FILAMENTARY STRUCTURE OF SERPENS MAIN AND SERPENS SOUTH SEEN IN N_2H^+, HCO^+, AND HCN

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We present the N_2H^+ ($J = 1 \rightarrow 0$) map of the Serpens Main and Serpens South molecular cloud obtained as part of the CARMA Large Area Star Formation Survey (CLASSy). The observations cover 150 arcmin^2 and 250 arcmin^2, respectively, and fully sample structures from 3000 AU to 3 pc with a velocity resolution of 0.16 km s^{-1}. They can be used to constrain the origin and evolution of molecular cloud filaments. The spatial distribution of the N_2H^+ emission is characterized by long filaments that resemble those observed in the dust continuum emission by Herschel. However, the gas filaments are typically narrower such that, in some cases, two or three quasi-parallel N_2H^+ filaments comprise a single observed dust continuum filament. Our results suggest that single filaments seen in Serpens South by Herschel may in fact be comprised of multiple narrower filaments. Some molecular filaments show velocity gradients along their major axis, and two are characterized by a steep velocity gradient in the direction perpendicular to the filament axis. The observed velocity gradient along one of these filaments was previously postulated as evidence for mass infall toward the central cluster, but these kind of gradients can be interpreted as projection of large-scale turbulence. Finally we compare the morphologies of these N_2H^+ filaments with those detected in HCO^+ and HCN. In Serpens South we find that the N_2H^+ and dust maps are well correlated, whereas HCO^+ and HCN do not have regularly have N_2H^+ counterparts. We postulate that this difference is due to large-scale shocks creating the HCO^+ and HCN emission.