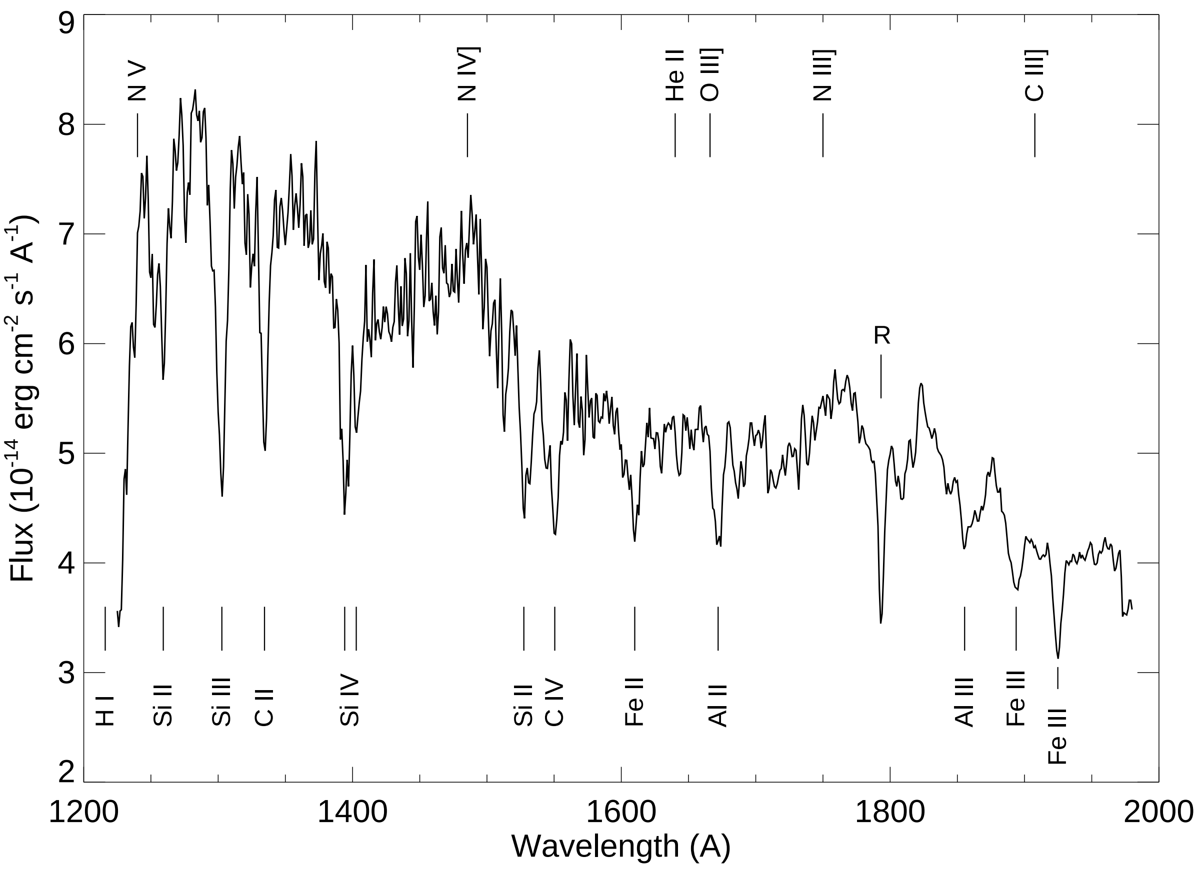


Fig. 1.— The reference SWP spectrum of stars 2 and 3 is the exposure-weighted sum of SWP 30592, 30637, and 30743. The principal stellar and interstellar absorption features are identified below the spectrum. The position of the six UV emission lines are marked above the spectrum. A prominent camera reseaux is indicated by 'R'.

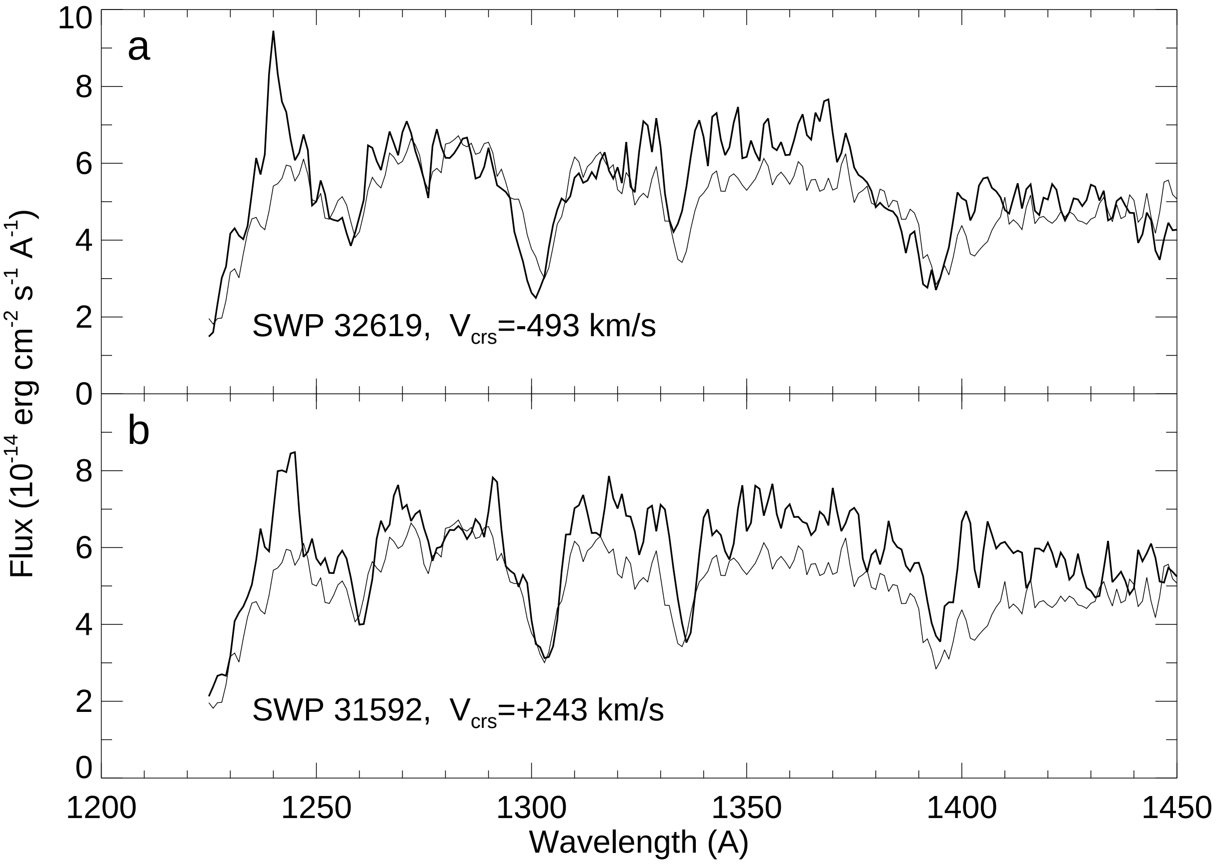


Fig. 2.— Two SWP spectra of SN 1987A (thicker lines) illustrating the effect of the changing orientation of stars 2 and 3 with respect to the dispersion axis. The SWLA position angles for the two spectra differ by 156°. The reference spectrum of stars 2 and 3 (cf. Fig. 1) is shown by the thinner line.

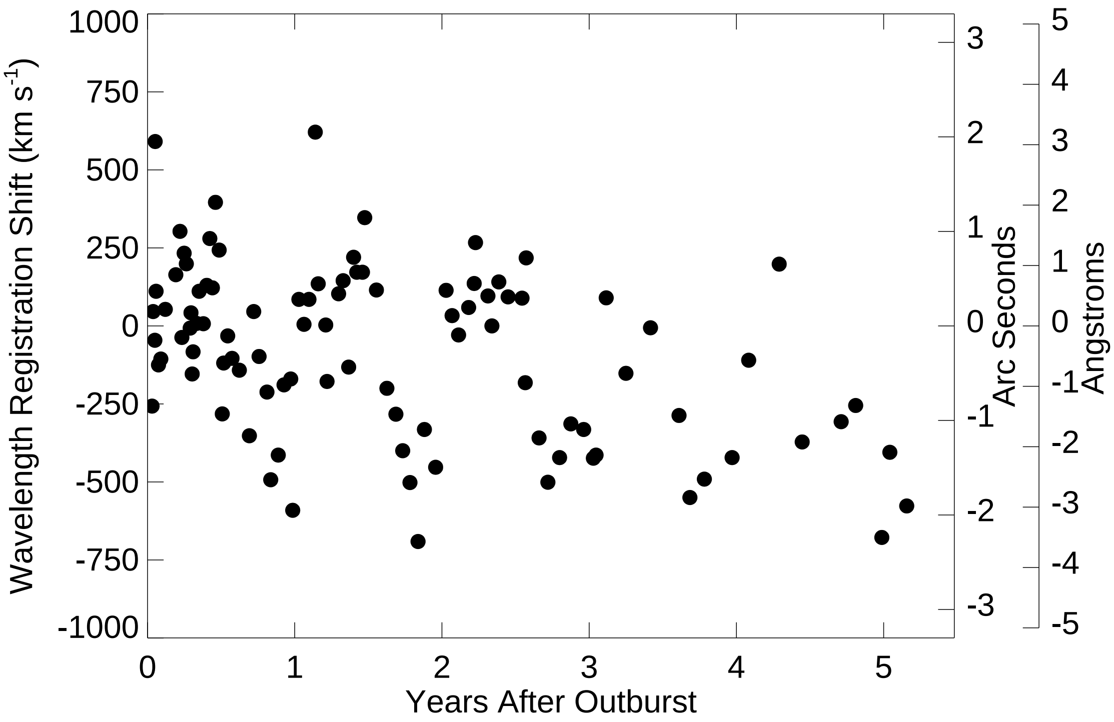


Fig. 3.— The wavelength (velocity) registration shift for the SN 1987A SWP database, as determined by cross-correlation with the star 2 and 3 reference spectrum, shown as a function of time. The right-hand axes show the corresponding spatial and wavelength scales. The scatter at the level of $\pm125$ km s$^{-1}$ is a measure of the accuracy with which the supernova is centered in the aperture. The one-year cycle of aperture rotation on the sky produces the long-term variation.

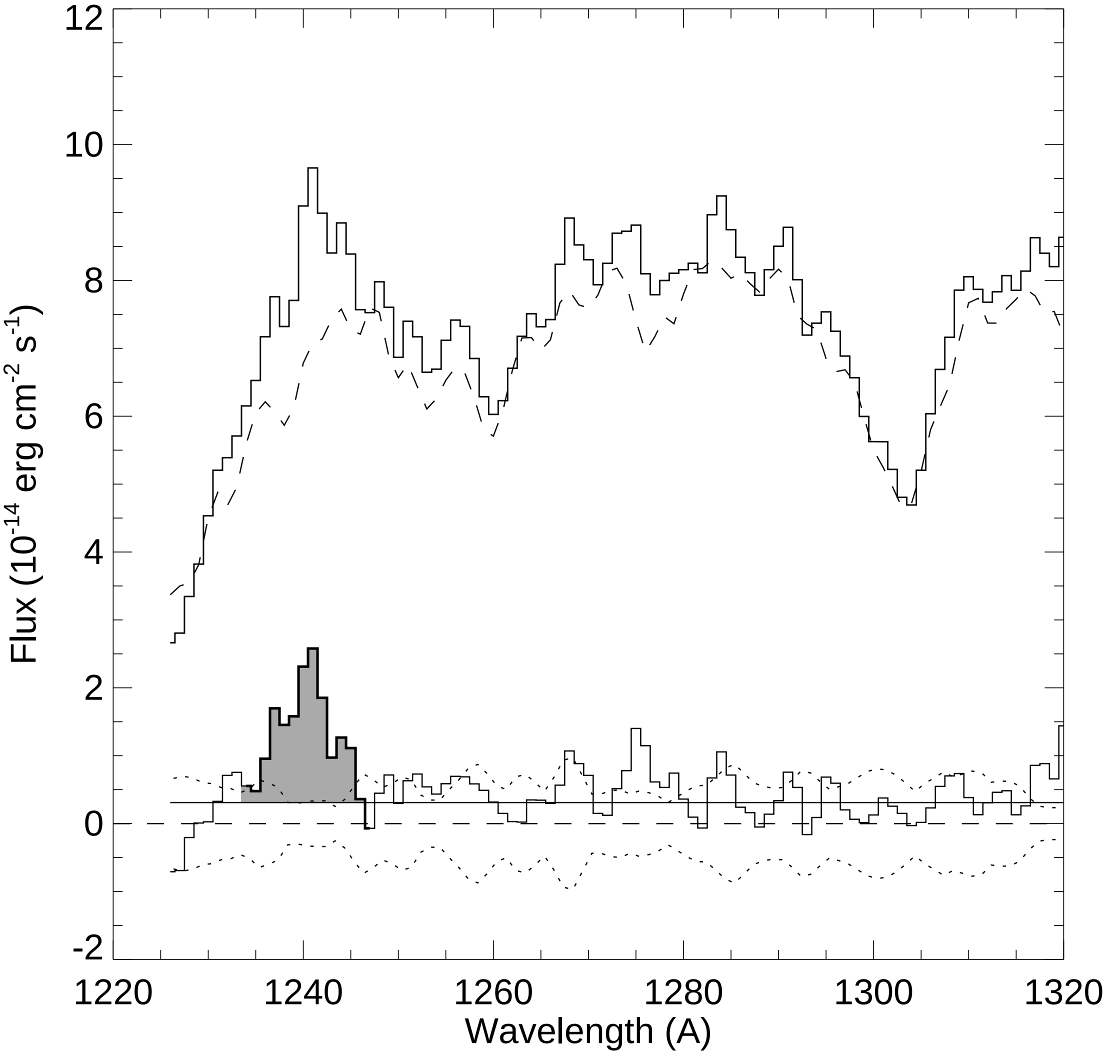


Fig. 4.— Continuum subtraction for N V in SWP 36801. The upper *solid* line is the observed SN 1987A spectrum. The upper *dashed* line is the reference spectrum of stars 2 and 3 from 1987 March (cf. Fig. 1). The difference spectrum (*SN - stars*) is shown by the *solid* line at the bottom of the figure on the same flux scale. The *solid horizontal* line is the continuum level established for this N V flux measurement (*shaded area*). The *dashed horizontal* line marks the zero flux level. The N V emission feature is more easily distinguished in the difference spectrum. The *dotted lines* above and below the difference spectrum are the $\pm 1\sigma$ residuals for the reference spectrum. Cross-correlation techniques were used to register the SN 1987A and star 2 and 3 spectra; a +93 km s$^{-1}$ correction was applied to the reference spectrum in this example.

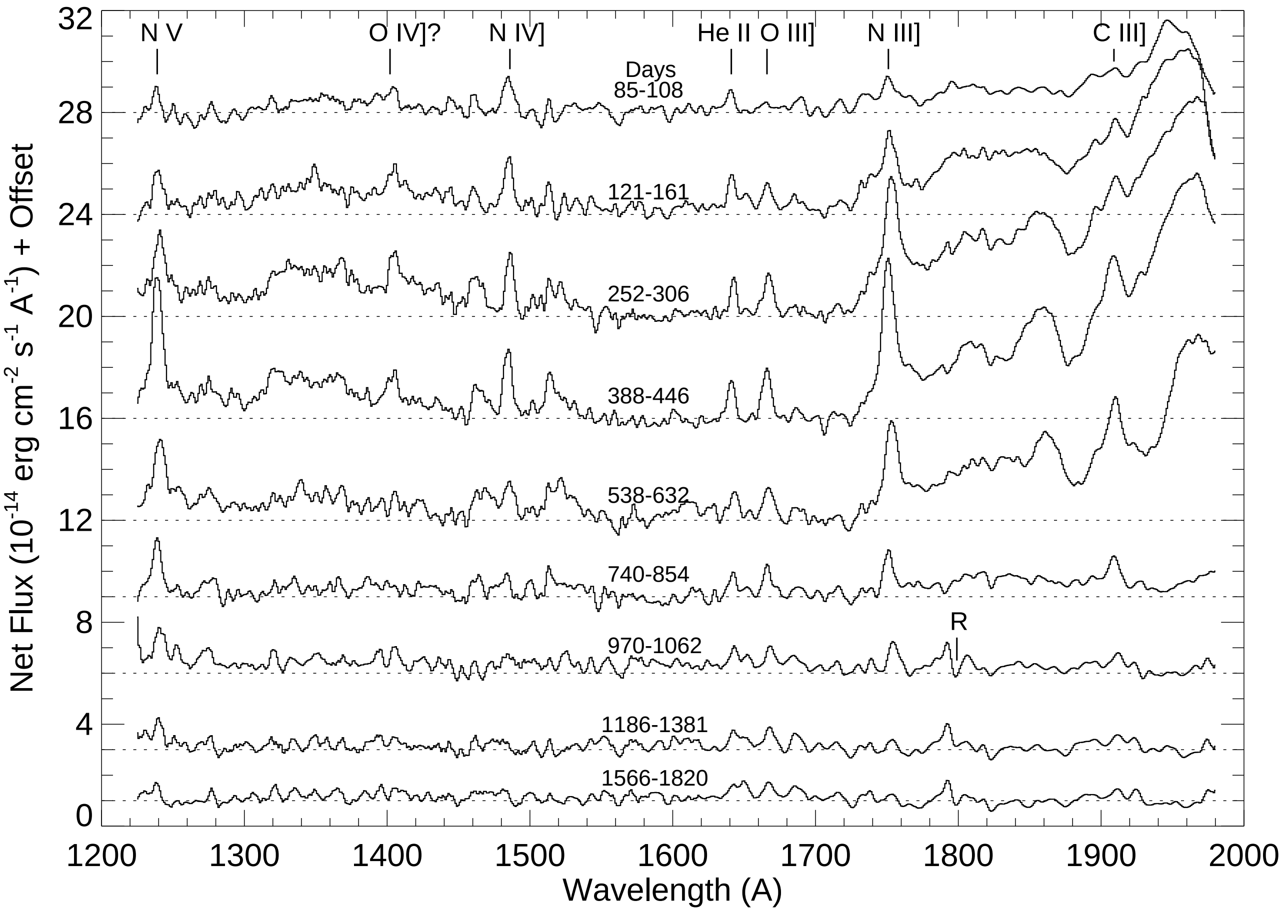


Fig. 5.— The mean SWP spectrum of SN 1987A (minus stars 2 and 3) is shown for nine time intervals spanning the first 1820 days of the outburst. Each mean spectrum is the average of five exposures over the indicated time interval. They are plotted on the same flux scale and are offset for clarity. The *dashed horizontal* lines mark the zero level for each spectrum. The six emission lines measured are marked at the top of the figure, as is the possible identification of O IV] multiplet UV 0.01.

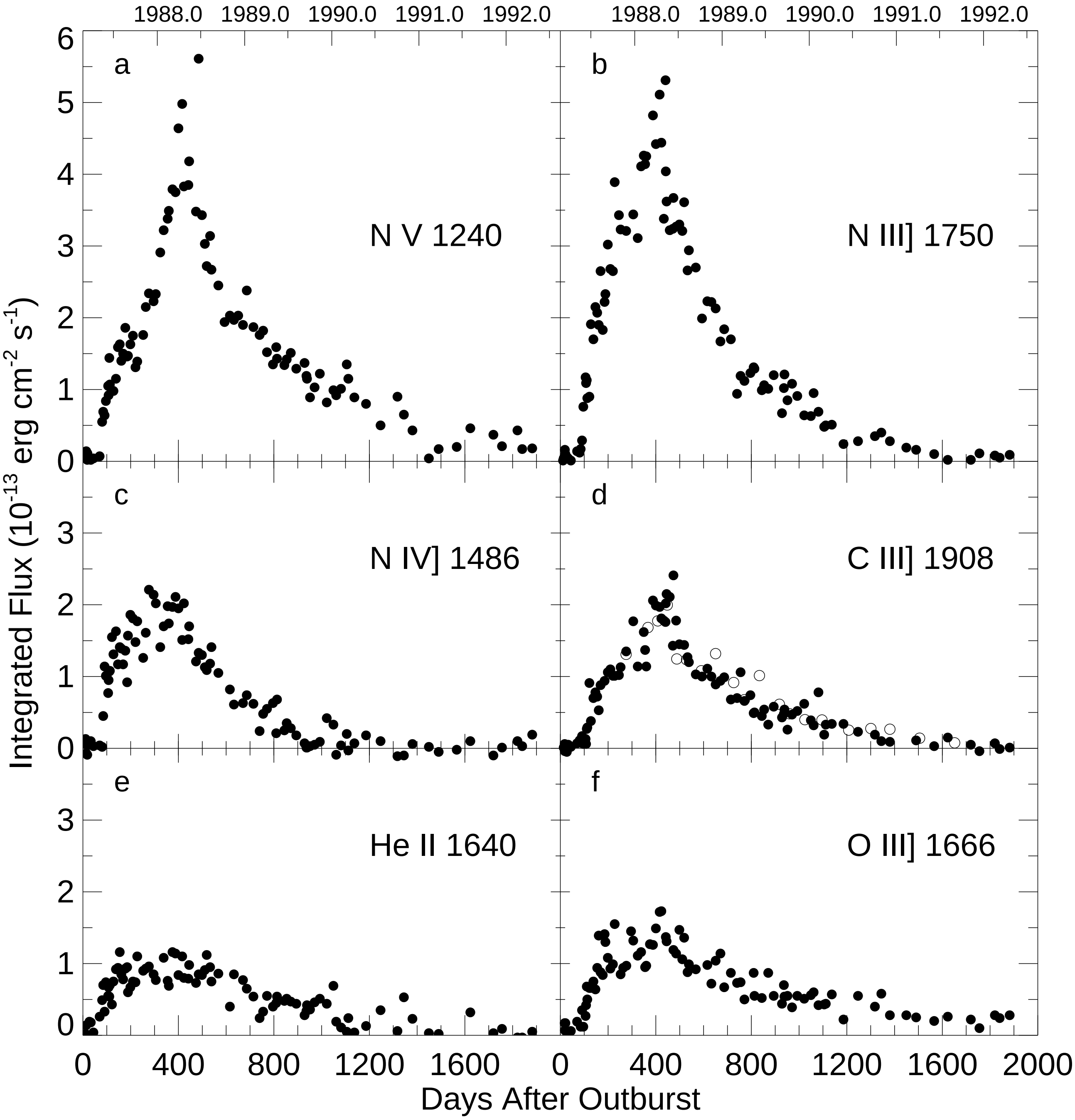


Fig. 6.— The light curves spanning day 11 to 1882 for the six UV emission lines in SN 1987A. The *open circles* in Fig. 6d are the combined C III] $\lambda$1906.68 and $\lambda$1908.73 fluxes from the *IUE* high dispersion spectra (Table 2).

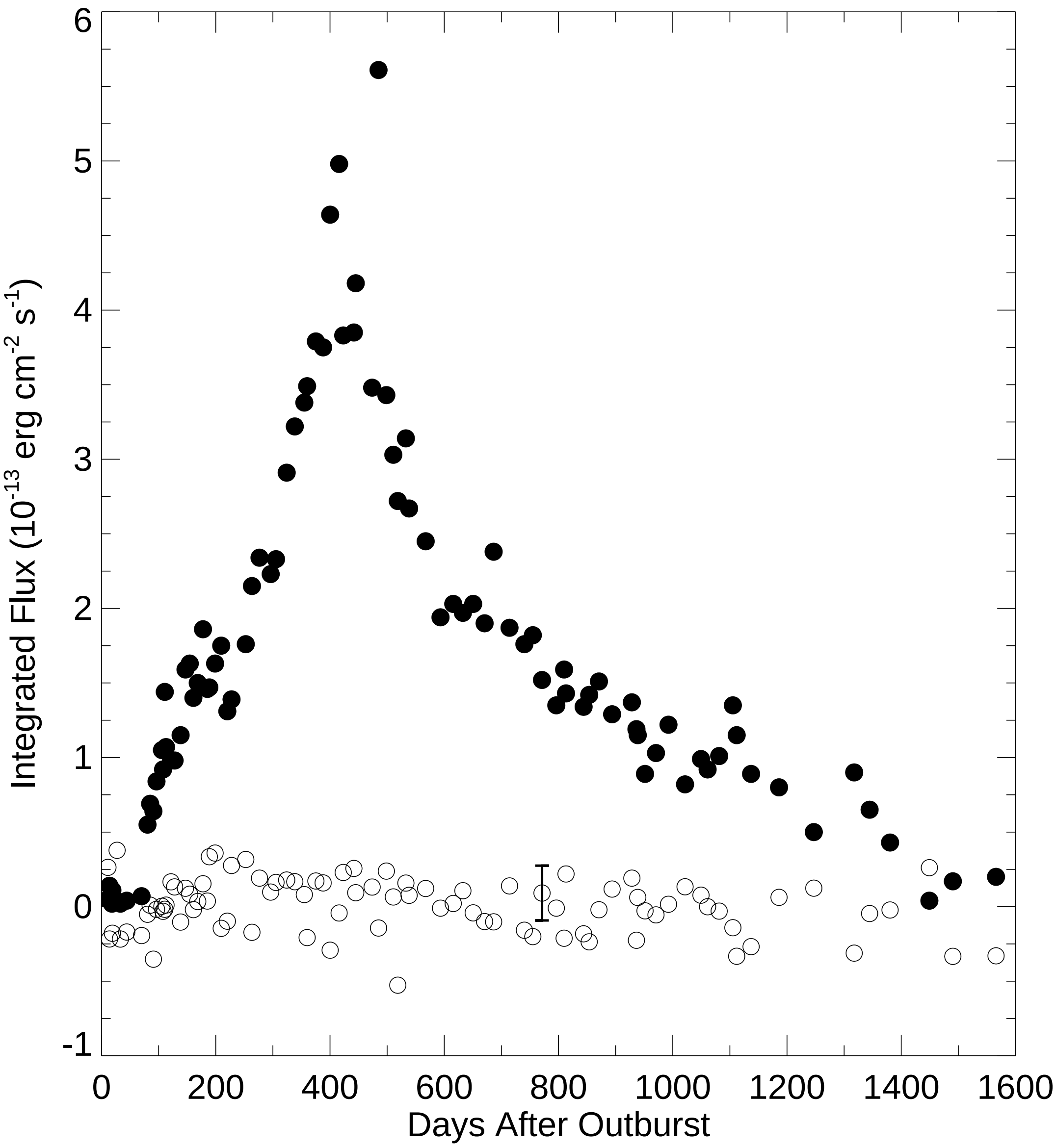


Fig. 7.— The N V $\lambda$1240 light curve (*filled circles*) and continuum residual, $\delta F_c$ (Eqn. 1), near the line are shown as a function of time. $\delta F_c$ is a measure of the accuracy and consistency of the continuum placement used to compute the flux in the line (cf. Fig. 4). The results shown for N V are representative of the six lines measured. The error bar ($\pm 1\sigma = 1.82\times 10^{-14}$ erg cm$^{-2}$ s$^{-1}$) is the measurement uncertainty for individual data points.

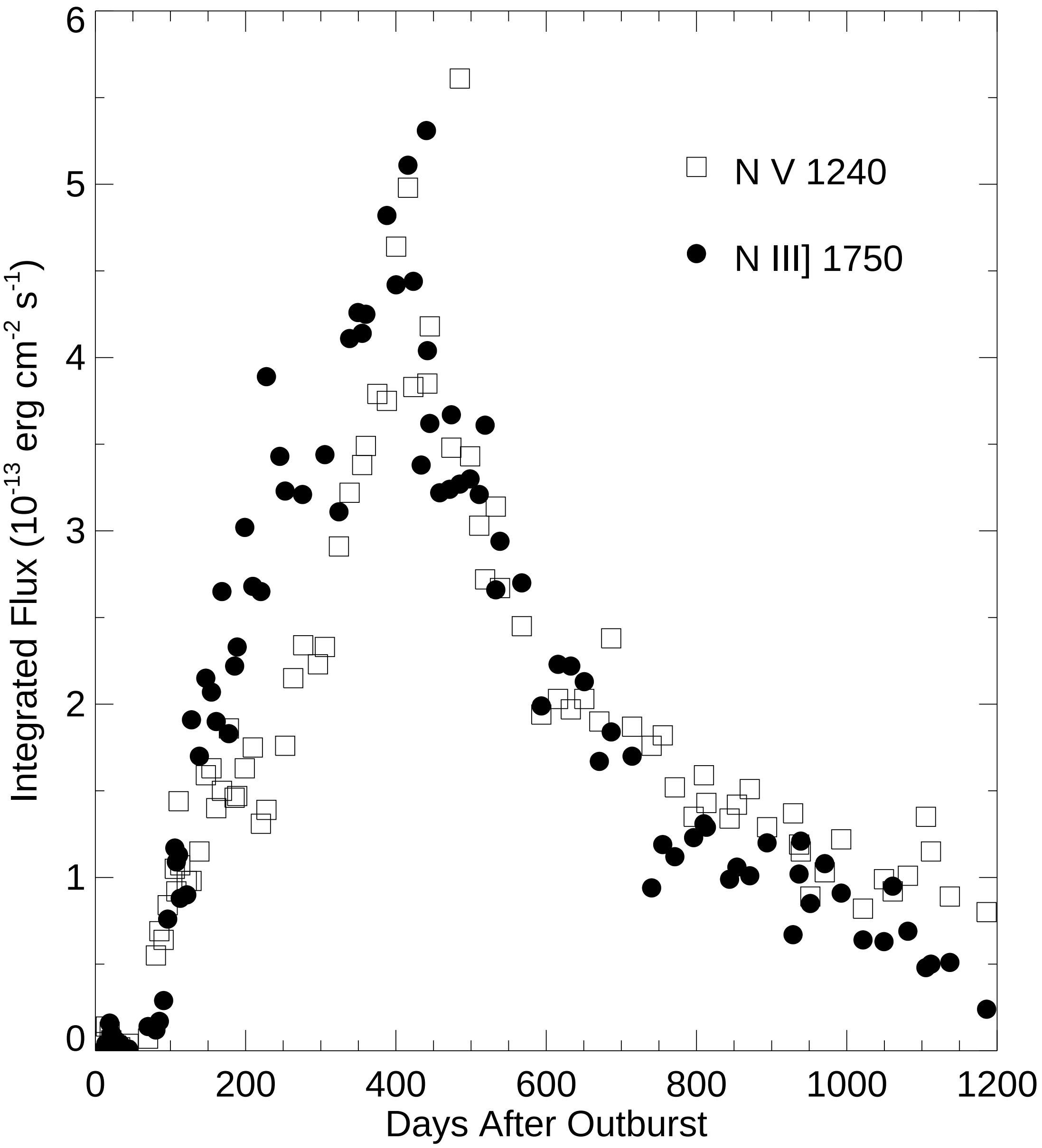


Fig. 8.— Comparison of the N III] and N V light curves near maximum. The large deficiency of N V relative to N III] before maximum is believed to be the result of resonant scattering by $N^{+4}$ ions in the highly ionized gas close to the ring along the line of sight to the supernova.

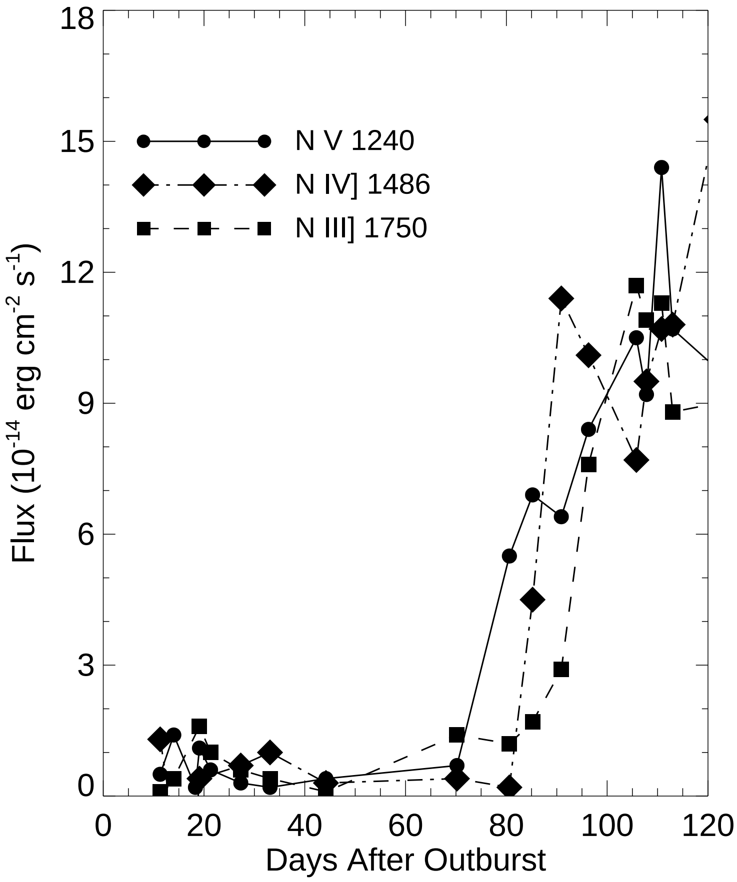


Fig. 9.— Comparison of the three nitrogen emission line light curves before day 120. The sudden onset of the lines also indicates a progression from higher to lower ionization potential.

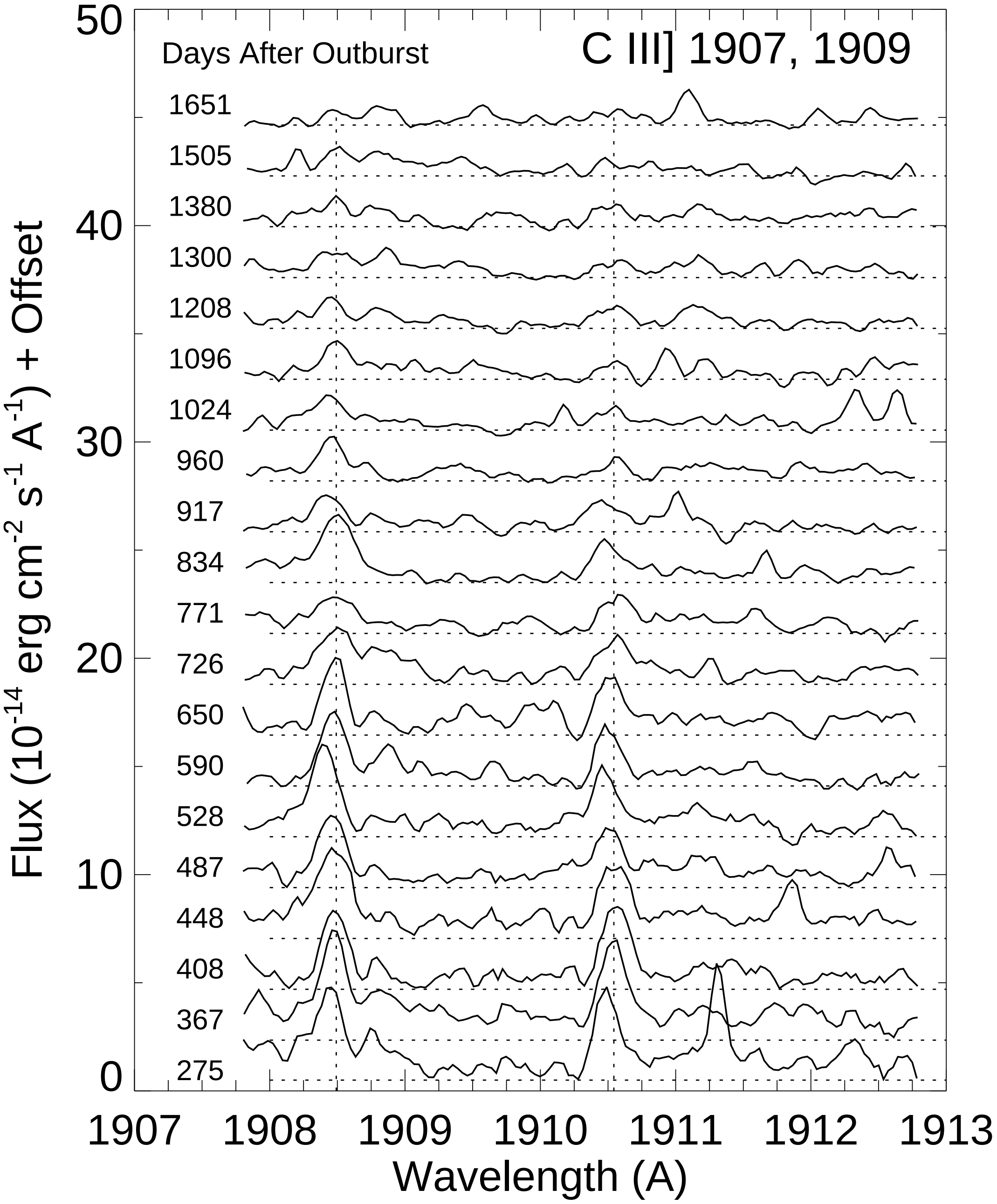


Fig. 10.— Line profiles of C III] multiplet UV 0.01 detected in *IUE* high dispersion spectra of SN 1987A between days 275 and 1652. The two vertical dashed lines mark the positions of the $\lambda$1906.68 and $\lambda$1908.73 components at a heliocentric velocity of +285 km s$^{-1}$.

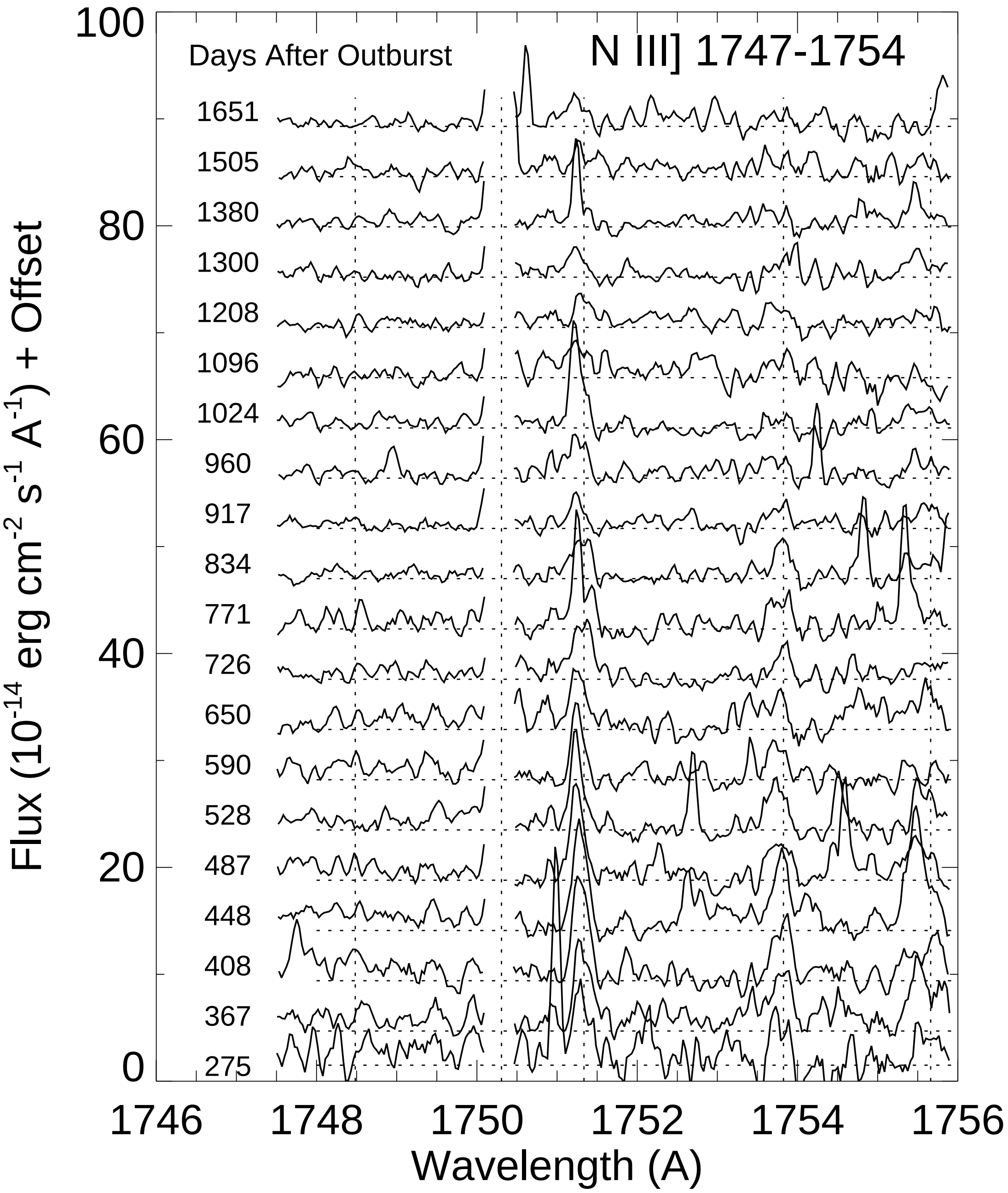


Fig. 11.— Line profiles of N III] multiplet UV 0.01 detected in *IUE* high dispersion spectra between days 275 and 1652. The five vertical dashed lines mark the positions of the multiplet components at a heliocentric velocity of +285 km s$^{-1}$.

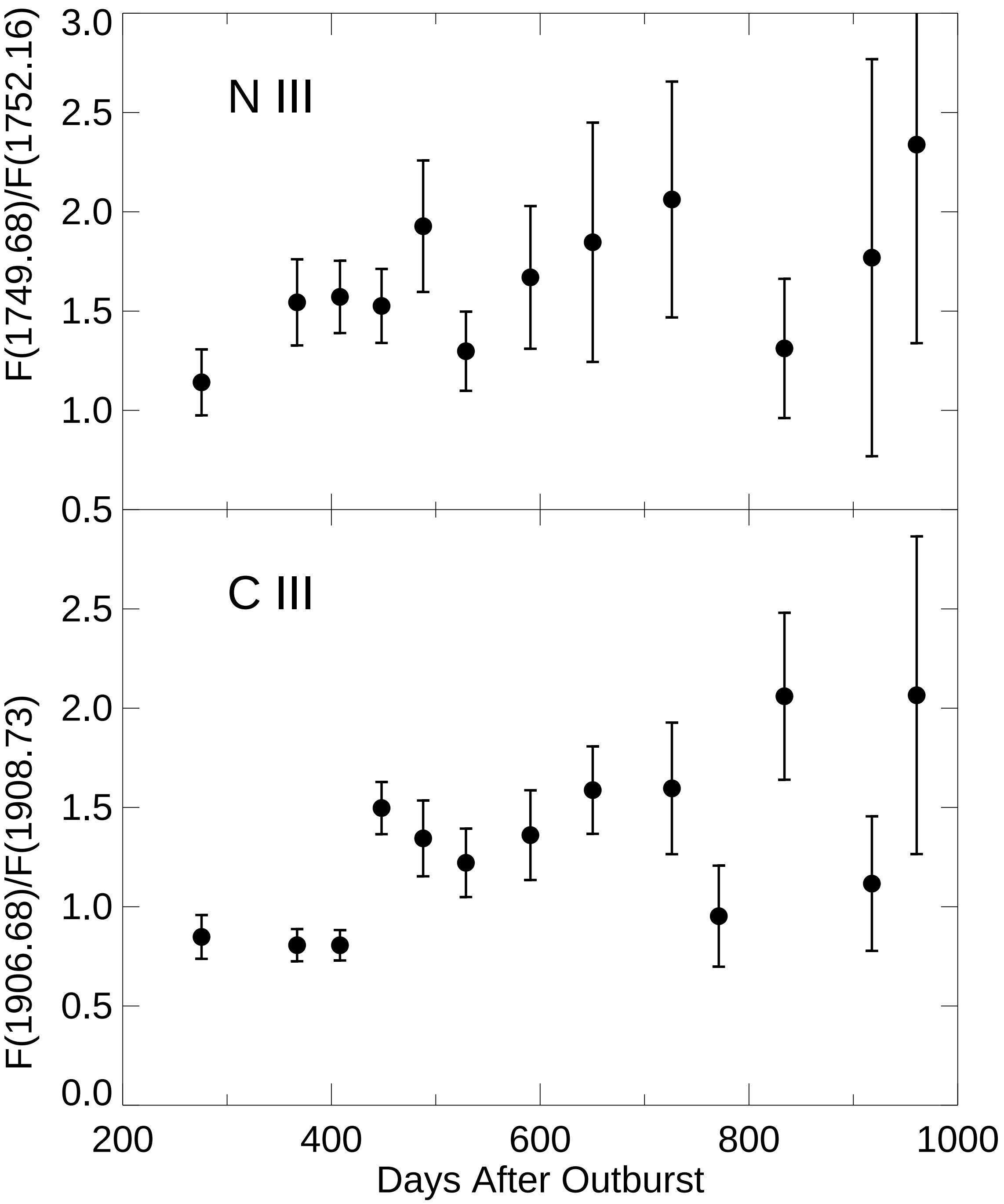


Fig. 12.— Evolution of the N III] $\lambda1749/\lambda1752$ and C III] $\lambda1907/\lambda1909$ line ratios between days 275 and 1000.

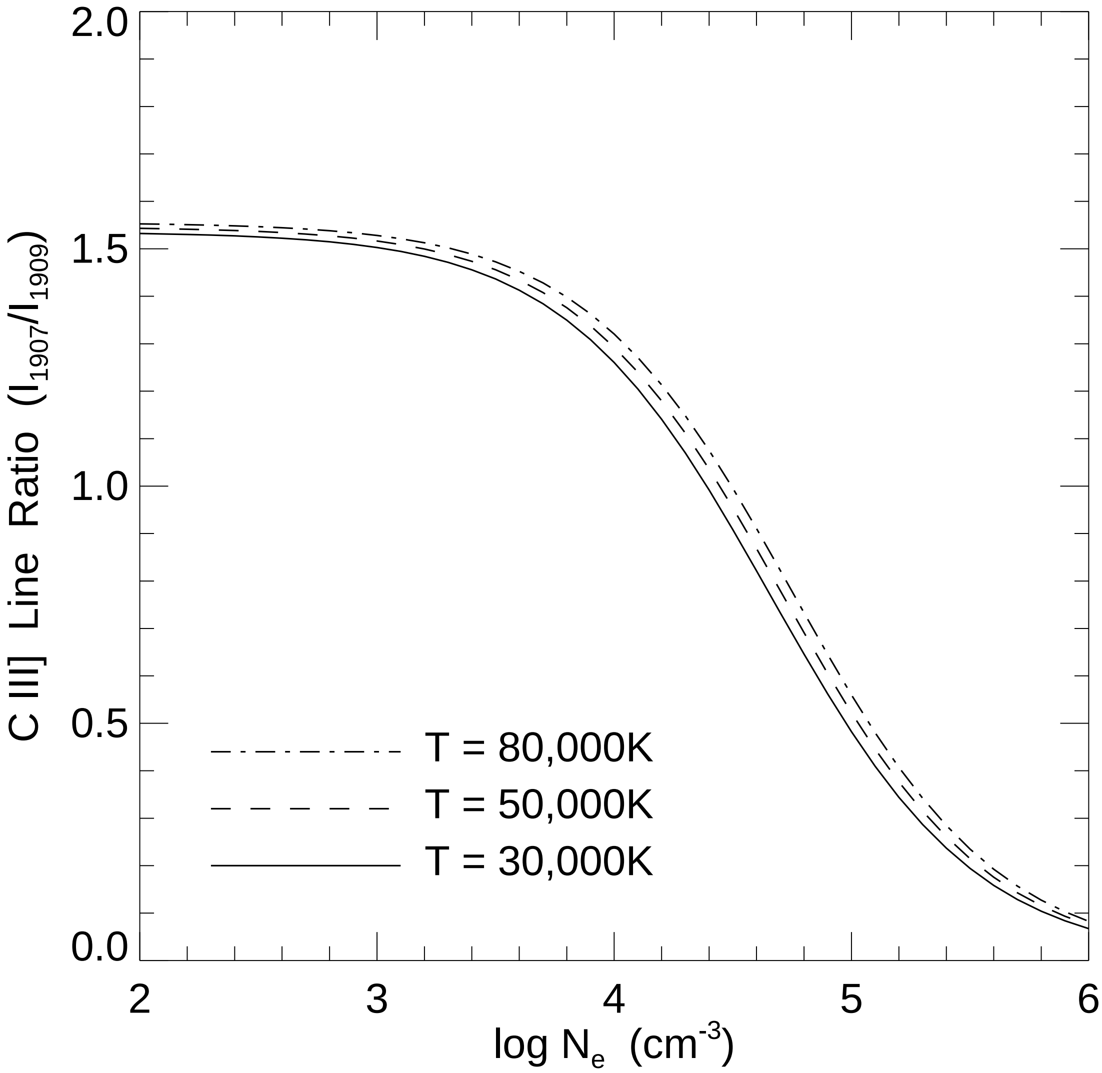


Fig. 13.— Calculated C III] line ratios ($I_{1907}/I_{1909}$) as a function of $n_e$ for a 6-level C III atom are shown for electron temperatures of 30,000 K, 50,000 K, and 80,000 K. The atomic data are from several sources: A-values for C III from Nussbaumer & Storey (1978), Allard et al. (1990), and Fleming et al. (1994), energy levels are those of Mendoza (1983) and Aggarwal et al. (1986), and collision strengths from Seaton (1987), and Keenan et al. (1992).