The Photometric and Spectral Evolution of the 2008 Luminous Optical Transient in NGC 300

Roberta M. Humphreys (1), Howard E. Bond (2) Luigi R. Bedin, (3) Alceste Z. Bonanos (4), Kris Davidson (1), L. A. G. Berto Monard (5), Jose L. Prieto (6), and Frederick M. Walter (7)

(1) University of Minnesota, (2) Space Telescope Science Institute, (3) INAF-Osservatorio Astronomico di Padova, (4) National Observatory of Athens, (5) Klein Karoo Observatory, S. Africa, (6) Carnegie Observatories S. Africa, (7) Stony Brook University

The 2008 optical transient in NGC 300 is one of a growing class of intermediate-luminosity transients that brighten several orders ofmagnitude from a previously optically obscured state. The origin of their eruptions is not understood. Our multi-wavelength photometry and spectroscopy from maximum light to more than a year later provide a record of its post-eruption behavior. We describe its changing spectral-energy distribution, the evolution of its absorption- and emission line-spectrum, the development of a bipolar outflow, and the rapid transition from a dense wind to an optically thin ionized wind. In addition to strong, narrow hydrogen lines, the F-type absorption-line spectrum of the transient is characterized by strong Ca II and [Ca II] emission. The very broad wings of the Ca II triplet and the asymmetric [Ca II] emission lines are due to strong Thomson scattering in the expanding ejecta. Post-maximum, the hydrogen and Ca II lines developed double-peaked emission profiles that we attribute to a bipolar outflow. Between approximately 60 and 100 days after maximum, the F-type absorption spectrum, formed in its dense wind, weakened and the wind became transparent to ionizing radiation. We discuss the probable evolutionary state of the transient and similar objects such as SN~2008S, and conclude thatthey were most likely post-red supergiants or post-AGB stars on a blue loop to warmer temperatures when the eruption occurred. These objects are not LBVs.

Reference: Asreophysical Journal
Status: Manuscript has been accepted

Weblink: arXiv:1109.5131

Comments:

Email: roberta@umn.edu