

THE ANOMALOUS A-TYPE SUPERGIANTS IN THE MAGELLANIC CLOUDS - EVIDENCE FOR POST-RED SUPERGIANT EVOLUTION

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A group of A-type supergiants in the SMC and LMC with spectral types in the range B8-F0 have an anomalously strong Balmer jump and hydrogen lines for their luminosities. The appearance of the Balmer series suggest a luminosity about two magnitudes fainter than derived from their membership in the Clouds. Their colors are also too red in U-B with little or no change in B-V relative to the colors of normal A-type supergiants, consistent with the strong Balmer jump in these star's spectra.

Earlier Kudritzki (1973) had shown that an increased helium abundance will result in stronger hydrogen lines and Balmer jump (and red U-B color). To test this hypothesis, we have obtained high resolution spectra of four of these anomalous supergiants in the SMC and two in the LMC together with spectra of several normal supergiants in both Clouds. The measured equivalent widths of the hydrogen lines confirm their increased strength in these anomalous A-type supergiants while their metallic lines are comparable to those in normal supergiants of similar temperature, luminosity and metallicity.

A grid of NLTE models (8750-14000 K, $\log g = 0.75-2.00$, and $Y = 0.1$ to 1.00) show that an enhanced He abundance up to .5 by number can account for the stronger Balmer series lines. Details of the computations and the fine analysis will appear in a later paper.

Given the location of these anomalous A-type supergiants on the HR diagram plus the strong evidence for enhanced He in their atmospheres, these stars have probably been through a high mass loss stage as red supergiants. They are good candidates for post-red supergiant evolution and the progenitors of the kind of star that became SN1987A.