Feedback in massive star forming regions: from simulations to observations

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The early stages of the formation of massive stars, as well as their interaction with their natal environment, are still not fully understood. It is common knowledge that young massive stars influence their immediate surroundings via their strong stellar winds and ionising radiation, but the role of this mechanical and radiative feedback on the star formation process as well as its dependence on the properties of star forming regions is yet to be understood in detail. Also, understanding the interplay between young massive stars and star clusters with their parent molecular clouds can yield important clues on both the formation of individual massive clusters and the global evolution of galaxies. Simulations of star forming clouds that include the feedback of ionisation and winds predict that the radiation from massive clusters clears bubble-shaped gas voids, exposing pillar-like structures, reduces the overall star formation rate, and affects the geometrical distribution of stars in the vicinity. While many of the morphological aspects of massive star forming complexes predicted by simulations are in qualitative agreement with observations, a detailed quantitative comparison between simulations and observations is still lacking.
In our project (FuSIOn, Feedback in massive star forming regions: from SImulations to Observations), we seek to statistically validate the predictions of the above mentioned numerical simulations by surveying feedback in high mass star forming regions selected from large scale multi-wavelength surveys of the Milky Way. We are using the extensive library of numerical simulations of high-mass star formation with feedback assembled by Dale et al. to extract time-dependent observable parameters (stellar luminosity function, cold gas reservoir and dynamics and the hot/ionized gas content) to be compared with observational data. We will ultimately compile a thorough quantitative comparison between simulations and observations.