A Massive Star Odyssey, from Main Sequence to Supernova
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Long-term spectral variability of the O4 If$^+$ star HD 15570 in the open cluster IC 1805

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1. Observations and explanations

We present preliminary results concerning the O4If$^+$ star HD 15570. Of-type supergiants are believed to represent an evolved evolutionary stage of very high mass stars ($M_{init} > 40\,M_\odot$). Their low numbers and extreme peculiarity make each of these objects worth of continuous monitoring. HD 15570 dominates the very young open cluster IC 1805 and is thought to have had an initial mass $\geq 100\,M_\odot$. Low-, intermediate- and high-resolution spectra were collected at the Loiano and San Pedro Mártir telescopes since 1992. The comparison of our high- and low-resolution spectra shows clear variability of a number of spectral features. It is worth noticing, that the variation of Hα seems to follow a repeated secular trend, increasing its equivalent width from $\sim$3Å to more than 8 Å in a few years. At the same time, its profile is varying, from a shape quite similar to the theoretical one corresponding to the Klein & Castor (1978) model C, to a much more developed P-Cygni profile, with a deep blue absorption wing. The possibility of instrumental effects is ruled out by the remarkable constancy of the nearby diffuse interstellar band at 6613 Å and of the He II 6683 Å absorption. The Hβ profile variability is evident from the comparison of the 1996 and 1998 high-resolution spectra. The emission component, which is clearly visible at all epochs, is absent in the 1996 spectrum when the line appears in pure absorption. No relevant line-profile variation seems to be present in the He II and N III lines contributing to the 'feature f', that looks remarkably constant, as well as Hγ, while their equivalent widths seem to show a modest amount of random variability.

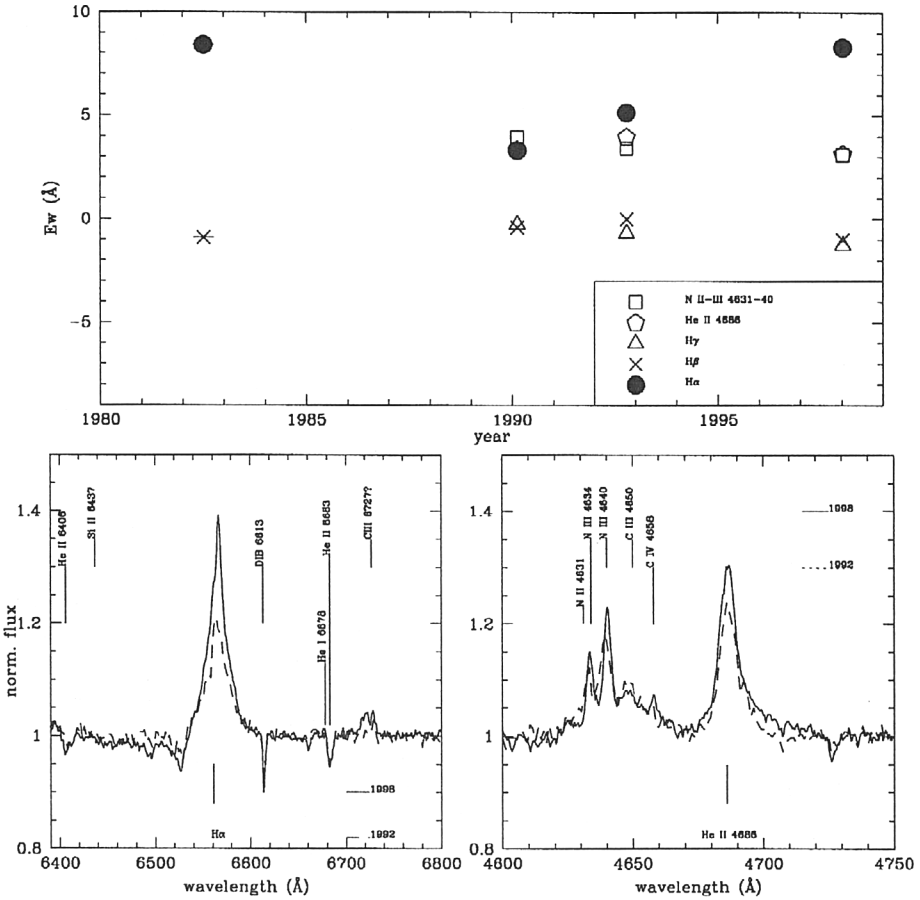

Figure 1. *Top*: time variations of the equivalent widths of the most prominent spectral features of HD 15570: points from 1990 to 1998 come from the present work. Other points are from Peppel (1984). The symbol size corresponds to the estimated uncertainties of the line equivalent width in our measurements ($\sim$0.5 Å). *Bottom left*: variation (1992 *vs.* 1998) of the Hα line profile. *Bottom right*: the 'feature f' at the same epochs.

References

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