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Pro-Am Collaborations with research grade robotic instruments and their contribution to outreach.

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Abstract

Robotic telescopes in both the commercial sector and outreach area have increasingly provided both professional and amateur astronomers with high quality data. Projects like the Faulkes Telescope, which is an educational and research arm of the Las Cumbres Observatory Global Telescope Network (LCOGTN) with their network of 1 and 2-metre robotic telescopes, have been directly involved in support for missions such as the European Space Agency Rosetta and Gaia missions, as well as involvement in a variety of NASA Comet missions such as the EPOXI/Comet 103P encounter.

These telescope networks are unique in that they provide school students and high end amateur astronomers, with access to research grade instrumentation and equipment which may not have been affordable to them in many instances. With social media collaboration and dedicated websites, increasingly bridging the gap between the professional and amateur community, more and more amateurs are working as collaborators with scientists in not only providing data, but also in data reduction.

Amateur astronomers have increasingly also been working with schools suggesting projects which have provided valuable scientific input to professional astronomers, whilst also giving young scientists in secondary education, an opportunity to work with professional instrumentation and methods, albeit at an entry level. We aim to demonstrate the long term value of these collaborations, and propose better working methodologies to help the professional community get more from amateur input.

We will cite some examples of research paper collaborations, and scientifically valuable data sharing between professional and amateur astronomers,

- Observations and results from the global campaign on Comet C/2007 Q3; Ref.[1]
- Observations of the fragmentation of Comet 168P; Ref.[2]
- Observations relating to the evolution of Comet C/2012 S1; Ref.[3]

Introduction

The introduction of robotic telescope networks such as the NSO Liverpool Telescope on La Palma, and the Faulkes Telescopes in Hawaii and Siding Spring, have provided for a decade, research grade instrumentation to both the high end amateur community, but more importantly to schools for the purpose of scientific learning and outreach. The key remit is the engagement of school students in taking part in real scientific research projects. Increasingly, the Faulkes Telescope team and amateur astronomers working on the LT Telescope, as well as amateurs using telescopes by the Tzec Muan group and iTelescope groups, have worked with professional astronomers, primarily in the study of solar system bodies. The data they have collected has resulted in detailed extended knowledge on cometary evolution and morphology, rotation rates of comets and asteroids, as well as high quality continual monitoring of the atmospheres of the large gas giants, including asteroid and comet impact detections.

The lack of long lead times, and detailed proposal processes for telescope time has allowed amateur astronomers and schools to partake in rapid reaction and response to events such as nova/supernova and cometary outburst and fragmentation Ref.[2]., with round the clock coverage. It also allows the amateurs to facilitate themed observing sessions lasting several hours for monitoring post events. From these observations, the evolution of impact scars on the atmosphere of Jupiter, Storm evolution on Saturn, as

well as detailed observations of cometary bodies and asteroids have been possible.

In the case of cometary bodies, the amateur data has been to provide professional astronomers with sufficient data to enable calculations of body rotation rates Ref.[3]., detailed views of coma morphologies, and tail structures/disconnection events, and when observations are scheduled with schools over longer periods, to monitor bodies for anomalous outbursts or long term variance in the comet as it approaches and goes through perihelion, Ref.[1/3].

In working with schools, on specific targeted projects, amateurs have vastly increased public awareness of space missions. We believe that greater benefit can be had from these collaborations however, with a more coordinates approach, moderated by high end amateur astronomers working with professional scientists. We aim to demonstrate the beneficial effects of this proposal for students and public outreach in astronomy in general.

Figures

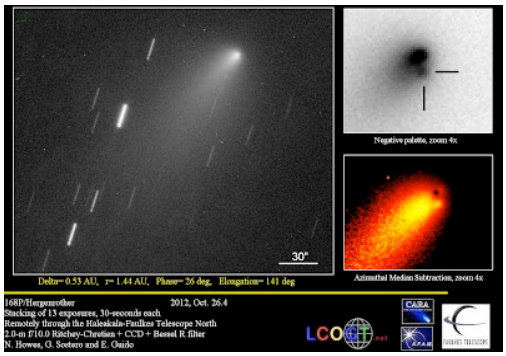

Figure 1: Observation of the fragmentation in Comet 168P.

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Summary and Conclusions

The Faulkes and Liverpool Telescopes as well as commercial robotic networks have provided amateur astronomers alongside schools and colleges with valuable exposure to research-grade astronomical imaging, and an introduction to professional data reduction techniques, which standard scientific teaching methods cannot match.

The amateur and student engagement and feeling of being part of real scientific research, we suggest, will nurture a desire for students to take up a career in astronomy in the future, and amateur astronomers to refine and become better at data reduction techniques. In some instances, we have also found that these collaborations have encouraged amateur astronomers to a return to full time education to improve on their scientific methodology and understanding.

The projects which have garnered wide-scale publicity via social media, online publication and print media channels have also increased public awareness of science projects due to the “amateur” news interest element, which in turn has increased awareness in some instances of space science missions.

References

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