

STAR FORMATION IN 30 DORADUS *

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Abstract

Using observations obtained with the Wide-Field Camera 3 on board the *Hubble Space Telescope*, we have studied the properties of the stellar populations in the central regions of 30 Dor in the Large Magellanic Cloud. The observations clearly reveal the presence of considerable differential extinction across the field. We characterize and quantify this effect using young massive main-sequence stars to derive a statistical reddening correction for most objects in the field. We then search for pre-main-sequence (PMS) stars by looking for objects with a strong ($>4\sigma$) $H\alpha$ excess emission and find about 1150 of them over the entire field. Comparison of their location in the Hertzsprung-Russell diagram with theoretical PMS evolutionary tracks for the appropriate metallicity reveals that about one-third of these objects are younger than ~ 4 Myr, compatible with the age of the massive stars in the central ionizing cluster R 136, whereas the rest have ages up to ~ 30 Myr, with a median age of ~ 12 Myr. This indicates that star formation has proceeded over an extended period of time, although we cannot discriminate between an extended episode and a series of short and frequent bursts that are not resolved in time. While the younger PMS population preferentially occupies the central regions of the cluster, older PMS objects are more uniformly distributed across the field and are remarkably few at the very center of the cluster. We attribute this latter effect to photo-evaporation of the older circumstellar disks caused by the massive ionizing members of R 136.

Footnote

* Based on observations with the NASA/ESA *Hubble Space Telescope*, obtained at the Space Telescope Science Institute, which is operated by AURA, Inc., under NASA contract NASS-26555.

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