# Data description
# HST CANDELS/EGS

To obtain the knowledge of the universe, the large survey observation is indispensable, which mainly contains large galaxy survey, CMB survey, HI survey and so on. In large galaxy photometric surveys, source detection is one of the most fundamental steps of the image analysis. The following analysis are all based on the identified source images. The Hubble Space Telescope (HST) covers the large sky map and has data of multi-bands, which allow us to do source detection and finally obtain the catalog of galaxies and stars with their photoz and other properties.

The Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey (CANDELS) is a 902-orbit Multi-Cycle Treasury(MCT) program on the HST that is designed to document the first third of galactic evolution from $z = 8$ to 1.5 via deep imaging of more than 250,000 galaxies (Grogin et al., 2011; Koekemoer et al., 2011). The project targets five premier existing survey fields on the sky, each with extensive multi-wavelength data, and obtains new observations using the Wide Field Camera 3 (WFC3) IR and UVIS channels, together with the Advanced Camera for Surveys (ACS), in a variety of filters in the optical and near-infrared bands. The deeper CANDELS survey covers 130 $arcmin^2$ to a depth of 27.629.4 AB ($5\sigma$ limit for point source) over the north and south fields of the Great Observatories Oringins Deep Survey(GOODS). The shallower CANDELS survey extends to 720 $arcmin^2$ down to depth of $26.9 - 28.9$ AB in five fields, i.e., GOODS-N, GOODS-S, the Extended Groth Strip (EGS), the Cosmic Evolution Survey field (COSMOS), and the Ultra Deep Survey field (UDS). The CANDELS pipeline constructs inverse variance images for all the exposures obtained with WFC3/IR, WFC3/UVIS and ACS/WFC to obtain the weight map.

Here we mainly focus on the EGS field, which has been extensively studied in the literature. It provides a perfect training dataset for us to get familiar with the source detection tools. The CANDELS EGS field is centered at $\alpha(J2000) = 14^h17^m00^s$ and $\delta(J2000) = +52°30'00''$, with deep HST WFC3 F125W and F160W coverage, and new data from ACS F606W and F814W mosaics (parallel observation). The AEGIS ACS data were taken in a mosaic pattern of contiguous tiles, covering an effective area of $10'.1 \times 70'.5$ in the F606W and F814W bands. The nominal exposure time was one orbit ($2000s$) per filter. The WFC3 observations were performed within the AEGIS ACS footprint, using a rectangular grid of $3 \times 15$ tiles and forming a contiguous field of $6'.7 \times 30'.6$ at a position angle of 42°. A given tile nominally received one orbit of observing time ($2000s$, with 2/3 orbit for F160W and 1/3 orbit time for F125W). The arrangement of tiles are shown in Figure 1. The image mosaics used in this work have a pixel scale of 60 mas $pixel^{-1}$ with the same WCS. The nominal exposure times of WFC3 IR mosaics are $1300s$ and $2700s$ in F125W and F160W, respectively. The ACS mosaics incorporate the contemporaneous CANDELS data and the ealier AEGIS data and have nominal exposure time of 6000 and $12,000s$ in F606W and F814W, respectively, reaching $AB = 28.8$ and 28.2 mag ($5\sigma$ in apertures of $0''.24$ diameter, corresponding to $2\times$ FWHM of the PSF). Table 1 summarizes the data quality of multi-bands observations. Here the F160W mosaic is used for our analysis as shwon in Figure 2.

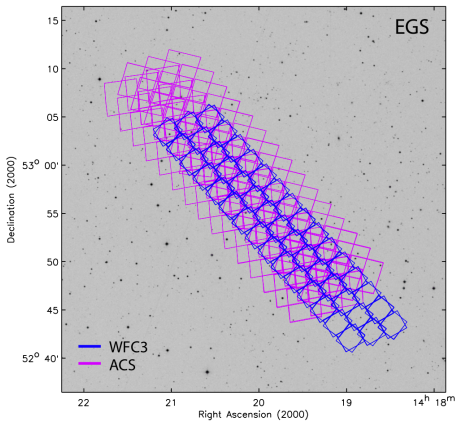


Figure 1: EGS tile map.

Table 1: Data Quality Summary

| Instrument | Filter | Effective Exptime | Sensitivity | PSF FWHM |
|---|---|---|---|---|
| ACS/WFC | F606W | 3300s | 28.5 | 0.”08 |
| ACS/WFC | F814W | 6900s | 28.4 | 0.”09 |
| WFC3/UVIS | F350LP | 434s | 26.4 | 0.”08 |
| WFC3/IR | F125W | 1900s | 27.0 | 0.”12 |
| WFC3/IR | F160W | 3200s | 26.9 | 0.”18 |

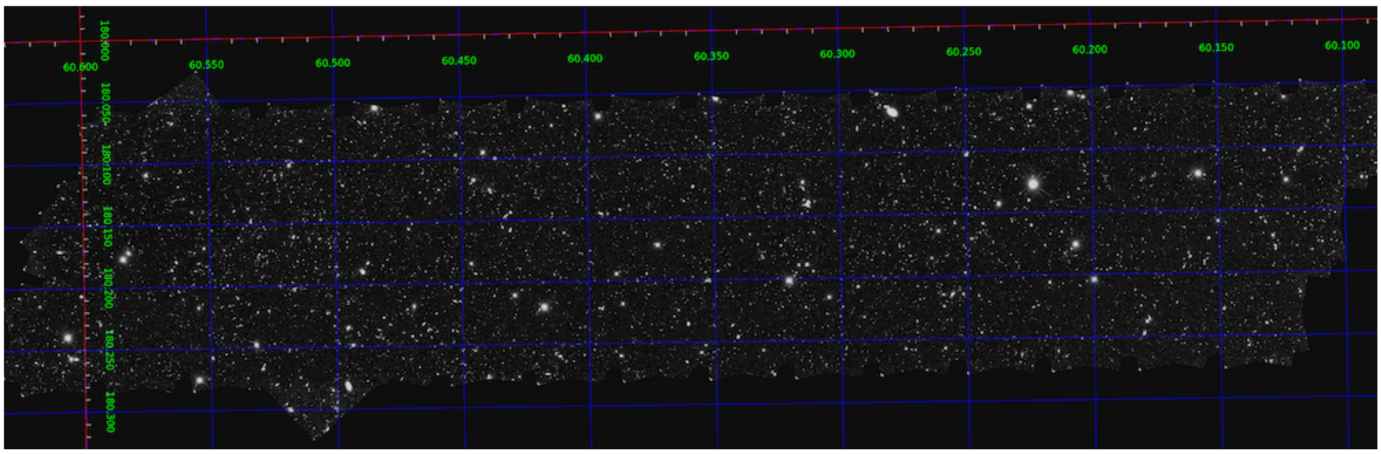


Figure 2: The CANDELS/EGS field at F160W filter. The RA and Dec coordinates are labeled on the image.

# References

Grogin, N. A., Kocevski, D. D., Faber, S., et al. 2011, ApJS, 197, 35

Koekemoer, A. M., Faber, S., Ferguson, H. C., et al. 2011, The Astrophysical Journal Supplement Series, 197, 36