Bootes Spectroscopic Redshift - Selection Functions and Completness - Version 1.0

The Bootes field is covered by only a few surveys each with different selection criteria. We have discussed about the Selection and Completeness Sections for each survey below.

1 AGES: The AGN and Galaxt Evolution Survey - Source 1

The AGES spectroscopic campaign is described by Kochanek et al. (2012) and measures in total 23745 redshifts within the Bootes field. The survey targeted 15 overlapping sub-fields in the Bootes field as shown in Figure 2. A full description of the various samples and sparse sample selection is beyond the scope of this document (readers are encouraged to look at the paper), but predominatly galaxies were targeted usign an $I < 20\,\mathrm{mag}$. For AGN targets selected in radio, X-ray, IRAC mid-IR and MIPS 24μm a faiter I band magnitude of 22.5 was used. Figure 1 shows the distribution of spectra measured in a plot of I band versus 3.6μm.

In the sub-fields spectra were attempted for 96.6% of the sample with a success rate of 93.6%, however fields 13, 14, 15 have lower fractions between (83–89%). As part of the survey 7102 AGN candidates were observed with redshifts obtained 5217 of which 4764 were not galactic stars.

2 SDSS DR12 - Source 2

The SDSS data covers the entirety of the Bootes field and provides measurements of 4283 redshifts of which 4274 are considered reliable. As the SDSS contains many different surveys with different selection criteria we refer the reader to the SDSS DR12 webpages. However, the main galaxy sample consists of galaxies with r-band Petrosian magnitudes $r \leq 17.77$ and r-band Petrosian half-light surface brightnesses $\mu_{50} \leq 24.5\,\mathrm{mag\,arcsec^{-2}}$ and are essentially ($\sim 99\%$) complete.

3 Houck et al, (2005) - Source 4

This paper follows up sources detected with a 24 μm in the NOAO region of the Bootes field. Thirty one sources from the 24 μm survey with $F_{24} > 0.75\,\mathrm{mJy}$ which are optically very faint ($R \geq 24.5\,\mathrm{mag}$) were followed up with the infrared spectrograph on SST. Of the 31 targetted 17 redshifts were detected. Sixteen of the seventeen sources are withing a redshift range of 1.7–2.8.

4 Weedman et al. (2009) - Source 8

Like Houck et al. (2005) this survey is following up sources detected at 24 μm, but with a limit of $F_{24} > 0.75\,\mathrm{mJy}$. Spectra were taken for 60 out of 100 sources, with 31 detections.

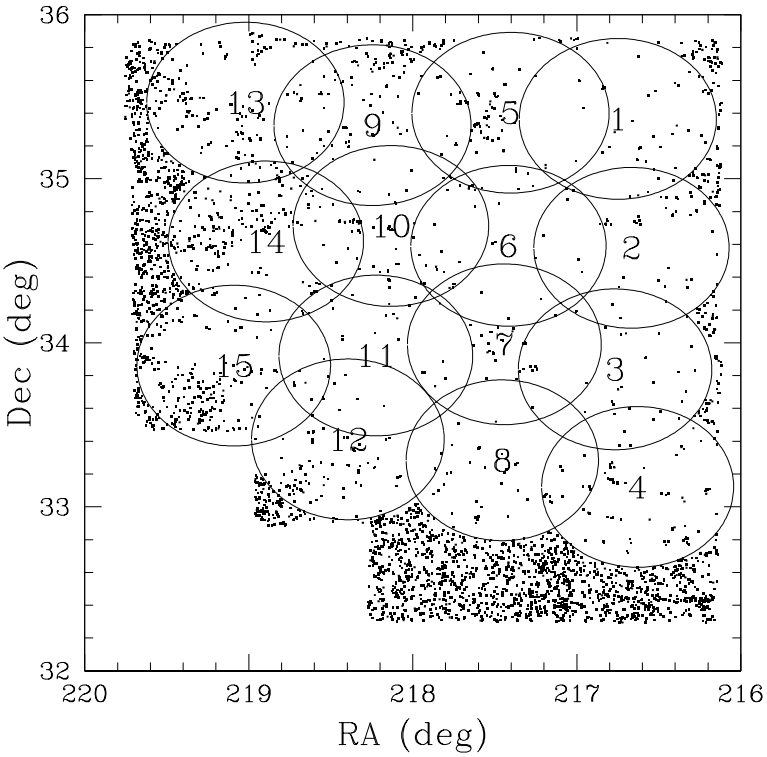

Figure 1 This figure has been taken from Figure 2 in the AGES paper (Kochanek et al. 2012). The caption taken directly from the paper is: The 15 standard sub-fields listed in Table 1. The points are the 2006/2007 primary galaxy sample targets (gcode06 neither zero nor 2048) lacking redshifts. Note the high completeness in the sub-fields and the significantly lower completeness elsewhere in the Bootes field. Some redshifts were obtained outside the standard fields because of the shifting centers of the individual Hectospec pointings.

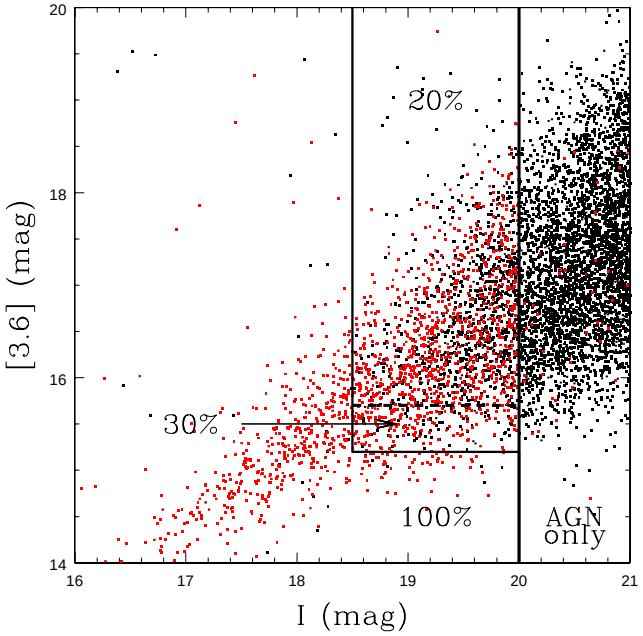

Figure 2 This figure has been taken from Figure 1 in the AGES paper (Kochanek et al. 2012). The caption taken directly from the paper is: The distribution of galaxies in I band and IRAC [3.6] magnitudes. The points are a randomly selected 10% of the sources in the main survey area, where red points have measured redshifts. The boundaries indicate the survey sampling regions and the sparse sampling rates. The actual fractions of redshift measurements in these regions are much higher than the nominal 20% or 30% sampling rates because of the different color weightings of the various bands and the observations of lower priority sources with unused fibers. AGN were targeted to fainter magnitudes, leading to the redshift measurements with $I > 20$ mag.