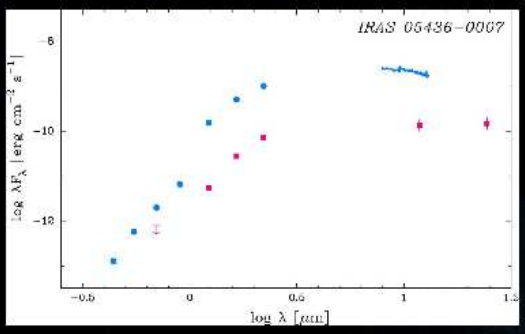
Monitoring the Early Outburst of IRAS 05436-0007/V1647 Ori with Optical Spectroscopy

D. Fedele, M. E. van den Ancker, M. Petr-Gotzens, N. Ageorges (ESO)

1. INTRODUCTION

In late January 2004 the amateur astronomer J.W. McNeil (2004, IAU circ. 8214, 1) first reported the discovery of a bright reflection nebula in a previously dark region of the L1630 cloud within the Orion B complex. Subsequent studies showed it to be the consequence of an outburst that began in November 2003. In the next few months the source rose in brightness of about 4 mag in I. The presumed source of the outburst of V1647 Ori correspond to the infrared source IRAS 05436-0007 and is located at the apex of McNeil's nebula. Here we present an optical spectroscopic monitoring of the early outburst of IRAS 05436-0007/V1647 Ori taken with the FORS spectrograph at the VLT.



~ 1 ' Spectral Energy Distribution of IRAS 05436-0007 before (open squares) and after (filled circles) the outburst from . The pre-outburst data come from POSS, 2MASS and IRAS. The post-outburst data come from FORS photometry (optical) SAAO photometry (near-IR) and from TIMMI2 spectrum (mid-IR)

2. OBSERVATIONS

The observations presented here are part of a year-long monitoring program of the outburst of IRAS 05436-0007. The program consists of two runs: run A from February to March 2004, run B from December 2004 to March 2005. Both the runs were carried out with the long slit spectrograph FORS2 at the 8.2 meters VLT telescope. For the run A we have 5 spectra in the wavelength range 4560-5860 Å at a resolving power of $\lambda/\Delta\lambda$~2100. For the run B we have 6 spectra in the wavelength range 4560-5860 Å and 6 spectra in the range 5750-7310 Å at a resolving power of $\lambda/\Delta\lambda$~2100. 2140 respectively.

3. SPECTRA ANALYSIS

Figures 2 shows some features extracted from the spectra of the nights 2004 March 12, 2004 December 17 and 2005 January 4. The H_β line displays a characteristic P Cygni profile with a blue-shifted absorption component, signature of a strong outflow. From the three plots a decrease with time of the extent of both the absorption and emission component is clearly visible. The location of the maximum absorption in the spectra shifts from -300 km s-1 to -100 km s-1 from March 2004 to January 2005. The prominent absorption wing, extending to 800 km s-1 to the blue in March 2004 is virtually absent in December 2004 and January 2005.

The FeII (42) 5169.03 Å line has a blue-shifted absorption component with the same properties of the Hβ (location of the maximum absorption and velocity shifts). A weak emission component centered at lo is visible in the spectra of March 2004 and January 2005 while it is absent in the spectrum of December 2004.

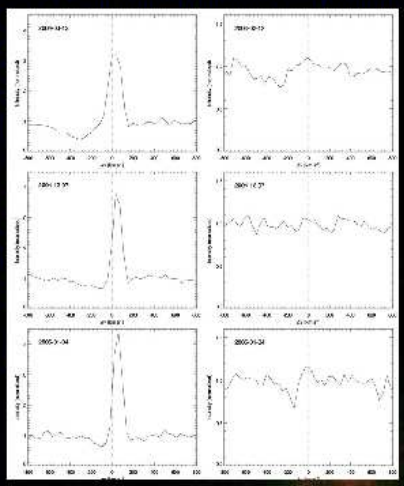


Fig 2 (left) H_β line in IRAS 05436-0007 showing a pronounced P Cygni profile. The strength of the blue-shifted absorption is clearly decreasing with time. (right) FeII 5169.03 Å line showing a blue-shifted absorption plus a weak emission centered at λ_{lo}.

4. CONCLUSION AND FUTURE WORK

Early observations of the first part of the outburst of V1647 Ori have suggested the remarkable brightening of this object to be due to a FU Orionis-like event or to the unveiling of a heavily embedded class I protostar (e.g. Walter et al. 2004, AJ 128, 1872; Vacca et al. 2004, ApJ 604, L29; Briceño et al. 2004, ApJ 606 L123). Our data show data the outburst is still going on more than a year after it started. As next step in our analysis we will correlate the observed variations in the optical spectra with the photometric variations, and attempt to fit the observed variations with a simple model for an active disk with varying accretion rate.

Background: composite B, H and z filters image also obtained in early 2004, with in early 2004