Morphology and Environments of X-ray/Radio-Loud AGN in the GOODS Fields

A. M. Koekemoer (STScI), B. Mobasher (STScI), R. P. Norris (ATNF), B. Chan (U. Sydney), L. Cram (ARC), J. Afonso (Lisbon), C. Conselice (Caltech), N. A. Grogin (JHU), E. Chatcharitstot (Yale), C. Jackson (RSAA), S. Jogee, P. Padovani (STScI), R. Lucas (STScI), E. J. Schreier (STScI/AUI), C. M. Urry (Yale), R. Fosbury (ST-ECF), S. Ettori (ESO), GOODS Team

Abstract

The advent of ultra-deep X-ray surveys with Chandra, together with deep HST/ACS imaging and infrared studies of active radio sources, allows us to directly probe the physical properties of the environments, host galaxies and central accretion disks of the most distant radio galaxies. Here we present results from a combined program of one ultra-deep X-ray radio survey with the Australia Telescope Compact Array (ATCA) and GOODS near-infrared (1.6 and 3.6 µm) and radio (1.4 GHz) imaging, together with optical (B, V, i, z) imaging of the GOODS fields.

Introduction

A major question in modern astrophysics is the understanding of active galactic nuclei (AGN) and their role in their host galaxies. AGN dominate the energy output of the most luminous galaxies and are believed to be the engines that power the formation and evolution of galaxies. However, our current understanding of AGN is largely based on their proximity and therefore their environments are not well understood.

We present results from this combined program of multi-band GOODS (0.4–100 kpc) observations with ATCA and HST, together with optical (1.6 and 3.6 µm) and radio (1.4 GHz) imaging of the GOODS fields.

Observations

The radio and optical surveys covered a total area of 15 deg², divided into four parallel fields. The ATCA observations were obtained using the Australia Telescope Compact Array (ATCA), which consists of six 15 m radio antennas operating at 1.4 GHz, with a median noise level of 1 mJy/beam. The HST imaging was obtained using the Advanced Camera for Surveys (ACS), which consists of two cameras operating in the broadband filters of F606W, F814W, and F160W.

Discussion and Conclusions

The advent of ultra-deep X-ray surveys with Chandra, together with deep HST/ACS imaging and infrared studies of active radio sources, allows us to directly probe the physical properties of the environments, host galaxies and central accretion disks of the most distant radio galaxies. Here we present results from a combined program of one ultra-deep X-ray radio survey with the Australia Telescope Compact Array (ATCA) and GOODS near-infrared (1.6 and 3.6 µm) and radio (1.4 GHz) imaging, together with optical (B, V, i, z) imaging of the GOODS fields.

References


Figure 1. A composite image of the GOODS fields, highlighting the radio-loud AGN.

Figure 2. A diagram showing the relationship between the X-ray flux and the radio luminosity of the GOODS fields.

Figure 3. A diagram showing the relationship between the X-ray flux and the optical luminosity of the GOODS fields.

Figure 4. A diagram showing the relationship between the X-ray flux and the infrared luminosity of the GOODS fields.

Figure 5. A diagram showing the relationship between the X-ray flux and the ultraviolet luminosity of the GOODS fields.