Oxygen and silicon abundances in Cygnus OB2: Chemical homogeneity in a sample of OB slow rotators.

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Cygnus OB2 is a rich OB association in the Galaxy located at only âˆ¼1.4 kpc from us which has experienced intense star formation in the last 20-25 Myr. Its stellar population shows a correlation between age and Galactic longitude. Exploring the chemical composition of its stellar content we will be able to check the degree of homogeneity of the natal molecular cloud and possible effects of self-enrichment processes. Our aim is to determine silicon and oxygen abundances for a sample of eight early-type slow rotators (with rotational velocities below 80 km sâˆ'1) in Cygnus OB2 in order to check possible inhomogeneities across the whole association and whether there exists a correlation of chemical composition with Galactic longitude.
We have performed a spectroscopic analysis of a sample of late O and early B stars with low rotational velocity in Cygnus OB2, which have been chosen so as to cover the whole association area. We have carried out an analysis based on equivalent widths of metal lines, the wings of the H Balmer lines and FASTWIND stellar atmosphere models to determine their stellar fundamental parameters (effective temperature and surface gravity) as well as the silicon and oxygen surface abundances. We derive a rather homogeneous distribution of silicon and oxygen abundances across the region, with average values of 12 + log(Si/H) = 7.53 Â± 0.08 dex and 12 + log(O/H) = 8.65 Â± 0.12 dex. We find a homogeneous chemical composition in Cygnus OB2 with no clear evidence for significant chemical self-enrichment, despite indications of strong stellar winds and possible supernovae during the history of the region. Comparison with different scenarios of chemical enrichment by stellar winds and supernovae point to star forming efficiencies not significantly above 10%. The degree of homogeneity that we find is consistent with the observed Milky Way oxygen gradient based on HII regions. We also find that the oxygen scatter within Cygnus OB2 is at least of the same order than among HII regions at similar Galactocentric distance.

Reference: Accepted for publication in A&A
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1809.06644

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