INTRODUCTION

Eta Car is with M > 100 M⊙ and L ~ 10^6 L⊙ one of the most massive and most luminous stars in our Galaxy. During its Great Eruption 170 years ago, its luminous energy output rivaled that of a supernova as it expelled 10-30 M⊙. Due to its proximity to us, η Car is one of few supernova impostors whose recovery and continuing instability we can analyze in detail; numerous data sets cover several centuries. Commingling about 15 years ago, η Car showed a dramatic increase in the near-UV, visual, and near-IR [2]. As the most obvious explanation a decrease in η Car’s mass loss rate was proposed. The recent X-ray light-curve also indicated a decrease in wind momentum and optical spectra from 1998-2012 revealed major changes in the primary wind. These findings lead to the hypothesis that η Car’s wind may have gradually decreased by a factor of 2 over the last decade [5,6,4,1]. To further investigate the current state of η Car and to complement the recent studies in the visual and X-rays, we obtained JHKs photometry with IRSF/SIRIUS in 2012 May. We expected to observe long-term changes in the JHK light-curves and color-color diagrams if the wind and/or the central star itself had changed over the last decade.

CONCLUSIONS

1. Eta Car’s 1972-2004 JHK light-curve showed increasing brightness in all three bands with time. 2012 May SIRIUS data indicate that η Car followed this trend only in J, while H and K band magnitudes are similar or even fainter than in 2004; η Car became bluer in the near-IR since the early 1990s.

2. This is consistent with the hypothesis that η Car’s wind may have gradually decreased over the last two decades. The recent JHK magnitudes can be explained with a combination of an expanding Homunculus nebula and increased heating by the central source.

3. We do not detect significant sub-diaily variations.

REFERENCES

10. JHKs PHOTOMETRY OF ETA CARINAE WITH IRSF/SIRIUS

ANOTHER EVIDENCE FOR THE DECREASING WIND HYPOTHESIS

Andrea Mehner (ESO Chile), Kazunori Ishibashi (Nagoya University), Takahiro Nagayama (Nagoya University)

IRSF/SIRIUS OBSERVATIONS

IRSF (InfraRed Survey Facility) is a 1.4 m telescope located at SAAO. It is a joint project of Nagoya University, the National Astronomical Observatory of Japan, and SAAO. SIRIUS (Simultaneous-3color InfraRed Imager for Unbiased Survey) is a simultaneous 3-channel JHK camera equipped with three 1024x1024 HAWAII arrays. The field of view is approximately 7.8x7.8 and the pixel scale is 0.45/pixel.

On 2012 May 11 and 15 we monitored η Car with 1.6 s and 2 s exposures for more than 12 hours. Because of η Car’s brightness a 1% plus a 10% neutral density filter were used. Great care was taken to achieve high-precision photometry of η Car. For example, we monitored the same 2 standard stars throughout the night to determine the zeropoints and extinction curves.

The data were reduced using the SIRIUS pipeline. The resulting SIRIUS JHKs values were converted to Carter s photometry with IRSF/SIRIUS pipeline. The resulting SIRIUS JHKs values were converted to Carter JHK photometry with IRSF/SIRIUS in 2012 May. We expected to observe long-term changes in the JHK light-curves and color-color diagrams if the wind and/or the central star itself had changed over the last decade.

REFERENCES

10. An Introduction to Stellar Evolution

A Workshop on Outstanding Problems in Massive Star Research - The Final Stages, 30 Sep - 3 Oct 2012, St. Paul, Minnesota, USA