TIDAK: the updated Suhora database of O−C diagrams and elements of eclipsing binary stars

Waldemar Ogłoza[1], Greg Stachowski[1], Bartłomiej Zakrzewski[1] and Michał Żejmo[2]

1. Mt. Suhora Astronomical Observatory, Pedagogical University of Cracow, Podchorążych 2, 30-084 Kraków, Poland
2. University of Zielona Góra, Szafrana 2, 65-417 Zielona Góra, Poland

The database of minima, O−C diagrams, and linear elements of eclipsing binary stars maintained at the Mt. Suhora Observatory of the Pedagogical University of Krakow in Poland is widely referenced in eclipsing binary studies. Here we present the latest version of the database, along with a new, graphical interface including features such as interactive O−C diagrams. This is the final result of an extensive modernization program aimed at making the database more useful and convenient for researchers and observers.

1 Introduction

Observations of the times of minima of eclipsing binary stars have long been an important tool for the study of these types of objects. Comparison of the observed times of minima with those predicted from an ephemeris (often presented as 'O−C', i.e. 'observed − calculated', values plotted on an 'O−C diagram') can reveal physical effects including stellar evolution, mass transfer between the components, or gravitational interaction with a third star or, potentially, planets. For this kind of analysis, it is beneficial to have records of minima times that cover as long a time as possible, in order to resolve slow changes in the binary system.

2 Previous editions of the database

For several decades through the work of Prof. J. M. Kreiner, times of minima have been collected at the Mt. Suhora Observatory of the Astronomy Department of the Pedagogical University in Krakow base and used to generate up-to-date ephemerides and O−C diagrams of eclipsing binary stars. Previously the ephemerides and O−C diagrams were presented in the *Atlas of O−C Diagrams* (Kreiner et al., 2001), available as a set of physical books and also online on the website of the Astronomy Department of the Pedagogical University, and subsequently only as an online service (Kreiner, 2004). The collected times of minima were also available to be sent to researchers on request.

However, in recent years, and especially with the growth of automated surveys, the number of stars and minima times had outgrown the technical capabilities of the underlying database. It became necessary to replace the database architecture, and at the same time, the opportunity was taken to create a new online interface with more features.
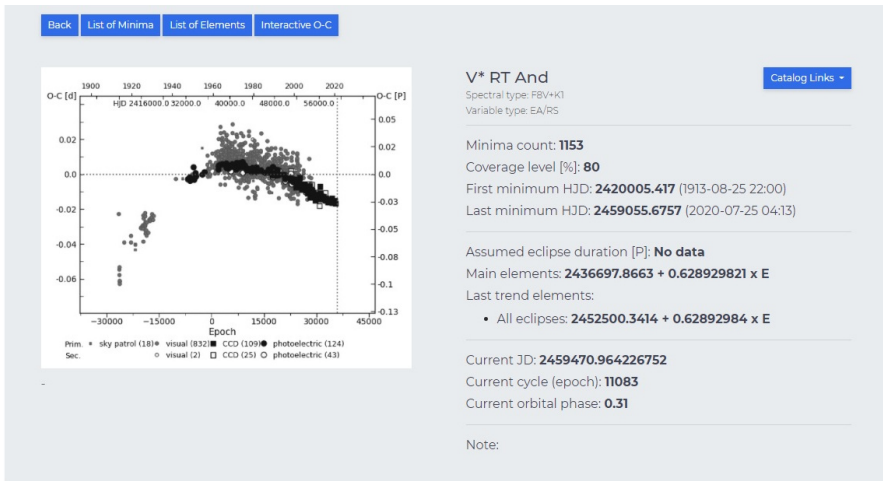
Fig. 1: List of eclipsing binaries in the constellation Andromeda.

Fig. 2: Star overview page for RT Andromedae.

3   The new version: TIDAK

The new version of the database (stylized as 'TIDAK', for 'Timing Database at Kraków') uses PostgreSQL to store the data with an interactive website created using Django and Python. The user can find stars by searching for catalog identifiers or coordinates, with the SIMBAD service (Wenger et al., 2000) used to interpret the query, or by constellation (e.g. Fig. 1). The individual overview page (Fig. 2) shows an O−C diagram, the ephemeris elements, and a list of upcoming minima to
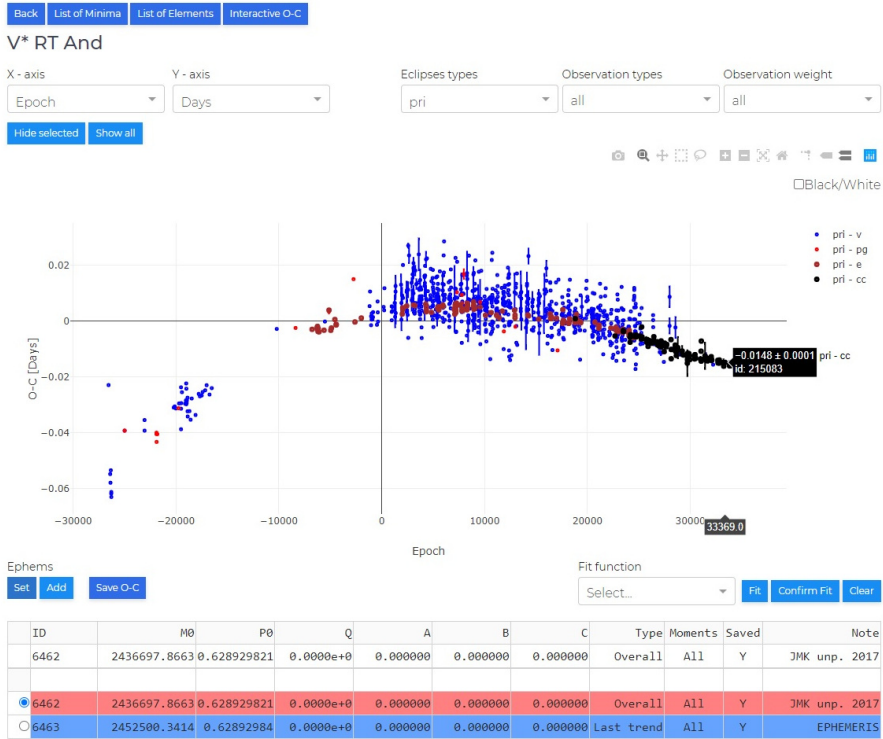
Fig. 3: Interactive O−C plot.

aid with planning observations.

New features include an interactive O−C plot (Fig. 3) where the user can explore different ephemerides and fit new elements, unlimited ephemerides for each star (previously only 3 ephemerides were stored) allowing more flexibility for analyzing trends and changes in behavior, and the possibility for users to download lists of minima and O−C values directly for themselves.

4 Summary

The database currently contains data for 8054 stars with 254 thousand minima, gathered from literature and direct observations by the staff of the Mt. Suhora Observatory. New minima are continuously being added. The database can be accessed at `https://www.as.up.krakow.pl/tidak`.

References

Kreiner, J. M., *Acta Astron.* **54**, 207 (2004)

Kreiner, J. M., Kim, C.-H., Nha, I.-S., An Atlas of O-C Diagrams of Eclipsing Binary Stars (2001)

Wenger, M., et al., *A&AS* **143**, 9 (2000)