Triggered Star Formation in a Turbulent ISM
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Triggered cluster formation in the RMC

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Abstract. A comprehensive study of clustered star formation in the Rosette Molecular Complex was carried out based on archived data from the 2 Micron All Sky Survey. We presented strong evidence that triggered formation of embedded clusters and stellar aggregates took place in the working shells of the Rosette Nebula, a spectacular HII region excavated by the dozens of OB stars of the emerging massive cluster NGC 2244. Surprisingly, we have identified, within the confines of NGC 2244, a distinct congregation of young stellar objects showing prominent NIR excess that forms an arc like structure in appearance. Its location right to the south-east of the center of the main cluster and its strange morphology indicate most likely an origin from a former working shell of the HII region. This relic arc and the large, fragmented working surface layer of Rosette with the ambient cloud roughly show a concentric origin in morphology. This implies also a common origin of the clusters or stellar aggregates in association. The formation of massive star clusters was evidenced further into the heart of the molecular complex, and structured clustering star formation seemed to have taken place toward the south-east edge of the complex.

Keywords. stars: formation, ISM: clouds, ISM: structure

1. The Formation of New Generation OB clusters in the RMC

The surface density distribution of the 2MASS sources toward the RMC indicate distinctively the existence of two outstanding clusters, one corresponds to the emerging OB cluster NGC 2244, the other is a newly hatched massive cluster in the densest ridge of the RMC that is located ~ 20 pc to the southeast boundary of the Rosette Nebula.

2. Modes of Star Formation in the RMC

The spatial distribution of the sources indicating apparent excessive emission in the NIR toward the RMC shows the coexistence of distributed or isolated star formation and clustered star formation. However, when we restrict to only sources with higher H-K color, the distribution of the excessive emission sources appear to be congregated to multi-shell structures surrounding the main cluster. This definitely suggests an externally triggered origin of the shell clusters or stellar aggregates. Prominent new generation OB clusters were identified further into the molecular complex in the densest ridge. However, star formation toward the southeast edge of the RMC appears to be in a highly structured mode. A tree model was introduced to interpret the structured clustering of star formation that follows most likely tracks of the decay of macro-turbulence, in which the forming OB clusters are located at the root of tree pattern.

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