Mapping the Star Formation in Orion A/L1641

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Abstract First phases of the process of star formation are characterized by excess in infrared and high X-ray emission. With Spitzer and XMM-Newton we have surveyed the Orion A part relative to the filamentary cloud Lynds 1641 (L1641). Furthermore, an extended spectroscopic survey has been realized to better constraint the cluster membership of stars without IR excess. We find that:

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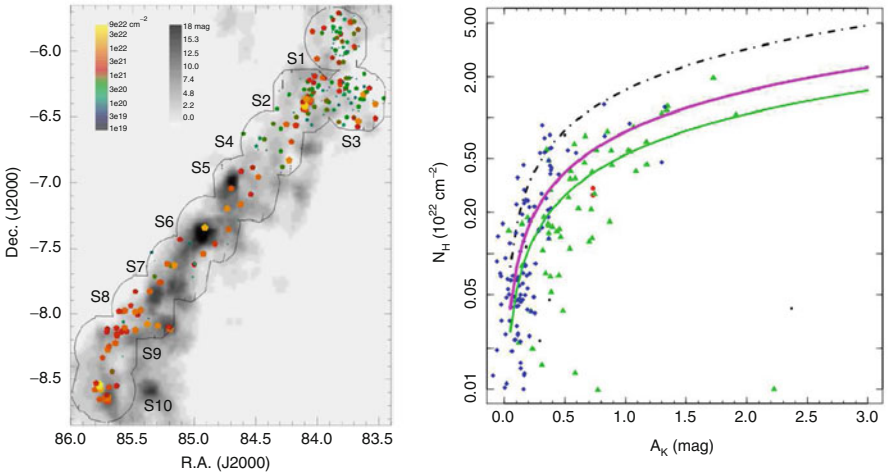

Fig. 1 *Left panel*: map of N_H absorption obtained from X-ray spectra and A_K extinction obtained from $H - K$ color. The stars with less absorption are more numerous in the northern part near Iota Orionis. These form a more evolved cluster likely in front of the cloud or less embedded in it. *Right panel*: the relationship between N_H and A_K has a flatter slope than found in ISM and ONC (Vuong et al. [2]), RCW 38 and RCW 108 (Wolk et al. [4,5]) but similar to that found in low mass star forming regions like Serpens and NGC 1333 (Winston et al. [3])

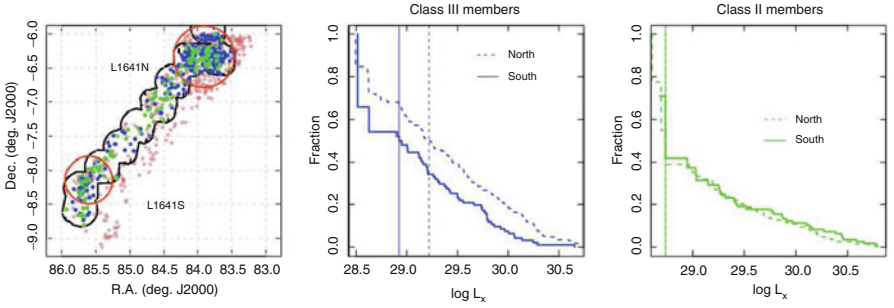

Fig. 2 The spectroscopic survey of L1641 has identified 864 members, 458 of them being Class III stars (Hsu et al. [1], *red symbols* in *left panel*). *Blue* and *green* points are Class III and Class II stars, respectively. Basing on this list of members, we have calculated upper limits to X-ray luminosity for the undetected stars and distributions of X-ray luminosity (XLD) for Class II and Class III stars (*central* and *right panel*). Class III stars in L1641 North and around Iota Orionis are more luminous in X-ray by a factor ∼2 than their analogs in L1641 South, while Class II stars are almost at the same level of luminosity in both regions

- The young stellar population in the surveyed region is composed by a number of stars in the range 1,800–2,350,
- More evolved Pre Main Sequence disk-less stars are copiously found around Iota Orionis and in L1641 North,
- This group of stars likely formed before the Orion Nebula Cloud (Fig. 1, left panel and Fig. 2),

- Stars with disks and protostars are found in small subgroups along the cloud filament of L1641,
- N_H/A_K is lower than ISM but similar to other low mass star forming regions (Fig. 1, right panel)
- This suggests some difference in the grain size and growth in star forming regions with lack of strong UV flux from massive stars.

References

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