

## Tracking Star Formation in Dwarf Galaxies

"Dwarfs are the most numerous class of galaxies, but until recently they got little press," says Susan Gessner (University of Alabama). These small conglomerations of stars and interstellar matter provide a simple environment in which to study star formation. It was once thought that dwarfs had enough gas and dust to sustain only an initial burst of star formation; subsequent stellar winds and supernova explosions blew away all the remaining material. Yet many dwarfs have been found to contain very young stellar populations, testifying to recent star-forming activity. Furthermore, most dwarfs lack a spiral density wave — the mechanism by which star formation is generated in disk galaxies like the Milky Way.

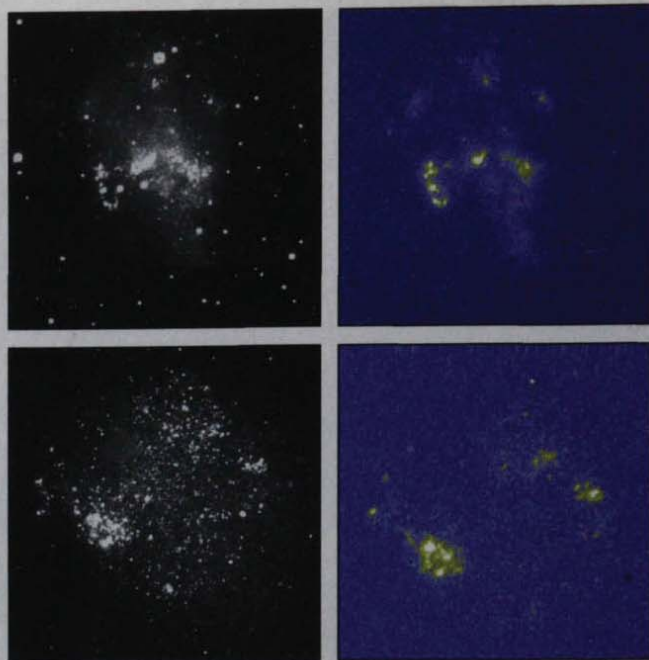
To address this problem a team of astronomers led by Gessner imaged several dwarf galaxies with the Ultraviolet Imaging Telescope (UIT), part of the Space Shuttle's Astro 2 payload in 1994 (*S&T*: June 1995, page 11). A galaxy's star-forming complexes can be very conspicuous in both far-ultraviolet and hydrogen-alpha emission, but the latter "shuts off" once the gaseous reservoirs of raw material are consumed or dissipated. Thus, comparing UIT images to H-alpha ones has allowed Gessner and her colleagues at NASA's Goddard Space Flight Center to date the star-forming regions in these dwarfs.

For instance, Holmberg 2, an irregular member of the M81 group, possesses an arc of embryonic stellar complexes that climb in age from 3 million years at one end to 6 million at the other. IC 2574, another companion to M81, also shows a structured pattern of star formation across its face.

Sextans A, a probable member of the Local Group, was the team's third target. This irregular, box-shaped galaxy was found to have regions of star formation in two corners, both of which await dating by the means described above. However, Deidre A. Hunter (Lowell Observatory) and Julia D. Plummer (Washington State University) have imaged the boxy dwarf at several wavelengths. Their study shows that, overall, Sextans A is forming stars at a low rate, some 6 Suns per millennium, typical for irregular galaxies. And it's doing so only where densities exceed a critical threshold.

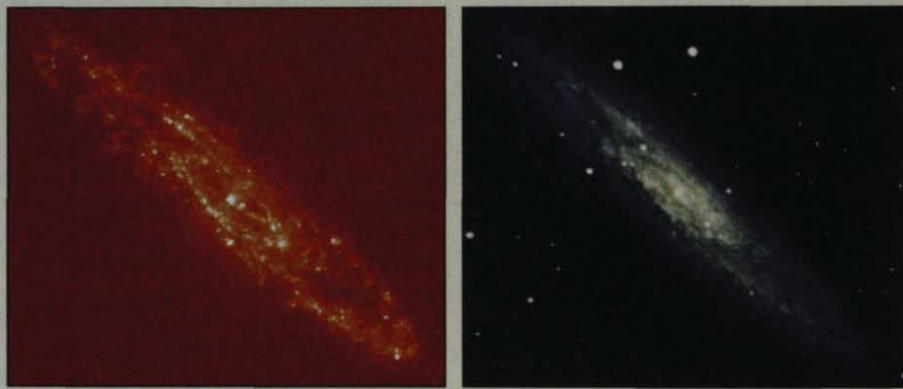
These studies are but clues toward deducing the means by which star for-

Star formation in dwarf galaxies. Star-birth has progressed from left to right along Holmberg 2's luminous arc, shown at visible-light (*upper left*) and far-ultraviolet (*upper right*) wavelengths. Sextans A, also shown in visible (*lower left*) and far-UV (*lower right*) light, has two star-forming complexes that may have been triggered by accretion. UV frames courtesy S. Gessner and the UIT team. Visible-light images courtesy Kwang-Ping Cheng (California State University, Fullerton) and J. Plummer, respectively.



mation is triggered in all three objects. While Gessner suspects that the accretion of a gas cloud may be at work within Sextans A, internal mechanisms seem more likely for the patterns seen

in Holmberg 2 and IC 2574. Gessner and Plummer presented their results at January's meeting of the American Astronomical Society in San Antonio, Texas.



## Sculptor-Group Surprises

A team of astronomers from New Mexico State University has mapped the distribution of diffuse ionized gas in three members of the Sculptor galaxy group. Charles G. Hoopes, René A. M. Walterbos, and Bruce Greenawalt used the 24-inch Curtis Schmidt telescope at Cerro Tololo Inter-American Observatory to obtain images of NGC 253, NGC 55, and NGC 300 in the light of hydrogen-alpha emission. In NGC 253, shown at upper left, the diffuse interstellar medium is present throughout the disk but traces the galaxy's spiral arms especially. An oblique viewing angle and heavy dust obscuration make these arms difficult to discern in a visible-light image, such as the photograph at upper right. A similar gas distribution is seen in the other Sculptor galaxies. Diffuse ionized gas is a useful probe of a galaxy's interstellar medium and may fill as much as 10 to 20 percent of a spiral's disk. Astronomers still aren't sure how this gas becomes ionized, but ultraviolet radiation from O and B stars is a likely source. The visible-light photograph was obtained by Peter Riepe, Stefan Binnewies, and Dieter Sporenberg with a Celestron C11 catadioptric telescope and hypered Kodak Ektar 100 film. H-alpha image courtesy Charles Hoopes. South is up and west is to the left in each panel.