

IUE Low Dispersion Sensitivity Monitoring XVII.

Introduction

The low dispersion sensitivity monitoring analysis for the LWP, LWR, and SWP cameras has been updated to March 1989. The following stars are used to monitor changes in camera sensitivity:

BD+28° 4211, HD 93521, HD60753, BD+33° 2642, BD+75° 325.

The symbols for each star are, respectively:

+ , * , ◊ , □ , △ .

Analysis

The sensitivity data are analyzed using the standard methods as described by Holm and Schiffer (1980). The data are ratioed to a reference spectrum for each star (listed in Table 1) and placed into three wavelength bins, each 150Å wide (300Å for the LWR). The binned flux ratios are then fit with a multiple linear regression to find the rate of change (%/yr.) in each wavelength region and the overall temperature dependence (%/°C) of the camera. The temperature dependence is assumed to be time independent and is fit to the head amplifier temperature (THDA). The temperature and time dependent coefficients for the three cameras are listed in Table 2. The data are normalized to 1978 and corrected for camera temperature (THDA) dependence before being plotted in Figures 1-4.

Table 1.

Reference Stars used for normalization

| STAR | LWP | date | LWR | date | SWP | date |
|-------------|------|--------|------|--------|------|--------|
| BD+28° 4211 | 3688 | 1984.5 | 1712 | 1978.5 | 2139 | 1978.6 |
| HD 93521 | 3535 | 1984.4 | 1589 | 1978.4 | 1955 | 1978.5 |
| HD 60753 | 3689 | 1984.5 | 1642 | 1978.4 | 1752 | 1978.3 |
| BD+33° 2642 | 3610 | 1984.5 | 2137 | 1978.6 | 4003 | 1979.1 |
| BD+75° 325 | 3537 | 1984.4 | 2748 | 1978.8 | | |

Results

LWP degradation appears to be linear since the 1984 - 1985 epoch when it became the primary camera.

The rate of the LWR sensitivity degradation appears to be slowing over the years, and is most evident in the 2400 Å wavelength region. This decrease is probably tied to the fact that the camera is no longer used routinely.

The SWP degradation rates exhibit little or no change over previous values. The lack of change is most obvious in the long wavelength region of the camera when one examines the data as shown in Table 2. The degradation values in this region have remained steady for the past two years.

The camera head amplifier temperatures (THDA) are also monitored for temporal variations and are plotted in Figure 5. When the least-squares analysis is restricted to dates after 1981 (1983 for the LWP), the statistical increase in camera temperatures is less than 1%/yr.

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15 May 1990

Holm, A.V., and Schiffer, F.H., 1980, "IUE Camera Sensitivity Variations", NASA IUE Newsletter No. 9, p. 8

Garhart, M.P., and Teays, T.J., 1989, "IUE Low Dispersion Sensitivity Monitoring XVI.", NASA IUE Newsletter No. 40, p. 54

Table 2.

Results of low dispersion camera sensitivity analysis - May 1990

LWP CameraTemperature dependence = -0.20 ± 0.03 %/°C

RMS error for a single observation = 5.5 %

457 data points used in regression

| Wavelength Region (Å) | Time Dependence (%/yr.) 1980.4 through | | | | | |
|--------------------------|---|------------|------------|------------|------------|------------|
| | 1990.3 | 1989.2 | 1988.4 | 1987.7 | 1986.4 | 1985.3 |
| 2075 - 2225 | -0.63±0.04 | -0.33±0.05 | +0.01±0.07 | +0.16±0.08 | +0.56±0.12 | +0.90±0.16 |
| 2225 - 2375 | -1.25±0.04 | -1.07±0.05 | -0.87±0.07 | -0.73±0.08 | -0.52±0.12 | -0.31±0.16 |
| 2375 - 2525 | -1.16±0.04 | -0.97±0.05 | -0.74±0.07 | -0.61±0.08 | -0.43±0.12 | -0.22±0.16 |
| 2525 - 2675 | -1.18±0.04 | -1.04±0.05 | -0.87±0.07 | -0.74±0.08 | -0.45±0.12 | -0.06±0.16 |
| 2675 - 2825 | -1.08±0.04 | -0.96±0.05 | -0.83±0.07 | -0.72±0.08 | -0.50±0.12 | -0.18±0.16 |
| 2825 - 2975 | -0.88±0.04 | -0.75±0.05 | -0.57±0.07 | -0.47±0.08 | -0.27±0.12 | +0.07±0.16 |

LWR CameraTemperature dependence = -0.88 ± 0.04 %/°C

RMS error for a single observation = 3.5 %

389 data points used in regression

-5.0 kV UVC = 309 data pts.

-4.5 kV UVC = 80 data pts.

| Wavelength Region (Å) | Time dependence (%/yr.) 1978.4 through | | | | | |
|--------------------------|---|------------|------------|------------|------------|------------|
| | 1990.3 | 1988.1 | 1987.7 | 1986.4 | 1985.3 | 1984.2 |
| 2250 - 2550 | -1.90±0.04 | -2.06±0.04 | -2.34±0.05 | -2.49±0.08 | -2.23±0.10 | -2.45±0.09 |
| 2550 - 2650 | -1.47±0.04 | -1.51±0.04 | -1.65±0.05 | -1.73±0.08 | -1.69±0.10 | -1.36±0.09 |
| 2750 - 3050 | -1.34±0.04 | -1.34±0.04 | -1.55±0.05 | -1.73±0.08 | -1.84±0.10 | -1.35±0.09 |

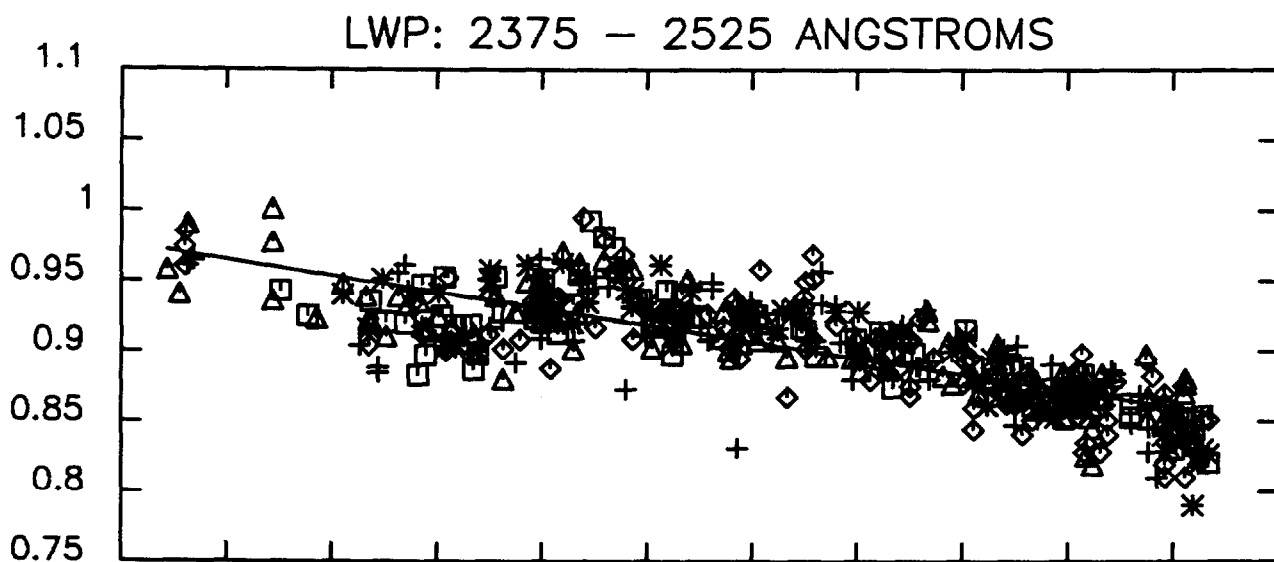
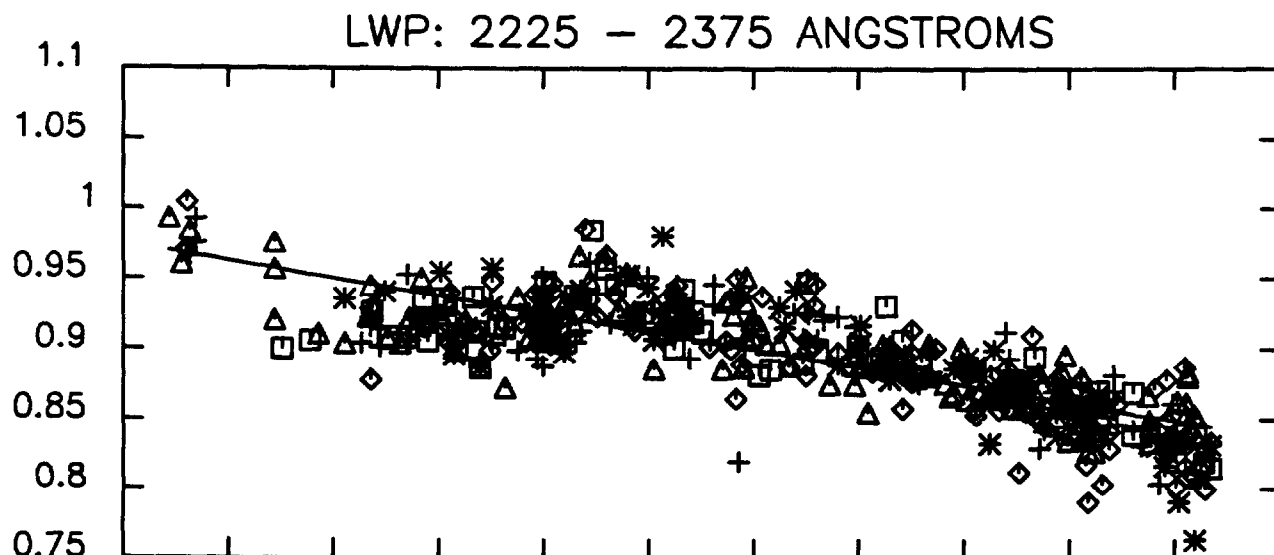
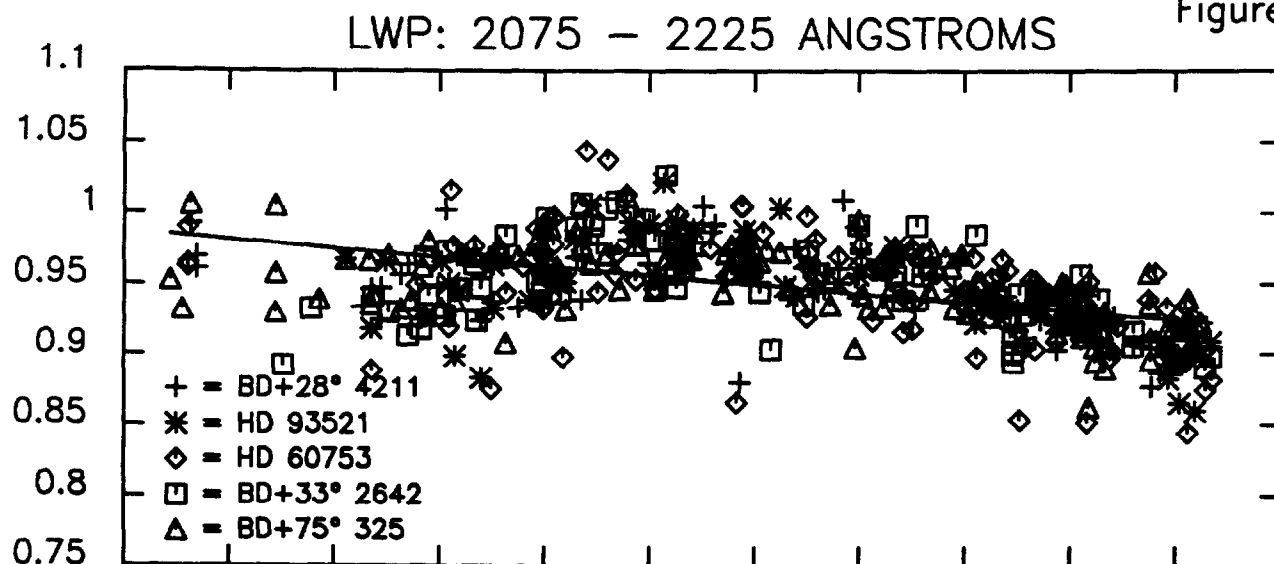
SWP CameraTemperature dependence = -0.45 ± 0.03 %/°C

RMS error for a single observation = 3.2 %

450 data points used in regression

| Wavelength Region (Å) | Time dependence (%/yr.) 1979.5 through | | | | | |
|--------------------------|---|------------|------------|------------|------------|------------|
| | 1990.3 | 1989.2 | 1988.7 | 1987.7 | 1986.3 | 1985.3 |
| 1225 - 1375 | -0.83±0.03 | -0.79±0.03 | -0.75±0.04 | -0.69±0.04 | -0.66±0.06 | -0.69±0.08 |
| 1475 - 1625 | -0.53±0.03 | -0.50±0.03 | -0.47±0.04 | -0.38±0.04 | -0.22±0.06 | -0.17±0.08 |
| 1775 - 1925 | -0.80±0.03 | -0.79±0.03 | -0.79±0.04 | -0.78±0.04 | -0.69±0.06 | -0.63±0.08 |

Figure 1.



1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991

Figure 2.

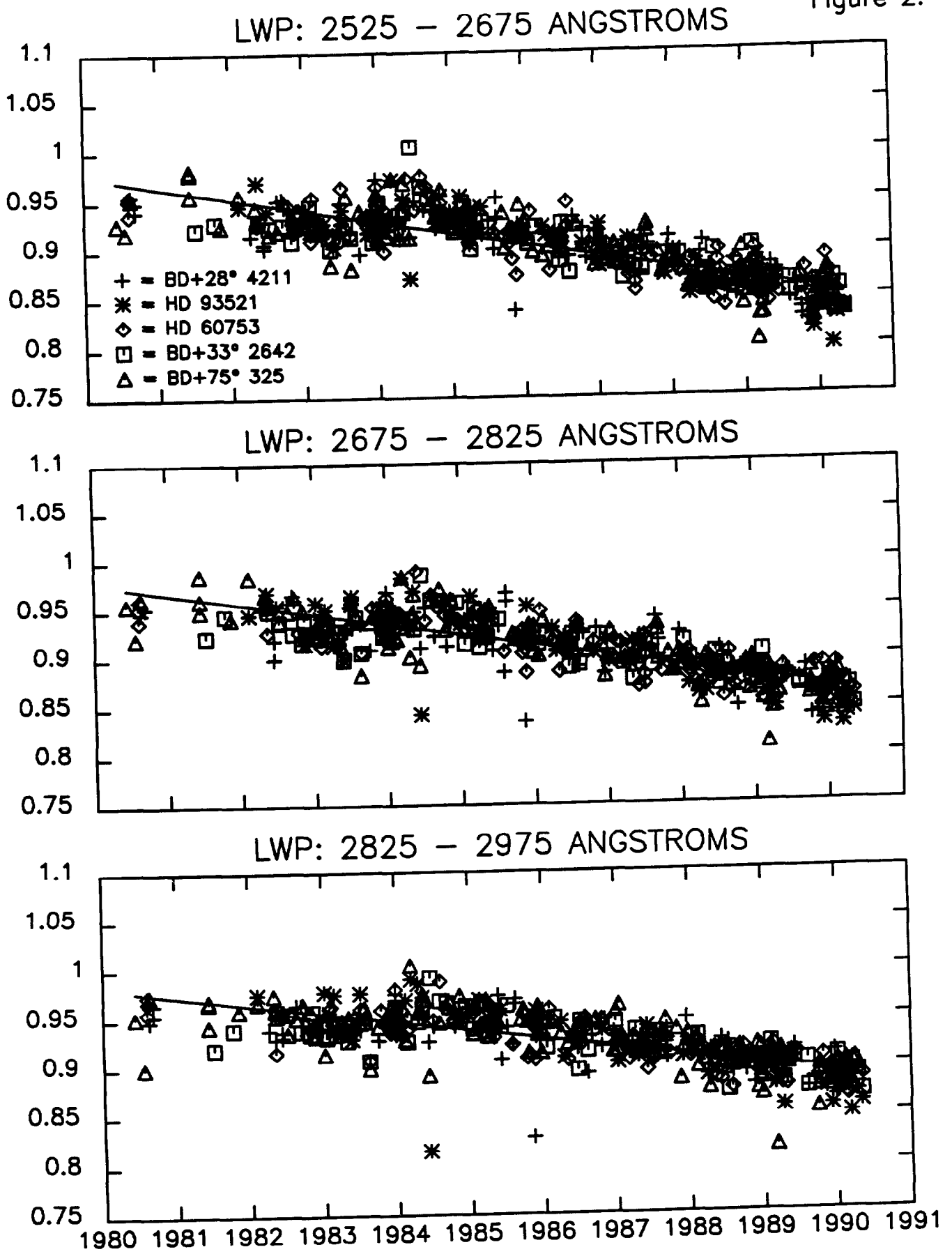


Figure 3.

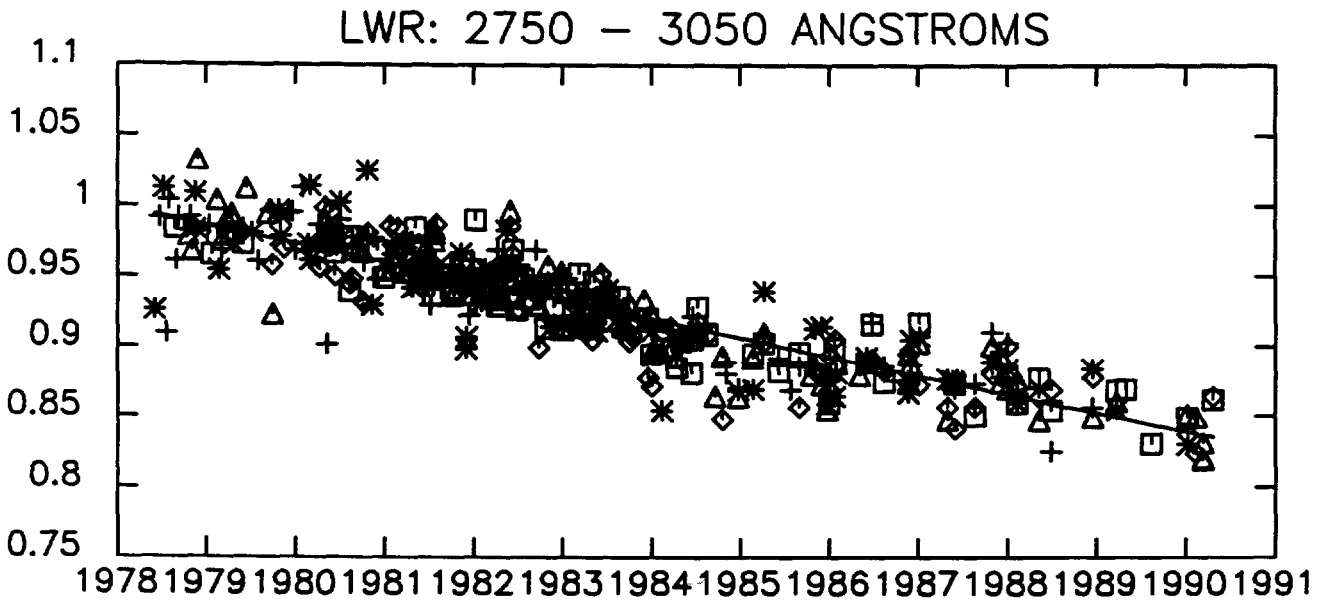
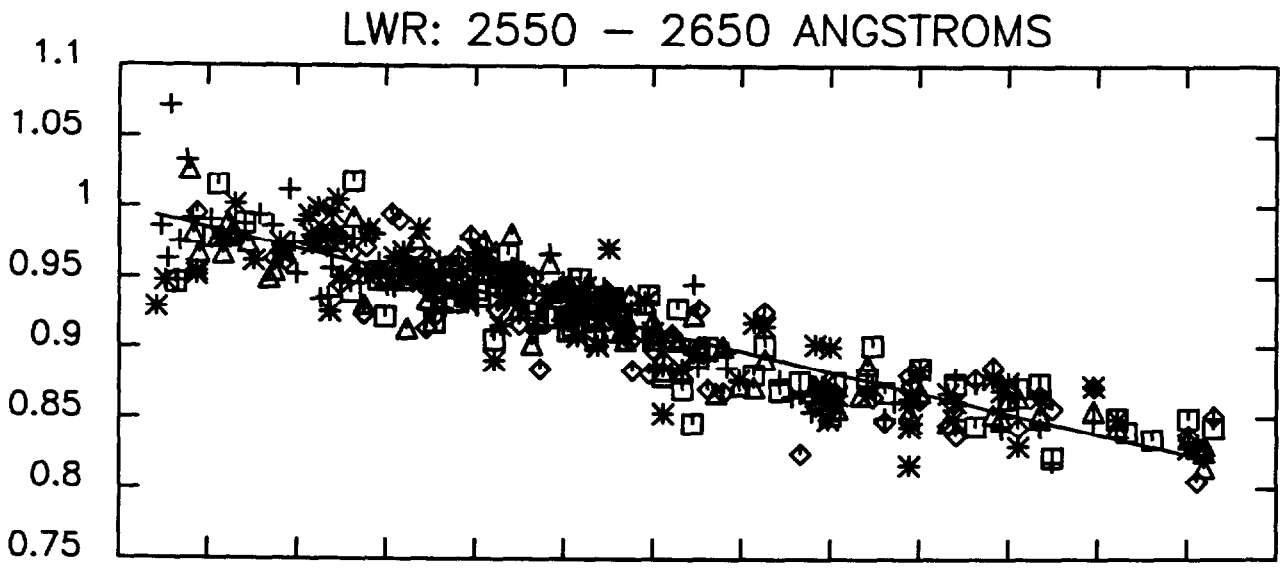
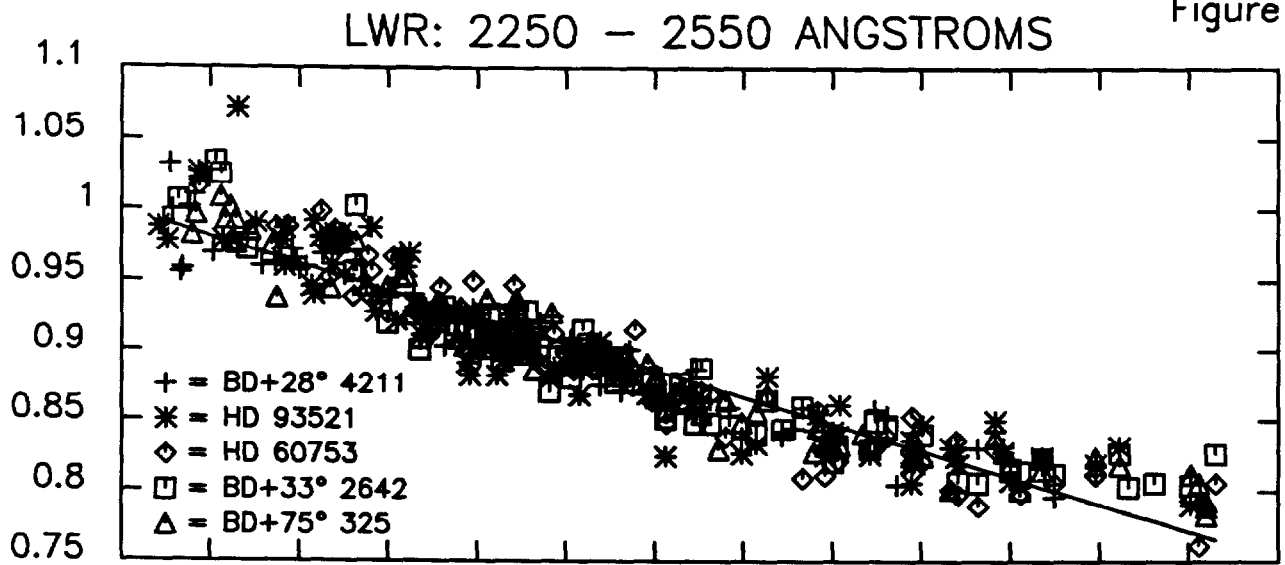
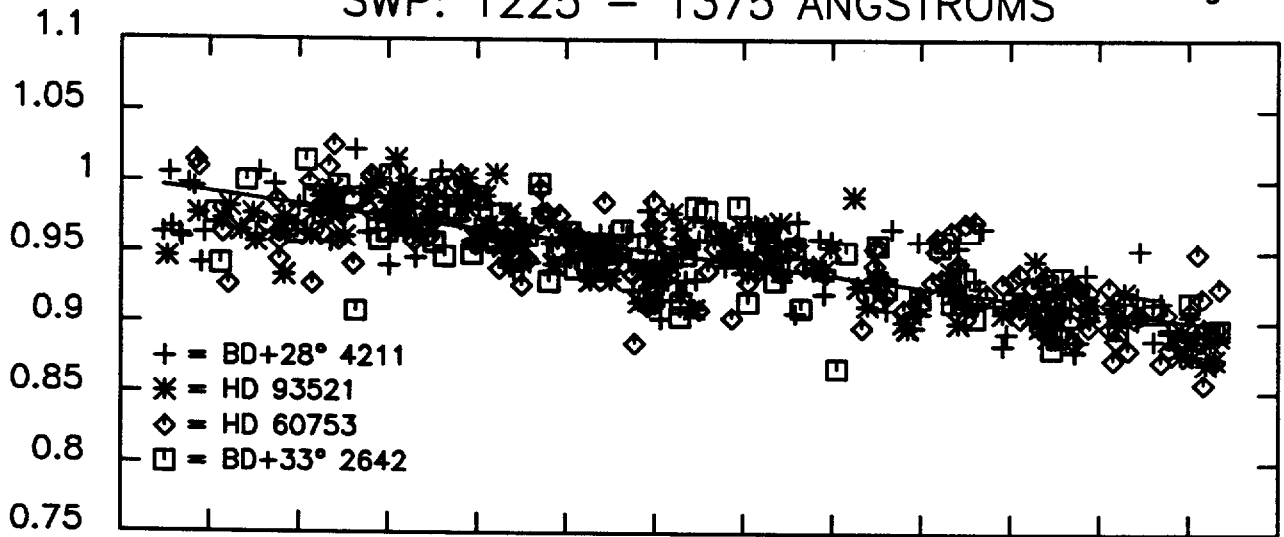
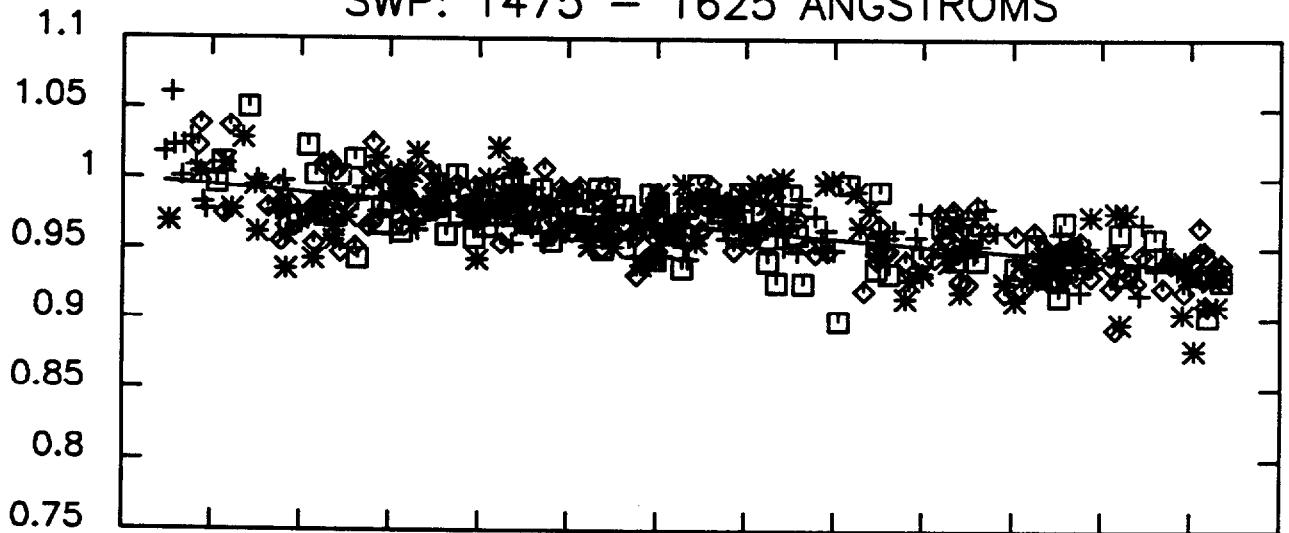


Figure 4.

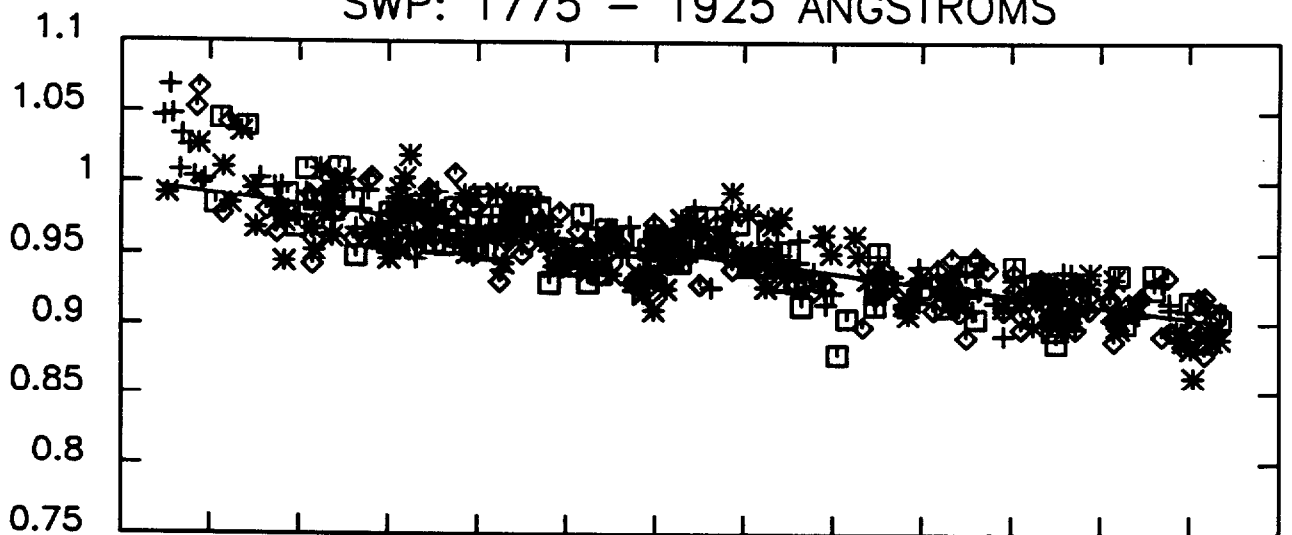
SWP: 1225 - 1375 ANGSTROMS



SWP: 1475 - 1625 ANGSTROMS



SWP: 1775 - 1925 ANGSTROMS



1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991

Figure 5.

HEAD AMPLIFIER TEMPERATURES

