

P121b Probing Initial Conditions of Star Cluster Formation in Serpens South

Fumitaka Nakamura (NAOJ), Hiroyuki Nishitani (NRO), Tomhiro Tanaka (Osaka Pref. Univ.),
Koji Sugitani (Nagoya City Univ.)

The majority of stars form in clusters (Lada & Lada 2003). Therefore, understanding the formation process of star clusters is a key step toward a full understanding of how stars form. However, the initial conditions of cluster formation remain to be elucidated because of the lack of the observational characterization. This is because once active star formation is initiated, stellar feedback such as protostellar outflows and radiation rapidly shapes their surroundings, making it difficult to track back the physical conditions of the clumps prior to active cluster formation, i.e., pre-protocluster clumps.

Recently, we discovered a nearest pre-protocluster clump that is located in the Serpens South infrared dark cloud (IRDC) at a distance of $d \sim 400$ pc. CCS is extremely abundant in the clump, indicating the chemical youth of the clump (0.1 – 0.3 Myr). In addition, on the basis of multi-line observations, we found two or three velocity-coherent filaments with different line-of-sight velocities. From these characteristics, we propose that the Serpens South protocluster has been formed by a filament-filament collision and the collision has just happened at the southern tip of the pre-protocluster clump. In this presentation, we will present the evidence of the filament-filament collision that has triggered active cluster formation in this region within 0.5 Myr.