Multi-waveband Luminosity Functions and Number Counts in the GOODS Southern Field

**Aims**

- Study the evolution of rest-frame UBRK luminosity functions (LFs) of galaxies in the range $0.1 < z < 1$ to constrain epoch of formation of red and blue galaxies.
- Study how changes in SFR with redshift affect U-band LF of galaxies in the range $0.1 < z < 1$.
- Constrain the mass assembly rate in galaxies at different epochs, using near-IR LFs.
- Study of optical and near-IR number counts for galaxies of different spectral types (elliptical, spiral, starburst).

**The Data**

An area of 0.075 sq. deg in Chandra Deep Field South is surveyed in UBVRIJK, using WFI (ESO/2.2m) and SOFI (ESO/NTT). SExtractor is used to construct catalogues selected in each of these wavebands, with psf-matched photometry carried out.

**Photometric Redshifts**

Given the depth of this survey, it is not possible to measure spectroscopic redshifts for a complete sample of galaxies. Therefore, photometric redshifts are estimated using the Bayesian techniques. A sample of 272 galaxies with available spectroscopic data in COF-S is used to calibrate the photometric redshift method. Comparing the estimated photometric redshifts with spectroscopic redshifts gives an error of $z_{\text{spec}} - z_{\text{phot}} / (1 + z_{\text{spec}}) = 0.085$.

A total of six template SEDs are used, consisting of ellipticals, spirals, and starbursts. The method also provides spectral type of each galaxy. In estimating the LFs, particular attention was paid in allowing for uncertainties in the estimated photometric redshifts.

**Luminosity functions**

**Number Counts**

**Summary**

We present the first results on the luminosity function and number counts in the GOODS southern field.

Comparing photometric redshifts with a sample of 272 spectroscopic redshifts, we find an accuracy $\sigma_{z_{\text{phot}}} < z_{\text{spec}} = 0.085$.

We present rest-frame U, B, R, and K-band LFs in the redshift range $0.1 < z < 1$. The characteristic magnitude, $M^*$, gets brighter at low $z$ in the K-band. This shows evidence for changes in the mass function of galaxies with redshift. The U-band characteristic magnitude becomes fainter towards lower redshift, consistent with a decreasing star formation rate.

The faint-end slope becomes steeper with redshift in the U-band, while the opposite trend is found for the other filters. This is, however, only a 1-sigma effect.

The bright end of the R-band LF is dominated at all magnitudes by early-type galaxies, while late-type galaxies and starbursts dominate the faint end of the LF. This is seen in all redshift bins.

U-band counts are dominated at all magnitudes by late-type galaxies and starbursts. Early-type galaxies dominate at bright magnitudes in the R-band, while late types dominate at faint magnitudes.