

JET INDUCED STAR FORMATION IN CENTRALLY DOMINANT GALAXIES?

Brian R. McNamara

Kapteyn Institute, Groningen, Netherlands

N 9 3 - 2 6 8 4 0

Using $U - I$ CCD color maps of two centrally dominant cluster galaxies, we find unusual color structures which may be due to star formation which has been induced by their radio sources. These objects, located in the clusters A1795 and A2597, have blue central colors to radii of ~ 20 kpc, spatially extended emission-line structures, and powerful radio sources. They reside at the centers of cooling flows with mass-accretion rates which are estimated to be $\gtrsim 300 M_{\odot} \text{ yr}^{-1}$. The regions of bluest local color are superposed on or along their radio-source structures (see Figure 1 for one example and McNamara & O'Connell 1992, AJ, Submitted). Our observations suggest that the radio sources associated with these objects may be inducing massive star formation in their central 20 kpc. The star formation may be the result of the radio plasma interacting with the warm emission-line gas and dense, X-ray-emitting filaments similar to those recently discovered in two other clusters with the *ROSAT* Observatory (Sarazin, O'Connell & McNamara 1992, ApJ, 389, L59; and in press). Since radio jets are likely to be transient, this may help to explain the scatter in the correlations between color and mass-accretion rate (*cf.* McNamara & O'Connell 1992 ApJ, 393,579), although other factors may also contribute. Alternatively, scattered radiation from a hidden active nucleus (Crawford & Fabian 1991, preprint; Sarazin & Wise 1992, preprint) or recent mergers may be responsible for the color structure. The color and radio properties of these objects are qualitatively similar but smaller in luminosity and spatial extent to those found in high redshift radio galaxies (McCarthy *et al.* 1987, ApJ 321, L29; Chambers *et al.* 1987, Nature, 329, 604.). Our observations of galaxies at $z \sim 0.06 - 0.1$ show that processes similar to "the alignment effect" found in high redshift radio galaxies occur at more recent epochs.

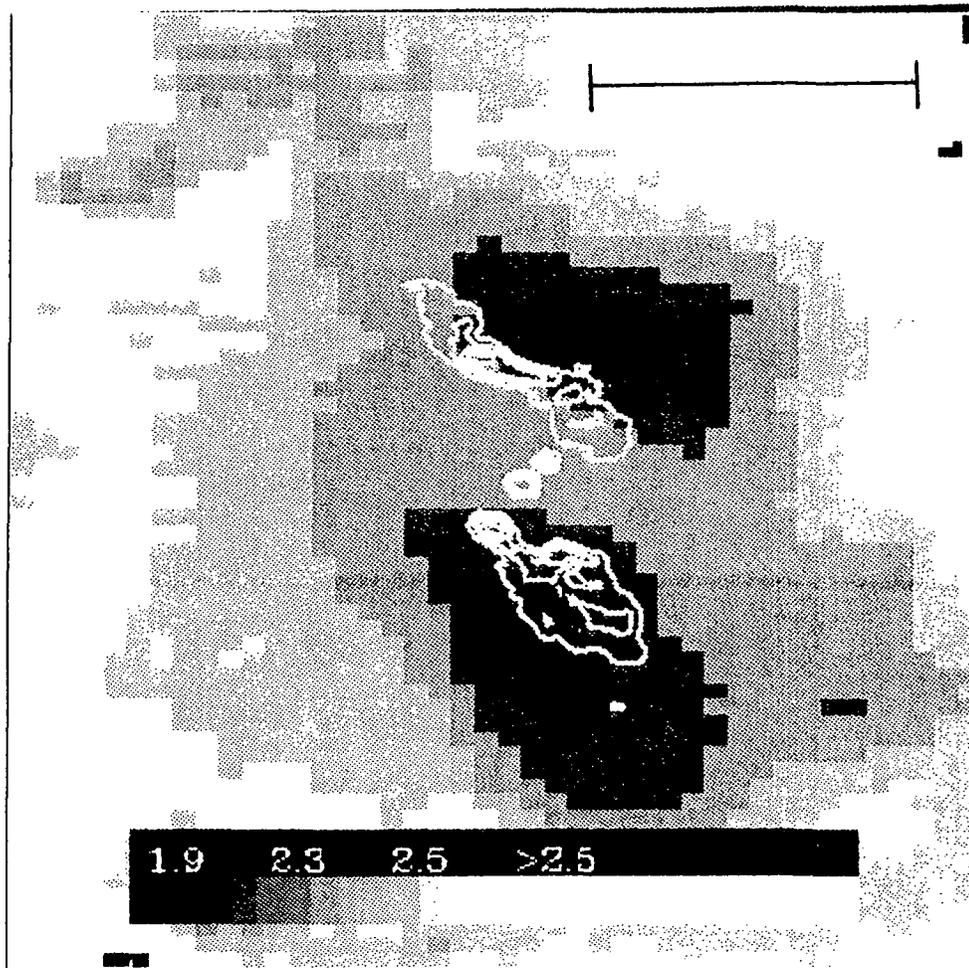


Figure 1 Gray scale version of a $U - I$ color map for the central region of the centrally dominant galaxy in the cluster Abell 1795. Superposed in white contours is a high resolution radio map at 3.6-cm (Ge 1991; PhD Thesis, New Mexico Tech). North is at the top, east is to the left; the scale bar to the upper right indicates 5 arcsec (~ 10 kpc; $H_0 = 50$ km/sec/Mpc). Both the U and I band images were smoothed with a 5×5 pixel sliding box before computing the color map. The white regions correspond roughly to old background population colors. The entire central ~ 20 kpc is bluer than a normal centrally dominant galaxy. The blue lobes are ~ 0.9 mag. bluer than normal. The region between and surrounding the blue lobes are 0.4–0.6 mag. bluer than normal. The radio and optical maps were aligned assuming the central radio source midway between the radio lobes is centered on the I-band nucleus. The blue lobes, primarily resulting from blue continuum light, are found along the edges of the radio lobes. The lobes are bluest in their centers. If the blue light is primarily due to massive star formation, the rate of star formation is $\sim 10 - 45 M_{\odot} \text{ yr}^{-1}$ for ages between 5 Myr and 4 Gyr, assuming the Local IMF (McNamara & O'Connell 1992, AJ, submitted).