Relationship between Luminosity and Temperature (Color) due to Nova Eruption of the T Coronae Borealis

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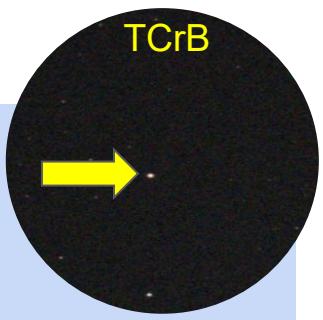
What is TCrB ?



○T Coronae Borealis (TCrB) (1)
- Recurrent nova
- Distance from the Earth
  : About 3000 light years
- Variable width :0.3～0.6 magnitude (Normal state)

Background

- **The period of the eruption**: about 78 years
- **The last eruption** : 1946
- **Sign of the next eruption**

→The next eruption time predicted : February 2024 to September 2024 (2)

Purpose:To clarify the relationship between brightening and temperature※ change due to the nova eruption.

※The temperature is measured by its color

Hypothesis

TCrB is usually a red star in a normal state .
Turning blue at eruption.

Using ICT

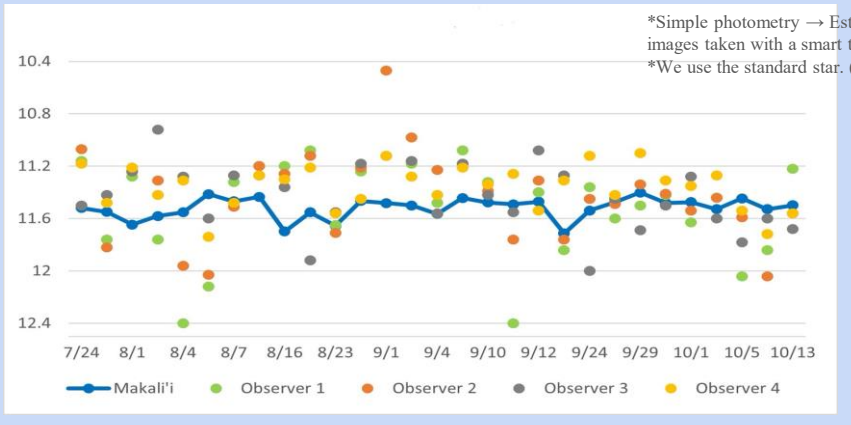
Seestar 50-mm f/5 All-in-One Smart Telescope:
Images can be easily obtained with mobile app.

Makali'i : A software which calculates TCrB luminosity by simply tapping on a standard stars.

The advantages of using Seestar s50 and Makari'i :

- Easy to share data
- Faster than people can do it
- The same result is obtained no matter who does it

MAG. Comparison of Makalii and simple photometry



*Simple photometry → Estimates luminosity by eye from images taken with a smart telescope.
*We use the standard star. (Mag : 11.405)

Acknowledgement

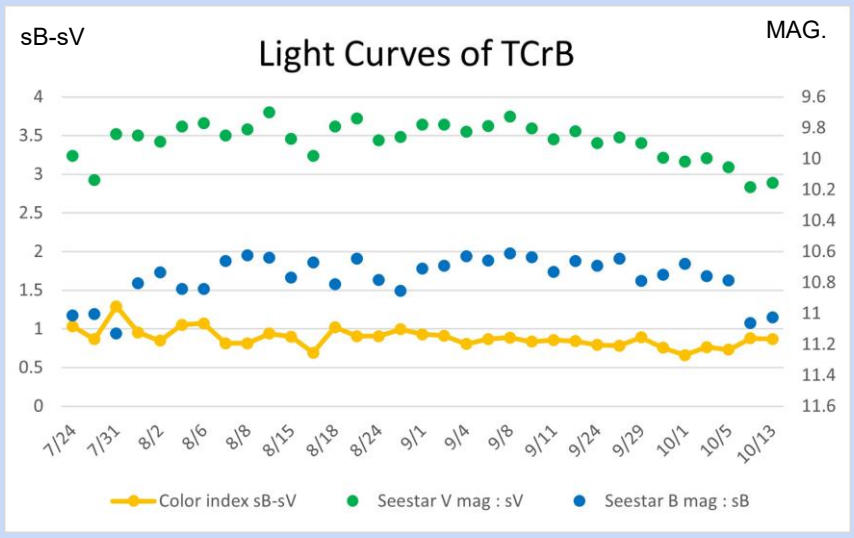
We would like to express appreciation for the support Mr.Yusa , everyone in Palette Osaki and all the volunteers of the Star Viewing group.

Experimental methods

<Comparing the luminosity>
TCrb is compared with accurately measured luminosity of stars with "Makalii".
*We use the images captured by Seestar s50

◎ Observing TCrb (I) before brightening, (II) when brightening, (III) at the peak of brightening, and (IV) when dimming.

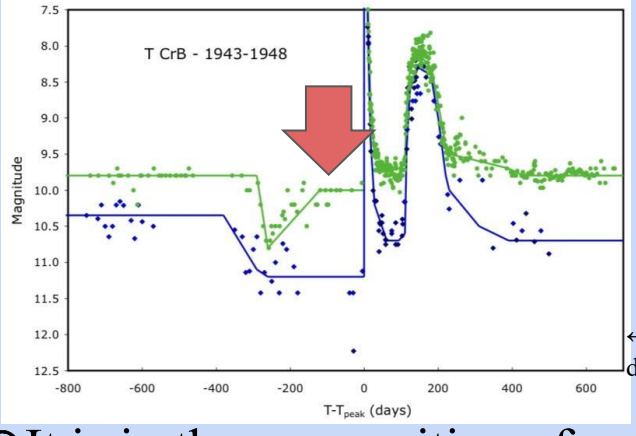
Result



B: 10.6 - 11.1 G: 9.70 - 10.2 B-G : 0.13 -0.58

○The eruption has not happened yet.

Interpretation



←Change in luminosity during the previous eruption (3)

○It is in the premonition of eruption.
○We are going to continue observation.

References

(1) The Japan variable star society [2024].Let's monitor the eruption of the recurrent nova ,T Coronae borealis!
(2) B. E. Schaefer (Louisiana State Univ.), B. Kloppenborg (AAVSO), E. O. Waagen (AAVSO), and the AAVSO observers[2023]. Announcing T CrB pre-eruption dip . AAVSO
(3) Bradley E. Schaefer [2010] . COMPREHENSIVE PHOTOMETRIC HISTORIES OF ALL KNOWN GALACTIC RECURRENT NOVA
(4)Bradley E. Schaefer [2023] .The B & V light curves for recurrent nova T CrB from 1842–2022, the unique pre- and post-eruption high-states, the complex period changes, and the upcoming eruption in 2025.5 ± 1.3