GLOBAL PROPERTIES OF STAR FORMATION IN TAURUS

[1] Ana I. GOMEZ DE CASTRO[1,2] and [2] Ralph E. PUDRITZ[2]
[1] Observatorio Astronomico de Madrid, Alfonso XII, 3, 28014-Madrid, Spain
[2] Department of Physics, McMaster University, Hamilton, L8S 4M1, Ontario, Canada

SUMMARY: A careful analysis of the data available in the literature has been carried out to determine the global properties of star formation in Taurus. Three main trends arise in the data:
(1) the magnetic field in Taurus is distorted in the direction of the proper motions of the T Tauri Stars (TTS) (see below).
(2) the groups with different proper motions seem to have different stellar contents. An analysis of the stellar population based on the equivalent width of Hα, W(Hα), shows that groups I and III (Jones and Herbig, 1979) have approximately the same population (TTS show either large or small W(Hα)). However in group II (central part of the cloud) there are also a large number of stars with intermediate W(Hα) (Gomez de Castro and Pudritz, 1990).
(3) the mass function of the NH_3 cores (thought to be "protostellar cores") is $dN/dM \propto M^{\alpha}$ with $\alpha=-1.5$, in contrast with the IMF of the TTS given by Cohen and Kuhi (1979), $\alpha=-2.5$.
Only point (1) will be outlined in this contribution.

1. MAGNETIC FIELD GEOMETRY AND STELLAR MOTIONS

The magnetic field in Taurus, as delineated by the observed optical polarization of background stars, changes its orientation across the cloud (Moneti et al., 1984; Hsu, 1984). In Figure 1, we have superposed the proper motions for 75 TTS (Jones and Herbig, 1979) on the magnetic map. This clearly shows that the stars move approximately parallel to the filaments and nearly perpendicular to the field direction. The velocity dispersion in one coordinate is typically 2-3 km/s; less than the escape velocity from the clouds (Jones and Herbig, 1979).

There is no evidence of any systematic velocity differences between the stars and the molecular cloud. The radial velocity dispersion respect to the gas is <1.5 km/s (Herbig, 1977; Hartmann et al., 1986). This is consistent with the internal motions of the gas (Ungerechts and Thaddeus, 1987).

If clouds and stellar motions are coupled as these data suggest, then the filaments that constitute the Taurus clouds are moving in the direction of the field distortion.

E. Falgarone et al. (eds.), Fragmentation of Molecular Clouds and Star Formation, 415–416.

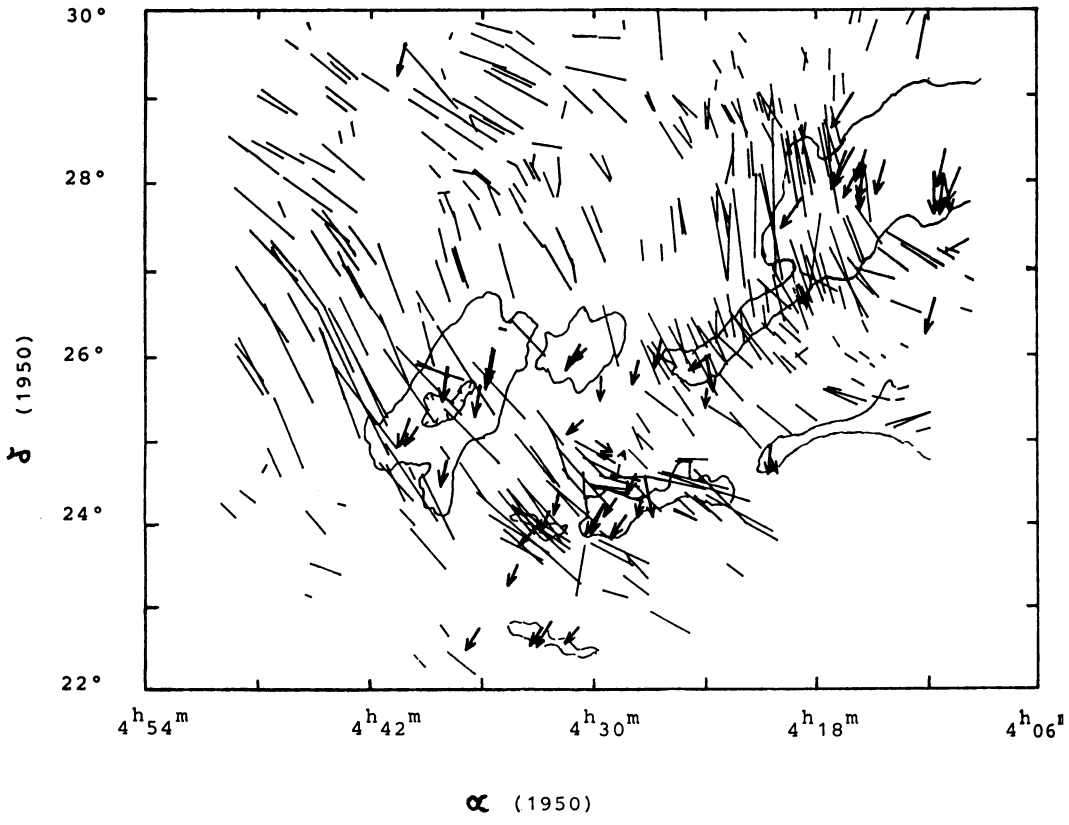

Figure 1. The magnetic field in Taurus delineated by the polarization vectors taken from Hsu (1984), Moneti et al. (1984) and Heyer et al. (1987). The proper motions of the TTS are indicated by arrows. The aspect of the Taurus clouds is sketched.

REFERENCES:
Cohen, M., Kuhi, L.V., 1979; Ap.J. Suppl., 41, 743
Gomez de Castro, A.I., Pudritz, R.E., 1990; preprint
Hartmann, L., Hewett, Stahler, S., Mathieu, R.D., 1986; Ap.J., 309,275
Herbig, G.H., 1977; Ap.J., 214, 747
Heyer, M.H., Vrbs, F.J., Snell, R.L., Schloerb, F.P., Strom, S.E., Goldsmith, R., Strom, K.M., 1987; Ap.J., 312, 855
Hsu, J.C., 1984; Ph.D. Thesis, University of Texas, Austin
Jones, B.F., Herbig, G.H., 1979; A.J., 84, 1872
Moneti, A., Pipher, J.L., Helfer, H.L., McMillan, R.S., Perry, M.L., 1984; Ap.J., 282, 508
Ungerechts, H., Thaddeus, P., 1987; Ap.J. Suppl., 63, 645

https://doi.org/10.1017/S007418090019922X Published online by Cambridge University Press