The Influence of Feedback from High-Mass Stars on the Formation of a New Generation of Stars

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High-mass stars can influence their surrounding environments both in destructive and constructive ways. The strong stellar wind and ultraviolet radiation field of high-mass stars destroy their natal clouds, and thereby suppress subsequent star formation. High-mass stars can, in contrast, trigger the formation of a new generation of stars under specific conditions. However, the physical causality between feedback from high-mass stars and a sequential star formation event has been indirectly inferred from observations although a number of previous studies have suggested the age gradient of young stellar objects and the morphology of gas structures as evidence for feedback-driven star formation. Here we show on the basis of gas and stellar kinematics that the feedback from O-type stars is indeed responsible for the formation of a new generation of stars in the young open cluster NGC 1893. High-resolution spectrograph Hectochelle and Immersion Grating Infrared Spectrograph capture the radial motion of hot and warm gas moving away from the O-type stars in the center of the cluster. Young stars in the vicinity of the tadpole nebula Sim 130 also show a systematic redward velocity relative to the systemic velocity of the cluster. This coincidence of the velocity fields between the young stars and expanding gas indicates that the formation of these young stars took place in gas swept by the O-type stars. Our results strongly suggest the most convincing physical causality between feedback from high-mass stars and the formation of a new generation of stars.