Determination of the velocity of "comet c262p/McNaught-Russell" in October 2012

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Abstract

This project studies the motion of comet "c262p/Mcnaught-Russell" from 3 October to 31 October 2012. The comet is tracked and photographed with PROMPT telescope in Chile. The position of the comet is then tracked over time and angular velocity is calculated. The velocity is measured to be fluctuating during the study period with the angular velocity measured to be between 20.54-35.09 arcmin/day

Introduction

Comet is an object in solar system. It orbits around the sun, consisting of ammonia and ice bordered mostly. Scientisis believe that comets carry the compound organic to the world. This research was conducted to study the project of data collection and calculation velocity of the comet. And find out the location that change, compared with stars.

Method

1. Find out the location of comet by making an approximate estimate of each day from the http://ssd.jpl.nasa.gov/horizons.cgi which will tell the position RA and DEC of the unit in hours.

2. Ordered shooting 3,4,13,16,17,21,23,29 and 31 October, 2012 with the camera PROMPT (Panchromatic Robotic Optical Monitoring and Polarimetry Telescopes) in Chile (CTIO :(Cerro Tololo Inter-American Observatory)).

3. The photographs were brought to analyze the position of the comet in the images of using techniques blink to observe point moving in the picture and when it was found. We would choose a schedule the light of an object if the position cover the area more than 1 pixel we would use an average instead.

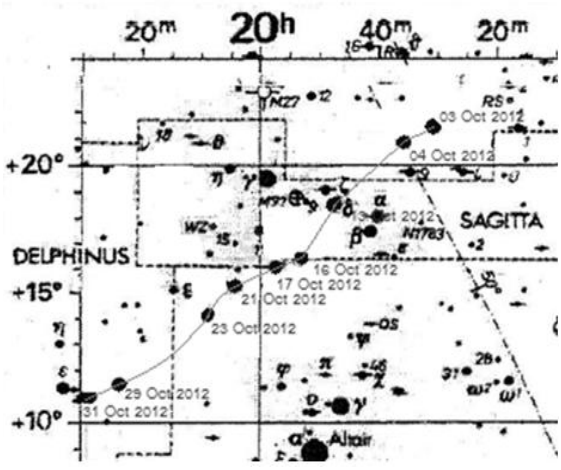
4. In each day checked and noted how the comet has changed and recorded the time.

5. Bring the record from the note and calculated it and found out the velocity in the unit of arcmin/day. It was separated from two to consider the change in the value of RA can be calculated from $\frac{15(\Delta RA)\cos Dec}{\Delta t}$ and the other part of the DEC calculated from $\frac{Dec_2 - Dec_1}{\Delta t}$ by Δt is the difference in the time from the first point to the second point it has a unit in Julian date.

6. The resultant velocity is calculated in each day by velocity = $\sqrt{V^2_{RA} + V^2_{DEC}}$

Result

Day/month/year	Dec			Ra			Mag
	Degree	Lipda	Philipda	Degree	Lipda	Philipda	
03/10/55	21	42	3.05	19	30	56.505	15.34
04/10/55	21	21	25.18	19	32	15.57	15.31
13/10/55	18	07	34.55	19	16	41.63	14.97
16/10/55	16	59	44.87	19	52	31.57	14.86
17/10/55	16	37	9.26	19	54	41.26	14.83
21/10/55	15	04	12.53	20	03	28.04	14.69
23/10/55	14	15	52.29	20	08	21.57	14.63
29/10/55	11	51	51.65	20	24	5.36	14.45
31/10/55	11	03	27.41	20	29	45.02	14.39



This picture showing the movement of the comet “c262p/Mcnaught-Russell” by the x- axis shown the value Ra and y- axis are shown the value Dec with the table that shows the coordinates of the comet

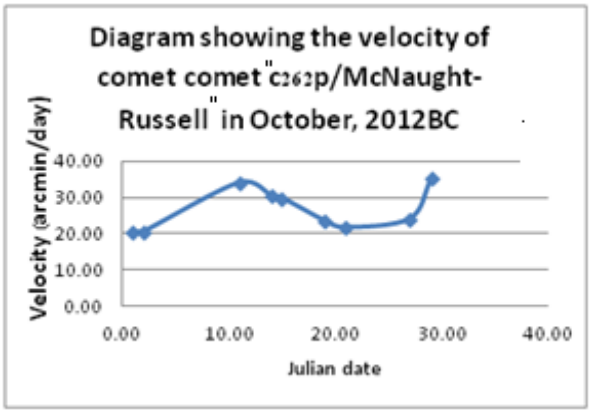


Diagram1 The diagram showing the resultant speed of the comet 3,4,13,16,17,21,23,29,31 “c262p/McNaught-Russell” on October, 2012received.

Discussion

We have tracked the motion of comet “c262p/McNaught-Russell” in October. The angular velocity is then calculated from the change in coordinate using the formula discussed above. The resulting angular speed is as follows :

Day/month/year	Velocity (arcmin/day)
3/10/2012	20.54
4/10/2012	20.58
13/10/2012	34.05
17/10/2012	30.41
21/10/2012	29.77
23/10/2012	23.51
24/10/2012	21.61
29/10/2012	24.02
31/10/2012	35.09

We can see that the angular velocity increases slightly. From the magnitude data, we also see that the comet also brighten up every day. This means either the comet is orbiting closer to the Sun or the distance to Earth is decreasing.

One difficulty in determining the location is to find where the comet nucleus is. We solve this problem by choosing the brightest part of the comet as the nucleus. In the case where more than one pixels tie for the brightest, we simply take the average as the position.

This study also has other limitations such as the relative position between Earth and the comet that would affect the position of the comet. It is also possible there are other factors that might affect the apparent speed of the comet.

Conclusion

The velocity is measured to be fluctuating during the study period with the angular velocity measured to be between 20.54-35.09 arcmin/day.

Acknowledgement

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