

The Spatially Resolved Star Formation History of NGC 300

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ABSTRACT

We present the star formation histories (SFH) of two regions in NGC 300 from the ACS Nearby Galaxies Survey Treasury (ANGST). ANGST is using the *Hubble Space Telescope (HST)* to determine the star formation histories of a volume-limited sample of nearby galaxies. We demonstrate that even small regions within a galaxy contain enough stars to derive the SFH by comparing color-magnitude diagrams (CMDs) of the resolved stellar populations to synthetic CMDs from stellar evolution models. Of the two regions selected, one can be identified as star-forming from its UV, H α , and dust emission. The SFH of this region shows significant star formation over the past 10 Myr, unlike a non-star-forming region of the same size. These preliminary results will form the basis of a larger study of spatially-resolved star formation in nearby spirals.

Subject headings: galaxies: star formation

1. Introduction

The ACS Nearby Galaxy Survey Treasury (Dalcanton 2008) was designed to create a volume-limited sample of nearby galaxies, allowing for an unbiased accounting of star formation in the nearby universe. The high resolution of *HST* brings us resolved stellar populations in nearby spirals, providing enough stars to obtain detailed star formation histories in different regions. For each region, we find the combination of synthetic CMDs from stellar evolution models (Girardi et al. 2002) that provides the best fit to the observed CMD, using the software and method described in Dolphin (2002).

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2. Results

Figure 1 shows NGC 300 at four wavelengths: UV (Gil de Paz et al. 2007), optical (ANGST), $H\alpha$ (Larsen & Richtler 1999), and mid-IR (Helou et al. 2004). Two small regions were selected as test cases: one region with strong UV, $H\alpha$, and dust emission which indicates that it is currently star-forming, and one region which appears to be non-star forming. We selected individual stars in these regions from ANGST photometry; CMDs are shown in Figure 2. The star-forming region has several young main sequence and helium-burning stars, while the stellar population of the non-star-forming region is older.

Figure 3 shows the star formation histories derived from the observed CMDs. There is a clear difference in recent SFH between the two regions: UV, $H\alpha$, and dust emission correspond to a pronounced spike in star formation over the past 10 Myr, while the region which is faint at these wavelengths shows no star formation in the past 10 Myr.

3. Future Work

The two regions shown here are only an example of the type of results we expect from ANGST. With deep photometry of resolved stars (for NGC 300, we have 50% completeness at 27.3 mag in F606W), we can find the SFH for any region of interest selected in any waveband. Projects underway include analyses of the radial variation of SFH and the dependence of SFH on the UV/ $H\alpha$ flux ratio. The volume-limited sample of ANGST will allow us to characterize the star formation history of the nearby universe.

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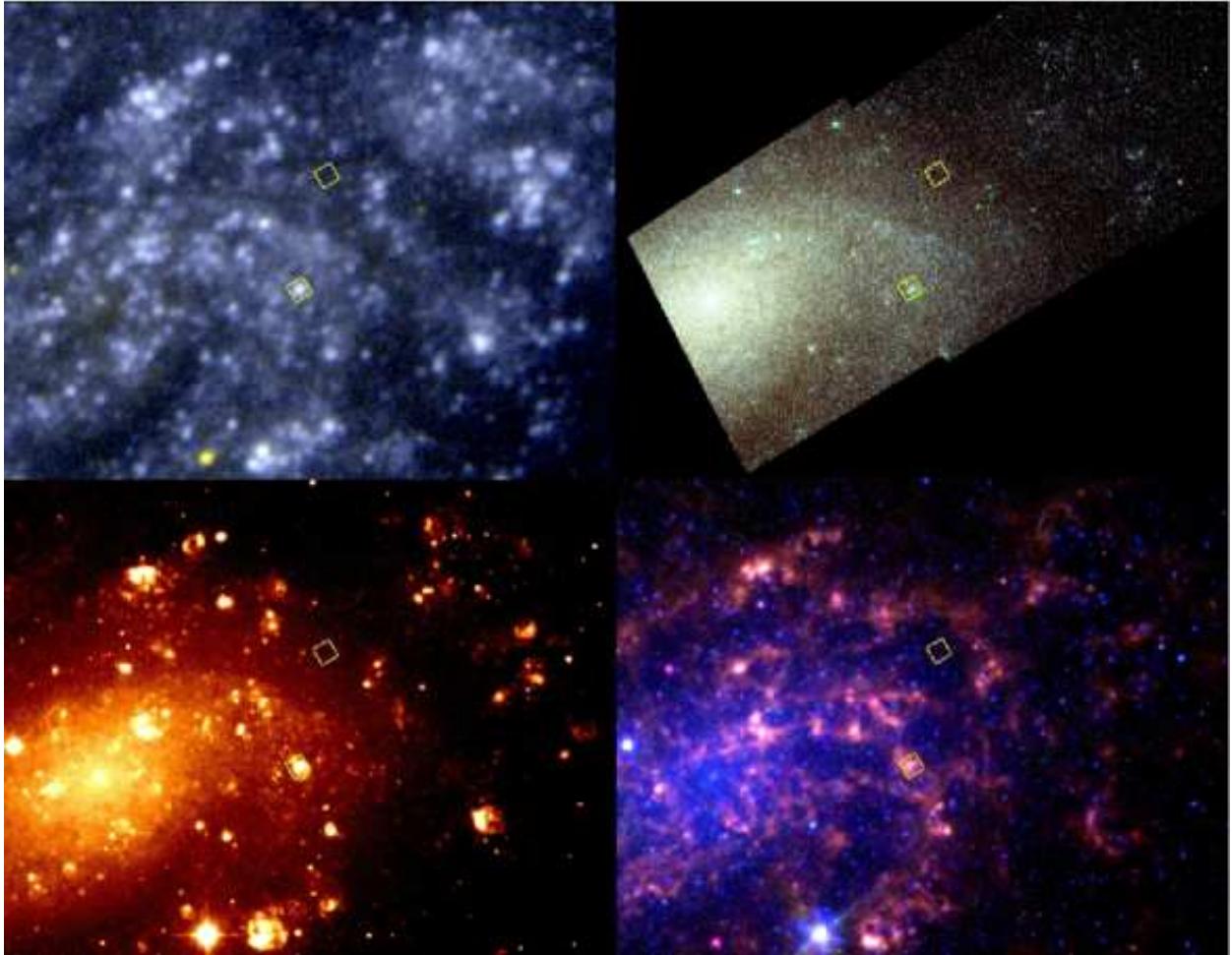


Fig. 1.— NGC 300 in 4 wavelengths. Top left: GALEX (FUV in blue, NUV in red, average in green); top right: HST/ACS (F555W in blue, F606W in green, F814W in red); bottom left: $H\alpha$; bottom right: Spitzer (4.5 μm in blue, 5.8 μm in green, 8.0 μm in red). Square regions outlined in yellow are the star-forming (SF, bottom left) and non-SF (top right) regions referred to in the figures below.

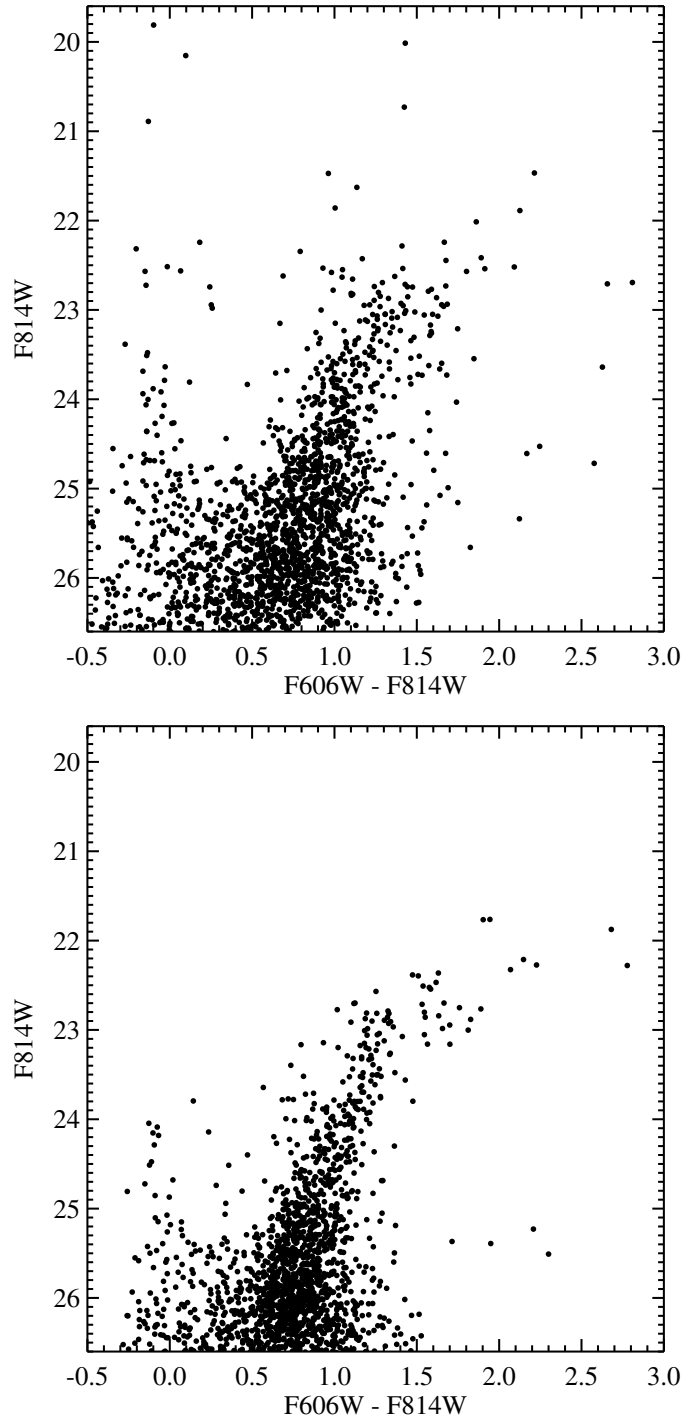


Fig. 2.— CMDs of SF (upper) and non-SF (lower) regions. The SF region shows a population of young main sequence and helium burning stars which are absent in the non-SF region.

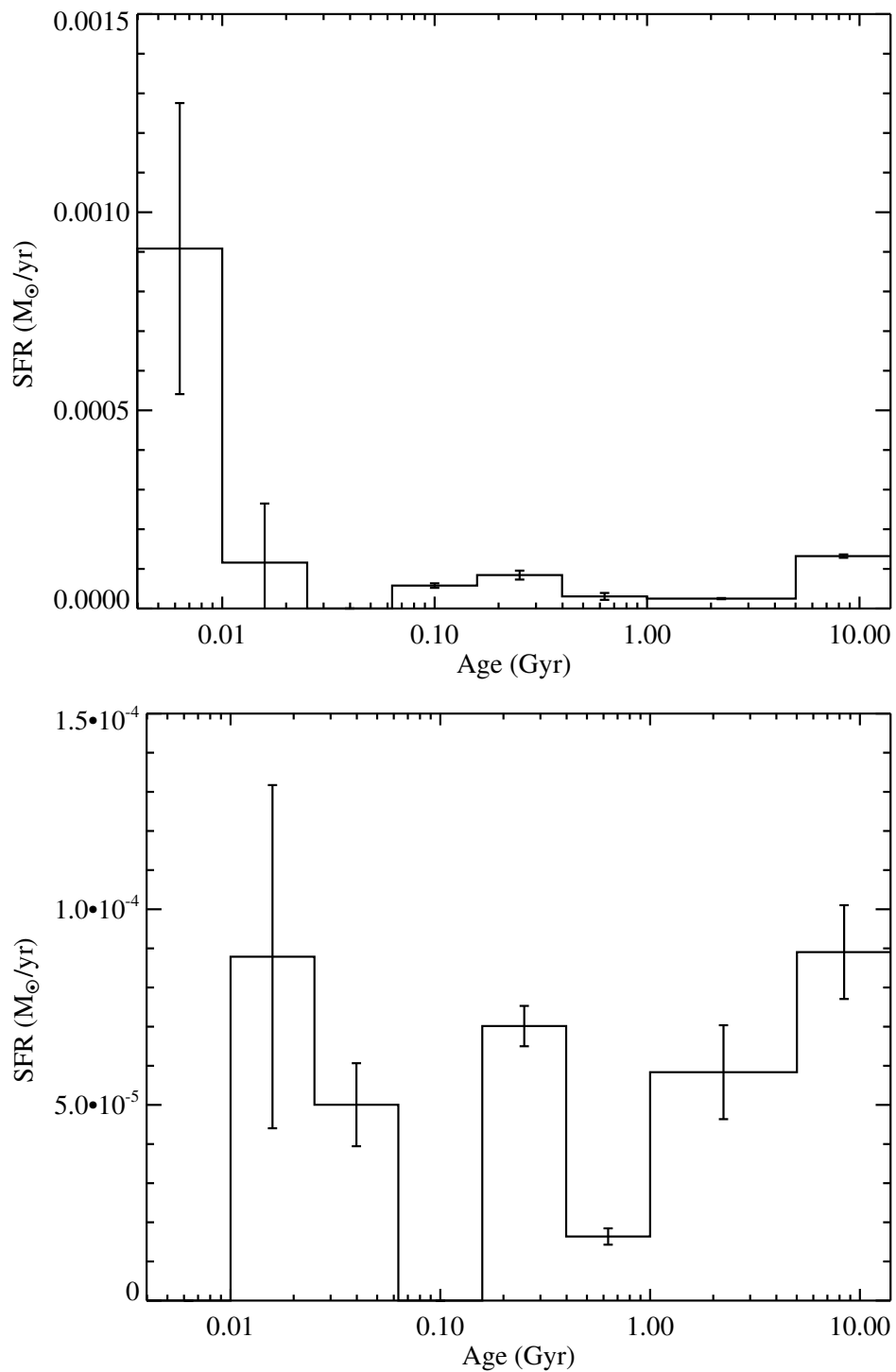


Fig. 3.— Star formation histories of SF (upper) and non-SF (lower) regions. The pronounced recent SF in the upper plot corresponds to enhanced UV, $H\alpha$, and dust emission in Figure 1. Note the different scales on the y axis.