1. Overview

- We are imaging the CDFS and ELAIS-S1 SWIRE fields at 20 cm. Combining radio data with other wavelengths will help us understand the formation and evolution of early galaxies.
- When finished, this will be the widest (6") deep (10-15 µJy) radio survey ever. It will:
  - not be affected by dust obscuration
  - uncover rare classes of object
  - show obscured large-scale structure.
- This is an interim report — we are about half-way through the observations and have not yet reached our final sensitivity. Only CDFS data are shown here.
- We see a mixture of star-formation and AGN galaxies.
- We have combined radio, infrared, and optical data to produce SED fits and photometric redshifts. We also have spectroscopic redshifts for a subset.
- Stacking gives an rms \( \sim 1.5 \mu \text{Jy} \) and shows the radio-FIR correlation extends down to \( S_{\text{20cm}} \sim 10 \mu \text{Jy} \).
- We identify a class of radio sources with surprisingly little infra-red emission.

2. Observations & Data

Vital statistics:
- 809 radio components in current image.
- These correspond to 764 galaxies (because some galaxies have multiple radio components).
- 713 of these have SWIRE IDs (at any wavelength).
- 208 have good SED fits, yielding classifications and photometric redshifts.

Challenges
- Better calibration to remove sidelobes from 1 Jy source requires a better antenna primary beam model.

3. Results

A typical part of the field with 20 cm radio contours overlaid on 24 µm SWIRE image.

One of the remarkable features of this field is the vast amount of data at wavelengths ranging from radio to X-ray, and we have cross-identified 93% of our radio sources with optical/IR data. 208 of our radio sources have optical (ugriz from CTIO) and infrared (IRAC and MIPS) data good enough to fit SED templates to yield classifications and photometric redshifts. We also have AAO 2dF spectroscopy of a small number of galaxies. Of the 9 which have both spectroscopic and good photometric redshifts (shown above), 7 agree within 20%.

Some sources follow the radio-24µm correlation, indicating they are driven by star formation, while others have a strong radio excess, indicating AGN.

Stacking the radio data at the positions of known 24 µm sources enables us to probe very weak radio fluxes, and shows the radio-FIR correlation holds down to 10 µJy.

This 6mJy radio source (contours) is undetected at 20 cm, 4.5 µm, and 24 µm, indicating it is a radio-only source. Stacking the radio and IRAC data still shows a high radio-IR ratio. Stacking IRAC data still shows no counterparts, implying it is well below the detection threshold. These “IR-faint radio sources” may be very heavily obscured, or high-z, AGN.