

First time comet observations from National Observatory of Turkey

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Introduction

We performed first time scientific comet observations from Tübitak National Observatory (TUG), Turkey using two telescopes of that facility. In order to test the capabilities of the instruments we performed a long comet monitoring campaign from October 2013 to January 2014. We observed many comets, including but not limited to C/2012 S1 ISON, 154P Brewington, and C/2013 R1 Lovejoy. All comets were monitored for several nights with the Bessel R, V, B filters from the 1 meter (T100) and 1.5 meters (RTT150) telescopes. Additionally, we acquired the first spectroscopic observations of a comet from TUG, using TUG Faint Object Spectrograph (TFOSC with grism between 3230-9120 Å) mounted on RTT150.

With these observations, we could assess the quality of TUG instruments for cometary science, and identified a few limitations. We propose some technical improvements for future comet observations. These will open new observational opportunities to Turkish astronomers and a participation to international campaigns on cometary science.

Observations and simulations

Apart from testing the instruments, our observations were also driven by the scientific questions regarding comet ISON around its perihelion passage. We intended to follow the formation and evolution of dust coma structures, and use well tested models to simulate and understand this activity (Vincent et al. 2010, 2012; Lin et al. 2012). Additionally we wanted to acquire spectra and derive the composition of the tail before and after perihelion. Unfortunately, the comet was not very active before perihelion and completely disintegrated at the end of November 2013. Nonetheless, we had acquired many images in the previous weeks, and we used the remaining nights to monitor other comets, mainly C/2013 R1 Lovejoy.

Since the observatory is not equipped with the

comet gas filters, we concentrated on dust structures and monitored comet ISON during October 2013 in Bessel R, B, V filters. Comet's activity structures are investigated and simulations of dust tail are performed (See Fig. 1). On December 2013, we performed first comet spectroscopy targeting comet 154P and additionally observed comet C/2013 R1 in Bessel R, B, V filters.

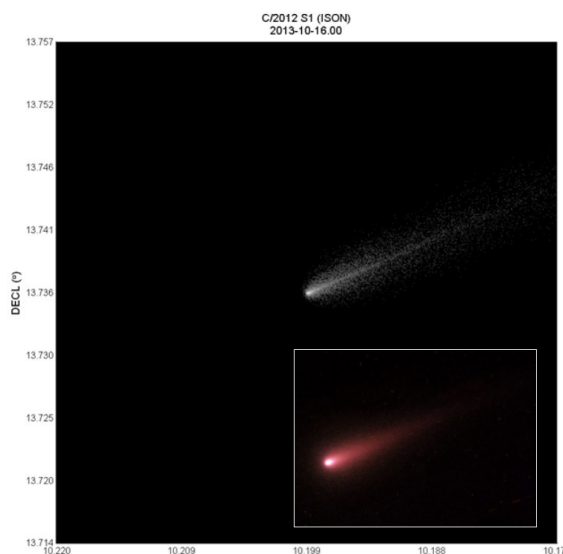


Figure 1: Simulation of comet ISON dust tail + RGB composite image obtained from T100.

Results

Some additional gas filters for comet observations would be very useful for further observations. Fortunately, budget for them is approved for 2014 and they are in the selection process. This will significantly improve future comet observations at TUG.

T100: Imaging of fast moving bright comets (like ISON) can be achieved by using short exposure times

from remotely operable T100 telescope, but non-sidereal tracking has to be improved for the observation of fast moving small bodies of the solar system. Studies on the improvement of T100's tracking have already started at TUG.

RTT150: Non-sidereal tracking is excellent and allowed us to take spectra of comet 154P.

For future, we have established collaboration with the Rosetta mission and will monitor comet 67P/Churyumov-Gerasimenko starting from spring 2015. We are also ready for follow-up GAIA observations of solar system objects with RTT150 (max. 5 nights/yr), T100 (max. 80h/yr) and T60 (10-15

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