



M33 Globular Cluster System with PAndAS

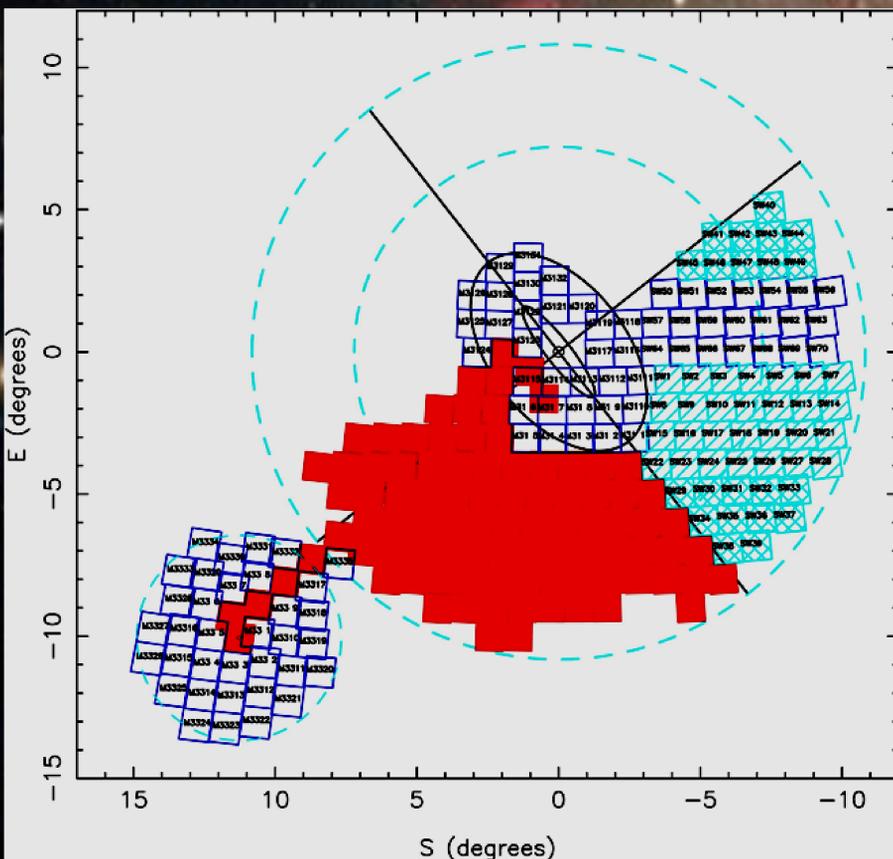


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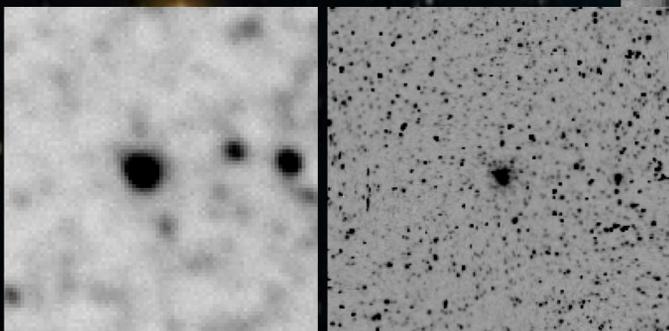
1. Introduction

We can study the evolutionary history of galaxies in the greatest possible detail if we can directly study large samples of individual stars and clusters of stars in them. The Local Group members give us the best chance to study the evolutionary history of galaxies this way. M33 is the third largest member in the Local Group after the Milky Way and M31. There has been, up to this point, a trade-off between the size and resolution of observing surveys of these closest galaxies, such that the greater area observed the less detail the survey had. However, my PhD data will be coming from the Pan-Andromeda Archaeological Survey (PAndAS) project, which will image M31 and M33 with depth, detail and coverage that is unmatched by any previous or planned project. Individual CFHT/MegaCam frames for the M31 and M33 fields taken so far are shown below.



2. Globular Cluster System

To study the oldest and first part of a galaxy's history, globular cluster (GC) systems are very important. Each GC system – which can be made up of dozens to thousands of GCs – is located around the host galaxy. GCs are much brighter than stars, and so we can see them individually even at the great distances from our Galaxy. We can also study them much further than the stars from the centre of their host galaxy. GCs are generally extremely old objects, so they “capture” the earliest environments in which the host galaxy forms. As the galaxy fully forms and evolves, the GCs also continue forming and capture these environments.

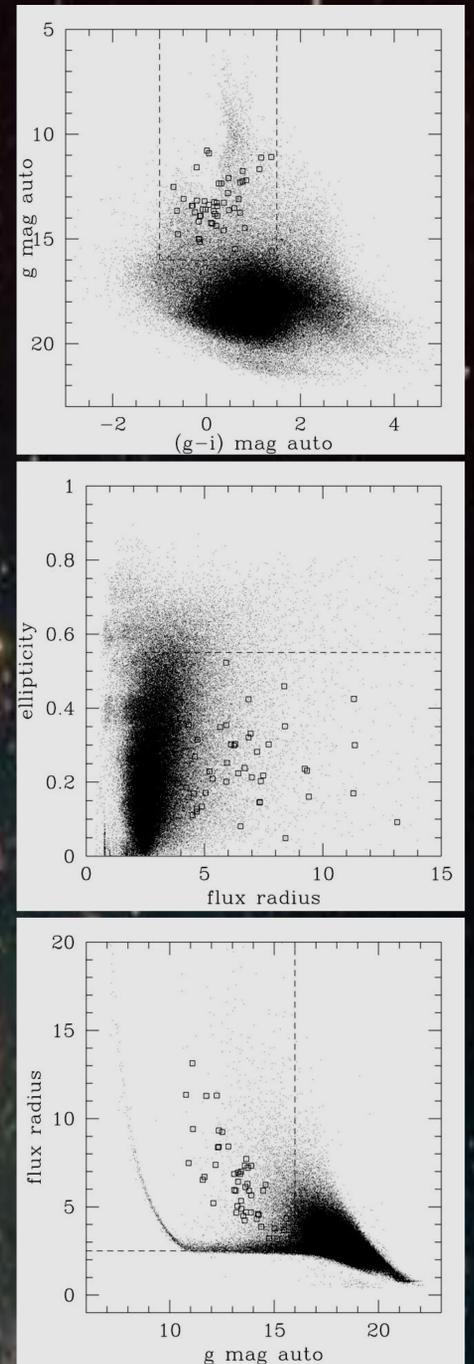


References

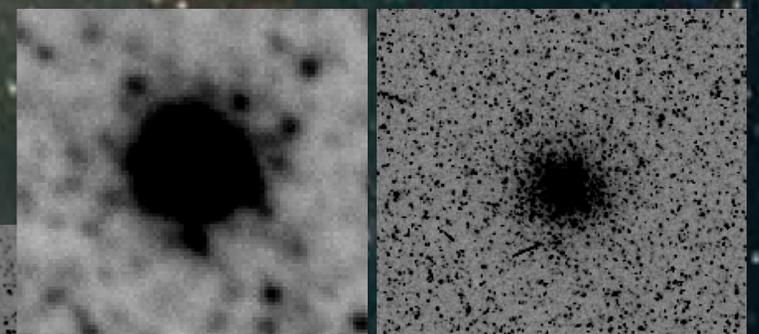
McConnachie, A., (background image)
Sarajedini, A. and Mancone, C.L. 2007
HST images from NASA STScI Archive

3. Selection Criteria/Visual Inspection

Recently, all of the previous eight surveys and their catalogues of M33 GCs have been collected together to form one overall catalogue (Sarajedini and Mancone, 2007). Although this is very useful and allows analysis over the whole system of M33 globular clusters unlike before, these authors also recognize that “the overwhelming conclusion seems to be that a more complete and thorough cluster search is needed, covering at least 4 deg² centered on M33” which the PAndAS project will far exceed, going out to a radius of 50 kpc (~46 deg²). We base our selection criteria for picking GC candidates from the MegaCam images on an object's flux radius, ellipticity, magnitude and colour: flux radius > 2.5, ellipticity < 5.5, g mag (auto) < 16 and -1 < (g-i) < 1.5. The three figures above right show all objects identified by Source Extractor in our M33 images, with the S&M2007 objects highlighted in boxes



and the selection criteria shown as dashed lines. The three pairs of images below show how three of these objects look on our images (left), compared with those from HST (right). When looking at the M33 background image, these objects are all found in the approximate region outlined by the blue box.



4. Future Work

After identifying and measuring the clusters we'll then analyse the data. Some specific examples of the things we're interested in: the metallicity distribution, colour, age, luminosity function, chemical enrichment as a function of time, radial distribution, size of GCs, kinematics and the spectral energy distribution. With all this data, we can look for correlations between properties, and compare with the GCs in the Milky Way, M31 and the Magellanic Clouds (two satellite galaxies of the Milky Way).