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Studying star-formation using low-frequency uGMRT observations

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1 Extended Abstract

Radio continuum emissions at low frequencies are dominated by the synchrotron radiation from the star-forming regions in the disk-galaxies and from the powerful active galactic nuclei (AGN) jets. These emissions from the star-forming galaxies (SFGs) give extinction-free estimates of star-formation. Deep radio observations have opened up a new window for studying the cosmic evolution in diverse source populations. We have extensively studied the ELAIS-N1 field using uGMRT centered at 400 MHz, 612 MHz and, 1.2 GHz. For 300-500 MHz observations, we reached the central off-source RMS noise of 15 μJy beam^{-1}, yielding a catalog of 2528 sources in 1.8 sq. degree of the sky. The flattening of differential source counts is observed at lower fluxes implying an increase in the population of SFGs and radio-quiet AGN. However, radio observations alone cannot reveal their true nature and a multi-wavelength study is essential for a comprehensive understanding of the physical and evolutionary properties of the various source populations. The ELAIS-N1 field is a widely studied extra-galactic field with a wealth of multi-band ancillary data. We thus classify the sources in SFGs and AGN to investigate the radio-IR relations which is one of the tightest correlations observed in astrophysics, up to z$\sim$2. The radio and IR wavebands were *k*-corrected to obtain the rest-frame flux values. We present the variation of monochromatic (at 24 and 70 μm) and bolometric(8-1000 μm) 'q' parameters with redshift. We measure significant non-linear slopes for all the radio-infrared relations highlighting the ambiguity in using q parameters to study the radio-IR relations.