The Vela Molecular Ridge: a laboratory for testing physical scenarios leading to a standard Initial Mass Function

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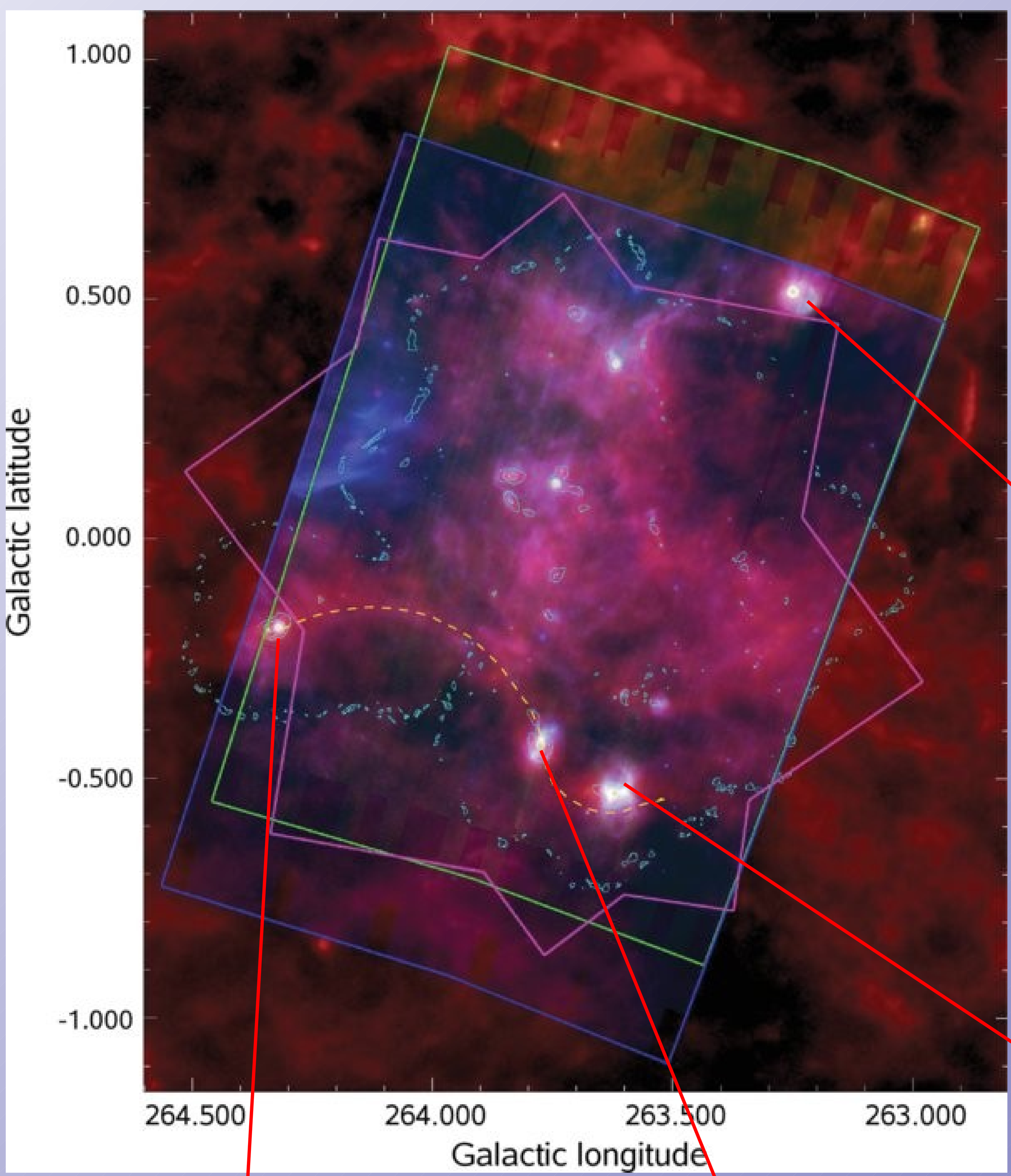
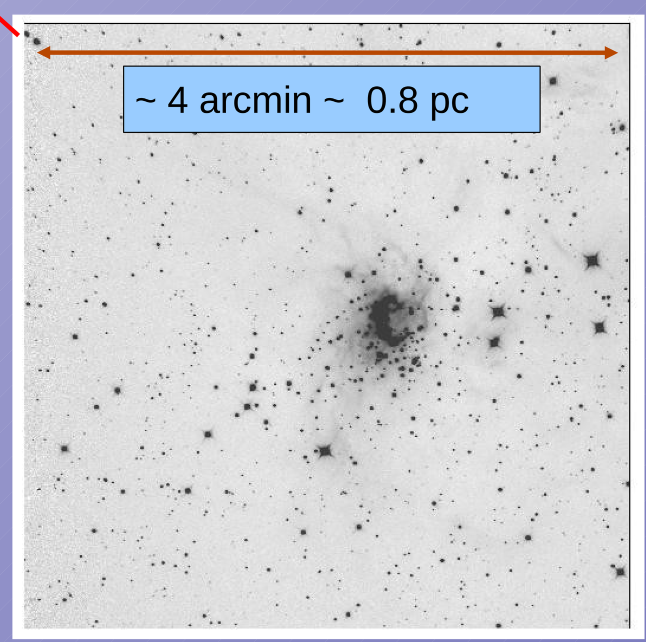
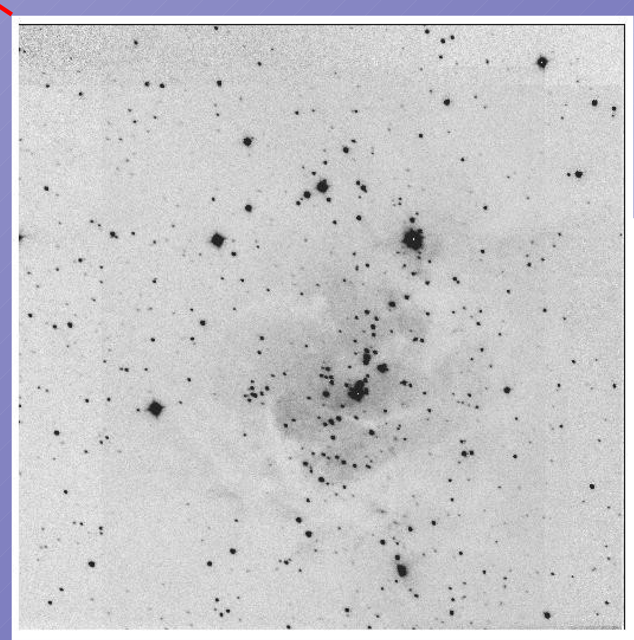
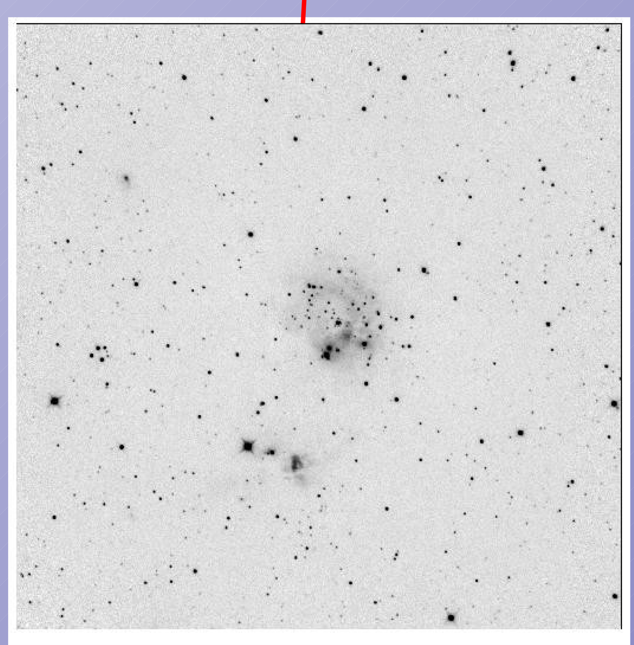


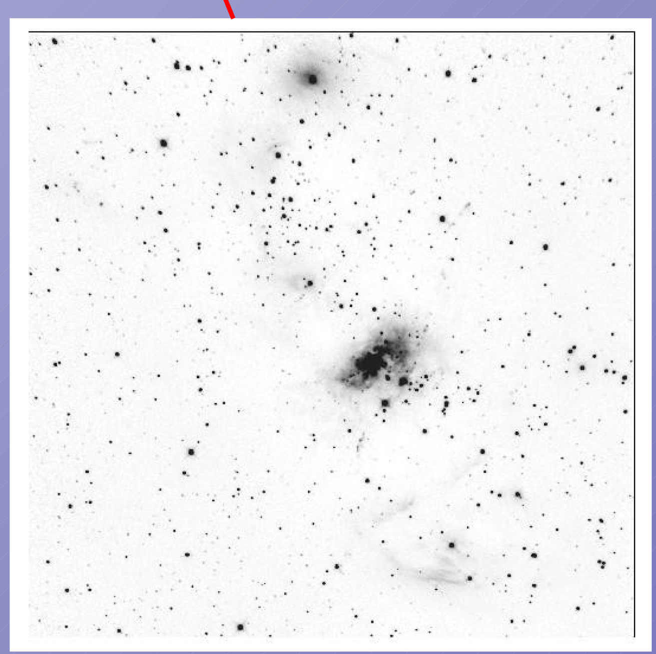
The Vela Molecular Ridge (VMR) is a close-by Giant Molecular Cloud complex in the Galactic Plane, outside the Solar circle. It is composed of 4 main clouds called A, B, C and D (Murphy & May 1991). Clouds A, C and D lie at a distance of about 700 pc (Liseau et al.1992). We have studied a part (~1 square deg) of cloud D in a wide range of wavelengths, from the NIR to the mm. We found that it hosts a number of young embedded clusters (age ~1 Myrs) whose IMF (Massi et al. 2006) is consistent with a standard IMF (e.g., Scalo 1998), along with a diffuse population of YSOs (de Luca et al. 2007, Giannini et al. 2007, Strafella et al. 2010). The most massive members of the clusters are intermediate-mass young stars (Massi et al. 1999, 2003). We identified also a number of prestellar and protostellar cores by using FIR (BLAST) and mm (SEST) observations (Olmi et al. 2009, Massi et al. 2007, Elia et al. 2007). The dynamics of the cores has been studied by Olmi et al. (2010).The VMR has proved to be a suitable laboratory to investigate the physical mechanisms leading to an Initial Mass Function.

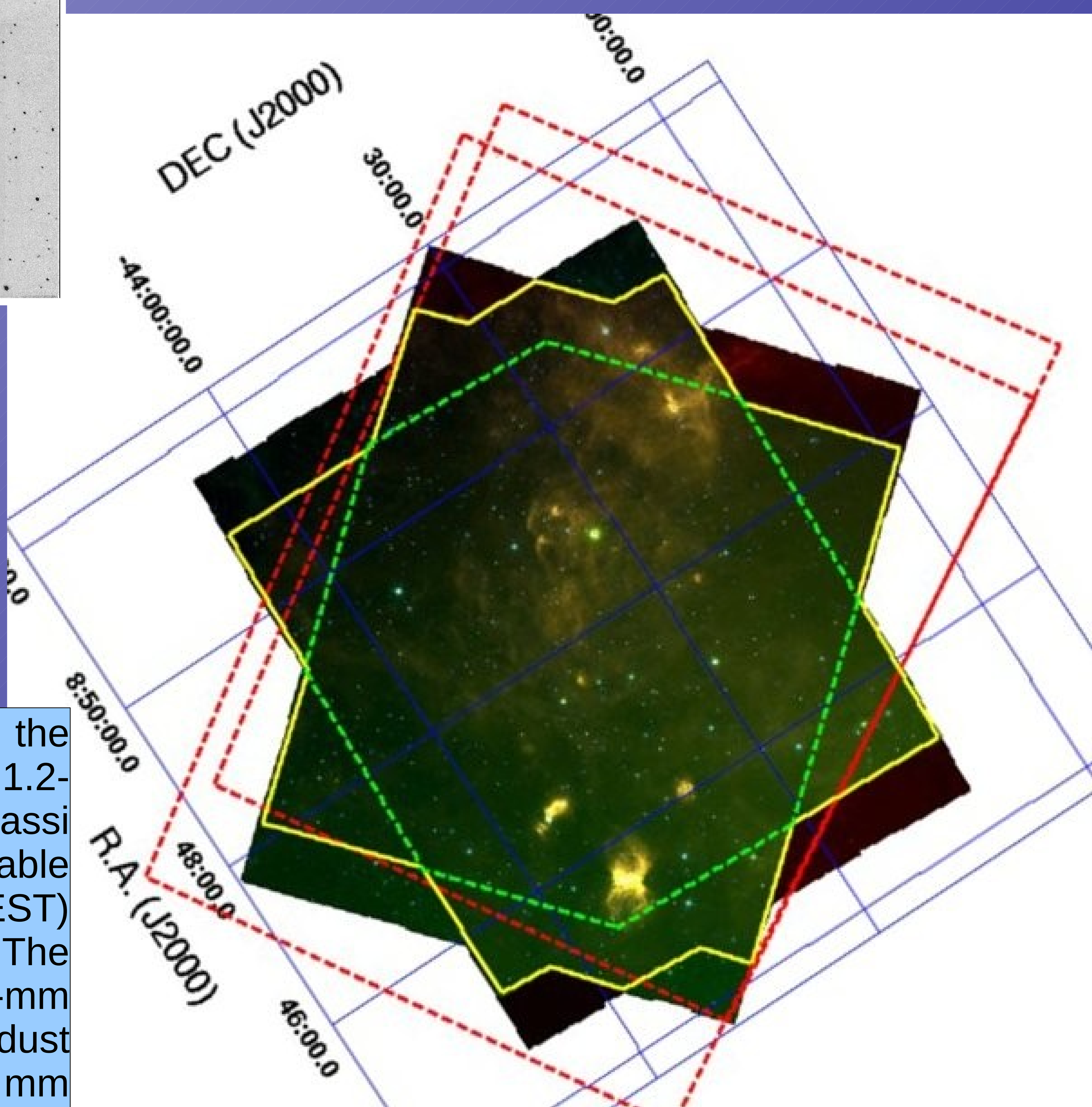


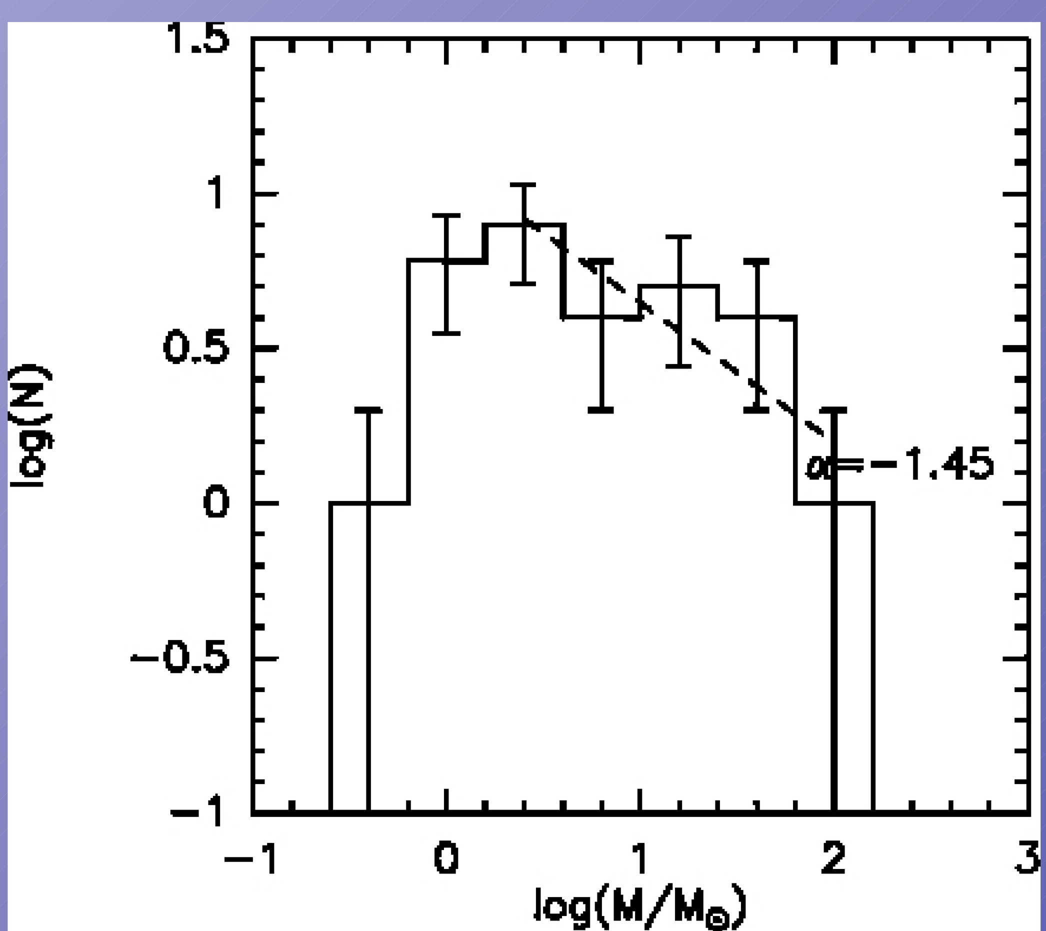
On the left, false colour image (blue: MIPS 24 micron, green: MIPS 70 micron, red: BLAST 250 micron) of cloud D (Olmi et al. 2009). The outer boxes show four of the young embedded clusters associated with cloud D (SofI/NTT, K band, ~4 arcmin x 4 arcmin). Below, false colour image (blue: IRAC 3.6 micron,green: IRAC 5.8 micron, red: IRAC 8 micron) of the same region (Strafella et al. 2010).

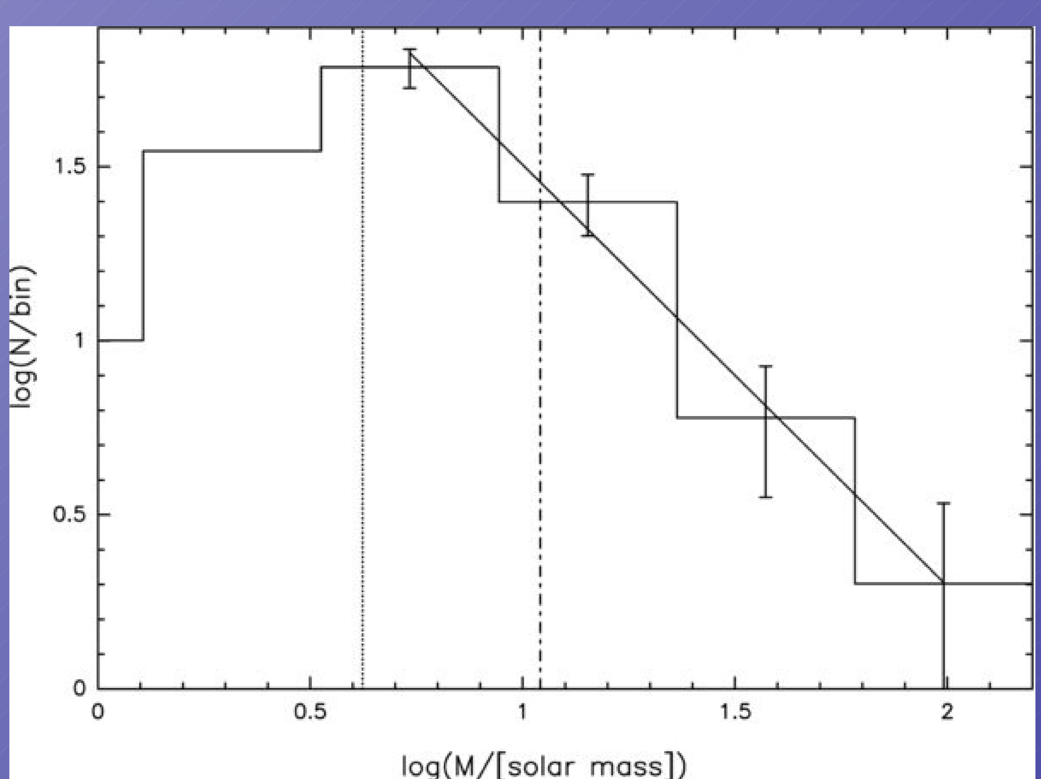












On the left, the mass function of the identified cores derived by using only 1.2-mm, SIMBA/SEST data (upper box, Massi et al. 2007), and by combining all available FIR (MIPS, BLAST) to mm (SIMBA/SEST) data (lower box, Olmi et al. 2009). The masses were derived from the 1.2-mm continuum emission by adopting a dust temperature of ~30 K. By using FIR to mm data, the dust temperature could be inferred from SED fits. The mass function derived by using only 1.2-mm data is flatter ($dN/dM \sim M^{-1.45}$) than a standard stellar IMF, whereas by using also FIR observations we obtained a Salpeter-like mass function ($dN/dM \sim M^{-2.3}$). The discrepancy might be due to incompleteness in the 1.2-mm data; however, this shows that some caution has to be adopted when inferring mass functions for samples of prestellar and protostellar cores.

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