Time Variation of SWS Spectra of Oxygen-rich Mira Variables

T. Onaka[1], T. de Jong[2,3], I. Yamamura[1,2], T. Tanabe[4], O. Hashimoto[5], and H. Izumiura[6]

[1] Department of Astronomy, University of Tokyo, Bunkyo-ku, Tokyo 113, Japan
[2] SRON Laboratory for Space Research Groningen, 9700 AV Groningen, The Netherlands
[3] Astronomical Institute 'Anton Pannekoek', University of Amsterdam, 1098 SJ Amsterdam, The Netherlands
[4] Institute of Astronomy, University of Tokyo, Mitaka, Tokyo 181, Japan
[5] Gumma Observatory, Ohtomo, Maebashi, Gumma 371, Japan
[6] Okayama Astrophysical Observatory, National Astronomical Observatory, Asakuchi, Okayama 719-02, Japan

Abstract

Two M-type Mira variables have been observed by SWS01 over an entire light variation cycle. One of the target stars, Z Cyg, shows strong variation of the circumstellar emission. The 10 μm and 20 μm 'silicate features' become stronger relative to the photospheric emission around maximum and the relative intensity of the 10 μm to the 20 μm features becomes larger also around maximum, indicating the increase of the temperatures of circumstellar dust grains. These variations have been confirmed by the PHT observations simultaneously made. We attribute the variation to the grain nucleation and subsequent grain growth processes in the circumstellar shell and make simple model analysis (cf. Onaka et al. 1989). Changes in the dust properties (Le Bertre 1993), changes in the size distribution of circumstellar grains (Little-Marenin et al. 1996), or changes in the photosperic emission (Aringer et al. 1997) may also contribute to the variation. The other star, T Cep, shows a different type of variation. This star shows the '13 μm' emission feature (Sloan et al. 1996) as well as the bands of CO_2. The time variation of these features in the spectrum of T Cep are also presented.

References

Aringer, B., Hron, J., Kerschbaum, F., and Windsteig, W. 1997, Proc. of "ISO's View on Stellar Evolution", in press.

Le Bertre, T. 1993, A&AS, 97, 729

Little-Marenin, I. R., Stencel, R. E., and Staley, S. B. 1996, ApJ, 467, 806

Onaka, T., de Jong, T., and Willems, F. J. 1989, A&A, 218, 169

Sloan, G. C., LeVan, P. D., and Little-Marenin, I. R. 1996, ApJ, 463, 310