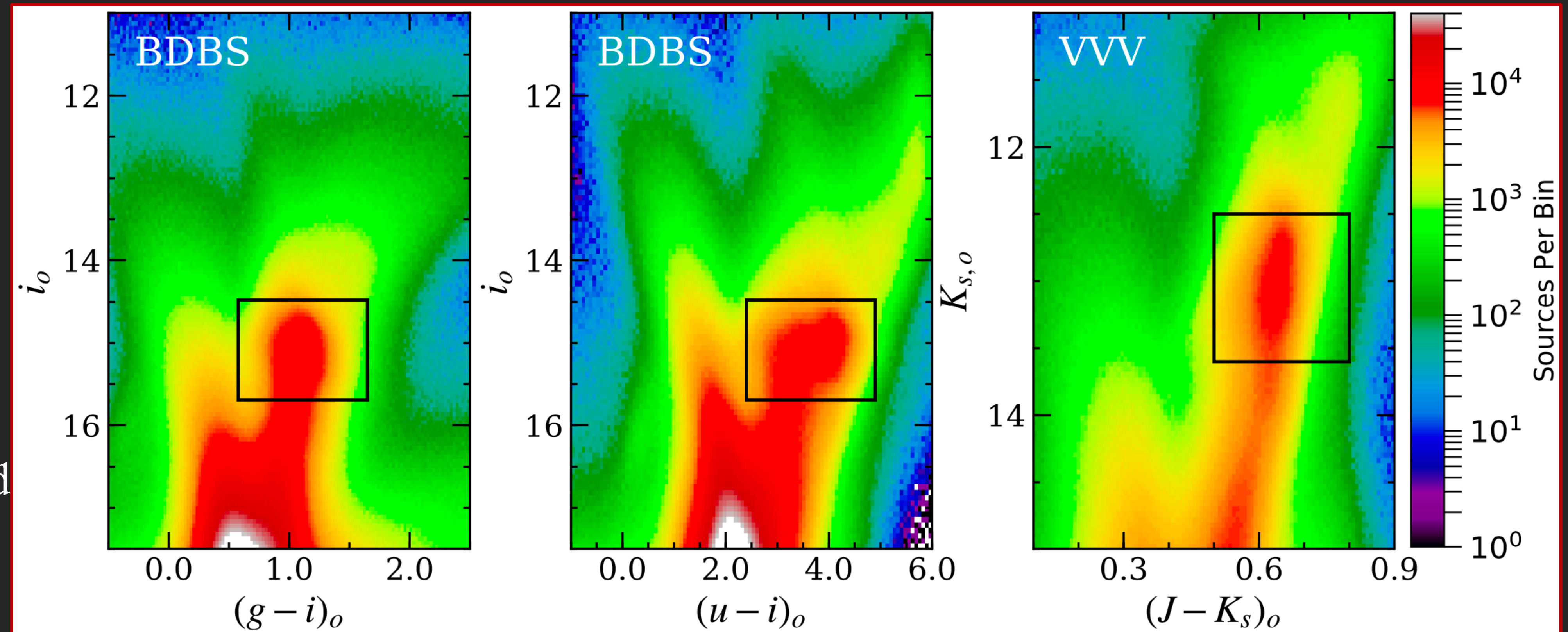


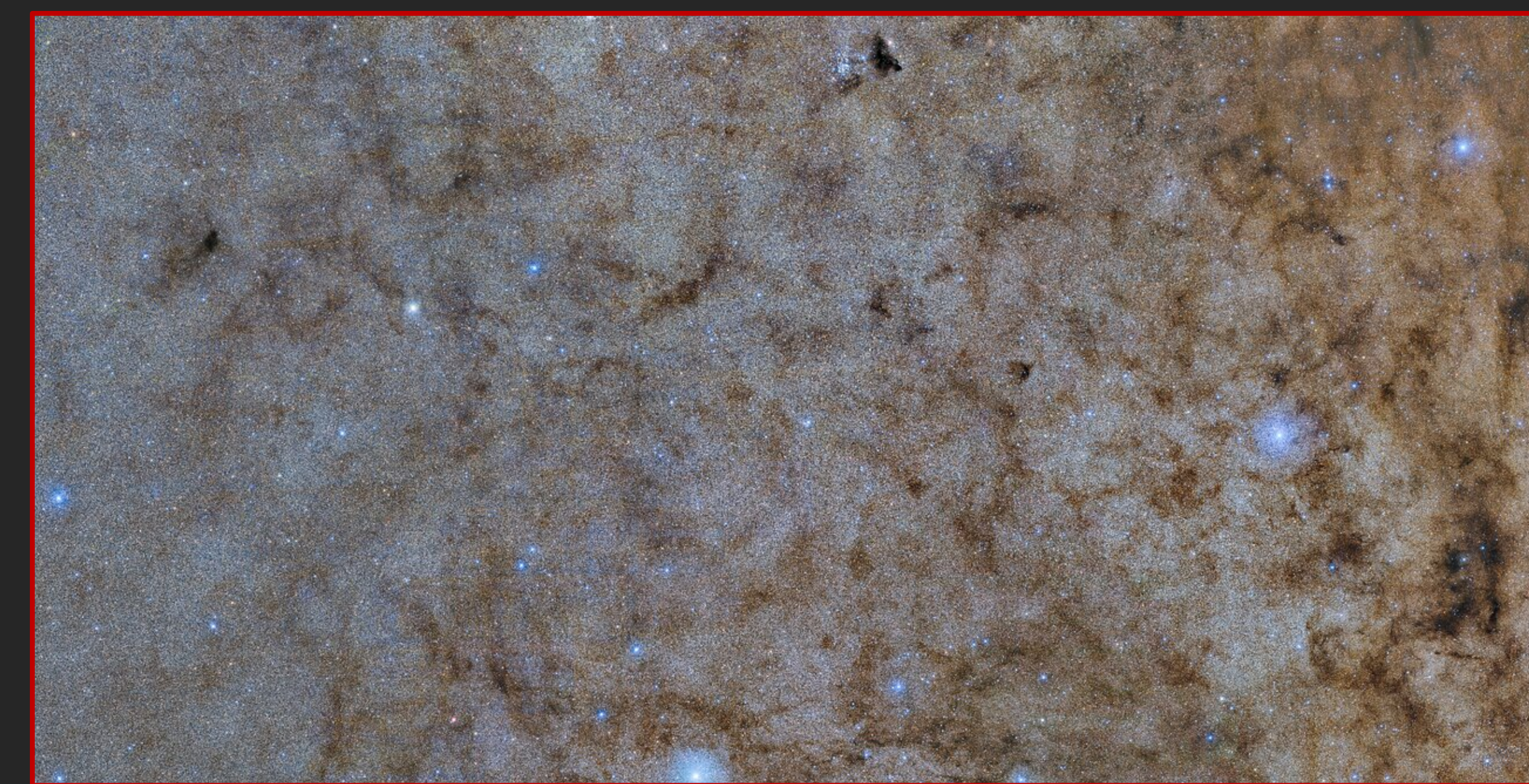
# Blanco DECam Bulge Survey (BDBS) Early Science Results: Red Clump Metallicities

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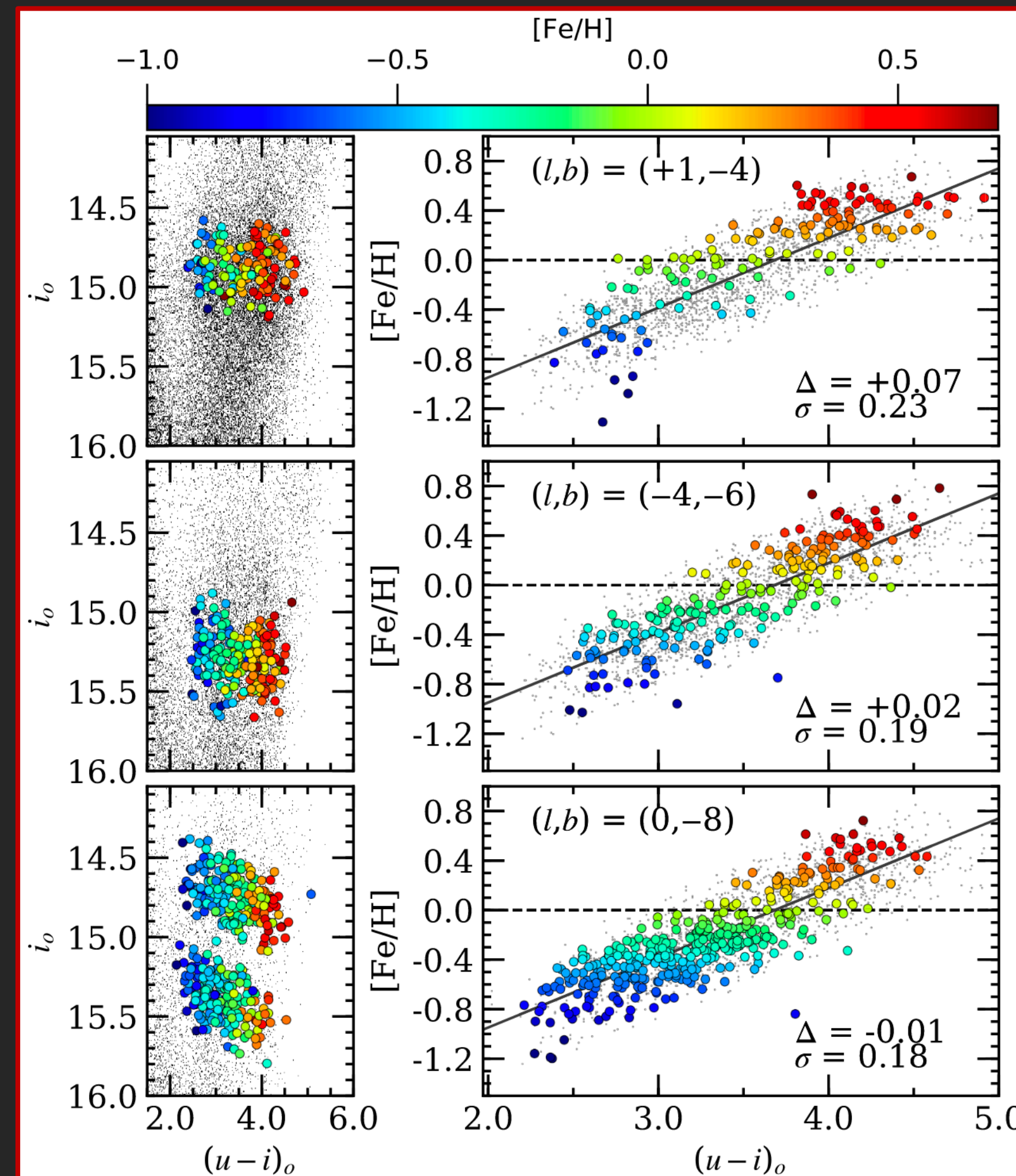
**Abstract:** The Blanco DECam Bulge Survey (BDBS) used the 3 sq. degree Dark Energy Camera to image  $> 200$  contiguous square degrees of the Southern Galactic bulge in order to better understand its structure, formation, and chemical enrichment history. The catalog contains PSF photometry and astrometry for  $\sim 250$  million sources in all 6 bands. Early science results show that the  $u-i$  color index is a strong metallicity indicator for red clump stars, and that the red clump exhibits a complex photometric morphology. The resulting metallicity distribution functions show a dramatic change from a unimodal, but long-tailed, distribution close to the plane to a bimodal metal-poor distribution at higher latitudes.



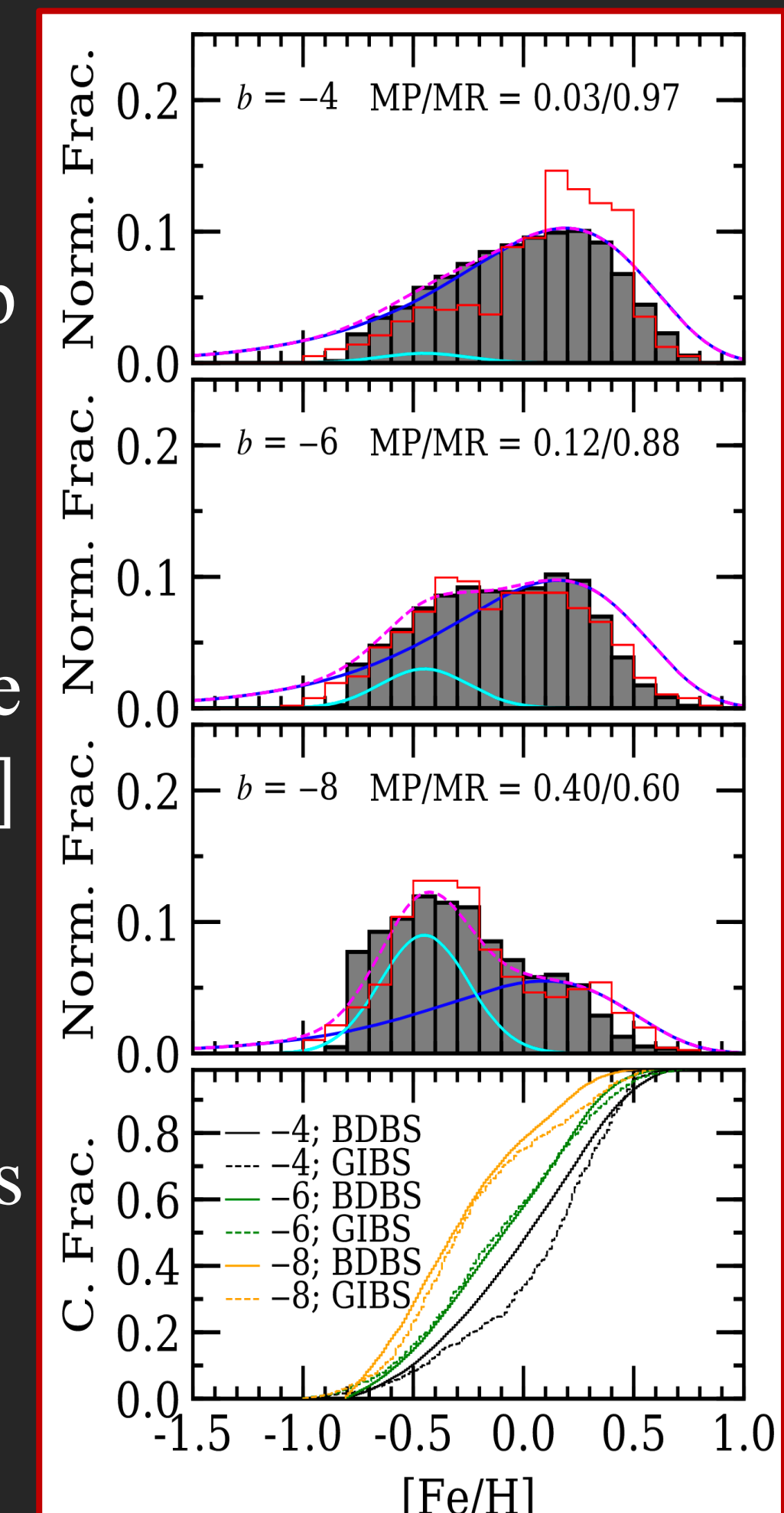
Optical and near-IR CMDs between  $-10 < l < +10$  and  $-10 < b < -3$ . The black boxes highlight the red clump. Note the more complex red clump structure when including the  $u$ -band, and the relative insensitivity to metallicity for near-IR colors.



A color image covering  $\sim 4\%$  of the BDBS survey area. Note the extreme crowding and strongly variable reddening. The final survey included  $\sim 450,000$  CCD images and required over 2 years of processing time on the Carbonate supercomputing cluster at Indiana University.



A comparison between  $u-i$  BDBS red clump  $[\text{Fe}/\text{H}]$  values and the GIBS spectroscopic abundances. The BDBS  $u-i$   $[\text{Fe}/\text{H}]$  values agree within  $\sim 0.2$  dex at all latitudes, including regions with double red clumps.



Metallicity distribution functions for several bulge fields that are summed across all longitudes. The inner bulge fields are reminiscent of simple closed-box enrichment models (blue lines).