A Preliminary Report on LWP Streak Subtraction

James Caplinger

IUE Observatory
March 1995

The onset of the FES streak in late 1992 has done more than merely make target acquisition and guide star tracking more difficult. Low dispersion LWP exposures at high βs longer than about a half hour contain an aperture-filling solar spectrum in addition to the desired target spectrum (see Caplinger, Carini, & Schlegel 1994). Following a suggestion by Rodriguez & Fernley (1993), we are exploring the possibility of using the current IUEDAC software to eliminate, or at least reduce, this contamination from these images.

Figure 1 shows a spectrum of the white dwarf LB 227 prior to the onset of the streak (early 1987) and more recently at high beta (early 1995, $\beta \sim 95°$). The contamination appears near 2700 Å, and quickly becomes significant at longer wavelengths. We have explored using the IUEDAC routine BOXCAR to specify the target and background regions for the extraction from the spatially-resolved (ELBL) files, choosing the background to cover the contamination. Figure 2 shows the cross-sections, initially generated by SRPLOT, that cover the 2000–2500 Å range for selecting the target region (Fig. 2a), and the 3000–3400 Å range which includes the target and background (Fig. 2b). In this instance, the target covered rows 51–59, while the streak covered rows 41–66. We chose the background to include the streak with no intervening rows between the background and target areas. One method in BOXCAR to specify the background is with a 4-element vector containing the starting and ending rows of each region; thus the spectrum and background rows would be specified by the IDL statement

```
spec = [51,59] & back = [41,50,60,66]
```

and BOXCAR would then be invoked by

```
boxcar,'lwp30136slg',spec,back,h,w,g,b,n,f,e,exp=95*60
```

where the exp term states the exposure time in seconds. Figure 3 shows the results, including the original and pre-streak spectra. Figure 4 presents the results for LWP 29072, a 145 minute exposure taken near $\beta \sim 85°$. In this case, the target covered rows 49–58, while the background regions were in rows 41–48 and 59–67. The centering of the target in the aperture is not critical to the extraction, as long as the observer chooses the target and background rows with care. All of our work has been done with point-source spectra; we have not yet dealt with extended sources.

While this method does a reasonable first-order job of eliminating the streak, there are several issues that are still being addressed. In the 2000–2700 Å range, we have found a difference of up to 20% in continuum levels between the pre-streak spectra and those extracted as above. We do not yet know if this results from the different IUESIPS processing eras of the spectra, or to some of the target flux being excluded from the extraction. Preliminary test suggest that the processing differences are the larger contributor; the flux difference between a pre-streak exposure and one extracted as above may then be less than 10%. Also, strong contamination can dominate the target

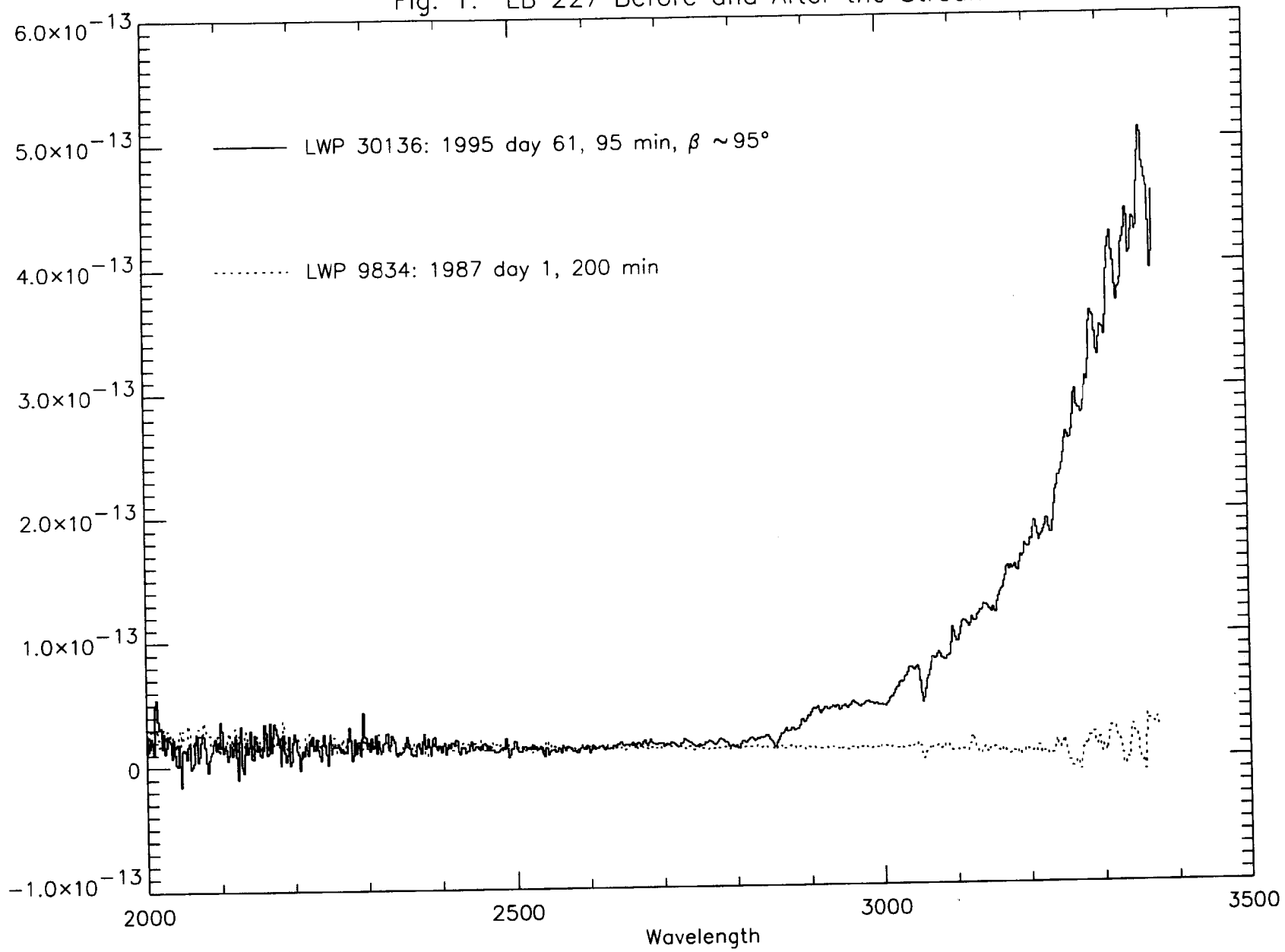
at the long wavelengths such that this method will not accurately extract the target spectrum. Since the streak is non-uniform perpendicular to the dispersion axis, one possible method of reducing the contamination is to specify an offset reference point more negative than the standard, such as $(-165, -176)$. Future reports, in either printed *Newsletters* or *IUEDAC Electronic Newsletters*, will contain more information to answer these questions, as well as report progress using other routines to reduce the impact of the streak.

References

Caplinger, J., Carini, M., & Schlegel, M. 1994, *IUE Newsletter #54*, p. 20.

Rodriguez Pascual, P., & Fernley, J. 1993, Report to the 3 Agency Meeting, November 16–18.

Fig. 1. LB 227 Before and After the Streak



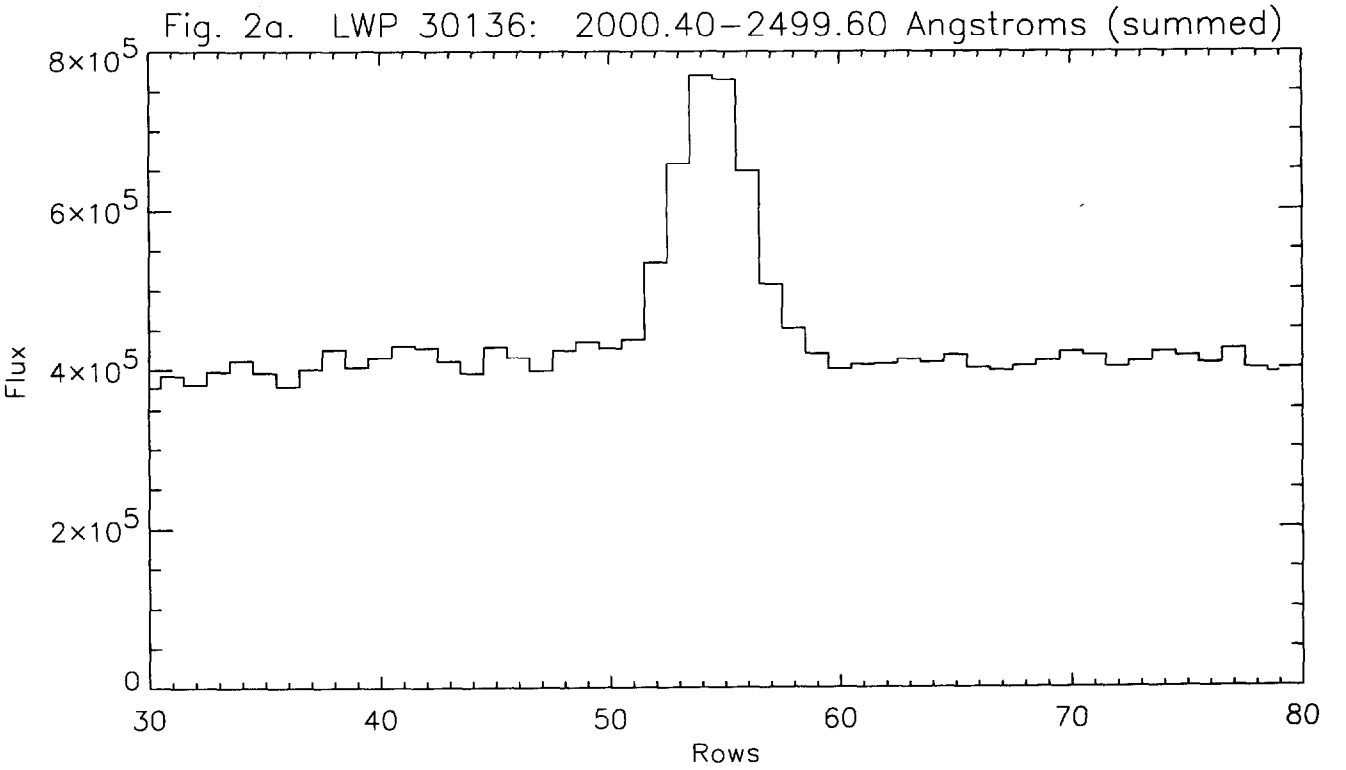


Fig. 2a. LWP 30136: 2000.40-2499.60 Angstroms (summed)
8×10^5
6×10^5
4×10^5
2×10^5
0
Flux
30
40
50
60
70
80
Rows

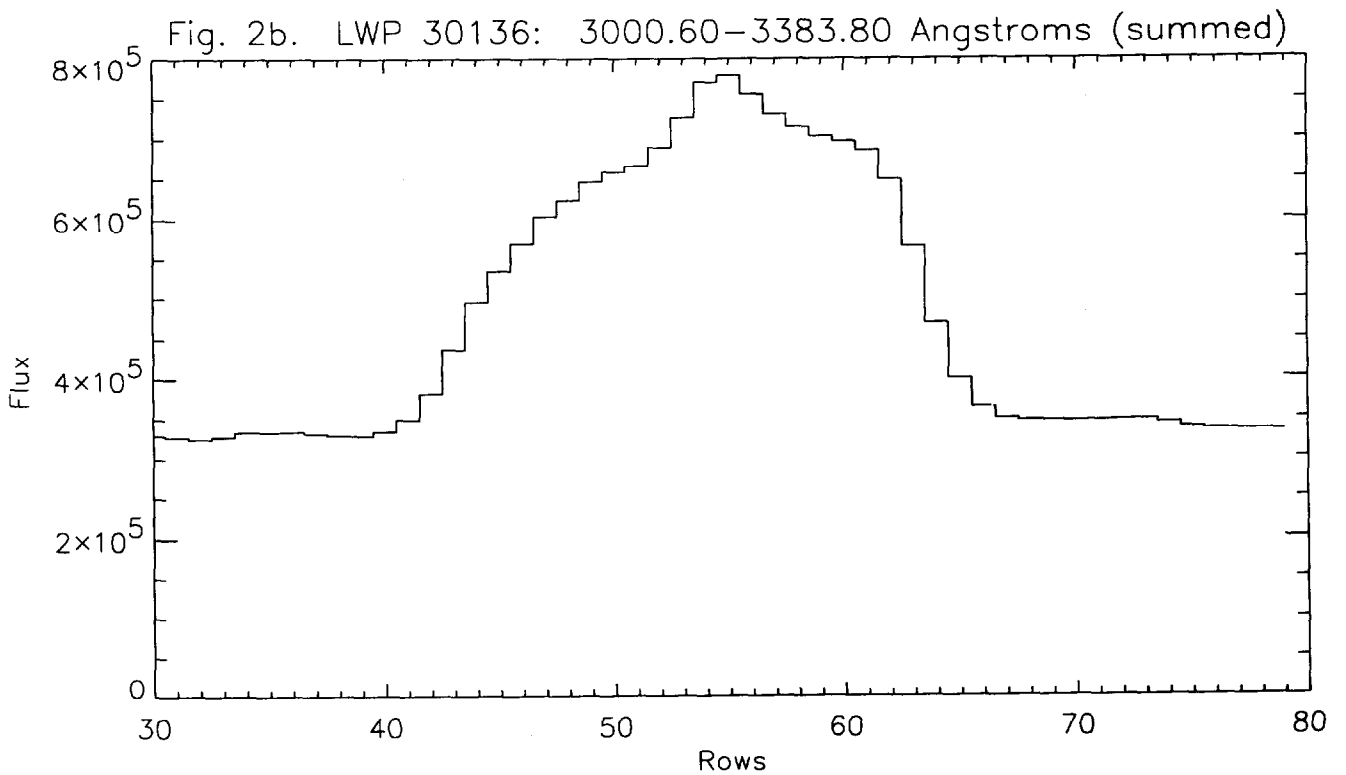


Fig. 2b. LWP 30136: 3000.60-3383.80 Angstroms (summed)
8×10^5
6×10^5
4×10^5
2×10^5
0
Flux
30
40
50
60
70
80
Rows

Fig. 3. BOXCAR Extraction of LWP 30136 *vs.* Pre-Streak Spectrum

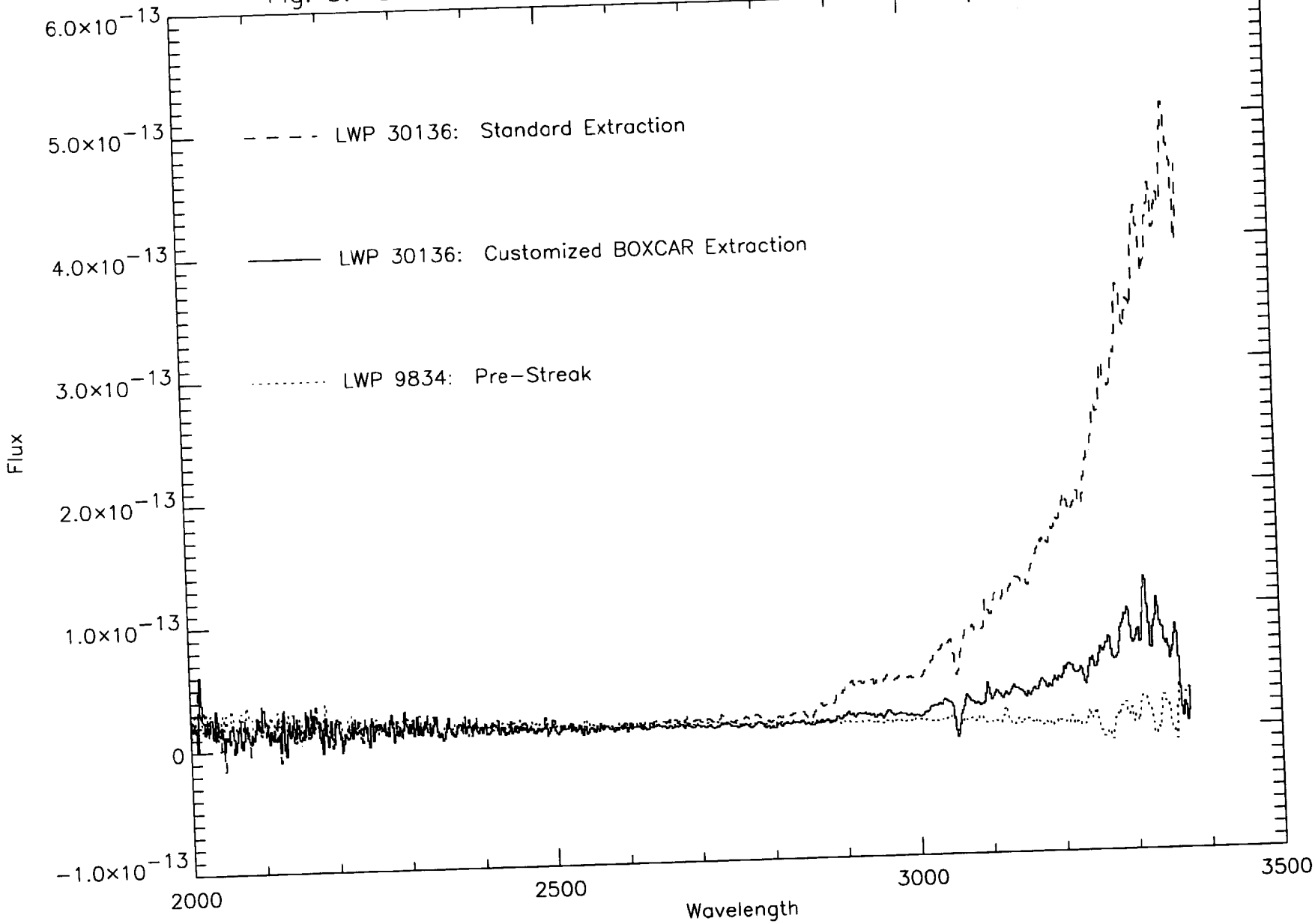


Fig. 4. BOXCAR Extraction of LWP 29072 vs. Pre-Streak Spectrum