TABLE 5

PROFILE TYPES IN GROUPS OF FOUR[a]

Epoch	Type				X_2				X_3			
	s	a	–	w	510	250	–	330	18	130	–	58
1991	s	a	w	w	460	220	290	340	20	130	78	58
	s	a	w	–	390	260	340	–	37	120	60	–
	–	a	a	a	–	380	370	320	–	210	160	180
1999	s	a	–	a	710	310	–	410	60	220	–	180
	s	–	w	–	640	–	500	–	40	–	70	–
	–	a	w	a	–	320	360	370	–	140	75	110
2005	s	a	w	w	650	270	360	400	20	140	33	93
	s	–	–	–	700	–	–	–	8	–	–	–
	–	–	–	w	–	–	—	400	–	–	–	73
2009	s	a	w	w	520	280	420	400	20	140	90	60
	s	a	–	–	400	250	–	–	45	110	–	–

[a]Columns 2–5: Same information as given in Table 3 but here organized in sets of four sequential nights per row. For all epochs there is a sequence: *s* (day 1) → *a* (day 2) → *w/a* (days 3 and 4). Second block of 4 columns: opacity parameter X_2 from the line fits; third block of 4 columns: opacity parameter X_3.

Given the above results we are led to conclude that the wind cycles through different opacity states over the 3.76 d period. These different states may be due to variations in the excitation/ionization structure or in the mass-loss rate, or a combination of the two. Such variations could be a consequence of pulsations in the underlying core. Piceno (2003) found periodic variation in the equivalent width of He II 4541 on timescales of 0.023 d, 0.044 d and 0.43 d on different nights of observation in the 1991 SPM data set, but not in the whole set of data, thus leaving an open question on the presence of possible non-radial pulsations. The precise mechanism by which the pulsations couple to the wind is still another open question (Townsend 2007).

An intriguing result concerns the radial velocity variations of the P Cygni absorption component of the *s* profiles. The centroid of these features was measured with a Gaussian fit from the location where the absorption meets the continuum level on the "blue" to the position of the emission component where the velocity is −500 km s^{-1}. In Figure 11 the derived RVs from the nine *s*-type profiles obtained over the 18 years of observation are plotted as a function of the 3.76 d phase computed with the Georgiev et al. (1999) ephemeris. The error bars correspond to the measurement uncertainties, estimated to be ±30 km s^{-1}. This figure shows a clear modulation. Thus, although the data points are too few for a strong conclusion to be drawn, this result does suggest the presence of an underlying "clock" that retains coherence over very long timescales. It also indicates that it may be necessary to use only the *s* profiles to study the source of the "clock".

6. DISCUSSION AND CONCLUSIONS

In this paper we used the N V 4604 line observed in HD 50896 spectra obtained over 18 years to explore the possible wind structure variations that may lead to the observed changes in the shape of this line. We find that the variability in the P Cygni absorption component can be explained in terms of changes in the opacity structure of the wind. Specifically, changes in the relative opacities in regions $R_2 \sim 0.47\ R_{\rm max}$ and $R_3 \sim 0.65\ R_{\rm max}$, where $R_{\rm max}$ is the maximum extent of the N V 4604 line-forming region. Both these regions lie in the accelerating portion of the wind, according to the linear velocity law used to fit the profiles. The *strong* P Cygni absorptions are visible when the opacity in region R_2 is larger than in R_3. When this ratio is inverted, the P Cygni absorptions vanish. Evidence of opacity enhancements has previously been found in other objects, such as the O7.5-star 68 Cyg (Prinja & Howarth 1988).

The temporal sequence for the appearance of the profiles is such that a profile with a strong P Cygni absorption is followed one night later by one in which