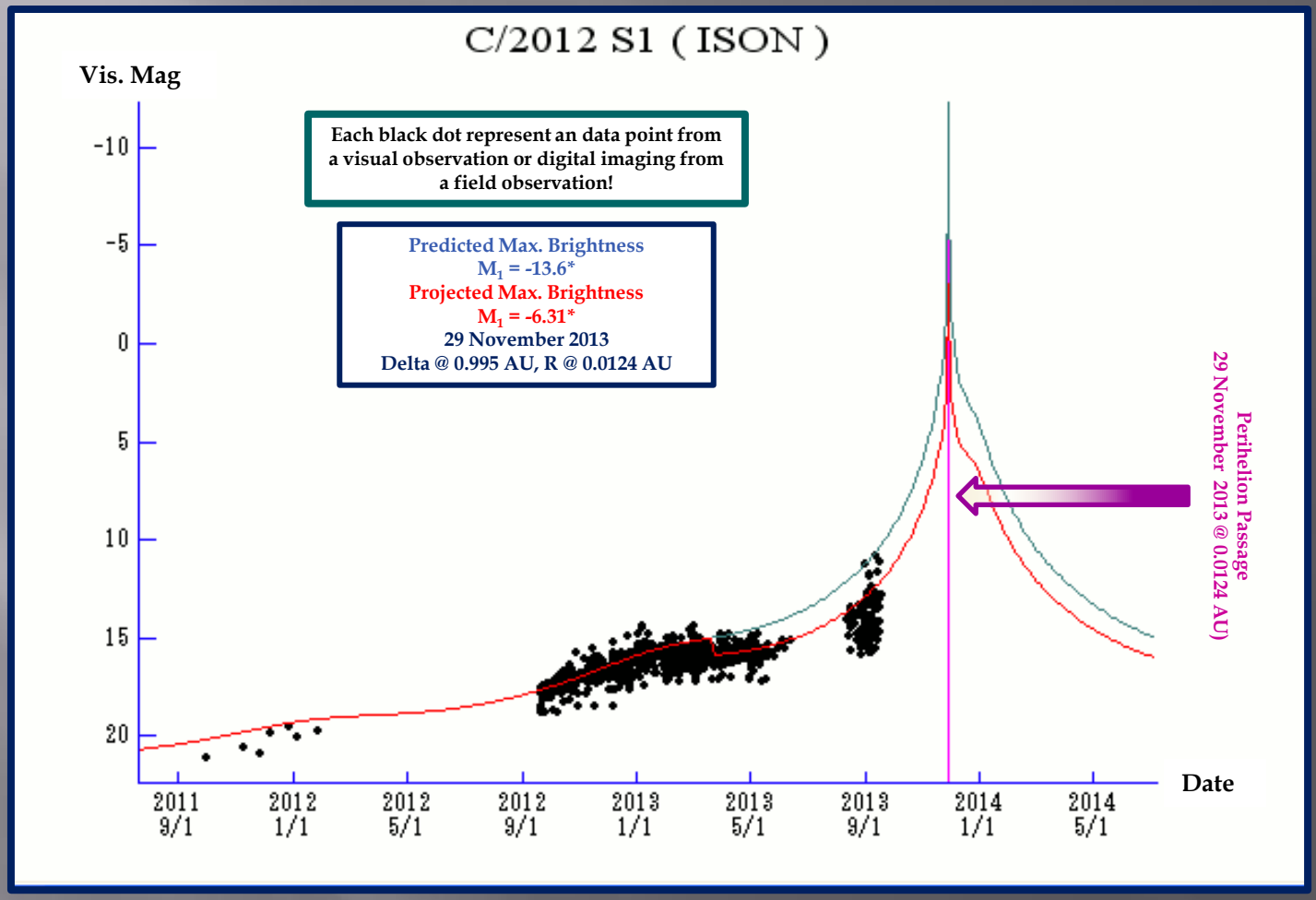
Figure 10: Co motion of ISON & Mars in SW region Leo from (10 – 31)October 2013!



Courtesy of Winnie's Comet Page: http://www.ki.tng.de/~winnie/kometen/aktuell.html, 4 October 2013.

C/2012 S1 (ISON)

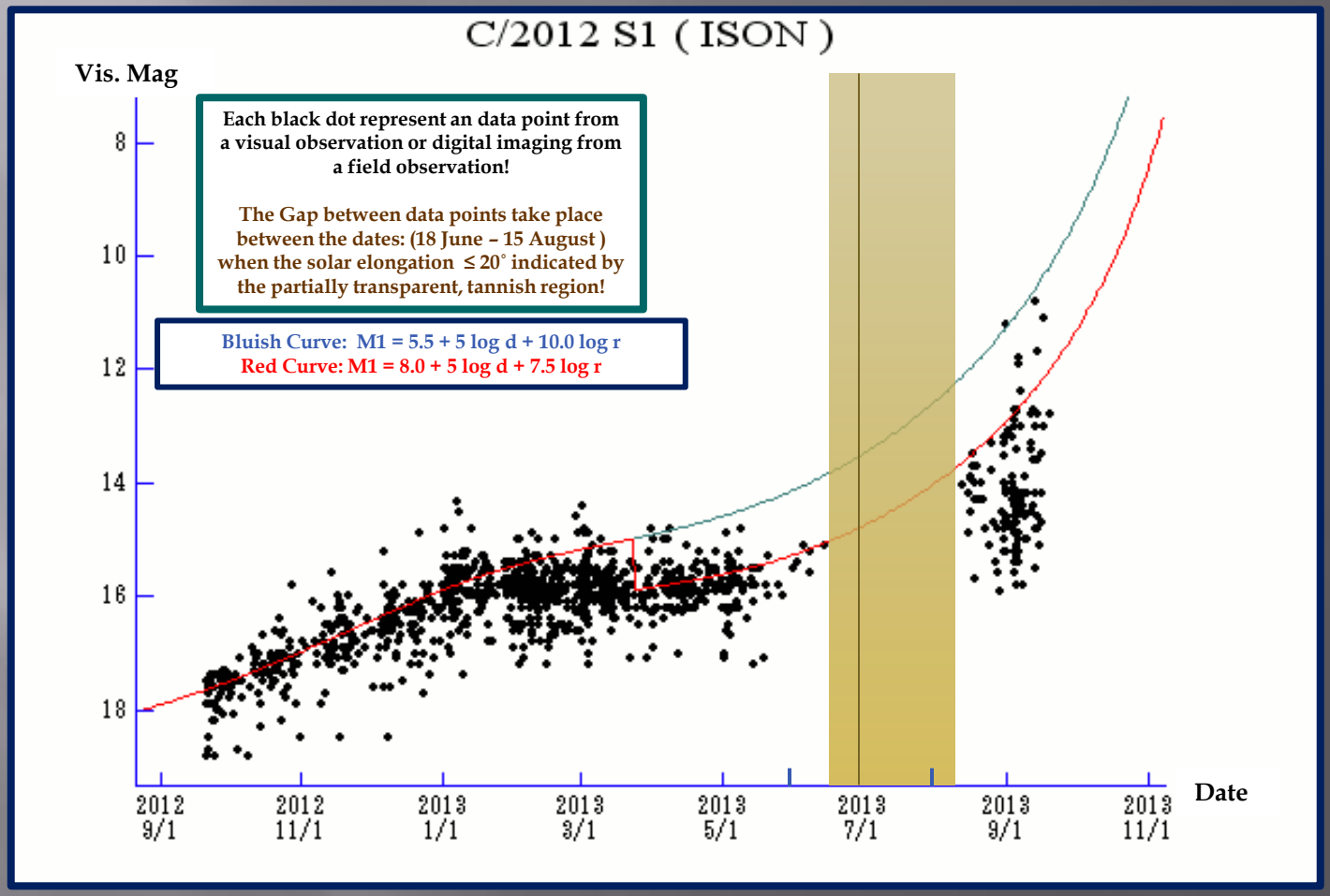
Photometry Graph of Comet ISON of Visual Magnitude vs. Date: 1 May 2013 – 1 Nov 2014



Courtesy of Seiichi Yoshida's Home Page:
http://www.aerith.net/comet/weekly/current.html, 4 October 2013.

C/2012 S1 (ISON)

Photometry Graph of Comet ISON of Visual Magnitude vs. Date: 1 May 2013 – 1 Nov 2014



Courtesy of Seiichi Yoshida's Home Page:
http://www.aerith.net/comet/weekly/current.html, 4 October 2013.

The Professor Comet's Report

IAU MPC Ephemeris data for C/2012 S1 (ISON): (1 October – 1 November) 2013

	CDT/CST	Epoch (J2000.0)		Basic Ephemeris							Sky Motion		Moon Phase	Moon Mag.
Date	hh:mm:ss	R.A.	Dec	Delta	R	El. (˚)	Ph.	M_1	M_{Pre}	% Fore.	"/min	P.A.	(0.00 - 1.00)	(Visual)
1-Oct-2013	00:00:00	09 35 01.4	17 34 52 N	2.145	1.647	47.7	26.7	11.28	9.32	55	1.38	111.8	0.15	-8.89
2-Oct-2013	00:00:00	09 37 10.4	17 22 19 N	2.115	1.628	48.1	27.3	11.21	9.24	54	1.41	112.0	0.09	-8.00
3-Oct-2013	00:00:00	09 39 21.7	17 09 26 N	2.086	1.609	48.6	27.8	11.15	9.16	54	1.44	112.1	0.04	-6.69
4-Oct-2013	00:00:00	09 41 35.3	16 56 12 N	2.056	1.590	49.0	28.3	11.08	9.08	53	1.47	112.3	0.01	-4.29
5-Oct-2013	00:00:00	09 43 51.5	16 42 34 N	2.026	1.571	49.4	28.9	11.00	8.99	52	1.50	112.5	0.00	-0.58
6-Oct-2013	00:00:00	09 46 10.2	16 28 34 N	1.997	1.551	49.8	29.5	10.93	8.91	51	1.53	112.7	0.02	-5.40
7-Oct-2013	00:00:00	09 48 31.6	16 14 08 N	1.967	1.532	50.1	30.1	10.86	8.82	50	1.57	112.8	0.06	-7.42
8-Oct-2013	00:00:00	09 50 55.9	15 59 16 N	1.937	1.512	50.5	30.6	10.78	8.73	49	1.60	113.0	0.12	-8.67
9-Oct-2013	00:00:00	09 53 23.3	15 43 57 N	1.907	1.492	50.8	31.3	10.71	8.64	48	1.64	113.2	0.21	-9.55
10-Oct-2013	00:00:00	09 55 53.8	15 28 08 N	1.877	1.472	51.1	31.9	10.63	8.55	47	1.68	113.4	0.31	-10.23
11-Oct-2013	00:00:00	09 58 27.6	15 11 49 N	1.847	1.452	51.5	32.5	10.55	8.45	46	1.72	113.6	0.42	-10.76
12-Oct-2013	00:00:00	10 01 05.0	14 54 57 N	1.816	1.432	51.8	33.2	10.47	8.36	45	1.77	113.7	0.53	-11.19
13-Oct-2013	00:00:00	10 03 46.2	14 37 30 N	1.786	1.412	52.0	33.9	10.38	8.26	44	1.82	113.9	0.64	-11.53
14-Oct-2013	00:00:00	10 06 31.3	14 19 28 N	1.756	1.391	52.3	34.6	10.30	8.16	43	1.87	114.1	0.75	-11.80
15-Oct-2013	00:00:00	10 09 20.6	14 00 46 N	1.726	1.371	52.5	35.3	10.21	8.06	42	1.92	114.3	0.84	-12.00
16-Oct-2013	00:00:00	10 12 14.3	13 41 24 N	1.696	1.350	52.7	36.0	10.12	7.95	41	1.98	114.5	0.91	-12.15
17-Oct-2013	00:00:00	10 15 12.6	13 21 19 N	1.666	1.329	52.9	36.8	10.03	7.84	40	2.04	114.7	0.96	-12.25
18-Oct-2013	00:00:00	10 18 16.0	13 00 27 N	1.635	1.308	53.1	37.5	9.94	7.73	39	2.10	114.9	0.99	-12.29
19-Oct-2013	00:00:00	10 21 24.7	12 38 47 N	1.605	1.287	53.3	38.3	9.85	7.62	38	2.17	115.1	1.00	-12.29
20-Oct-2013	00:00:00	10 24 38.9	12 16 14 N	1.575	1.265	53.4	39.2	9.75	7.51	37	2.24	115.3	0.98	-12.23
21-Oct-2013	00:00:00	10 27 59.1	11 52 47 N	1.545	1.244	53.5	40.0	9.66	7.39	36	2.32	115.5	0.95	-12.13
22-Oct-2013	00:00:00	10 31 25.7	11 28 20 N	1.515	1.222	53.5	40.9	9.56	7.27	35	2.40	115.6	0.90	-11.99
23-Oct-2013	00:00:00	10 34 59.0	11 02 51 N	1.485	1.200	53.5	41.8	9.45	7.15	34	2.48	115.8	0.83	-11.83
24-Oct-2013	00:00:00	10 38 39.4	10 36 15 N	1.455	1.178	53.5	42.8	9.35	7.03	32	2.58	116.0	0.75	-11.63
25-Oct-2013	00:00:00	10 42 27.6	10 08 28 N	1.426	1.155	53.5	43.8	9.24	6.90	31	2.68	116.2	0.67	-11.40
26-Oct-2013	00:00:00	10 46 23.9	09 39 25 N	1.396	1.133	53.4	44.8	9.13	6.77	30	2.78	116.4	0.57	-11.14
27-Oct-2013	00:00:00	10 50 28.9	09 09 01 N	1.367	1.110	53.3	45.9	9.02	6.63	28	2.89	116.6	0.48	-10.83
28-Oct-2013	00:00:00	10 54 43.3	08 37 10 N	1.338	1.087	53.1	47.0	8.90	6.49	27	3.01	116.7	0.39	-10.47
29-Oct-2013	00:00:00	10 59 07.6	08 03 47 N	1.309	1.063	52.9	48.1	8.78	6.35	26	3.14	116.9	0.29	-10.02
30-Oct-2013	00:00:00	11 03 42.6	07 28 46 N	1.280	1.040	52.6	49.4	8.66	6.21	24	3.28	117.1	0.21	-9.46
31-Oct-2013	00:00:00	11 08 28.9	06 52 01 N	1.252	1.016	52.3	50.6	8.54	6.06	23	3.43	117.2	0.13	-8.71
1-Nov-2013	00:00:00	11 13 27.5	06 13 23 N	1.224	0.992	51.9	51.9	8.41	5.90	22	3.58	117.4	0.07	-7.66

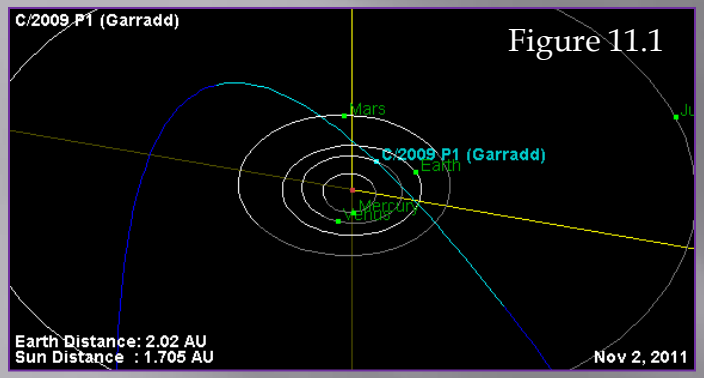
All ephemeris data is calculated based on the Geographical location of the George Observatory, SE Texas, United States.

29˚22'30" N, 95˚35'37" W

23 March 2013 Onward: $M_1 = 8.0 + 5.0 \log d + 7.5 \log r$

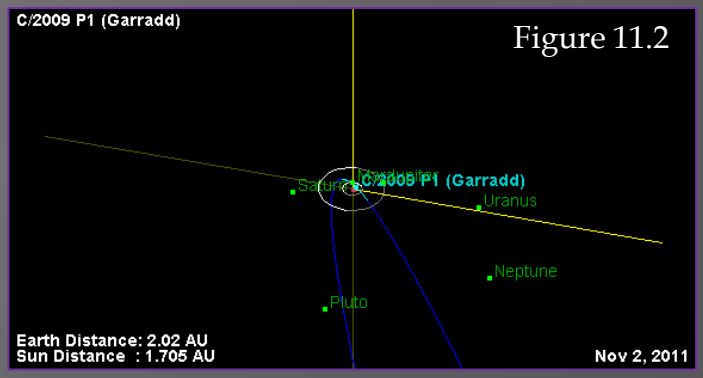
*Predicted: $M_{Pre} = 5.5 + 5.0 \log d + 10.0 \log r$

Overview of the Orbital Differences for Comets!



P – Periodic Comets

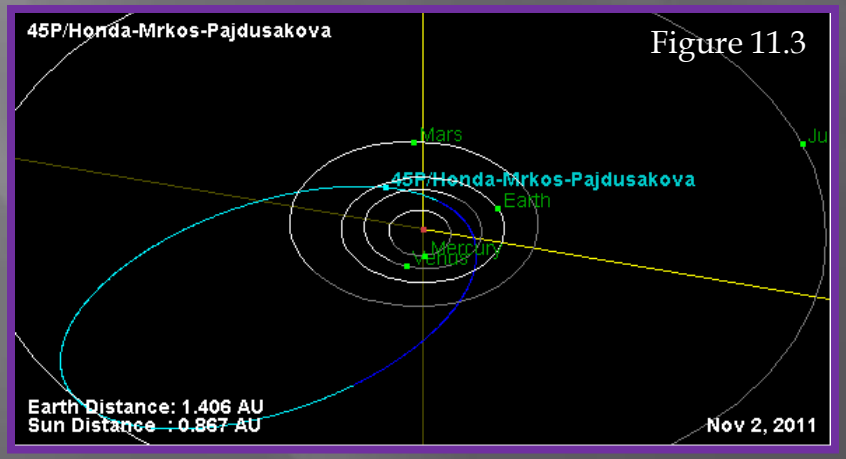
C – Non Periodic Comets



Comet Garradd is the perfect example of a non – periodic comet! The path is hyperbolic in nature. Comet 45P/Honda – Mrkos – Pajdusakova however is the perfect example of a periodic comet which is elliptical in nature.

Figures 15.1 & 15.2 are of Comet C/Garradd 2009 P1 and Figure 15.3 below shows the orbit of 45P.

All images were obtained from the JPL Solar System Dynamics/Small Body Database Browser . Courtesy of NASA/JPL/CalTech



Autumnal Season
October 2013

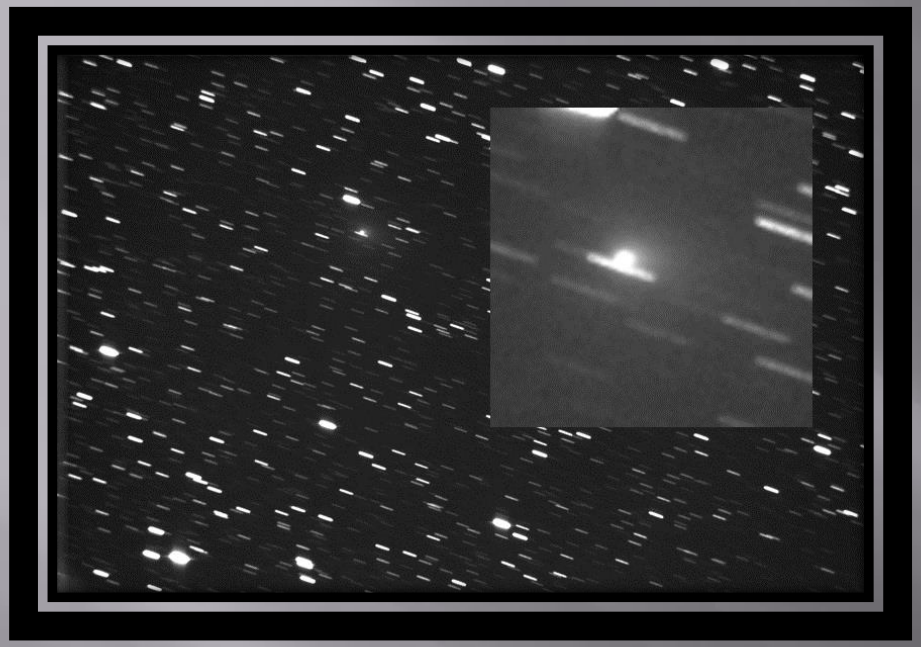
Comets for Future Observation (Oct – Dec) 2013!

	Evening			Midnight			Morning		
Month	Comet	Mag.	Max. Alt.	Comet	Mag.	Alt.	Comet	Mag.	Alt.
2013 October	154P/Brewington	11	56	C/2013 R1 (Lovejoy)	8	13	2P/Encke	7	69
	C/2012 F6 (Lemmon)	12	64	2P/Encke	8	21	C/2013 R1 (Lovejoy)	8	64
	C/2010 S1 (LINEAR)	13	72	154P/Brewington	11	34	C/2012 S1 (ISON)	8	35
	(596) Scheila	13	37	C/2012 F6 (Lemmon)	12	30	C/2013 N4 (Borisov)	12	14
	C/2012 K1 (PanSTARRS)	13	27	C/2010 S1 (LINEAR)	13	19	C/2012 F6 (Lemmon)	12	5
	C/2011 J2 (LINEAR)	13	16	(596) Scheila	13	37	(596) Scheila	13	7
				C/2011 J2 (LINEAR)	13	19	C/2012 X1 (LINEAR)	13	13
							46P/Wirtanen	13	3
							C/2011 J2 (LINEAR)	13	44
2013 November	C/2013 R1 (Lovejoy)	6	1	C/2013 R1 (Lovejoy)	6	15	C/2012 S1 (ISON)	3	32
	154P/Brewington	10	64	154P/Brewington	10	17	C/2013 N4 (Borisov)	6	75
	C/2010 S1 (LINEAR)	13	59	C/2012 F6 (Lemmon)	13	12	2P/Encke	7	16
	(596) Scheila	13	4	290P/2013 N1 (Jager)	13	62	C/2012 X1 (LINEAR)	12	22
	290P/2013 N1 (Jager)	13	12	C/2011 J2 (LINEAR)	13	28	C/2013 N4 (Borisov)	12	20
	C/2010 S1 (LINEAR)	13	54				290P/2013 N1 (Jager)	13	84
	C/2011 J2 (LINEAR)	13	28				C/2012 K1 (PanSTARRS)	13	4
							C/2012 F6 (Lemmon)	13	1
							C/2011 J2 (LINEAR)	13	44
2013 December	C/2012 S1 (ISON)	6	16	C/2012 S1 (ISON)	6	11	C/2012 S1 (ISON)	1	42
	C/2013 R1 (Lovejoy)	6	4	154P/Brewington	10	6	C/2013 R1 (Lovejoy)	6	32
	154P/Brewington	10	66	290P/2013 N1 (Jager)	12	87	C/2012 X1 (LINEAR)	12	29
	290P/2013 N1 (Jager)	12	26	C/2012 F6 (Lemmon)	13	1	290P/2013 N1 (Jager)	12	84
	C/2012 F6 (Lemmon)	13	47	C/2011 J2 (LINEAR)	13	29	C/2012 K1 (PanSTARRS)	12	29
	C/2011 J2 (LINEAR)	13	41				C/2012 F6 (Lemmon)	13	7
	C/2010 S1 (LINEAR)	13	33				C/2011 J2 (LINEAR)	13	39
							C/2013 N4 (Borisov)	13	20
							C/2006 S3 (LENEOS)	13	37

Courtesy of Seiichi Yoshida's Home Page: http://www.aerith.net/comet/weekly/current.html, 4 October 2013.

This table is a forecast of the possibilities of known comets and their future brightness based on a three month period from (October – December) 2013 for evening, midnight, and morning. The Magnitude column represents the maximum brightness of each comet during a particular period of astronomical observing during a particular month. The Max altitude column shows the maximum angle of altitude of a comet on the celestial meridian established at 35° N latitude. All comets in red font indicates the altitude on the celestial meridian at values below 15°.

Comets to Watch for this Autumn!

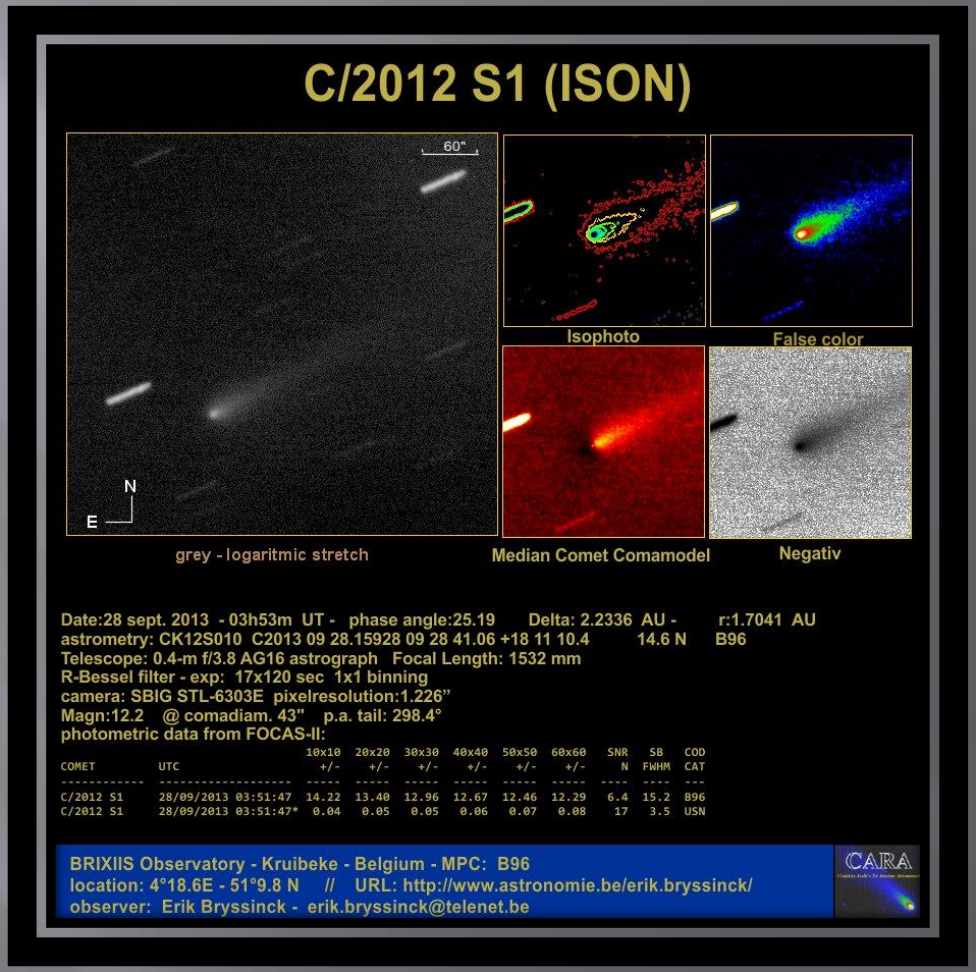


C/2013 R1 (Lovejoy)
(21 September 2013)
© Jose Francisco Hernandez



2P/Encke
(8 September 2013)
© Jose Francisco Hernandez

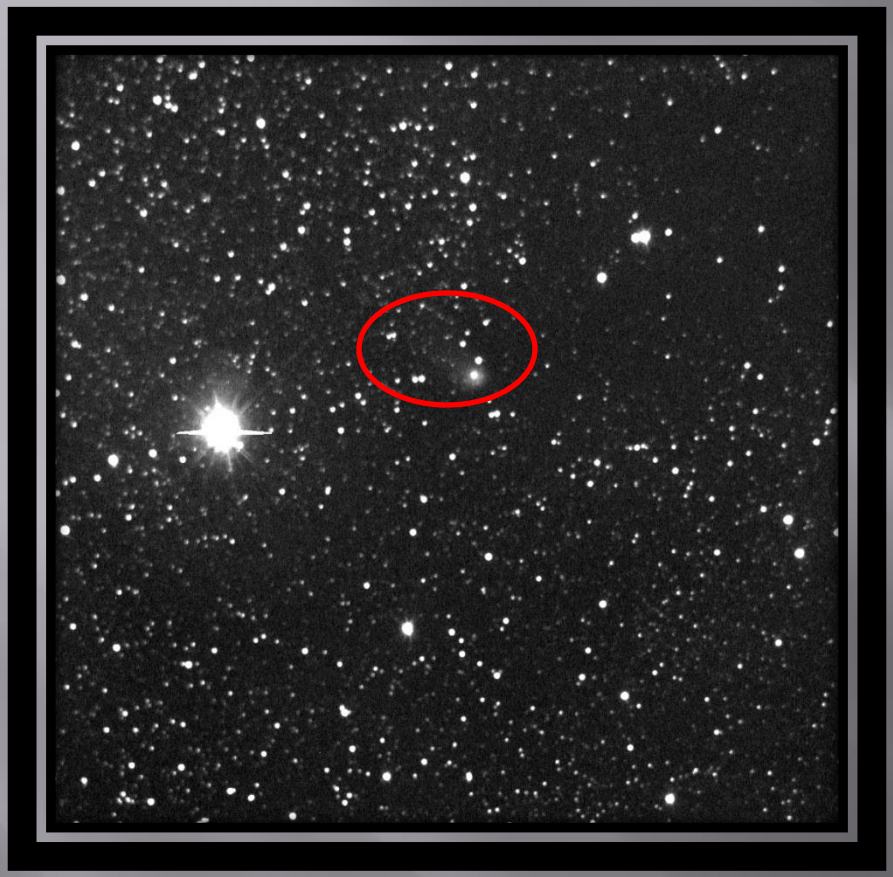
Predominant Comets for Autumn 2013!



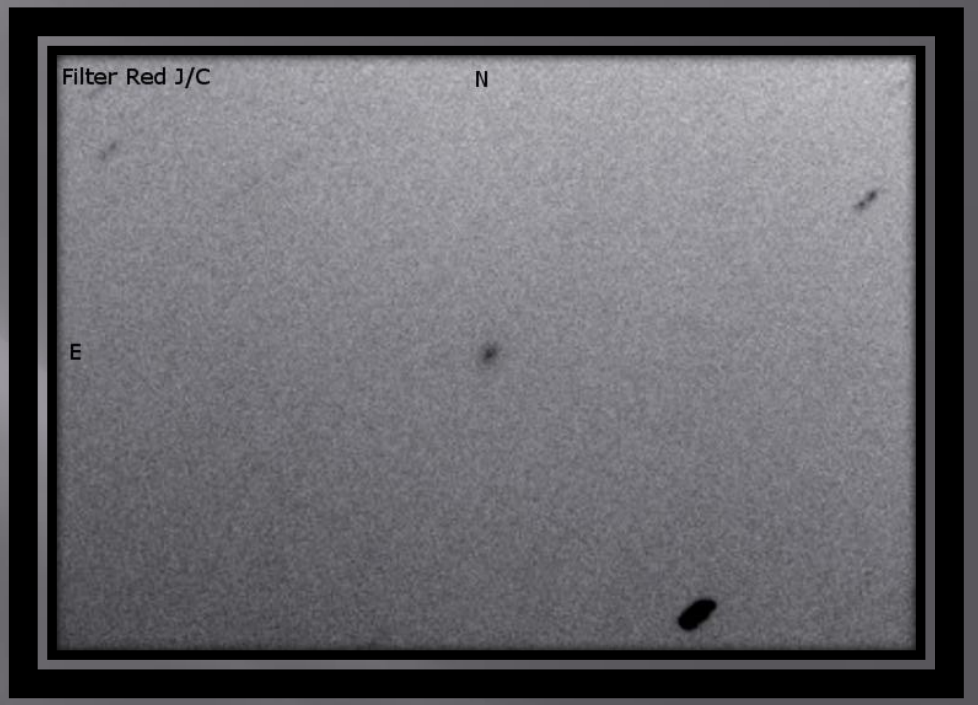
C/2012 S1 (ISON)
(28 September 2013)
© Erik Bryssinck
BRIXIIS Astronomical Observatory

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Predominant Comets for Autumn 2013!



C/2010 S1 (LINEAR)
(9 September 2013)
© Alexander Baransky

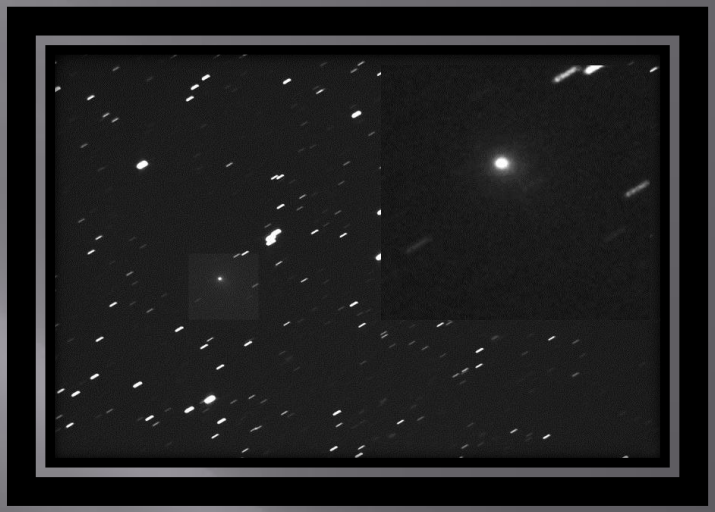


C/2013 N4 (Borisov)
(3 September 2013)
© Jose – Francois Soulier

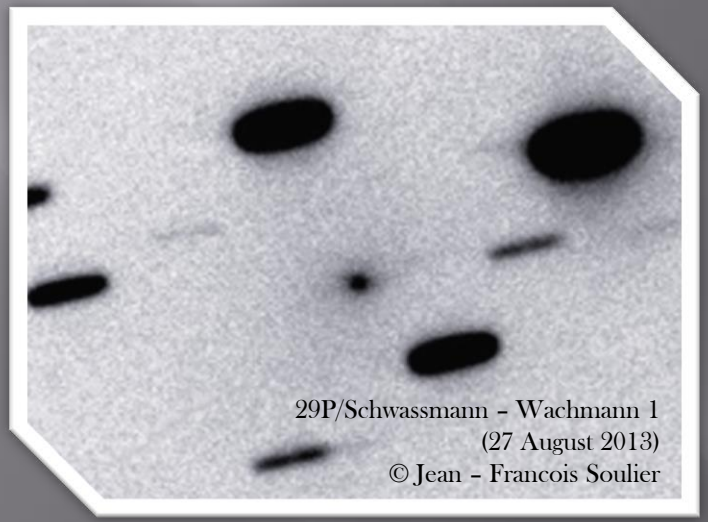
Predominant Comets for Autumn 2013!



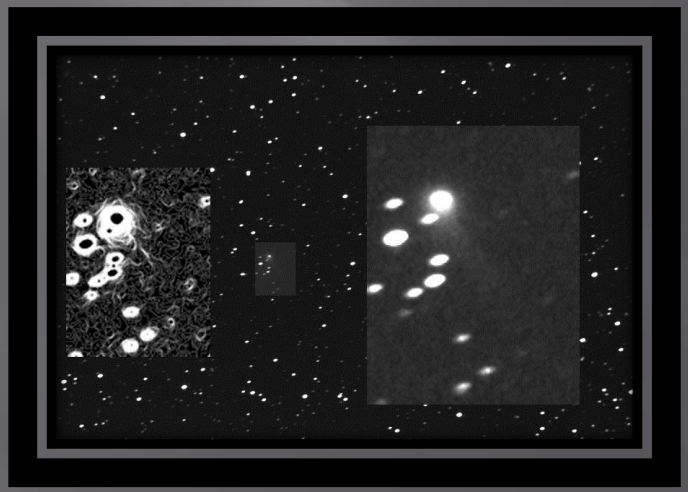
C/2012 F6 (LEMMON)
(7 September 2013)
© Jose Francisco Hernandez



154P/Brewington
(8 September 2012)
© Jose Francisco Hernandez



29P/Schwassmann – Wachmann 1
(27 August 2013)
© Jean – Francois Soulier



McNaught P/2013 J2
(7 September 2012)
© Jose Francisco Hernandez

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GO OUT AND OBSERVE THOSE COMETS!



Courtesy of EarthSky.org & Dave Eagle, www.eagleseye.me.uk, 2013.