THE COMET ISON

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Abstract

The comet was discovered last year on September 24th by Vitali Nevski and Artyom Novichonok (Rusia) and named "C/2012 S1", and though it had promise of being very bright at the end of the current year and the beginning of 2014, but the close encounter with the Sun (November 28th) was devastating; the comet couldn't survive this event. To this day (December 31th 2013), it hasn't yet been possible to detect the debris left in orbit not even by employing the Hubble Space Telescope. In this work the comet's light curve and the orbital parameters are obtained, using high precision data. We have photographed and studied the comet from the University of Nariño's Observatory (Pasto-Colombia) since January 31st , 2013. The pictures of the comet were captured with the following equipment: CGE PRO 1400 CELESTRON (f/11 Schmidt-Cassegrain Telescope) and STL-1001 SBIG camera.

Introduction

The brightness' variation of a comet with respect to the heliocentric distance is given by the following equation:

$$m = m_0 + 2.5n\log(r) + 5\log(\Delta) \quad (1)$$

m = magnitude as observed from the Earth

m_0 = absolute magnitude

r = distance of the comet in relation to the Sun

Δ = distance of the comet in relation to the Earth

n = index of cometary activity

The absolute magnitude informs us about the intrinsic brightness of the comet. The term related with the geocentric distance involves a variation of the brightness with the square distance's inverse. At the same time the term related with the heliocentric distance holds the factor (n) which varies from comet to comet and is important because its value is related with the physical processes that take place in the coma. By example, if the brightness varies by pure reflection then $n = 2$, but in most of the comets the brightness doesn't vary solely by reflection and there also exist processes of fluorescence caused by the Sun. Therefore, the brightness changes more rapidly with the variations of the heliocentric distance, and the "n" value indicates how fast this change is.

The law of a comet's brightness variation can be explained by means of the following equation:

$$I = \frac{I_0\phi(\alpha)}{r^n\Delta^2} \quad (2)$$

Where $\phi(\alpha)$ = phase's function

Astrometry of the Comet

C2013 01 31.02602	07 18 35.90	+31 43 04.2
C2013 01 31.02834	07 18 35.82	+31 43 03.8
C2013 01 31.03128	07 18 35.64	+31 43 03.8
C2013 02 01.11387	07 17 23.63	+31 43 53.6
C2013 02 01.13694	07 17 22.04	+31 43 55.0
C2013 02 01.14948	07 17 21.21	+31 43 55.8
C2013 02 19.00380	06 59 09.35	+31 43 22.1
C2013 03 02.01838	06 50 11.89	+31 31 31.9
C2013 03 02.02063	06 50 11.85	+31 31 31.7
C2013 03 02.02635	06 50 11.57	+31 31 30.7
C2013 04 04.07588	06 37 16.92	+30 28 03.3
C2013 04 13.00508	06 37 23.47	+30 08 07.5
C2013 04 13.01679	06 37 23.56	+30 08 05.9
C2013 04 13.02192	06 37 23.54	+30 08 05.1
C2013 05 17.02341	06 49 20.82	+28 50 25.7
C2013 05 17.03527	06 49 21.30	+28 50 23.1
C2013 05 17.03585	06 49 21.26	+28 50 23.0
C2013 05 17.04099	06 49 21.41	+28 50 23.0
C2013 05 17.04163	06 49 21.53	+28 50 22.6
C2013 05 17.04227	06 49 21.47	+28 50 22.5
C2013 05 17.04291	06 49 21.56	+28 50 22.0
C2013 05 17.04355	06 49 21.58	+28 50 23.3

Figura 1: Astrometry Data of ISON Comet.

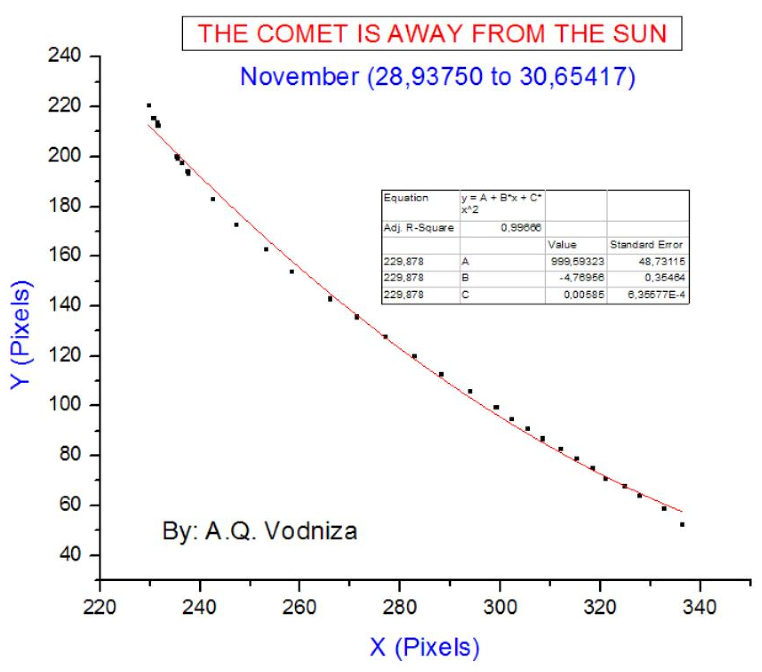

Figura 2: Coordinates of the Comet ISON.

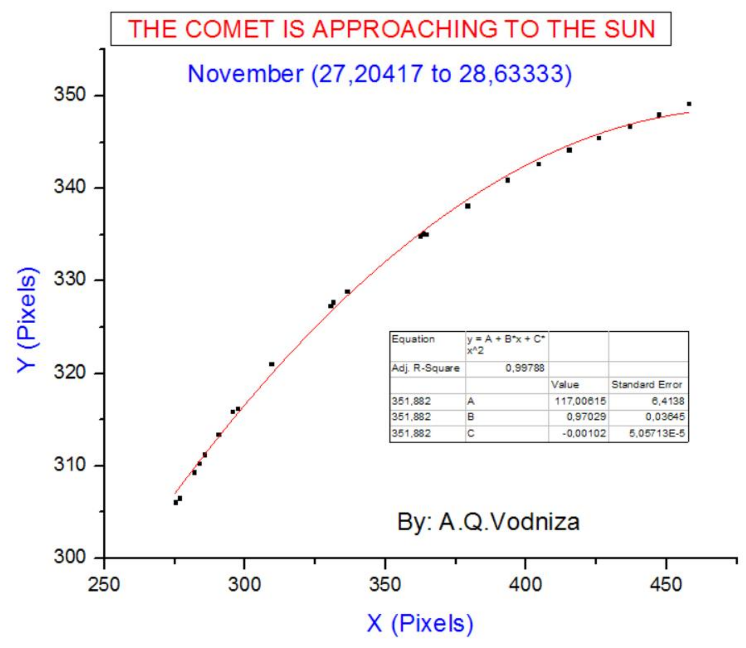

Figura 3: Coordinates of the Comet ISON.

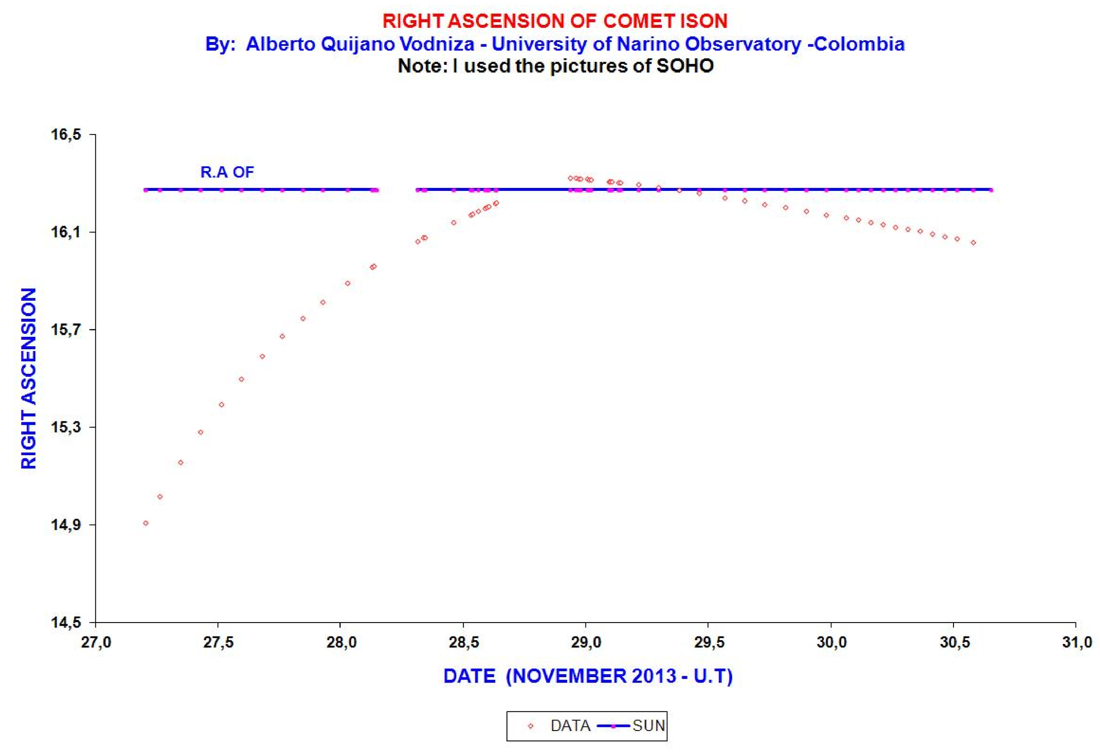

Figura 4: RA as a Function of Time.

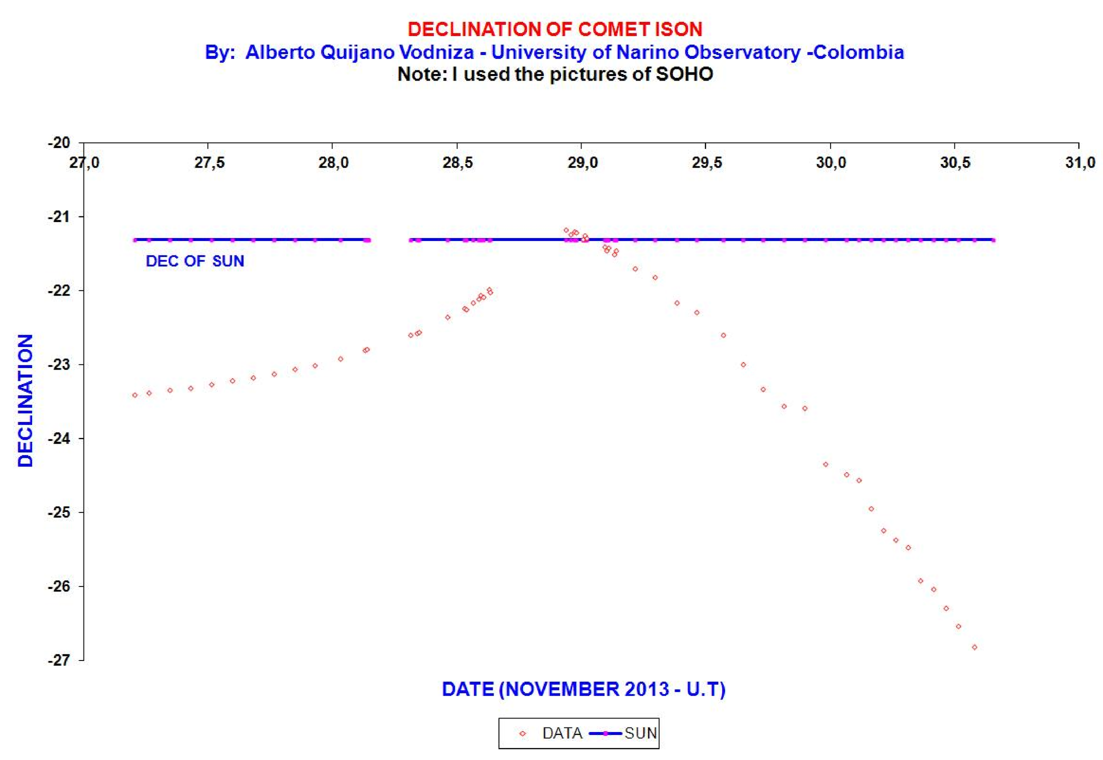

Figura 5: DEC as a Function of Time.

Light Curve of the Comet

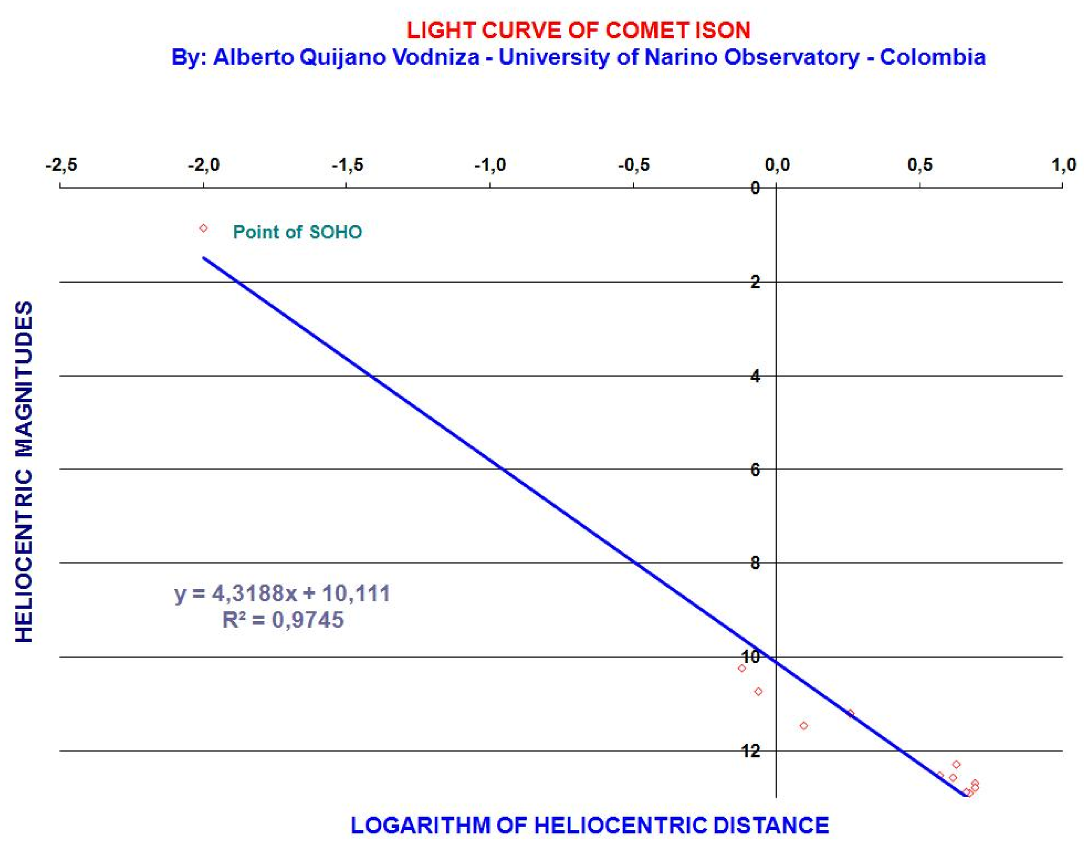

Figura 6: Light Curve of the Comet.

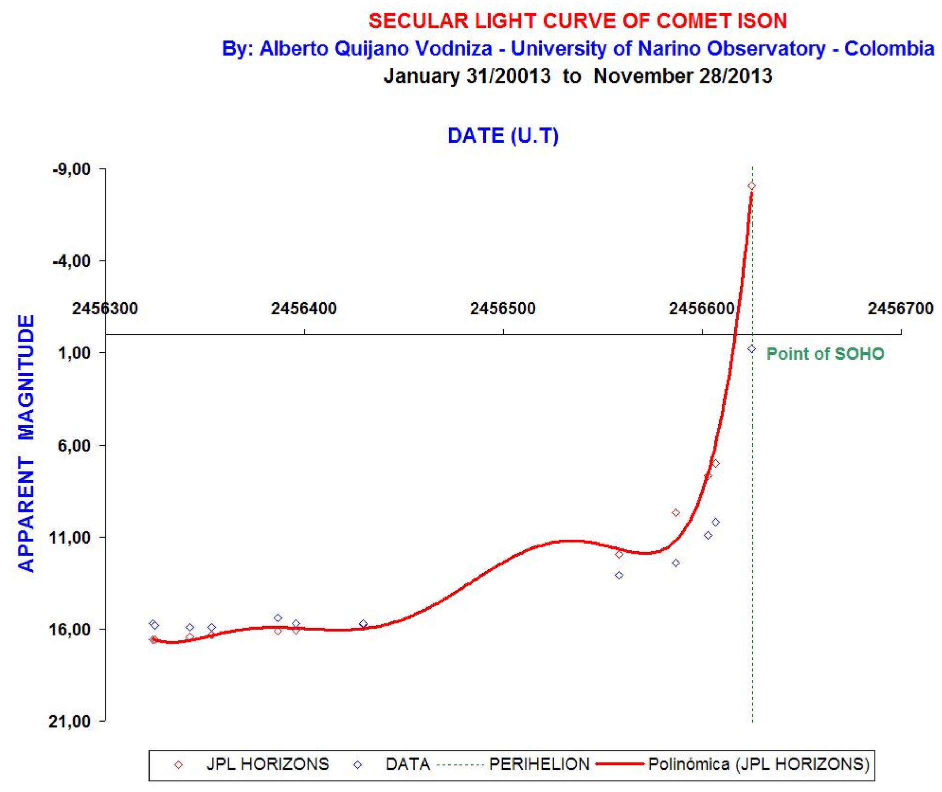

Figura 7: Secular Light Curve.

Motion of the Comet

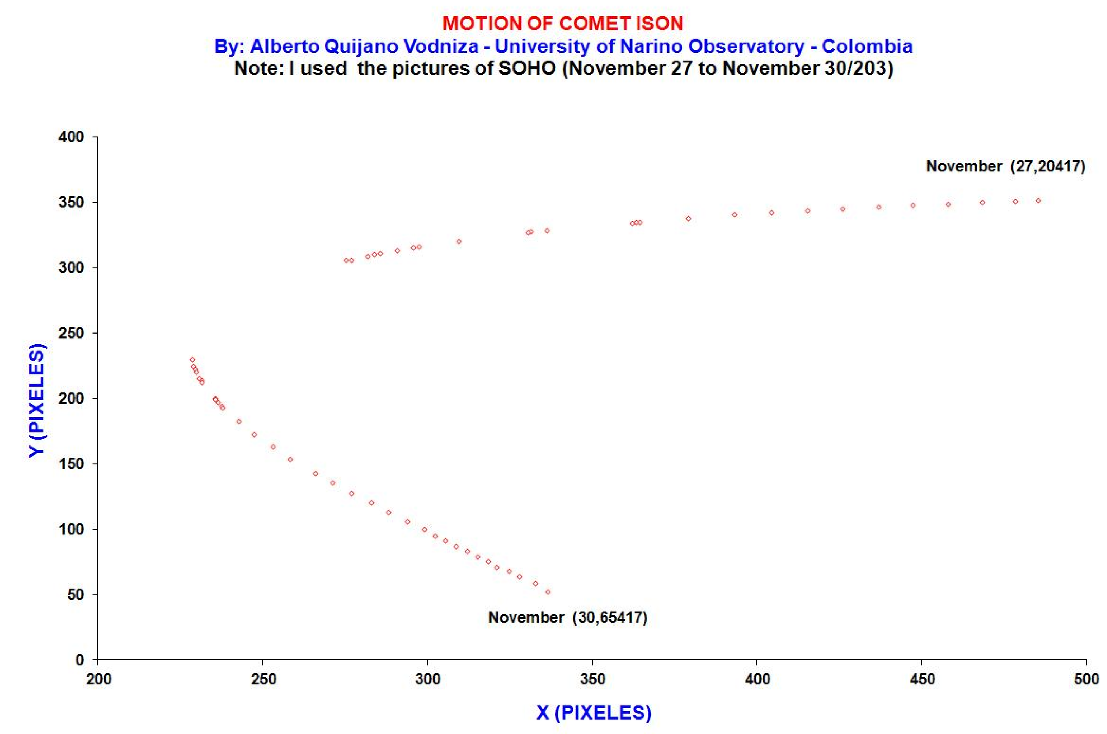

Figura 8: Path of the Comet.

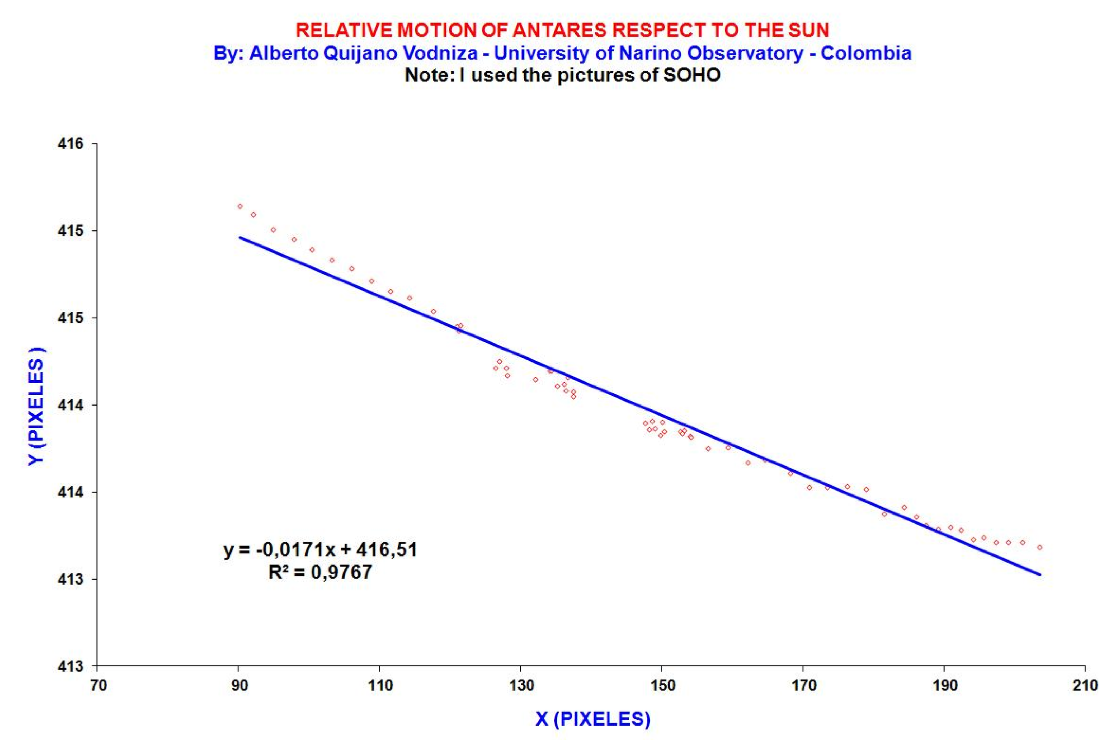

Figura 9: Relative Motion of Antares.

Summary And Conclusions

We obtained the following orbital parameters: eccentricity = 1.000009, orbital inclination = 61.92926 deg, longitude of the ascending node = 295.72536 deg, argument of perihelion = 345.51426 deg, perihelion distance = 0.01249336 A.U. The parameters were calculated based on 22 observations (2013 Jan 31-May 17) with mean residual = 0.387 arcseconds.

Acknoledgements

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