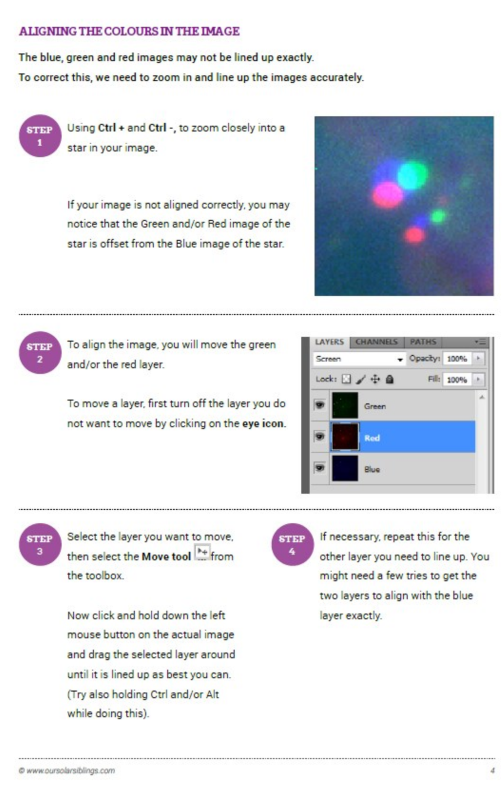
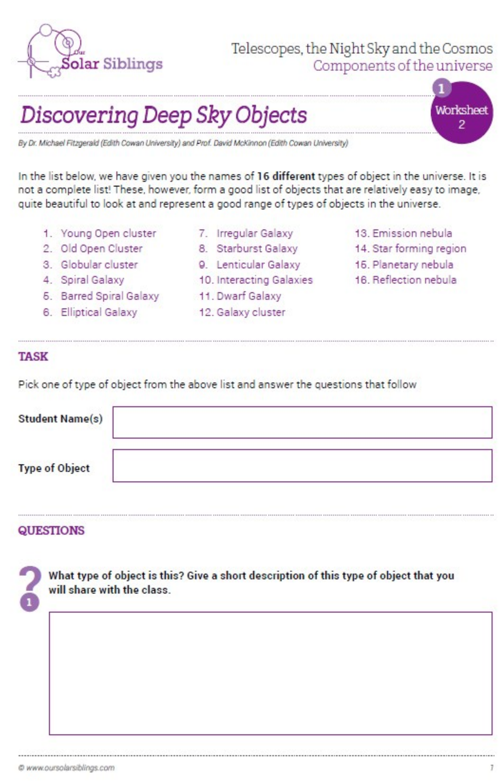
Michael Fitzgerald*
Lena Danaia
David McKinnon
Mariana Sacchi
Ross Cutts
Saeed Salimpour
* mfitzasp@gmail.com

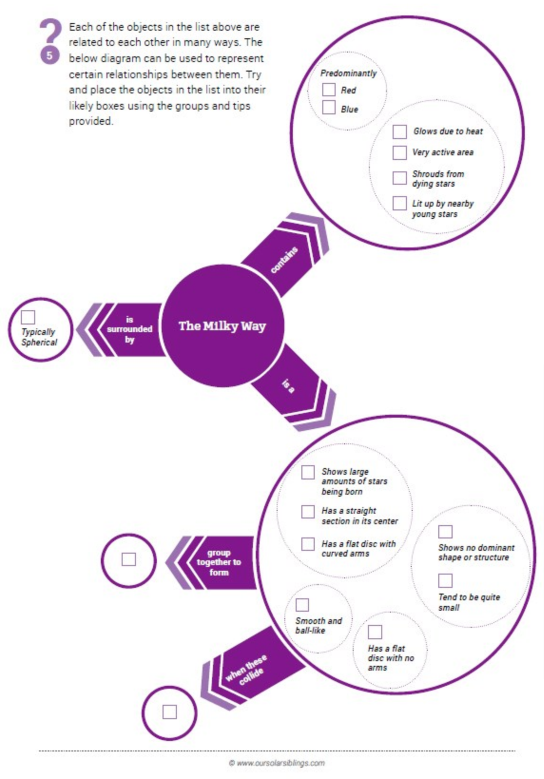
Our Solar Siblings

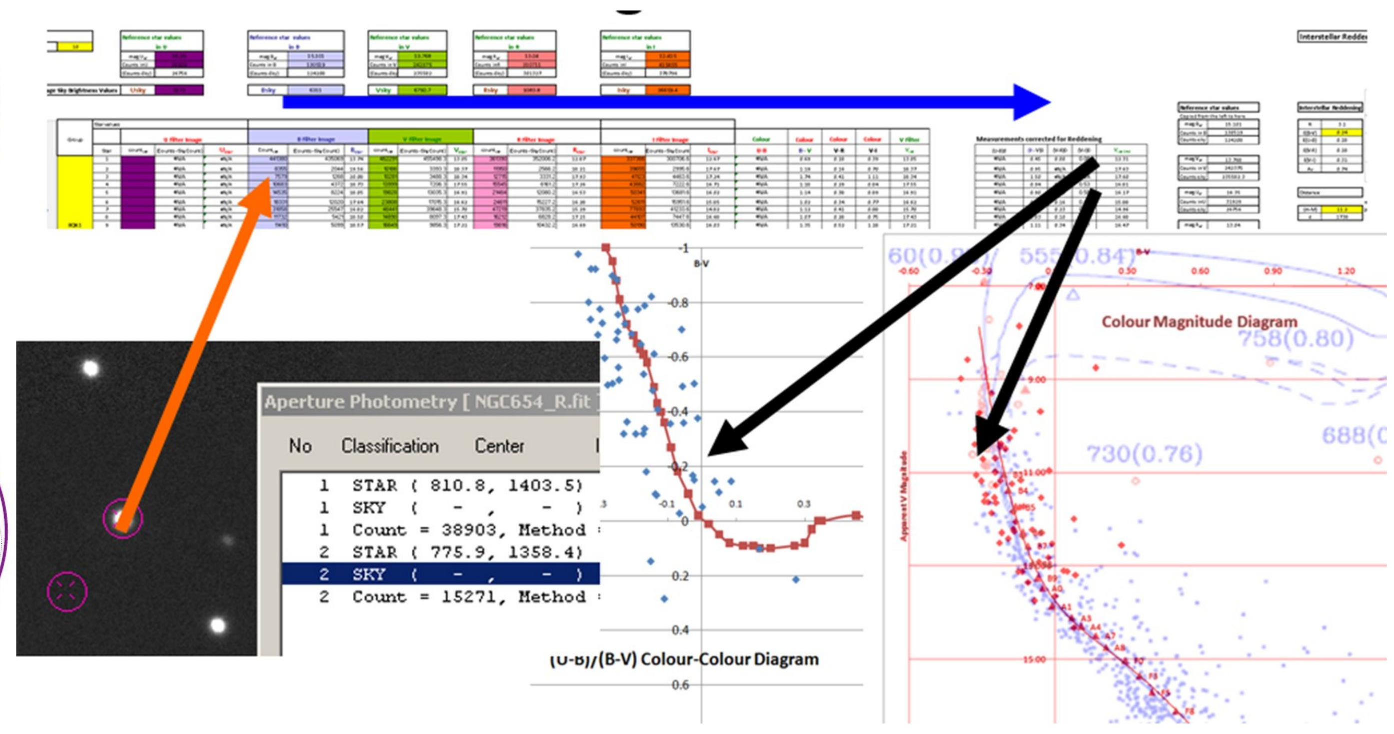
www.oursolarsiblings.com

Our Solar Siblings (OSS) is an Australian-based high school level astronomy curriculum replacement project open and free to any interested high school. OSS is an education partner of LCO.global. We provide curriculum materials, training and support to teachers to facilitate the non-trivial and effective use of these robotic telescopes within the everyday high school classroom in order to improve a variety of outcomes for all students. We also provide direct mentoring to students undertaking independent research projects.This classroom approach is primarily driven by three major sequential projects. In the first, students examine telescopes, the night sky, the objects it contains and plan their observation sessions with the LCO telescopes. In the second, students learn about how and why we use fits images in the context of colour imaging as a means to explore and understand objects in the cosmos leading onto covering the structure of the universe and the big bang. The third project has material for Yrs 11/12, the IB and for independent research projects.

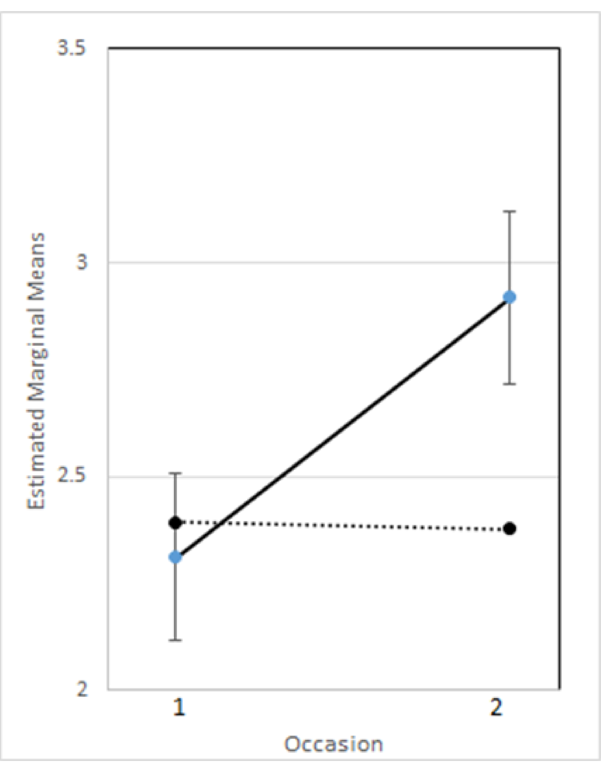


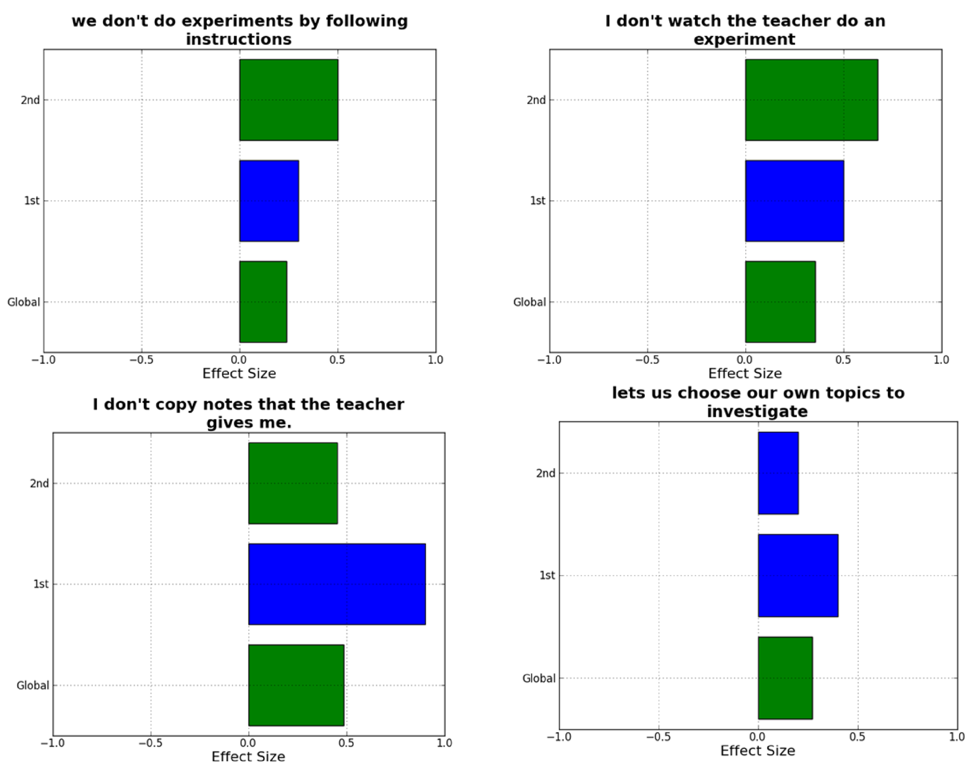


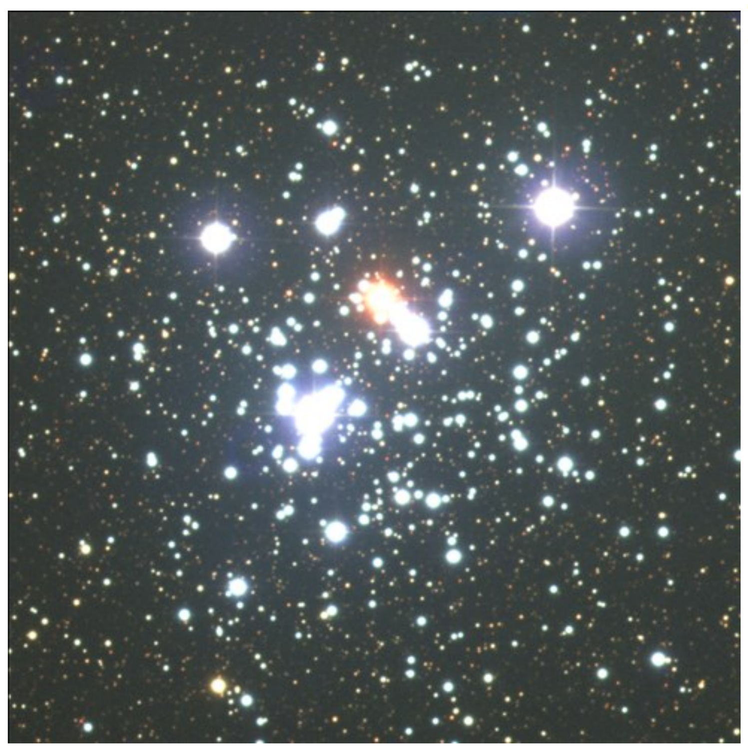


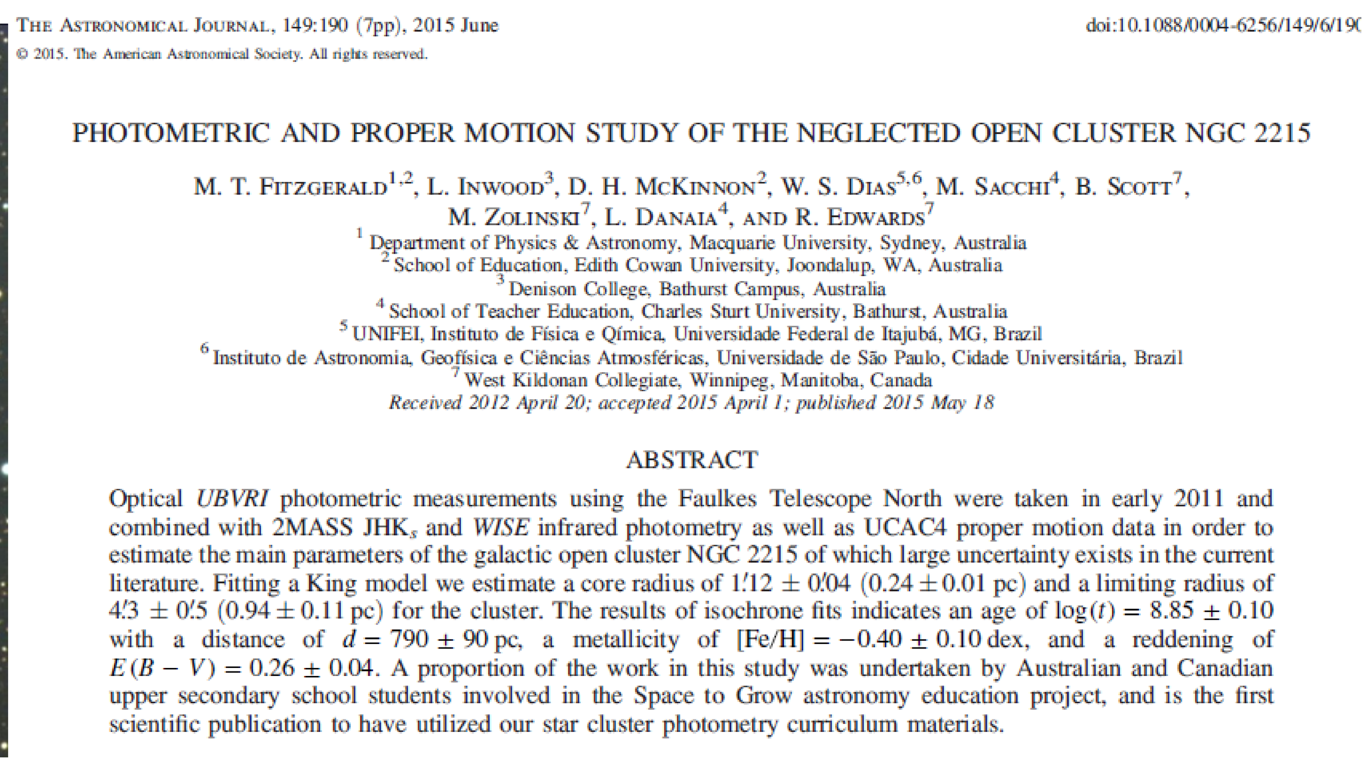


OSS's aims are to 1) Increase students' understanding and appreciation for the Universe around them; 2) Increase students' appreciation for the true methodology and approach of science; 3) Increase the probability of students choosing science other than as a potential personal interest, as a topic for higher level study or as a potential future career path; 4) Involve the nontrivial use of real astronomical data from a real research grade telescope; 5) Enable students to take their research to a natural scientific conclusion in the form of a scientific publication. We focus on Year 10 in Australia which is the last year of compulsory science before they choose to continue or discontinue physics in Year 11/12. Our endeavour is to shift this ratio. Year 10 is also the main year that astronomy is in the national curriculum.   There are currently a variety of astronomical publications resulting from student research as well as educational publications describing the outline, design, effectiveness and other issues.









THE ASTRONOMICAL JOURNAL, 149:190 (7pp), 2015 June
doi:10.1088/0004-6256/149/6/19(
© 2015. The American Astronomical Society. All rights reserved.

PHOTOMETRIC AND PROPER MOTION STUDY OF THE NEGLECTED OPEN CLUSTER NGC 2215

M. T. FITZGERALD[1,2], L. INWOOD[3], D. H. MCKINNON[2], W. S. DIAS[5,6], M. SACCHI[4], B. SCOTT[7], M. ZOLINSKI[7], L. DANAIA[4], AND R. EDWARDS[7]
[1] Department of Physics & Astronomy, Macquarie University, Sydney, Australia
[2] School of Education, Edith Cowan University, Joondalup, WA, Australia
[3] Denison College, Bathurst Campus, Australia
[4] School of Teacher Education, Charles Sturt University, Bathurst, Australia
[5] UNIFEI, Instituto de Física e Qímica, Universidade Federal de Itajubá, MG, Brazil
[6] Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo, Cidade Universitária, Brazil
[7] West Kildonan Collegiate, Winnipeg, Manitoba, Canada
Received 2012 April 20; accepted 2015 April 1; published 2015 May 18

ABSTRACT

Optical *UBVRI* photometric measurements using the Faulkes Telescope North were taken in early 2011 and combined with 2MASS JHK_s and *WISE* infrared photometry as well as UCAC4 proper motion data in order to estimate the main parameters of the galactic open cluster NGC 2215 of which large uncertainty exists in the current literature. Fitting a King model we estimate a core radius of $1'.12 \pm 0'.04$ (0.24 ± 0.01 pc) and a limiting radius of $4'.3 \pm 0'.5$ (0.94 ± 0.11 pc) for the cluster. The results of isochrone fits indicates an age of $\log(t) = 8.85 \pm 0.10$ with a distance of $d = 790 \pm 90$ pc, a metallicity of $[Fe/H] = -0.40 \pm 0.10$ dex, and a reddening of $E(B-V) = 0.26 \pm 0.04$. A proportion of the work in this study was undertaken by Australian and Canadian upper secondary school students involved in the Space to Grow astronomy education project, and is the first scientific publication to have utilized our star cluster photometry curriculum materials.

OSS officially began in October 2014. The in-class approach, though, has been rigorously evaluated and continuously reformed in response to student and teacher feedback over the past seven years. Evaluation of the content knowledge and attitudinal results from the students paints a fairly clear picture that the OSS materials have a strong impact on their classroom practices and understanding but also that there are many areas that also need to be addressed and aspects that need to be improved. Nevertheless, the 430 students (out fo 5000+) who presented both pre and post data pre-2015 show a moderate strength (cohen's d = 0.368) and statistically significant ($p < 0.0001$) content knowledge gain as well as a variety of strong changes in the nature of their experiences in the classroom. More recent shifts using the newer approaches are of the order of cohen's d = 1.0 . We seem to have solved the content knowledge problem, we are more focussed at the current level of development on shifting students attitudes towards science and their understandings of the nature of science and scientific inquiry. Please see our latest newsletter online and the materials near the poster.