Q16a Do stars destroy their gaseous nurseries?

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Stars are born within dense molecular gas clouds that form the coldest phase of the interstellar medium (ISM). The properties of these clouds such as their mass, radius and velocity dispersion, are the first environment a star feels. It is therefore these clouds that control the stellar birth rate. Yet once a star is born, it will also affect the cloud. Gas is removed to form the star which then releases heat into its surrounding gaseous nursery. How this relationship plays out is not clear. Does the star destroy the cloud which is unable to go on forming stars? Or is the cloud's evolution predominantly governed by external forces such as interactions with other clouds?

In this work, we compare four simulations of a Milky Way galaxy disc. The simulations were performed with the adaptive mesh refinement (AMR) code, Enzo, and resolve the gas to $< 10\,\mathrm{pc}$. The first simulation has only gravity, the second includes star formation but no feedback, the third adds in a radius-dependent photoelectric heating term and the forth includes local thermal feedback from supernovae. The properties of the clouds are analysed in each simulation, comparing how the roles of gravity, localised and non-localised feedback affects the cloud population. We conclude that localised thermal feedback (supernovae) suppresses the star formation but does not destroy the cloud. In contrast, gravitational interactions between the clouds are frequent, occurring multiple times per orbital period. These likely have a strong impact on cloud (and therefore star formation) evolution.