TEMPORAL CHANGES OF SED'S OF SAKURAI'S OBJECT (V 4334 SGR)

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Results of the computation of spectral energy distributions (SED) in spectra of Sakurai's object (V4334 Sgr) are discussed. Hydrogen deficient and carbon-reach model atmospheres with $T_{\rm eff}$ 4000–6200 K and $\log g = 1.0 - 0.0$ are computed by the technique of opacity sampling taking into account molecular and atomic absorption for abundances determined by Asplund *et al.* (1997) and T. Kipper & Klochkova (1997). The computed SED's ($\lambda\lambda$ $300 - 1000$ nm) are fitted to the observed ones. Our conclusion is as follows: a) the theoretical SED's of Sakurai's object show a strong dependence on $T_{\rm eff}$; b) in the frame of our self-consistent approach we estimate $T_{\rm eff}$, $\log g$, E_{B-V} from the fit of computed SEDs to the observed spectra.

INTRODUCTION

Sakurai's object (SO, V4334 Sgr) was discovered on February 20, 1996 (Nakano *et al.*, 1996). The character of observable processes testifies that the SO is at a final stage of helium flare source (Duerbeck & Benetti, 1996). The abundances in SO atmosphere are peculiar. There are found a hydrogen deficit, C/O > 1 and low $^{12}C/^{13}C = 5$ (Asplund *et al.*, 1997; T. Kipper & Klochkova, 1997). The SO is increased in optical luminosity already from 1995. Then, in early 1998, abrupt declines of brightness at all colours have occurred. They are interpreted as onsets of dust formation, which are very similar to those observed in R CrB variables. We study the changes of SEDs of the SO to determine some atmosphere parameters of the SO from April 1997 to August 1998.

In our work we use the spectra of the SO, taken on April 29, 1997 (range 300–1000 nm) and August 12, 1998 (range 355–1000 nm). The spectra corrected by $E_{B-V} = 0.7$ (for April 1997) and $E_{B-V} = 1.3$ (for August 1998) were kindly provided by Dr. H. Duerbeck.

In August 1998 the SO spectrum was taken shortly before the onset of the $\approx 6^m$ decline, but at a time when V4334 Sgr was obviously already suffering by dust formation $\approx 1^m$ of visual dust obscuration.

PROCEDURE

Numerical computations are completed within the framework of classical approaches. Chemical abundances by Asplund *et al.* (1997) and T. Kipper & Klochkova (1997) are used. Absorption by atoms, ions and molecules is calculated. Opacity sampling model atmospheres and SEDs of the SO are computed by the SAM941 program and WITA6 (see Pavlenko *et al.* (2000) for more details).

Note that SEDs of the SO are computed also for the real isotopic ratio $^{12}C/^{13}C$. Molecular constants for isotopic species are calculated by Pavlenko's ISOTOPC program based on Graybeal (1988) formulae. We used $^{12}C/^{13}C = 5$ derived by Asplund *et al.* (1997).

RESULTS

Recently Pavlenko *et al.* (2000) shown that the overall shape of the SED of the SO is governed by the C_2 and CN band systems. In the near UV ($\lambda < 400$ nm) the atomic absorption becomes important. The best fit to the observed SED for April 1997 is obtained for an $T_{\rm eff} \sim 5500$ K and $\log g \sim 1$, but for August 1998 – for $T_{\rm eff} \sim 5250$ K and the $\log g = 0$ (Fig. 1).

SUMMARY

- From April 1997 to August 1998, $T_{\rm eff}$ of the SO had declined by only ≈ 250 K (from 5500 K to 5250 K). The interstellar reddening E_{B-V} was increased from 0.7 to 1.3.

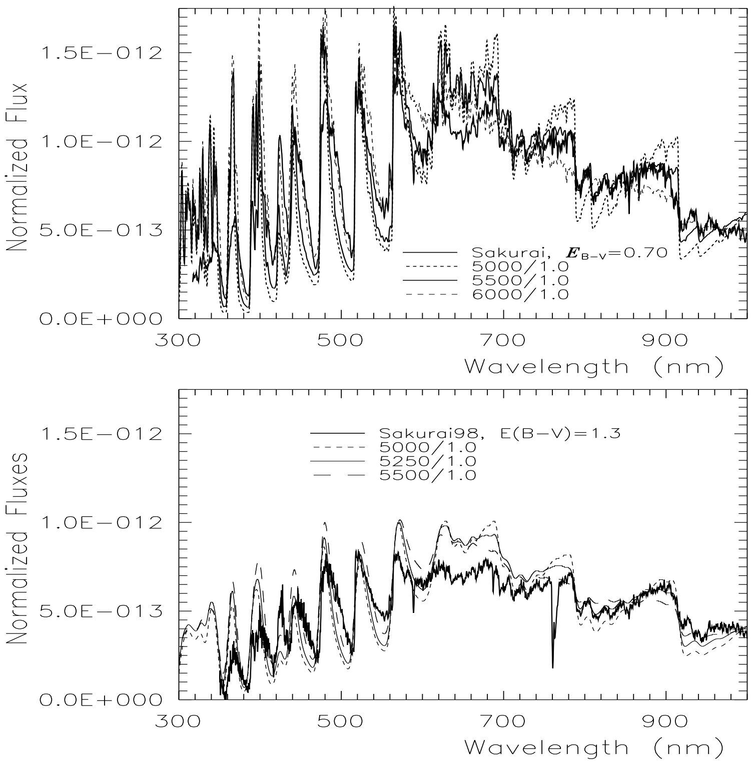

Figure 1: The best fits to the SO spectra in April 1997 (top) and August 1998 (bottom)

- The account of isotopic relation $^{12}C/^{13}C = 5$ does not change the calculated SED for our resolution 0.5 nm due to small shifts in wavelengths of the heads of the CN and C_2 isotopic bands.

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