Correlations between the stellar and disc properties of Taurus PMS stars in the GASPS sample

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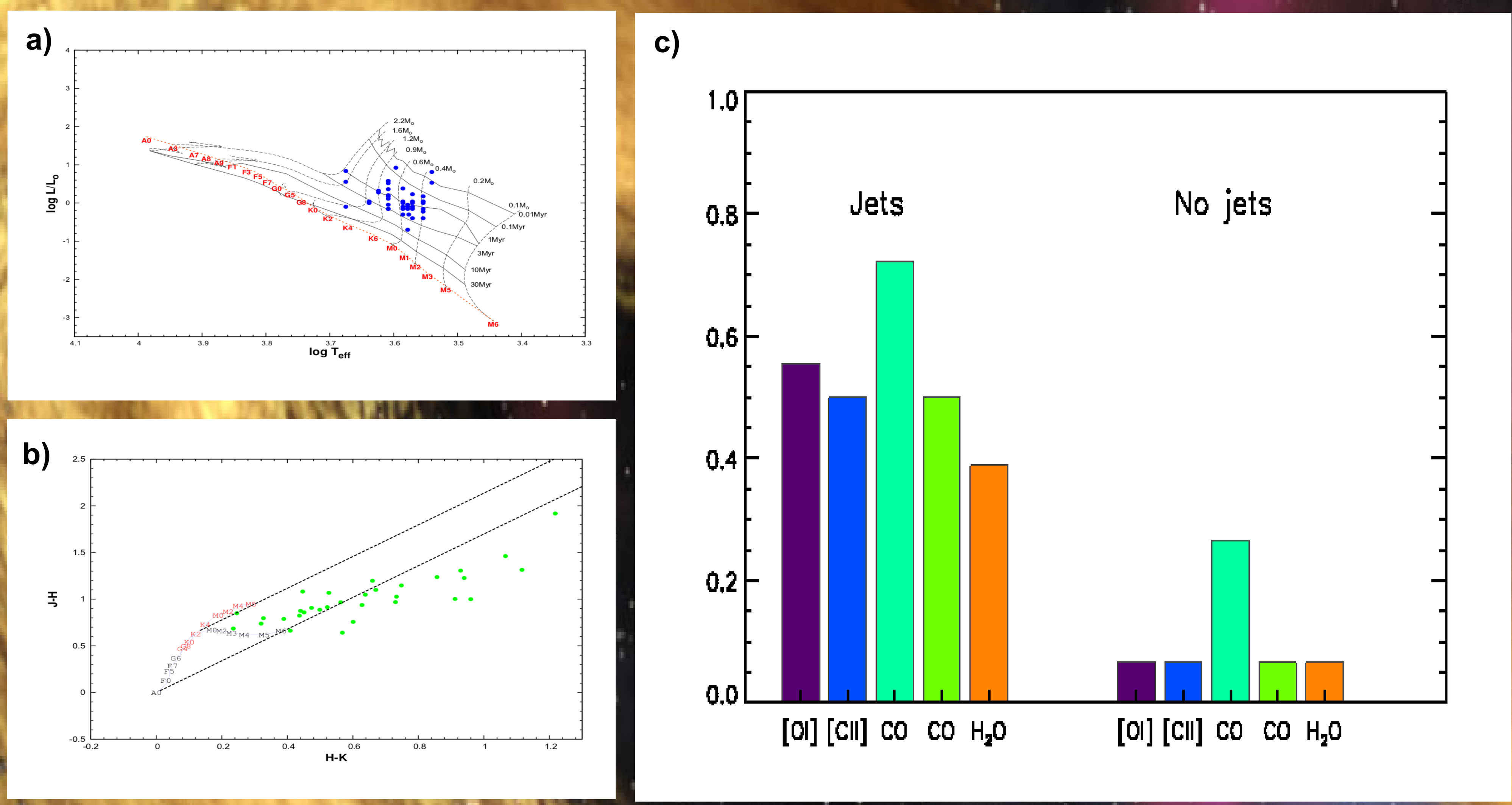

Fig.1: (a) HRD and (b) J-H vs. H-K$_s$ diagram showing our sample. Evolutionary tracks and isochrones from Siess et al. (2000) are shown; dotted red line is the Zero Age Main Sequence. Near-IR data from 2MASS. (c) Histogram showing the detection rate of emission lines in both the jet and non-jet sources.

GASPS aims to study gas and dust evolution in circumstellar discs. The present sample consists of 35 TTS in Taurus, with spectral types between K5 and M5. In *Fig.1a*, we show the HRD of our sample, while *Fig.1b* shows the sample in the JHK$_s$ colour-colour diagram. Based on near-IR spectroscopy we determined accurate spectral types and accretion rates.

The spectroscopic part of the survey with PACS aimed at the detection of [OI], [CII], CO, H_2O and other molecular species. In *Fig.1c* we depict the number of stars with detections, dividing the sample in stars with and without jets. In both groups, the CO line at 144.8 µm is most frequently detected. Clearly, sources where a jet is present have more line detections than sources without jets. This does not necessarily mean that the emission originates in the jet, but it suggests that there is a connection. Indeed, the line emission is most often confined to the central spaxel (with a size of ~1300 AU), but it is not clear whether the emission originates in the disc and/or the base of the jet.

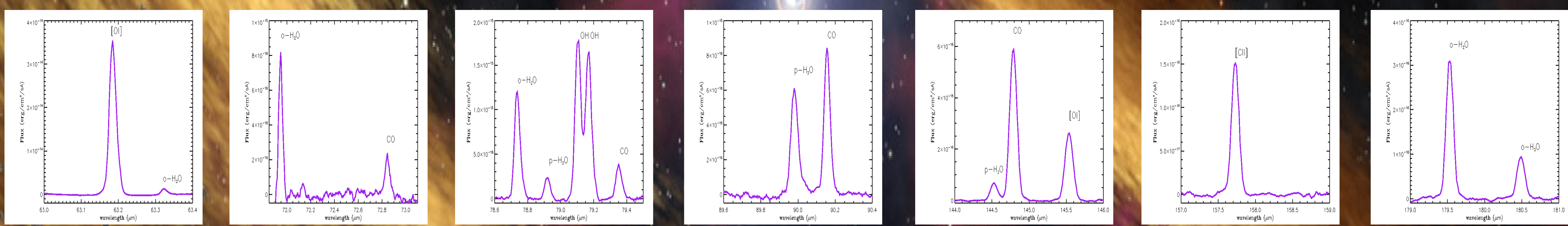

Fig.2: Line and range spectra of T Tau

As an example we plot the range spectra of T Tau (*Fig.2*) which is rich in molecular emission lines.

In order to better understand the origin of the different gas species present in the spectra, we compared the line fluxes with stellar and disc parameters. We performed a survival analysis on our data set to find correlations and also checked the likelihood that the correlation cannot be derived from a random population. In the following, we will focus on the CO lines.

We find a correlation between the CO 144.8 µm luminosity and 1) the [OI] 63 µm luminosity (*Fig.3*) and 2) the H_2O luminosity at 63.32 µm (not shown, Riviere-Marichalar et al., 2012). We did not find a correlation between CO luminosity and 1) T_{eff} (*Fig.4*), 2) X-ray luminosity (*Fig.5*) or 3) accretion luminosity (not shown).

In *Fig.3*, we distinguish between jet and non-jet sources. It is clear that those sources with stronger line emission have jets, but we point out that we also see - mostly weaker - emission in objects without jets, suggesting that the emission is not necessarily originating in a jet.

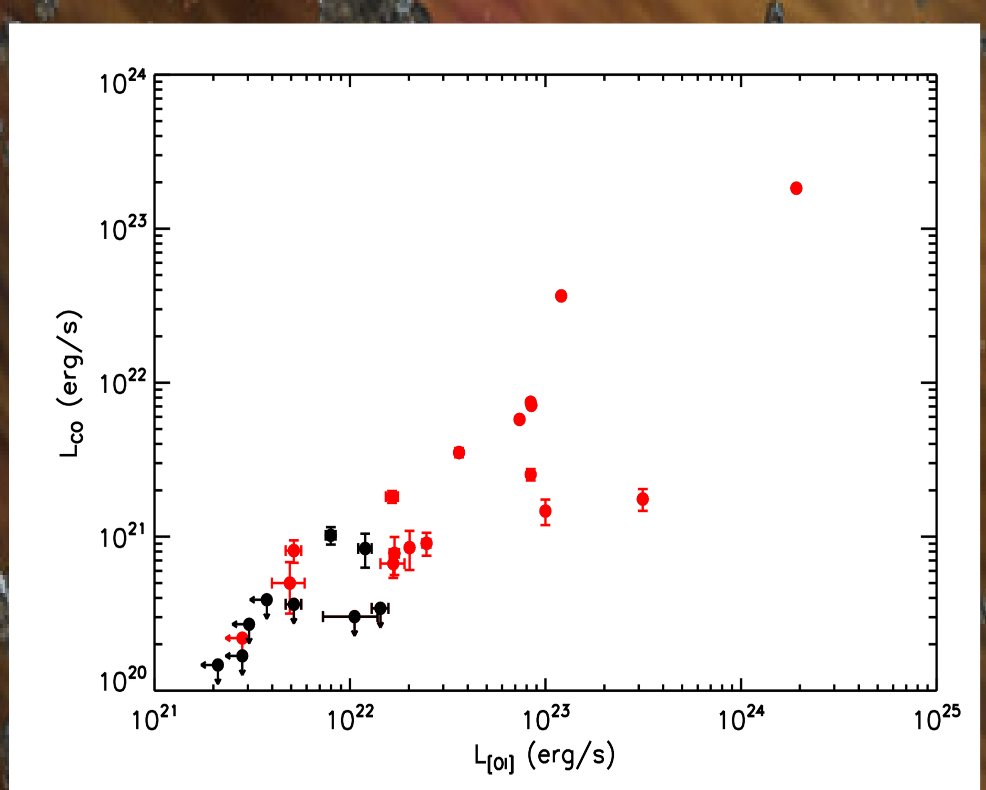

Fig.3: CO luminosity vs. [OI] luminosity ($L_{[OI]}$), red points are jet sources

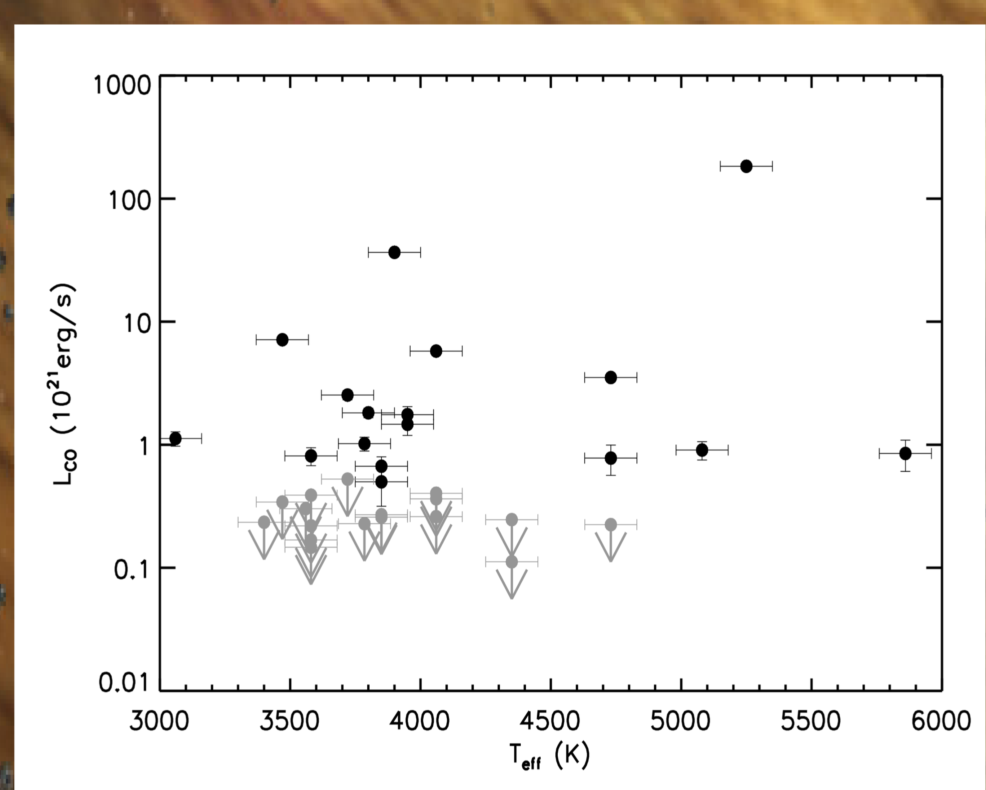

Fig.4: CO luminosity (L_{CO}) vs. T_{eff}

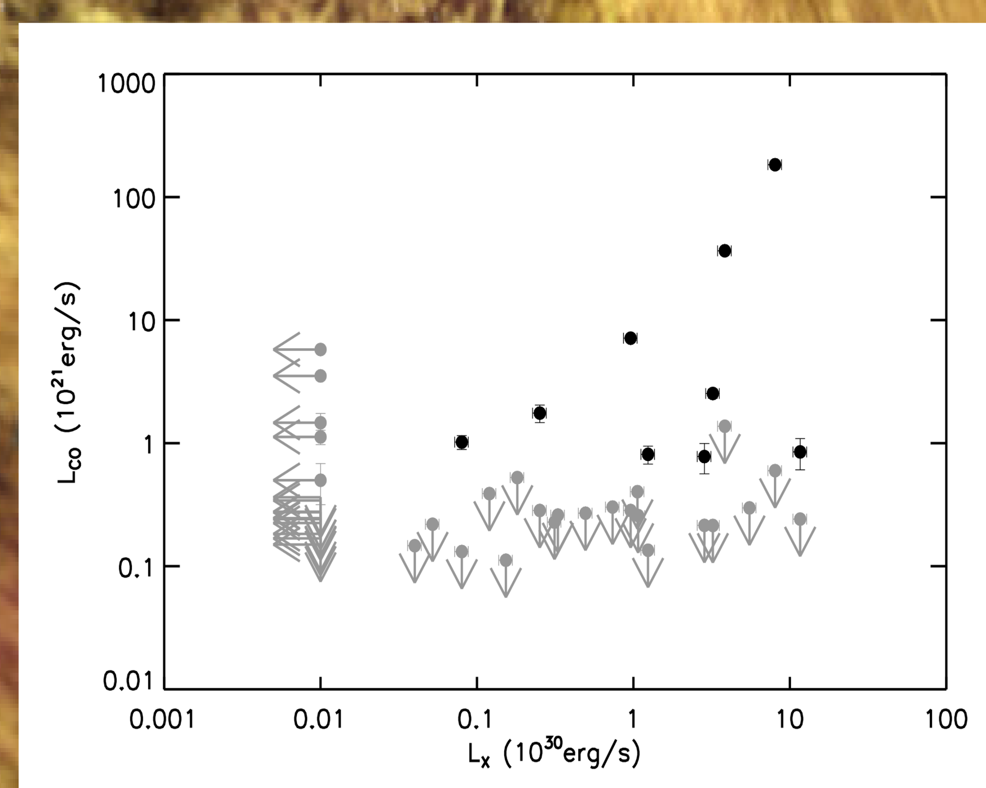

Fig.5: CO luminosity vs. X-ray luminosity (L_X)

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