

Red Variables from the MOA Database

Mine Takeuti

Astronomical Institute, Tohoku University, Aoba, Sendai 980-8578
Japan

Sachiyo Noda

Solar-Terrestrial Environment Laboratory, Nagoya University, Chikusa,
Nagoya 464-8601 Japan

I. A. Bond^{1,4}, N. J. Rattenbury¹, F. Abe², B. S. Carter³,
R. J. Dodd³, J. B. Hearnshaw⁴, M. Honda⁵, J. Jugaku⁶, S. Kabe⁷,
P. M. Kilmartin^{1,4}, K. Masuda², Y. Matsubara², Y. Muraki²,
T. Nakamura⁸, M. Reid⁹, N. J. Rumsey³, To. Saito¹⁰, H. Sato⁸,
M. Sekiguchi⁵, D. J. Sullivan⁹, T. Sumi², Y. Watase⁷,
T. Yanagisawa², P. C. M. Yock¹, M. Yoshizawa¹¹

Abstract. The red variables whose amplitude is larger than 1.3 mag in the MOA database are studied for the LMC. Among 3 196 such stars, 532 stars are likely to be Miras or red semiregular variables. The period-colour relation of these stars is shown.

The MOA database is a product of large-scale CCD photometry searching for gravitational microlensing events which are possibly caused by MACHOs in the galactic halo. An overview of the MOA project has been presented by Abe et al. (1997), Muraki et al. (1999) and also by Hearnshaw et al. (2000). The long-period variables and semiregular variables of the LMC have been studied by many authors (see Westerlund 1997). The large-scale photometry contributes to the study of such stars by supplying so much data. Wood et al. (1999) have presented excellent results based on the database of the MACHO Collaboration.

¹University of Auckland, Auckland, New Zealand

²Solar-Terrestrial Environment Laboratory, Nagoya University, Chikusa, Nagoya 464-8601, Japan

³Carter National Observatory, Wellington, New Zealand

⁴Department of Physics and Astronomy, University of Canterbury, Canterbury, New Zealand

⁵Institute for Cosmic Ray Research, University of Tokyo, Tanashi 188, Japan

⁶Institute for Civilization, Sakuragaoka 2-29-3, Tama 206, Japan

⁷National Laboratory of High Energy Physics (KEK), Tsukuba 305, Japan

⁸Department of Physics, Kyoto University, Kyoto 606, Japan

⁹Department of Physics, Victoria University, Wellington, New Zealand

¹⁰Tokyo Metropolitan College of Aeronautics, Tokyo 140-0011, Japan

¹¹National Astronomical Observatory, Mitaka, Tokyo 181-8565, Japan

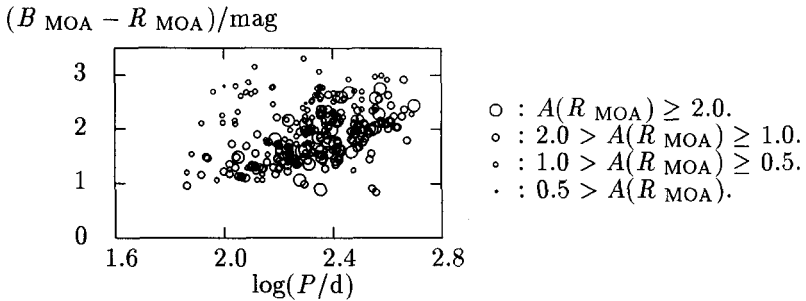


Figure 1. The period–colour diagram of red variables in the LMC.

We selected the samples among 43 801 LMC stars selected by Criterion 2 of the paper of Noda et al. (2000) by using two conditions: the amplitude in B_{MOA} or R_{MOA} is larger than 1.3 mag; and $B_{\text{MOA}} - R_{\text{MOA}} \geq 0.4$ mag. 1 063 stars in the LMC obtained as above are large amplitude red variables.

Initially we checked the periodicity with the help of an eye-estimate. Then the phase difference minimization method was used to establish the period. Among these 1 063 stars, 282 showed clear periodicity. Because the time-span is not so long, the periodicity of the stars whose periods are greater than ~ 250 d can only be confirmed in a longer time-span database. The variables are found at the tip of the AGB branch in the colour–magnitude diagram. Among our 282 stars, 69 are identified with those in Hughes & Wood (1990). The periods tabulated in their table agree with our results very well. Fig. 1 shows the period–colour diagram of red variables including suspected overtone pulsators.

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