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The Evolution of Radio Galaxies and X-ray Point Sources in Coma Cluster Progenitors Since z~1.2

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Using Chandra imaging spectroscopy and Very Large Array (VLA) L-band radio maps, we have identified radio sources at P_{1.4GHz} >=5x10^{23} W Hz^{-1} and X-ray point sources (XPSs) at L_{0.3-8keV}>=5x10^{42} erg s^{-1} in L>L* galaxies in 12 high-redshift (0.4<z<1.2) clusters of galaxies. The radio galaxies and XPSs in this cluster sample, chosen to be consistent with Coma Cluster progenitors at these redshifts, are compared to those found at low-z analyzed in Hart et al. (2009). Within a projected radius of 1 Mpc of the cluster cores, we find 17 cluster radio galaxies (11 with secure redshifts, including one luminous FR II radio source at z=0.826, and 6 more with host galaxy colors similar to cluster ellipticals). The radio luminosity function (RLF) of the cluster radio galaxies as a fraction of the cluster red sequence (CRS) galaxies reveals significant evolution of this population from high-z to low-z, with higher power radio galaxies situated in lower temperature clusters at earlier epochs. Additionally, there is some evidence that cluster radio galaxies become more centrally concentrated than CRS galaxies with cosmic time. Within this same projected radius, we identify 7 spectroscopically-confirmed cluster XPSs, all with CRS host galaxy colors. Consistent with the results from Martini et al. (2009), we estimate a minimum X-ray active fraction of 1.4+/-0.8% for CRS galaxies in high-z clusters, corresponding to an approximate 10-fold increase from 0.15+/-0.15% at low-z. Although complete redshift information is lacking for several XPSs in z>0.4 cluster fields, the increased numbers and luminosities of the CRS radio galaxies and XPSs suggest a substantial (9-10 fold) increase in the heat injected into high redshift clusters by AGN compared to the present epoch.

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