

# Comprehensive Compilation of Stellar Data in M33's Central Region: Unveiling the Final-Stage Evolution Through Near-Infrared Survey

Mina Alizadeh<sup>1,2</sup>, Atefeh Javadi<sup>2</sup>, Jacco Th. van Loon<sup>3</sup>, YousefAli Abedini<sup>1,4</sup>, Hedieh Abdolahi<sup>2</sup>

<sup>1</sup>Department of Physics, Faculty of Science, University of Zanjan, 38791-45371, Zanjan, Iran  
<sup>2</sup>School of Astronomy, Institute for Research in Fundamental Sciences (IPM), Tehran.19568-36613, Iran  
<sup>3</sup>Lennard-Jones Laboratories, Keele University, ST5 5BG, UK  
<sup>4</sup>Center for Research in Climate Change and Global Warming(CRCC), IASBS, Zanjan, Iran

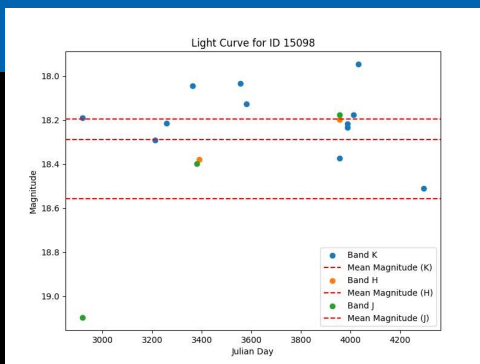


## ABSTRACT

We obtained data using three cameras at the UK Infrared Telescope (UKIRT) between 2003 and 2007.

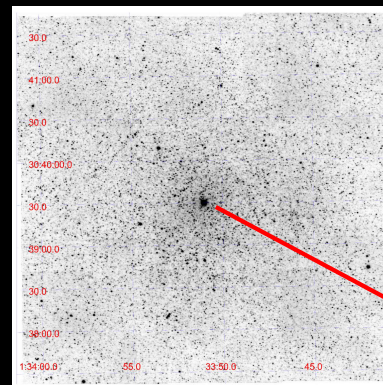
The observations in the K-band were conducted by the UKIRT Fast-Track Imager (UFTI) over three consecutive nights in August 2005. The Wide Field Camera (WFCAM) data in the J and H bands were collected between 2005 and 2007. Additionally, UIST data in the K-band for the central region of M33 were gathered from 2003 to 2007.

Our focus was on stars in the final stage of their evolution, where luminosity is more directly related to birth mass. By combining data from multiple instruments and projects, our aim is to identify long-period variables in the central region of the galaxy, as this area provides the deepest and most comprehensive investigation of the galactic center due to the nature of the data. The identification of variables will involve photometry on the WFCAM data with PSF calibration followed by a re-examination of the data.



## OBSERVATIONS

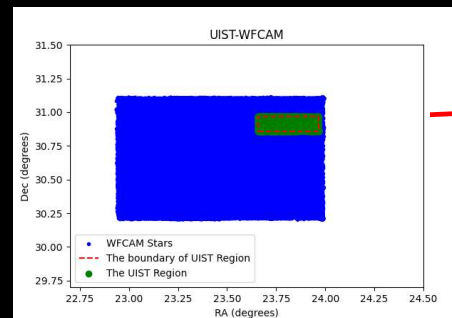
Observations were made with three of UKIRT's imagers: UIST, UFTI, and WFCAM.



UFTI K-band mosaic of the central square kiloparsec of M33 (Javadi et al. 2011)

## INTRUDUCTION

Messier 33 is a prototypical spiral galaxy in the Local Group, situated in Triangulum. Despite varying distance estimations, its favorable inclination angle of  $56^\circ$  makes it ideal for studying spiral galaxy structure and stellar content. AGB and RSG stars serve as crucial indicators of star formation history due to their luminosity and pulsation characteristics. Detection of variable AGB stars aids in reconstructing the galaxy's formation history, with various surveys, including optical and mid-IR observations, contributing to this understanding.



Comparison between UIST and WFCAM area, The blue color of WFCAM area and the green color of the UIST area it shows.

