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THE PHOENIX DEEP SURVEY: EVOLUTION IN THE MICROJANSKY RADIO POPULATION

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The era spanning $0 < z \lesssim 1$ is witness to strong evolution of star-formation in galaxies, evidenced by a decline of almost an order of magnitude in the space density of galaxy star-formation rates. Understanding galaxy evolution over this significant fraction of the age of the Universe is an extraordinarily complex undertaking. Investigation of this cosmologically significant era in a coherent fashion is complicated by the heterogeneous nature of the many surveys required to probe the full redshift range. The unknown extent of dust obscuration at different redshifts, extremely important for studies of star-formation, also adds to the complexity. These difficulties are being addressed by the Phoenix Deep Survey, an ongoing very sensitive radio survey. A homogeneous radio-selected catalogue of over 2000 sources reaching flux densities as faint as 50 μJy has been compiled.

The Phoenix Deep Survey includes observations made with numerous instruments. The 1.4 GHz mosaic was made with the Australia Telescope Compact Array (ATCA) in Narrabri, NSW, Australia. Use of a radio-selected sample avoids the complications of obscuration, and its homogeneity ensures that a consistent picture can be developed over the full redshift range of interest. This data are complemented by optical observations with the Anglo-Australian Telescope (AAT) at Coonabarabran, NSW, Australia, which include both imaging and spectroscopy. The 2dF spectrograph has successfully produced spectra for about 500 optical counterparts of catalogued radio sources. The imaging survey of the full 2° field was initially comprised of over 300 1k×1k R-band CCD images, with about half that many V-band images covering about half the field. This imaging allowed construction of an optical catalogue reaching about R=22, from which about half the catalogued radio sources were identified. Recently this has been supplemented by deeper 4-colour observations (BVRI), using the Wide Field Imager on the AAT, of three $30' \times 30'$ fields spanning the most sensitive portion of the radio survey. Designed to detect galaxies to about R=24, these new data will allow more radio sources to be optically identified, and photometric redshift estimates to be made for *all* the identified radio sources in these fields. Additionally, observations in the far-infrared with ISO and in the near-infrared from ground-based telescopes have also been obtained, as have 2.5 GHz radio observations with the ATCA, for selected objects. Together these data will allow construction of the largest homogeneously selected sample of star-forming galaxies spanning redshifts from 0 to 1.

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