

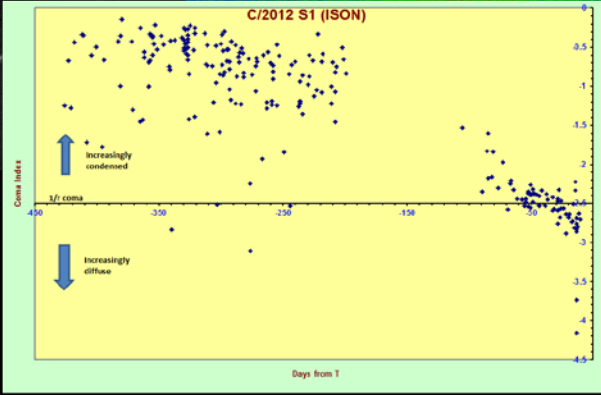
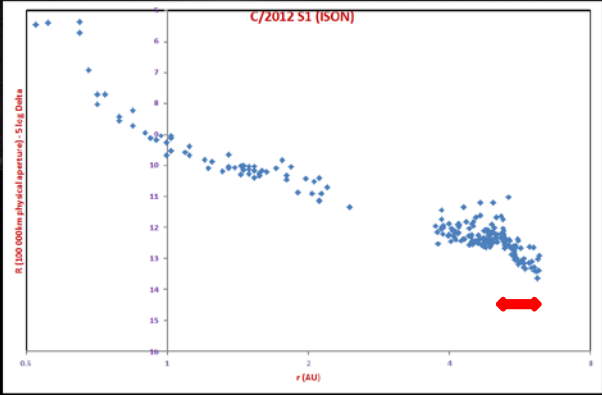
Comet ISON: The Comet of the Millennium

Century Year Month?

Cometa C/2012 S1 ISON - Observatorio Nazaret J47 - ASTRONOMIA LANZAROTE
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Unrealistic expectations were raised about the potential brightness of Comet ISON – C/2012 S1 (ISON) – based on its brightness at discovery and a very rapid rate of brightening at large distances from the Sun. The light curve evolution during 2013 suggests that it has started to fragment and may not even become a naked eye object. We examine its photometric evolution and speculate about its possible future visibility.

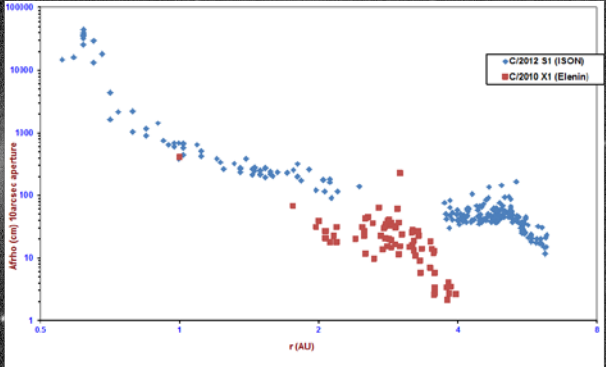


A very rapid initial rate of brightening (red region) when far from the Sun, with activity dominated by low temperature volatiles, combined with a very small perihelion distance (1.7 Solar radii), led to a predicted magnitude at perihelion of -17. This high degree of activity at large heliocentric distance is typical of a dynamically new object like Comet ISON.

The slope of the light curve since crossing the orbit of Jupiter (5.2AU) in early January, has been much flatter than immediately after discovery, also typical of dynamically new objects. The upturn in the light curve inside 1AU is due to gas production: the emission from the Swan bands of C2. This though has switched on very late, hence the extrapolated maximum magnitude at perihelion is much fainter than expected.

Comet ISON's inner coma was initially very condensed and almost stellar, despite a quite low degree of visual condensation, but is becoming rapidly more diffuse close to perihelion. It is now significantly more diffuse than the theoretical "1/r" coma expected for steady-state activity from the nucleus.

C/2010 X1 (Elenin) showed a similar trend before breaking up. The pattern of the evolution of activity of Comet ISON and the disappeared D/2010 X1 (Elenin) is quite similar, as shown below.



Conclusions

- Comet ISON is a small and intrinsically quite faint comet that had a high degree of activity at discovery due to low temperature volatiles.
- Its activity close to the Sun reflects its "true" activity. It could still become quite bright due to its very small perihelion distance, but not exceptionally bright.
- The large outburst in mid-November and post-outburst morphology suggest a major fragmentation event. This may actually improve the chances of the comet becoming bright at perihelion as fresh ice is exposed.

