Co-Evolution of Central Black Holes and Galaxies
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AGN in the GOODS Fields: Variability and Multiwavelength Detection

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Abstract. Active galactic nuclei can be identified in deep *HST* surveys using different selection techniques and multiwavelength data. We aim to produce a complete sample of AGN in the GOODS South and North fields by combining X-ray, optical and mid-IR selection criteria, including galaxies displaying nuclear optical variability.

Keywords. galaxies:active, galaxies:nuclei

Identifying AGN in deep surveys requires a multiwavelength, multi-technique approach. We identify intrinsically faint AGN in the GOODS fields via their nuclear optical variability and compare this selection to X-ray and mid-IR detection techniques. The high resolution achievable with *HST* allows for the detection of small flux changes in the nucleus by isolating the nuclear light within the non-varying host galaxy (Sarajedini *et al.* 2003, 2006). Eighty-five of 4174 galaxies (2%) display significant nuclear variability over a 6-month time period. About half of the variables are also X-ray and/or mid-IR detected AGN candidates (Alexander *et al.* 2003; Luo *et al.* 2008; Alonso-Herrero *et al.* 2006, Donley *et al.* 2008).

The variable AGN candidates span a wide range of absolute magnitudes, redshifts and colors. The faintest candidates ($M_B \approx -16$ mag) are generally variable but undetected in X-rays, indicating that variability is an important technique for identifying intrinsically faint AGN/host galaxies. The most luminous candidates are identified as both variable and X-ray sources. Spectroscopic surveys have identified 31% of the optical variables as BLAGN and $\sim$7% as NLAGN.

Future work includes investigating the nature of the optically variable populations, particularly the non-X-ray/IR detected variables. Variables will be confirmed with a longer baseline of two years which is available for part of the GOODS fields. We will also perform X-ray stacking to look for signs of weak X-ray emission and examine the host galaxy SEDs and morphologies.

References

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