The Nature of the MicroJy Radio Source Population

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Abstract

We explore the nature of the microJy radio source population using the deepest ever image obtained at 610 MHz with the GMRT covering 1 deg^2 within the ELAIS N1 field down to a rms noise of 10 μJy and detecting 2800 sources. These observations are complemented by a JVLA 5 GHz image over a smaller area (0.1 deg^2) down to a rms noise of 1 μJy. These data probe the radio source population at flux densities well below the regime dominated by classical radio galaxies and Active Galactic Nuclei. We have matched 85% of the radio population to Spitzer/IRAC and obtained a redshift estimate for 63%. For the sources with redshifts, we have carried out a multi-wavelength study using Optical, Near-Infrared, Spitzer and Herschel data. We use a classification scheme based on X-ray emission, QSO-like SDSS spectroscopy, IRAC colours, and radio-loud AGN flags defined by the logarithmic ratio of the Far-IR to radio flux densities. On the basis of this classification, we find that at least 20% of the sources with redshifts are AGNs while the remaining are adopted as SFGs. We explore the evolution of the Far-IR radio correlation of our SFGs with redshift by binning in radio and infrared luminosities and we find evidence that the median value of the far-IR/radio luminosity decreases with increasing radio luminosity.