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1988 AND 1989 BV PHOTOMETRY OF ER Vul

ER Vul (=#144 in the catalog of Strassmeier et al. 1988) is a member of the short-period, eclipsing RS CVn group. To more completely understand the nature of magnetic activity cycles in these stars, we have included ER Vul in our long-term monitoring program. We note that, despite its brightness and rapidly changing light curve, ERVul has not often been observed. We report here our 1988 and 1989 BV observations.

We observed ER Vul on the nights of 3, 4, 6, 7, 8 August 1988, 29, 30 June 1989, and 1, 2, 4, 8 July 1989 on the San Diego State University 61-cm telescope on Mt. Laguna, California. We used the photometer and techniques previously described by Heckert and Zeilik (1990). Our comparison and check stars were HD 200270 and HD 200425. Our reported data, plotted in Figures 1-4, are differential magnitudes (star-comparison) in the instrumental B and V band systems. These magnitudes are sufficient to model the geometrical starspot parameters; so we did not transform them to the Johnson UBV system.

We used the technique of Budding and Zeilik (1987) to fit the starspot parameters to the distortion wave. The initial binary model fits for unspotted stars for the V band and B band used temperatures of 5900 K and 5750 K from Hill et al. (1990).

From these fits we extract a distortion wave and calculate solutions for a circular spot at a temperature of 0 K. For 1988 and 1989 in the B and V bands we get, in degrees,:

	1988 V band	1988 B band	1989 V band	1989 B band
Longitude	99.5±3.5	94.9±4.6	281.6±4.6	279.6±3.9
Latitude	73.8±1.1	69.2±6.2	68.1±6.1	74.5±4.3
Radius	19.4±0.3	19.9±3.3	13.4±1.9	17.0±2.6

The B and V band results for each year agree to within the errors. Between 1988 and

Figure 1

ER Vul: Laguna 1988

V-Band Instrumental Magnitudes

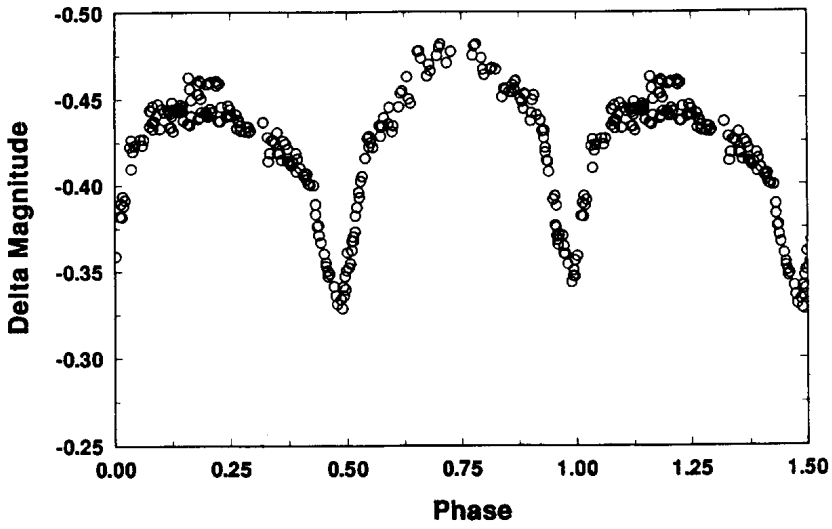


Figure 2

ER Vul: Laguna 1989

V-Band Instrumental Magnitudes

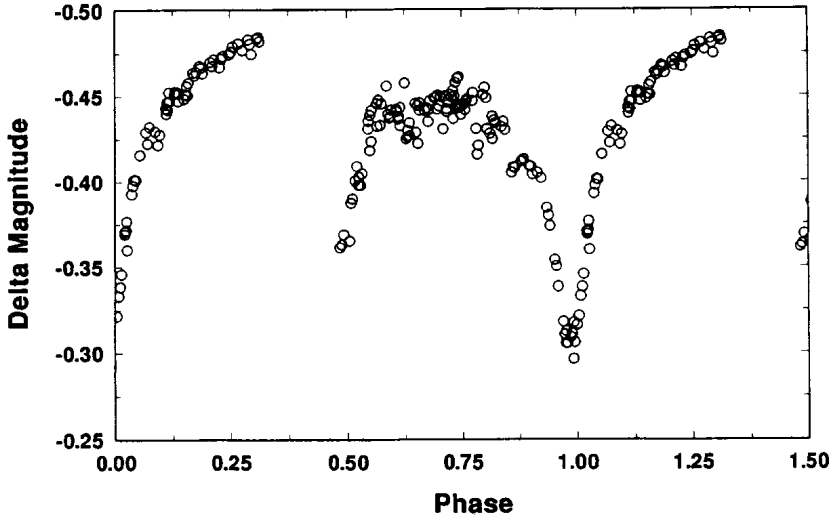


Figure 3

ER Vul: Laguna 1988

B-Band Instrumental Magnitudes

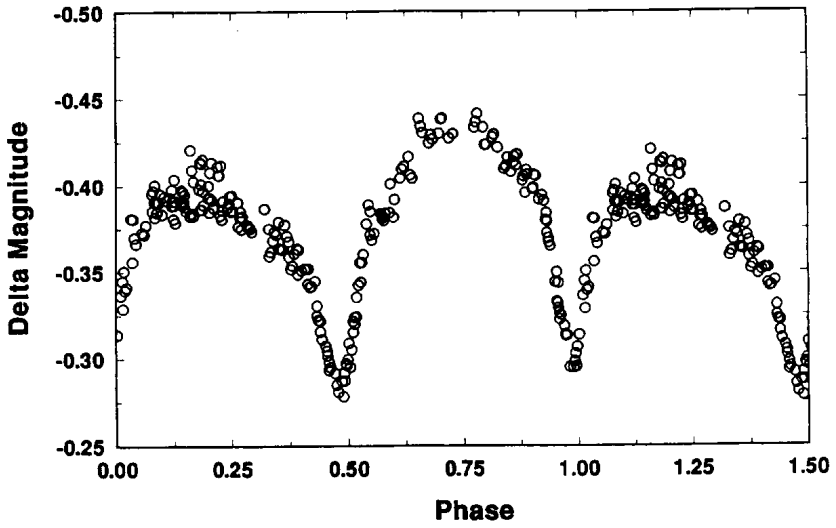
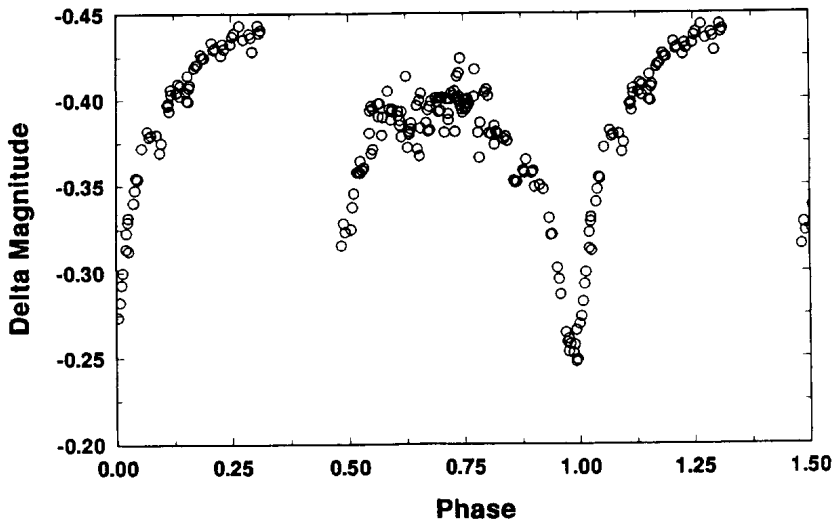


Figure 4

ER Vul: Laguna 1989

B-Band Instrumental Magnitudes



1989 the active region switched some 180° in longitude: for both years the active region was near one of the active longitude belts: ~90° in 1988 and ~270° in 1989. During the same time the latitude of the active region and the total spotted area remained roughly constant. For a comparison, Budding and Zeilik (1987), modeling 1982 data, found a longitude of roughly 101°, and a spot radius of roughly 9°. The 1988 and 1989 active regions have a slightly larger area and are at a higher latitude than the 1982 active regions.

A 180° longitudinal switch between the active regions during a year is not surprising. We envision that a large spot group has rapidly faded from one active longitude belt while another group developed in the other ALB. We also note that the spotted regions appear at high latitudes, in the range from 60° to 70°. These values are well determined in part because of the high quality of the data and in part because of the system's inclination (72°) is away from 90°.

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