The faint radio sky: a tale of three populations P. Padovani¹, M. Bonzini¹, V. Mainieri¹, N. Miller², K. I. Kellermann³

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Abstract

We present the evolutionary properties and luminosity functions of the radio sources belonging to the Extended *Chandra* Deep Field South (E-CDFS) Very Large Array survey, which reaches a flux density limit at 1.4 GHz of 32.5 μ Jy at the field centre and redshift ~ 5. Our sample, which includes ~ 700 radio sources, is ~ 3.5 times larger than the CDFS one, on which our recent work was based, and is the deepest radio sample for which such results have ever been obtained. The sub-mJy radio sky turns out to be a complex mix of star-forming galaxies and radio-quiet AGN evolving at a similar, strong rate and declining radio-loud AGN. While the well-known flattening of the radio number counts below 1 mJy is mostly due to star-forming galaxies, these sources and AGN make up an approximately equal fraction of the sub-mJy sky. One of the main messages, especially to non-radio astronomers, is that radio surveys are reaching such faint limits that, while previously they were mainly useful for radio quasars and radio galaxies (i.e., non-thermal sources), they are now detecting mostly star-forming galaxies and radio-quiet AGN, i.e., the bulk of the extragalactic sources studied by infrared, optical, and X-ray surveys.