MONITORING OF COMET C/2014 Q2 LOVEJOY DURING CLOSE APPROACH TO THE EARTH.
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Introduction: C/2014 Q2 (Lovejoy) is a long-period comet discovered on August 2014 by Terry Lovejoy from his observatory in Brisbane (Australia). Its high orbital inclination of 80.3º is the reason because its path in the sky had been in Austral skies until mid December 2014. We have been since then monitoring the activity of this fascinating comet from our observatories. The behavior and dynamic evolution of long period comets is particularly interesting because they end typically their lifes colliding with the Sun [1]. They are though to be fragments of primitive ice-rich bodies gravitationally dispersed during the early stages of solar system evolution [2]. Comet C/2014 Q2 has an extraordinarily active nuclear activity. Its ionic tail is several degrees long (Fig. 1) and shows an imponent coma. Seen through telescope the inner coma exhibits different jets that we have monitored for about two weeks so far. For the previously mentioned reasons, we have selected this comet to be studied by our team inside the CSIC-IEEC program of multiband photometric monitoring of comets. We describe here a 2-weeks follow-up made from Dec. 2014 until mid Jan. 2015.

Figure 1. A 2 min. exposure wide field image taken on Jan. 4.815 with a historic F24 Aerial camera (f: 5.6) coupled to a ST8 CCD camera. A few degrees long ionic tail is perfectly visible despite of the presence of the full Moon (J.M.Trigo-Rodríguez/B06).

Methods: We have conducted a monitoring program of ground-based photometry of C/2014 Q2 Lovejoy using standard Johnson-Cousin filters (V,R,I) following the same methodology explained in [3-4]. We have been monitoring this object on different nights from four observatories with the instruments described in Table 1. All astrometric and photometric observations have been reported to the Minor Planet Center (MPC). Photometry is standardized to an aperture of 10 arcsec, but photometric growth curves are made with increasing photometric aperture to study cometary activity (see Fig. 3).

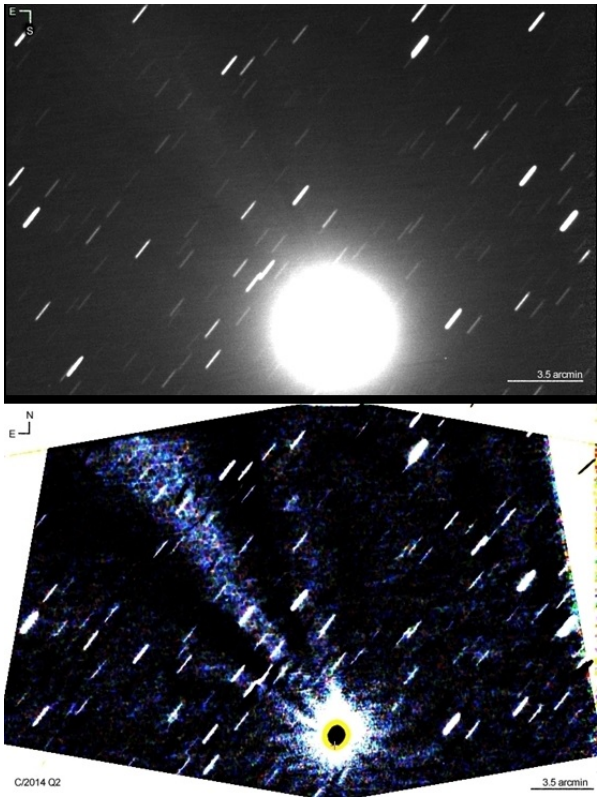

Figure 2. C/2014 Q2 imaged on Jan. 1.91, 2015 from MPC458 when the comet was in +9.5 R magnitude. Larson-Sekanina filter applied to original image to reveal jets and faint longer tail structures (D. Rodríguez/458).

Observatory (MPC code)	Instrument
Gualba, Barcelona (442)	SC 36.0 f/7
Guadarrama, Madrid (458)	SC 25 f/10
Montseny (B06)	T 20 f/6
Obs. Ast. Del Montsec (C65)	RCT 80.0 f/9.6

Table 1. Observatories involved in this follow-up.

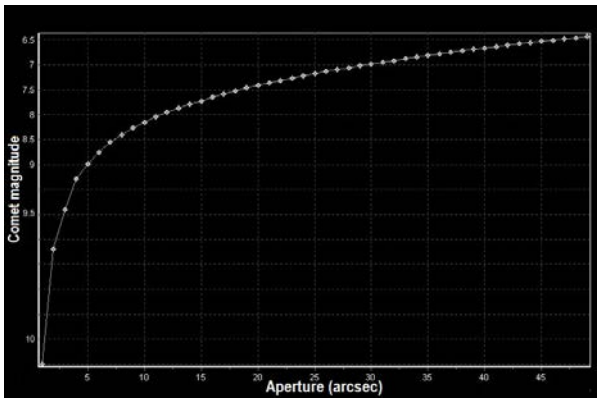

Figure 3. C/2014 Q2 comet magnitude from MPC442 in filter I of Fig. 4. (Res. 0.67 arcsec/pixel).

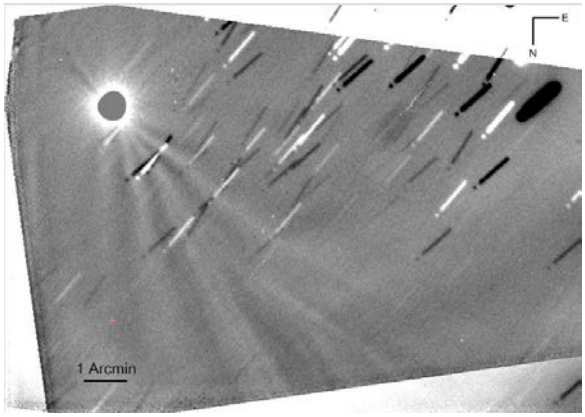

Figure 4. Larson Sekanina filter of a magnified image of C/2014 Q2 taken on Jan. 3.906 (A. Sánchez/442).

Results and discussion: We think that observations of the apparent comma diameter and multi-aperture photometry are relevant to quantify the activity of this comet, particularly once the size of the comet will be better established from future studies with larger instruments. On the other hand, we have demonstrated the importance to keep a continuous follow up of comets like e.g. the 29P/Schwassmann-Wachmann 1, in order to quickly identify sudden outbursts [4-6]. Fig. 5 compiles our photometric observations in the R band.

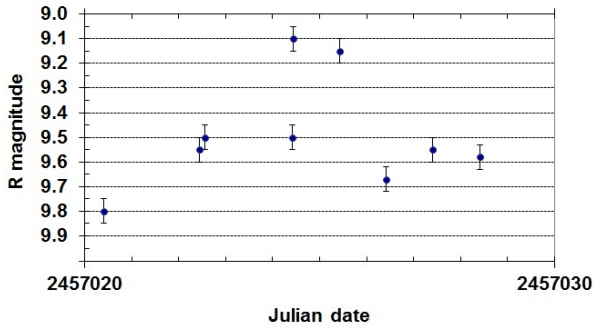

Figure 5. C/2014 Q2 Lovejoy photometry in the R band obtained for a 10 arcsec standardized aperture.

Conclusions: We have started a photometric monitoring program of comet C/2014 Q2 with medium-sized telescopes. We have found that the comet exhibits fluctuating activity from day to day (Fig.5), and even the inner coma exhibits ~15 minute fluctuations in brightness. The progressive increase observed in early January observations let us keep hope in that this comet still can keep increasing in magnitude to become a nice naked-eye object during mid January 2015.

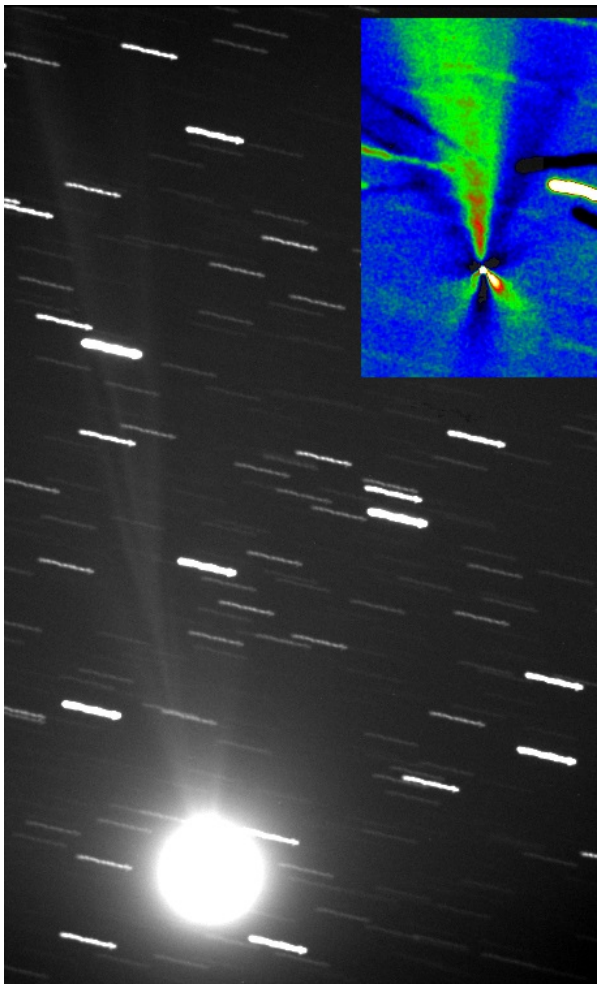

Figure 6. Image of C/2014 Q2 taken from B06 on Dec. 28.884. The top right inset is a Larson-Sekanina filter of the nucleus region (J.M.Trigo-Rodríguez/B06).

References: [1] Bailey M.E. et al. (1992) *A&A*, 257, 315-322. [2] Jewitt, J. (2008) in *Trans-Neptunian Objects and Comets*, SAAS-FEE 35, Springer, pp. 1-78 [3] Trigo-Rodríguez J.M. et al. (2009) *A&A*, 485, 599-606. [4] Trigo-Rodríguez J.M. et al. (2010) *MNRAS*, 409, 1682-1690. [5] Sekanina. Z. (1982) In Comets (L.L. Wilkening, ed.), Univ. Arizona Press, pp. 251-287 [6] Trigo-Rodríguez J.M. et al. (2010) *LPS XLI*, Abstract # 1533.