Analysis of Galactic late-type O dwarfs: more constraints on the weak wind problem.

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We have investigated the stellar and wind properties of a sample of five late-type O dwarfs in order to address the weak wind problem. A grid of TLUSTY models was used to obtain the stellar parameters, and the wind parameters were determined by using the CMFGEN code. We found that the spectra have mainly a photospheric origin. A weak wind signature is seen in CIV 1549, from where mass-loss rates consistent with previous CMFGEN results regarding O8-9V stars were obtained. A discrepancy of roughly 2 orders of magnitude is found between these mass-loss rates and the values predicted by theory (Mdot(Vink)), confirming a breakdown or a steepening of the modified wind momentum-luminosity relation at log L/Lsun < 5.2. We have estimated the carbon abundance for the stars of our sample and concluded that its uncertainty cannot cause the weak wind problem. Upper limits on Mdot were established for all objects using lines of different ions, namely, PV 1118,28, CIII 1176, NV 1239,43, Si IV 1394,03, and NIV 1718. All the values obtained are also in disagreement with theoretical predictions, bringing support to the reality of weak winds. Together with CIV 1549, the use of NV 1239,43 results in the lowest mass-loss rates: the upper limits indicate that Mdot must be less than about -1.0 dex Mdot(Vink). Regarding the other transitions, the upper limits still point to low rates: Mdot must be less than about $(-0.5 pm 0.2)$ dex Mdot(Vink). We have studied the behavior of the Halpha line with different mass-loss rates. We have also explored ways to fit the observed spectra with Mdot(Vink). By using large amounts of X-rays, we verified that few wind emissions take place, as in weak winds. However, unrealistic X-rays luminosities had to be used (log Lx/Lbol > -3.5) (abridged).

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