Abstract

Understanding how galaxies form and evolve through cosmic time, and how these processes are influenced by active galactic nuclei (AGN) are important goals of modern astrophysics. In this context, “radio-mode AGN feedback” is a regular ingredient in cosmological models, yet from an observational perspective still rather poorly understood. It is considered to be a key feedback mechanism, related to central supermassive black hole mass growth, at work in the latest phases of massive galaxy formation, and controlling the galaxy’s stellar mass build-up.
Over the past decades our understanding of radio AGN was significantly advanced by panchromatic look-back sky surveys, and we have recently entered a “golden age” of radio astronomy thanks to upgraded and new facilities delivering now an order of magnitude increase in sensitivity. The VLA-COSMOS 3 GHz Large Project is based on 384 hours of observations with the upgraded, Karl G. Jansky Very Large Array (VLA) at 3 GHz (10 cm) toward the two square degree COSMOS field. The survey, reaching a median rms of 2.3 uJy/beam over the two square degrees at an angular resolution of 0.75″, contains 10,830 radio sources down to 5 times the rms. It simultaneously provides the largest and deepest radio continuum survey at such angular resolution to-date, bridging the gap between last-generation and next-generation radio surveys. These radio data, in conjunction with the panchromatic COSMOS data sets, allowed us to study the physical properties, composite nature (i.e., star-formation vs. AGN related contributions to the total radio emission of the sources), and cosmic evolution of radio AGN out to a redshift of about 6, which can directly be linked to the radio-mode feedback, as postulated in cosmological models.