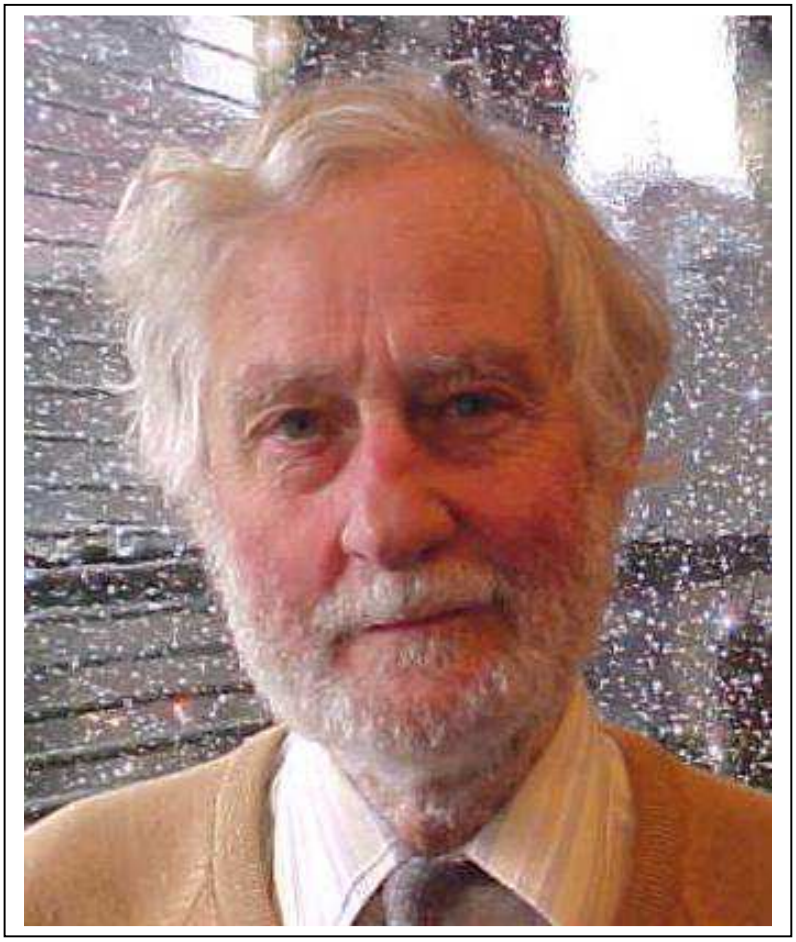
ISSN 0024-8266

mnassa

monthly notes of the astronomical society of southern africa

Volume 76 Nos 7 & 8 August 2017



In this issue:

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SUBSCRIPTIONS	*MNASSA* is available for free download on the Internet
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CONTRIBUTIONS	*MNASSA* mainly serves the Southern African astronomical community. Articles may be submitted by members of this community or by those with strong connections. Else they should deal with matters of direct interest to the community**.** *MNASSA* is published on the first day of every second month and articles are due one month before the publication date.
RECOGNITION	Articles from *MNASSA* appear in the NASA/ADS data system.

Cover Photo:
A workshop entitled “Trends in Astronomy” was held on 31 July 2017 to honour Emeritus Prof Michael Feast’s 90th birthday. See page 155.

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Feast Fest 2017: Trends in Astronomy

This was a workshop organized to celebrate the 90th birthday of Professor Michael Feast, held in the SAAO Auditorium on Monday, 31 July. The workshop was focused on new astronomy, highlighting possible future trends for astronomy in SA by posing the following questions:

- Are there areas in astronomy where SA instruments and technology could compete?
- What can be done with the world leading telescopes in South Africa?
- What sort of instruments should we develop to complement those being designed elsewhere for future ground based telescopes and instruments in space?
- Where are the best opportunities and what kind of collaborations will allow the growing African community to take advantage of them?
- Where do we need to develop better theory and better data processing techniques to make full use of our observations or to link the theory/models to the observations?

The workshop, aimed at PhD students, consisted entirely of plenary speakers, mostly local senior people from AIMS, SAAO, SKA SA, UCT, and UWC, but also some postdocs who are participating in the new opportunities. Speakers were also present from Canada, Japan, UK and USA and included past and present colleagues of Prof. Feast.

The event was funded by the SAAO, the NRF, UCT, and UWC.

Fig 1. Attendees at the workshop

Table: The programme (including links to the individual talks)

Time	**Speaker**	**Title**
8:50 – 9:00	Ted Williams (SAAO)	Welcome
Session Chair:	*Roy Maartens (UWC)*	
9:00 – 9:30	Renee Kraan-Korteweg (UCT)	Mapping the largest structures of the universe
9:30 – 10:00	George Ellis (UCT)	Views of the universe: past and present
10:00 – 10:30	Romeel Dave (SAAO, UWC)	The future of computational cosmology in South Africa
10:30 – 11:00	Donald Lynden-Bell (Cambridge, UK)	Lambda, the CMB and inflation
	Tea/Coffee	

Session Chair:	*Patricia Whitelock (SAAO/UCT)*	
11:20 – 11:50	Noriyuki Matsunaga (University of Tokyo)	Pulsating stars in the Milky Way: From the IRSF and more
11:50 – 12:20	Thebe Medupe (NWU)	Kepler mission and the physics of stars
12:20 – 12:50	Abi Saha (NOAO)	Identifying variable phenomena from the LSST alert stream for time critical follow-up
	Lunch break	
Session Chair:	*Patrick Woudt (UCT)*	
14:00 – 14:30	Bruce Bassett (AIMS, UCT, SAAO)	Astronomy in the era of machine intelligence
14:30 – 15:00	Russ Taylor (UWC, UCT, IDIA)	The SKA: Big telescope, Big Science, Big Data
15:00 – 15:30	Shazrene Mohamed (SAAO/UCT)	Detailed models of evolved stars: Present and future
	Tea/Coffee	
Session Chair:	*Ted Williams (SAAO)*	
15:50 – 16:20	Moses Mogotsi (SAAO)	Star formation: The molecular and ionized gas perspectives
16:20 -16:50	John Hutchings (DAO/HIA/NRC-Herzberg)	New developments in ultraviolet astronomy

16:50 -17:20	Petri Vaisanen (SAAO)	SALT and beyond – possibilities for optical/NIR astronomy in Africa
18:30	**Dinner**	

As indicated in the programme above, there was a dinner for the 50-odd delegates and guests held at the Wild Fig Restaurant. Prof. Patricia Whitelock gave a short overview of Prof. Feast's impressive work and achievements. This was followed by Prof. Patrick Woudt, who presented Prof. Feast with an image of the LMC that had been signed by all those who attended the workshop.

Prof. Feast ended the evening by thanking all and recounting some of the interesting anecdotes of his life, both serious and humorous. In all, a most memorable occasion.

Fig 2: (l-r) Donald Lynden-Bell (Cambridge), Patricia Whitelock and Michael Feast (SAAO/UCT), René Kraan-Korteweg and George Ellis (UCT)

News Note: Ministerial Meeting of the SKA Africa partner countries

Members of the nine Square Kilometre Array (SKA) African partner countries represented by its respective Ministers and Deputy Ministers of Science and Technology concluded the Fourth Ministerial Meeting on the SKA in Accra, Ghana, on 24 August 2017 by signing a memorandum of understanding to collaborate on radio astronomy.

The purpose of the meeting was to consider progress in the development of human capital initiatives, the establishment of relevant institutional arrangements to coordinate and support domestic SKA/African Very Long Baseline Interferometry (VLBI) Network (AVN) related activities, the formulation of new academic programmes around physics and astronomy, site selection and the rollout of high performance computing capabilities.

The meeting expressed appreciation for the progress in the development of the AVN project, particularly with Ghana being the first of the eight partner countries of the AVN to complete the conversion of a communications antenna into a functioning radio telescope.

Fig. 1 Minister of Science and Technology Naledi Pandor watches on as the President of the Republic of Ghana, His Excellency Nana Addo Dankwa Akufo-Addo cuts the ribbon at the launch of the Ghana Radio Astronomy Observatory

Radio telescopes naturally produce large quantities of data, in this regard, the meeting agreed that there is a need for advanced computing

infrastructure, training and skills development to process the data and to support broad research applications.
Current Big Data initiatives being rolled out in partnership between South Africa and member countries include the work being done by South Africa's Centre for High Performance Computing (CHPC) which is repurposing HPC systems and channelling them to the AVN partner countries to develop a footprint of high performance computing to be able to process high volumes of data.

Several funding sources for the building of the SKA in Africa are also being considered. These include the European Union for possible support to the African Data Intensive Research Cloud (ADIRC) and the African Renaissance Fund of the South African Department of International Relations and Cooperation (DIRCO) further supporting the AVN. In addition, a possible support through funding proposal-writing workshop will be explored by South Africa through the SADC Secretariat.

On the identification of the location of the second phase of the SKA, partner countries will be engaged through bilateral meetings with the SKA Project Office South Africa in a bid to develop a detailed roadmap beginning 2018. South Africa will host the next meeting of the Senior Officials and the Ministerial Forum in mid-2018 to coincide with the formal launch of the MeerKAT Telescope, a precursor instrument to SKA.

About the SKA

The SKA will be the world's largest and most sensitive radio telescope. The total collecting area will be approximately one square kilometre, giving 50 times the sensitivity and 10 000 times the survey speed of the best current-day telescopes. It is being built in Africa and Australia.

Thousands of receptors will extend to distances of up to 3 000 km from the central regions. The SKA will address fundamental unanswered questions about our universe, including how the first stars and galaxies

formed after the Big Bang, how dark energy is accelerating the expansion of the universe, the role of magnetism in the cosmos, the nature of gravity, and the search for life beyond Earth.

The SKA Organisation, with its headquarters at Jodrell Bank Observatory, UK, was established in December 2011 as a not-for-profit company in order to formalise relationships between the international partners and centralise the leadership of the project.

About the AVN

The AVN project aims to establish self-sufficient radio telescopes in Africa through the conversion of redundant telecommunications antennae into radio telescopes, "new-build" telescopes or training facilities with training telescopes.

Fig 2. The 32-m converted Ghana radio telescope in Kutunse, Accra.

The AVN project is currently jointly funded to the tune of R141 million by the African Renaissance Fund of the Department of International Relations and Cooperation and the Department of Science and Technology in South Africa.

It aims to:

- develop a network of Very Long Baseline Interferometry(VLBI)-capable radio telescopes on the African continent;
- transfer knowledge and technology to develop the necessary skills in participating countries in Africa to operate these telescopes independently;
- develop the skills needed in SKA partner countries to optimise the participation of these countries in SKA Phase 2;

- bring new science opportunities to participating countries over a relatively short time scale; and
- enable participation in SKA pathfinder technology development and science.

Obituary: Ronald P Olowin 15 April 1945 – 5 August 2017

We are sorry to have to report the death of Ron Olowin who worked at SAAO in its early days. He joined in March 1972 and was to stay for two years.

Ron was born in Erie, Pennsylvania, and studied Geophysics and Astronomy at the University of British Columbia before he came to South Africa.

While at SAAO, he worked mainly on photoelectric photometry, particularly of cosmic x-ray sources.

He was an amusing and outspoken person who refused to kow-tow to Sir Richard Woolley, the director of SAAO at the time, and clashed with him on several occasions. One such was remembered by his wife Mary as follows: “at Sutherland, during one stay, Ron asked if the "Coloured" workers could share the dining room with the astronomers as the site was incomplete and they were eating in a garage. When this request was refused by the manager, Ron ate in the garage with the workers. On his return to Cape Town Sir Richard told him "If you weren't an American I would fire you."

After South Africa the Olowins moved to Oklahoma where Ron worked at Oklahoma City University and obtained his PhD at the University of Oklahoma. His wife Mary meanwhile studied for a medical degree. There and in his early years at St Mary's he collaborated on the Abell Corwin Olowin Catalog of rich clusters of galaxies, his work focusing on the southern hemisphere.

In 1987 he joined the Physics and Astronomy Department of St Mary's College in Moraga, California where he remained a full professor until he became ill about a year before his death. He was instrumental there in founding the Geissberger Observatory, with a 16-inch research telescope. In his later years, Ron, a devout Catholic, lectured widely on issues of religion and science

MU69 Occultation follow-up Report

Compiled by Case Rijsdijk

This ancient KBO, which is more than 6.5 billion km from Earth, passed in front of a star on 17 July, 2017. A handful of telescopes deployed by the New Horizons team in a remote part of Patagonia, Argentina were in the right place at the right time to catch its fleeting shadow — an event known as an occultation – and were able to capture important data to help mission flyby planners better determine the spacecraft trajectory and understand the size, shape, orbit and environment around MU69.

This was the third of three ambitious occultation observations for New Horizons, and all contributed to the success of the campaign. On 3 June, teams in both Argentina and South Africa attempted to observe MU69 without success. (see MNASSA Vol.76 Nos 5 & 6 p. 118 – 126) .

Fig 1. Preparing a 16-inch telescope for the 3 June occultation.

But according to Dr Henry Throop, Sr Scientist, Planetary Science Institute, Tucson, USA/Mumbai India; "our June observations from both SA and Argentina missed the object entirely. But we did use that knowledge, as well as new HST observations, to refine

our prediction for the 17 July event. On that one, we nailed it: we saw MU69 get occulted in five of our portable telescopes. It was remarkable, and it's a huge achievement. This was by far the smallest object and hardest occultation ever attempted. It is absolutely due to the work that we did in SA, that we were able to finally see it in Argentina in July". Dr Amanda Sickafoose who was involved with the SA effort, echoed Dr Throops sentiments; that the efforts to observe the occultation in South Africa were extremely valuable. This was a difficult observation attempt, and it required record-breaking numbers of people across continents. We couldn't be more proud of the successful team effort.

In a matter of seconds, NASA's New Horizons team captured new data on its elusive target. Weary but excited team members succeeded in detecting the spacecraft's next destination, in what's being called the most ambitious and challenging ground occultation observation campaign in history.

A team of more than 60 observers who battled high winds and cold to set up a "picket fence" of 24 mobile telescopes in a remote region of Chubut and Santa Cruz, Argentina. Their goal: to spot the shadow of the mysterious Kuiper Belt object (KBO) where New Horizons will fly by on New Year's Day 2019, to better understand its size, shape, orbit and the environment around it. Before these observations, only the Hubble Space Telescope successfully detected MU69, and even it had not been able to determine MU69's size or shape.

When New Horizons flies by it, MU69 will be the most distant object ever explored by a spacecraft, over a 1.6 billion km farther from our Sun than Pluto. This ancient Kuiper Belt object is not well understood, because it is faint, likely 22 – 40 km across, and so far away. To study this distant object from Earth, the New Horizons team used Hubble Space Telescope and Gaia satellite data to calculate where MU69 would cast a shadow on Earth's surface. Both satellites were crucial to the occultation campaign.

It will take weeks for scientists to analyze the many datasets from the multi-faceted campaign. This advance observation is a critical step in flyby planning before the New Horizons spacecraft arrives at MU69 on 1 January, 2019. But early indications these new occultation observations, team members say MU69 may not be not a lone spherical object, but suspect it could be an *extreme prolate spheroid*, think of a skinny rugby ball, or even a binary pair. The odd shape has scientists thinking two bodies may be orbiting very close together or even touching; what's known as a close or contact binary. Or perhaps they're observing a single body with a large chunk taken out of it. The size of MU69 or its components also can be determined from these data. It appears to be no more than 30 km long, or, if a binary, each about 15-20 km in diameter.

Fig 2. One artist's concept of 2014MU69. Credits NASA JHU APL SWRIAlex Parker.

This effort, spanning six months, three spacecraft, 24 portable ground-based telescopes, and NASA's SOFIA airborne observatory was the most challenging stellar occultation in the history of astronomy.

ASSA ANNUAL GENERAL MEETING 2017

Presidential Address: A Snapshot of ASSA's Health

Pierre de Villiers

If this were a Court hearing and I were counsel for the defendant my summarising statement would be a lengthy "Your Honour, I rest my case".

The high quality of the Section Directors' reports attest in a very unequivocal manner to the fact that amateur astronomy in South Africa is very much alive and extremely healthy. There is a truly impressive range of astronomical activity at the various centres, clubs and associations, which is matched by an almost unbelievable expertise in the various Sections. The feedstock of "the study and enjoyment of astronomy" (ASSA's mission) is therefore broad and secure.

At the first Council meeting that I chaired two years ago I verbalised my primary objective as being the facilitation of sharing the expertise and experience at the various Centres and Sections more effectively among the astronomy community.

Practical interaction with the various groups has substantially modified my initial, intuitive objective of enticing all non-centre entities into becoming recognised ASSA centres. I now understand that the nature of the entity, whether it is an ASSA centre or non-ASSA Astronomy Club or simply an association, is irrelevant - as long as they continue stimulating an interest in astronomy. Having a constitution or even a committee is not as important as satisfying their members' needs, which is frequently no more than regular intellectual entertainment ("armchair astronomers", as Case Rijsdijk refers to them).

However, creating an awareness of the incredible resources that ASSA offers through its website, publications, discussion groups and expertise and experience on just about any topic imaginable somewhere in the country elicited a universally positive response. The way forward is clearly to maintain an interest in and encourage non-ASSA centres to continue what they are doing so enthusiastically and even passionately and make them aware of ASSA's resources.

By way of illustration the West Rand Astronomy Club has decided to become a formal ASSA centre, whereas the Southern Peninsula Astronomy Club "will consider" whether they will become formally organised and

apply for ASSA recognition. I will be visiting the Brak River Astronomy Club in October and Kos Coronaios's move to Pearly Beach will obviously impact the club's physical activities in Louis Trichardt, but Kos does intend to continue the club's activities from its more southerly base.

Each entity exists to cater for its members' needs and is therefore unique, operating as an island universe predominantly driven by internal demand. Whether its prime focus is observation, educational outreach or simply intellectual entertainment, it is stimulating an interest in astronomy and that is good.

My initial ideal of a two-monthly summary of astronomical activity around the country proved intractable because of non-uniform and incomplete inputs and was therefore discontinued. Collectively there is a lot of activity around the country. Chris Stewart's summary of inputs that he did receive showed that almost 10 000 people were involved in astronomical activity over the report period. Of this total outreach affected or "reached" over 6 000 people. Observing and regular meeting participation comprised about 10% each, with cosmology a surprising if distant third.

Council did approve adding a link to future activities at the various locations on the website, but this has yet to be completed.

In summary, it must be clear to all present this evening that the Society is in a healthy state. Council is functioning very effectively, the Section Directors and Appointees are doing great specialist work and the finances are sound, if not as comfortable as we would like. Adding the Cooke Scholarship fund to ASSA's own funds has enabled the Treasurer to obtain a higher interest rate than the two funds could achieve separately. Once ASSET has resolved the hitches that they are temporarily experiencing, the trustees could consider participating as well.

It has been a personally rewarding privilege to serve as President for the past two years. I gladly acknowledge and thank all Council members and

Appointees for the dedication and enthusiastic manner in which they participated in ASSA activities and discharged their voluntary obligations. It's a pleasure working with such a bunch of knowledgeable and committed members. Thank you to each and every one.

I must extend a special word of appreciation to Lerika. The Secretary has the thankless obligation to be the initiator, coordinator, outcomes-demanding follow-upper and, where necessary, nagger in what is arguably the most demanding and important portfolio on Council. ASSA has greatly benefitted from Lerika's project management skills and experience and her dedication and efficiency are truly remarkable. Thank You very much, Lerika, for always being available as a sounding board and source of sound advice. On behalf of Case (and in fact Chris) I am looking forward to more of the same in the year(s) ahead.

In conclusion I have two requests to all Council Members and Appointees, with particular reference to Centre Chairs and outreach-oriented entities:

- Please promote the purchase and use of the Sky Guide at all the schools you come into contact with. They do have so-called LSTM ("Learning Skills & Teaching Material") funds available and ASSA will provide a brief guide on how to effectively use this wonderful resource. Struik has kindly agreed to sell these at a 50% discount to the retail price of R140.00, with a 60% discount if we can generate another 1,000 orders. The word "Schools" must just be included in the order.
- Please seriously consider holding workshops for the science teachers in your areas, using existing and very simple but extremely effective material that Case Rijsdijk developed while he was still working. The Solar System and Sundials are the first two to be used in the Overberg and were very successful. Once teachers realise that they have been empowered with the material and methodology to conduct the same workshops at their own schools it's very rewarding

to see the “light bulbs switching on”. They have also confirmed that the workshops did help to teach the subject more effectively.

I visited both the Durban and Midlands Centres last week and I am optimistic that both will use this powerful resource. All the material used by the Hermanus Centre will be made available to anyone willing to agree to this request.

Thank you in anticipation for your cooperation in this regard.

I thank you for your kind attention.

I have a few more duties to perform: First of all a word of thanks to the SAAO for the use of this venue, which must be regarded as a first choice for an ASSA AGM. Secondly Thanks to you Eddy Nijeboer and the other members of the Cape Centre committee for all your arrangements regarding this event. Last but not least, Thank You to everyone present this evening for your attendance, which contributed significantly towards making it a memorable occasion.

Fig: Presidential Baton.

My final duty as President of the Society is to formally and ceremoniously hand over the baton of the Presidency to Case Rijsdijk. We suggest that you keep it on your desk to serve as a daily reminder of both the confidence and trust that Council has in your leadership, as well as the accountability that comes with the position. Congratulations, Mr President! May your term be enjoyable and successful.

Awards of Honorary Membership

Chris Stewart

Chris's contributions to Astronomy in SA are two-fold:

At a technical level he started the ATM classes 25 years ago and still serves as its technical leader. International recognition is illustrated by his being appointed as an Instructor of the Springfield Telescope Makers and their invitation to attend their 2017 Stellafane Convention as an Instructor at their cost.

At management level became a Council Member in 2010 and serves as Director: Instrumentation. His rational, thoughtful and empathetic contributions have always been appreciated and generally accepted as a mark of respect.
His election to Honorary Membership of the Johannesburg Centre has already recognized his huge contributions to the Centre.

Long Service Awards to Chris de Coning and Willie Koorts

Chris de Coning

Chris joined the Historical Section in 1992, which he still leads and quietly, but diligently, made huge contributions towards the preservation of the history and archives of both the ASSA and Astronomy in South Africa.

Became the Bloemfontein Centre representative on Council in 1995 until Council meetings were conducted by Skype.

Note: The Constitution's requirements state "not less than twenty years of invaluable service to the society or a centre thereof (or a combination of both)"

Willie Koorts

Willie's contributions to Astronomy in SA are multi-facetted and stretch over a long period:

MNASSA editorial board member since 2006, one-time Editor and still at the core of *MNASSA* activities. He is a regular contributor and participant in hugely popular "Sterre and Planete" on RSG; both live Radio and Facebook page. He is a frequent contributor to ASSA Discussion Groups a with high level and well thought out specialist contributions, he leads OOG; the Orion Observation Group's activities.

Overbeek Medal awards to Berto Monard and Andre van Staden

This newly created award was originally proposed by Case Rijsdijk, and then escalated by Pierre de Villiers; who proposed it become a medal. This was approved by Council to produce this prestigious medal; on a par with the Gill Medal. It was appropriate that these first presentations were made by Danie Overbeek's daughter and two sons; Margaret, Robin and Andy.

Berto Monard

SNe are massive stars that end their lives by exploding, and for a short time can outshine their host galaxy. Berto has been searching for, and finding, SNe for over 16 years; first from his Bronberg Observatory, and from 2010 from his Klein Karoo Observatory in Calitzdorp. To date he has discovered nearly 150 SNe. What makes his work outstanding is that in an age when massive, robotic surveys

are done at professional observatories using telescopes with huge CCD cameras, is that an amateur, using moderate equipment can still discover SNe! This is in large part due to finding, and using, niche areas and times; where and when to look. To handicap amateur SN hunters even more, since 2010 discoveries needed to be spectroscopically confirmed. This would need to be done by a professional observatory; that often would not have the opportunity, or the inclination, to do the follow up in time. One would like to think that in future, local amateurs might be able to do this!

Berto is a dedicated, committed and persevering observer; discovering SNe, and monitoring many other variable stars, the results of which have been published several times in MNASSA and are recognized by the AAVSO. These efforts make him a worthy recipient of the Overbeek Medal

Andre van Staden

Pulsars are rapidly spinning neutron stars resulting from the collapse of a massive star. Rather like the light beam from a lighthouse, the beam of radiation can be detected as the pulsar rotates. Often the pulsar has a companion star forming a binary system known as Red backs. The beam of radiation from the pulsar can heat the companion star, creating a hot-spot. Andre monitored the millisecond pulsar, PRS J1723-2837, and its companion star, photometrically, continuously for over a year and plotted detailed light curves using his 300 mm telescope. The detection of a hot spot on the companion star had not been detected before, probably due to a lack of continuous observation.

His results were published in several issues of MNASSA and in collaboration with Dr John Antoniadis from the Dunlap Institute for Astronomy and Astrophysics, University of Toronto, Canada, published the

results in the prestigious Astrophysical Journal, ApJ. This makes Andre a worthy recipient of the Overbeek Medal.

Gill Medal award to Case Rijsdijk

The Gill Medal has been awarded to Case Rijsdijk for his significant services and contributions towards Astronomy in Southern Africa in diverse fields.

As one of the longest serving members of the ASSA Council his loyalty to the ASSA and its ideals are unquestionable. As the Editor of MNASSA he has contributed substantially to a publication of which ASSA can be justifiably proud; in addition he has been admirably successful as ASSA Communications Officer. He has made huge contributions towards Astronomy and Physics Education and Outreach. He re-introduced Astronomy into the school curriculum and established the Outreach Department at SAAO. He was active in SciFest's training workshops for Science Teachers, educational outreaches in the George area as well as other ASSA Centres such as Hermanus. He has been a prolific, effective and popular presenter at ASSA Centres, SciFest, Scope-X, Astronomy clubs, schools and Public meetings. Furthermore his active participation in promoting ASSA involvement with Astronomy professionals, has maintained a link between the two communities.

Council Report

ASSA's Council is a creature of its Constitution, which both empowers it to "manage & control the affairs, property and funds of the Society" and obliges it to "frame an annual report on the activities of the Society during

its year of office" and present this to the AGM. I am now initiating this process on behalf of Council.

Most importantly, it is a pleasure to confirm that all the Constitutional requirements applicable to Council's activities have been executed scrupulously. The quarterly meetings called for in the Constitution were conducted by Skype voice calls in October, December, February and June, while a preparatory pre-AGM meeting was cancelled for the simple reason that everything was under control and therefore a Council meeting was not necessary. Council meetings were attended by on average 9 Council members and 5 Appointees and were conducted very effectively within 90 minutes thanks to well-drafted Agendas and preparatory material from the Secretary and the efficient IT connection skills of Chris Stewart.

Another factor contributing to the efficiency of Council meetings was the practise of having pre-Council financial sub-committee meetings to consider all financial matters and make considered and concise recommendations to Council for approval.

As evidenced by the Financial Report ASSA's finances are sound, but subject to the usual constraint of too many worthwhile projects for which there simply isn't funding. The unbelievably frustrating saga regarding authorised signatories was sorted out and both ASSA and the Cooke Scholarship fund benefitted significantly from the higher interest returns that the combined funds could attract.

There were further refinements to the Communications document, which is an extremely important and useful summary of all Council members' and appointees' responsibilities and recommended methods of execution. Like any "live" document there will always be further improvements, but the rate of change has now nearly flattened out completely.

Upgrading the software required to prepare the Sky Guide Africa South for publication by Struik has been done. Together with MNASSA these two publications contribute significantly towards achieving ASSA's prime objective of "encouraging and stimulating the study enjoyment of Astronomy". Both are publications to be proud of and the hours of hard

work required to ensure their publication is almost unheralded but most appreciated. Congratulations and Thank You to all involved.
There were a few minor amendments to the Constitution to provide for:
An Independent Compiler instead of an Auditor for cost reasons;
The ring-fencing of specific funds, such as the Cooke Scholarship fund;
The Overbeek medal to be awarded to amateur astronomers whose work is published in a recognised Astronomy publication;
The removal of contradictory clauses regarding Council voting procedures on medal nominations and
To leave the decision regarding a Centre's membership fees to the sole discretion of its committee.

The revised Constitution has been published on the website.
In summary, Council is functioning well in execution of its Constitutional obligations. The rest of Council's report on the Society's activities over the past year will be delivered by the Specialist Section Directors and the Centre Chairs reports on the activities in their Centres will be published on the website to give a comprehensive overview of the Society's activities of the past year.

Thank you for your kind attention.

Pierre de Villiers
pp ASSA Council

Astrophotography Section Report

Allan Versfeld

State of Astrophotography and Imaging

The Astrophotography section (formally known as the Imaging section in the ASSA constitution) was originally created to coordinate and promote the use of astronomical imaging technology in amateur observations, and to collect images created by amateur astronomers. In recent years, more

and more South African amateur astronomers have begun using their imaging equipment to collect and provide data to professional astronomers around the world. At the same time, astrophotography seems to be blossoming as an art form in South Africa. The quality of artistic astronomical images produced by both professional and amateur photographers in South Africa continues to improve.

Over the past year, the astrophotography section has focussed on curating the aesthetic and artistic images, and encouraging their creation, while those observers imaging serious science data have drifted more to the other sections relevant to the actual work being with those images.

Member Activity

The astrophotography section continues to encourage the submission of photographic images of astronomical subjects, which are stored in the ASSA image archive. This archive is kept on Flickr, with all original files kept in a cloud storage folder as backups. The images in the archive are displayed on the ASSA website, under the Gallery section, grouped by photographer and subject. We only accept submissions from South African photographers, or images that were captured in South Africa. We do not require the photographer to be an ASSA member, nor do we refuse submissions based on quality, in line with the requirement that the section work to promote and encourage the art of astrophotography.

Submissions continue to improve, though, in terms of general quality of work. The director continues to seek new photographers and encourage them to share their work. Our most notable new member is Martin Heigan, a professional photographer with an ongoing interest in astronomical subjects, and who is producing excellent work despite only having a few years of experience in this field.

Astrophotography Competition at ScopeX

The section director was on the judging panel of last year's astrophotography competition at ScopeX. In line with the improving quality of South African astrophotography already mentioned, the standard of entries was markedly higher than previous years. Prizes were awarded to Tanja Shmitz, for her wide-field images of Barnard's Loop and the Rho Ophiuchi complex, to Dawie Venter for his deep sky images of the Lagoon Nebula (Messier 8) and NGC 4845, and to Stefanus Potgieter for his montage of images created during a lunar eclipse.

Outreach

Last year, a group of ASSA members put together a project to use the partial solar eclipse of 1 September, 2016 to promote astronomy in Southern Africa. The astrophotography section's contribution to this project was to run a social media campaign, sharing and soliciting images of the eclipse from the public, and to provide a live video stream so that anybody on Earth could watch the eclipse as it happened from various viewpoints across Southern Africa, over the Internet. The social media campaign was unfortunately a failure, as we badly underestimated the amount of work required to run such a campaign, but the livestream was a huge success. Despite all but one of our cameras being clouded out (and that last camera providing a relatively poor quality image), our stream boasted 28 933 views, 253 "thumbs up", and 129 comments. A recording of the entire three-hour stream is available on YouTube, alongside a cleaned-up time-lapse, which compresses the whole event into a single minute.

Deep Sky Report

Auke Slotegraaf

I'm pleased to report to this meeting that the Section has had a good year.

Administratively, the Section was de-bundled, with Double and Variable Stars now a separate section, capably managed by Dave Blane. The Section's Collaborators continue, and are Carol Botha (Big 5 of the African Sky) and Hannes Pieterse (Deep-Sky Marathons as well as the Big 5).

During the year under review, observing pins were issued to Percy Jacobs, John Maynier, Dave Blane, Andy Overbeek and Louis Lombaard for observing the ASSA Top-100 Deep-Sky Objects. John Gill received a joint award (with the Astrophotography Section) for photographing the ASSA Top-100.

Two successful observing marathons were reported during the year. The first was conducted during the 2016 Free State Star Party, of the ASSA Top-100. During the 2017 Summer Southern Star Party, Deon Begemann, Ronel Begemann and Cheyenne Kersting (14) marathoned the Messier objects, capturing 85 of them during a 7-hour observing period. Special thanks to Deon for planning and managing this event.

The first Big 5 observations of the season were received from Mark Burkhardt, who is to be congratulated. Mark is now eligible to buy a t-shirt and a mug to proudly show off his accomplishment.

Richard Ford continues to observe the Bennett objects and submit observations from time to time.

Work on the LMC/SMC Atlas project continues. The intention is to produce an observing guide to the Magellanic Clouds, combining modern photography with visual observations. John Gill (Durban) has produced a low-resolution mosaic of the SMC, while Johan Moolman (Pretoria) has nearly completed a medium-resolution SMC mosaic. Magda Streicher and myself are contributing new visual observations. Other observers are most welcome to take part, too!

Deep-sky astrophotos from several members were received, annotated and discussed, and added to the DOCdb online database. Dale Liebenberg has submitted a series of mostly galaxies, for which he is thanked.

Percy Jacobs continues to inspire & challenge his group of deep-sky observers, including Neville Young who is contemplating compiling a book format version of the Top-100 observations, together with an observing form of his own design.

The ConCards free star atlas was updated and is available for download from the Section's web pages.

The Deep-sky Observer's Companion online database (DOCdb.net) continues to be used as a growing online repository, with 248 registered users (a 6% increase).

The Section's newsletter failed to appear on time, due entirely to my fault, and I'd like to apologize to the authors who have already submitted material: Owen Brazell, Doug Bullis, Bruce Dickson and Magda Streicher.

On a much happier note, Doug has very kindly (although tentatively) offered to take over editorship - negotiations continue and in a few weeks, we'll know more!

Double and Variable Star Section

Dave Blane

Double stars

The highlight of the year was a visit by Bob Argyle, ex Cambridge astronomer and president of the Webb Deep-Sky Society.

Between 2016 Aug 21 and Sep 16 Bob Argyle had the use of the 26.5-inch Grubb refractor in Johannesburg. Known as the Innes telescope, it is located at the former site of the Republic Observatory and was erected on that site in February 1925. The telescope was built for the discovery and observation of close double stars and it is still available for that use today.

Nearly four hundred measures were made and the results published in the Webb Deep-Sky Double Star Circulars as well as the Washington Double Star Catalog that is maintained by the United States Naval Observatory.

The programme of observation was similar to that carried out in previous years and included close visual binaries and wider pairs in the John Herschel catalogue which had not been measured for some time.

Vital technical support was provided by members of the Johannesburg Centre of the Astronomical Society of Southern Africa, especially by Jerome Jooste.

The author continued with double star measures of some wide southern doubles using a Meade Astrometric eyepiece and a Celestron C11 telescope. No other reports on double stars were received.

Variable stars

The author submitted 1800 variable star observation to the AAVSO and participated in an international collaboration with observers in New Zealand, Australia and Chile to observe QZ Carinae, the massive eclipsing binary system in the region of eta Carinae.

A beginner's course on DSLR photometry was presented in the form of two Skype sessions. The purpose of the course was to encourage those with basic DSLR cameras to get involved in the photometry of variable stars and to make a valuable contribution to the science of astronomy.

Several members operate independently and submitted their observations to organisations such as the AAVSO. No variable star observations were reported to the Section.

Historical Section Report

Chris de Coning

The following are the highlights of this section

Website

In 2013 the Council of ASSA decided to update the web presence of the society and a new format was chosen. Unfortunately the historical part of the website could not be transferred to the new format by the press of a button. Every page, layout and links had to be transferred manually. After 3 years this deadly boring waste of manpower was completed. The Historical Website is now in the new format and - at last - new material can be added.

Publications

Special mention needs to be made of the initiative undertaken by the editor of MNASSA, Case Rijsdijk, who initiated an article on *Private Observatories* (MNASSA, Vol 75. Nos. 11 & 12, December 2016.) This article forms an excellent "snapshot in time" of private observatories and is a superb historical reference.

Individuals in their private capacities wrote articles with historical content. Please note my appreciation to the following people:

Doug Bullis: "Port Elizabeth Peoples Observatory Society"; MNASSA, Vol. 75 Nos. 3 & 4. April 2016.
Ian Glass: "Biographical index to MNASSA and JASSA to December 2015"; MNASSA Vol. 75 Nos. 3 & 4. April 2016.

NRF Historical Steering Meeting

Prof Nithaya Chetty of the NRF Astronomy Desk hosted the History of Astronomy in Africa Steering Meeting on 5 August, 2016. Presentations and discussions centred around the state of *History of Astronomy* and projects to be launched. A committee was established under Ian Glass to create a *Roadmap* on how to achieve the goals.

Centre for Astronomical Heritage

A non-profit company was created in Cape Town to pro-actively approach issues of Historical nature. The Centre aims to record, preserve, and disseminate information about South Africa's tangible and intangible astronomical heritage.

Herschel-Darwin Commemoration Dinner

As reported in the MNASSA of August 2016, on 15 June 1836 Charles Darwin attended a dinner hosted by John Herschel. A few historical minded persons gathered on 15 June for dinner to commemorate the 2nd Centenary of the event. The evening was a success and proposals were made to institute more Commemorative Dinners.

Instrumentation Section Report

Chris Stewart

Activities of the Instrumentation Section largely revolve around communication, outreach, guidance and education, plus the important aspect of encouraging people in the pursuit of their personal instrumentation projects. There is no drive to formally induct members into the Section. Rather, the approach has been to address ASSA members' ad-hoc needs for information on a case by case basis.

In support of the Society's general communication efforts, which equally support the instrumentation Section's goals, the following activities are ongoing:

- Moderate the ASSA Facebook page
- Moderate the Yahoo! Group mail lists
- Moderate the Telescope Making SA Facebook page
- Respond to email queries by members and public

The Section directly supports the needs of both ASSA members and the public regarding selection, construction, purchase, maintenance and use of instrumentation. This is mostly done via the Amateur Telescope Making (ATM) class, the Telescope Making SA Facebook page, e-mail correspondence, telephonic discussion, and ScopeX.

Telescope Making SA Facebook group

The distinctly South African group has to date attracted 640 members from around the world, including several notable luminaries in this niche field. The international involvement produces an energetic flow of ideas, information, technical assistance and encouragement. Some of the (at times unusual) approaches to instrumentation developed locally have, after being highlighted in this medium, been favorably received and copied abroad. Prospective members are vetted prior to admitting them to the group and appropriate behaviour is gently but firmly enforced. (Unfortunately the usage/viewing statistics enjoyed by Pages are not available for Groups.)

The ATM class

This has been continuously active since mid-1991. It attracts a steady stream of newcomers to the art, with a good success rate of people finishing their first instruments. In addition, after completion of their first telescope, a fair number of participants stay on or return to tackle more

advanced projects. Members come and go per their needs and available time, work at their own pace on individual projects, and sometimes return after a long hiatus dictated by personal circumstances. The class is run informally in a flexible manner to accommodate the vagaries of members' lives. Consequently, there is no feasible way to ascertain the actual numbers of people or projects engaged in at any one time. Membership of ASSA, whilst encouraged, is not a prerequisite for participation in the ATM class. A class register is kept as an indication of activity levels, but signing it is not enforced.

ScopeX, which grew out of the ATM class, has had 15 successful annual events, and is gearing up for the 16th in September. To ensure continuation, it remains vital for competent people to volunteer their time and expertise and follow through. In addition to the primary goals of general astronomy outreach and publicizing the Society, ScopeX provides a platform for the telescope making community to exhibit their work and thereby encourage newcomers to engage in this fascinating hobby. Having a plethora of instruments at one place enables visitors and members alike to see, touch, compare and even use a variety of instruments – be they commercial, amateur-built or modified. This sparks discussion of ideas, approaches and relative merits, enabling people to make informed choices. ScopeX reports are published separately.

At the last tally, approximately 287 individuals have signed the ATM class manifesto since it was introduced in 2005. Although there is generally a spike in newcomers in the months following ScopeX, there is always a sporadic trickle of new candidates. Notable long-term projects underway include a 24" mirror, a Yolo telescope, and a complete telescope control system developed from scratch. Since progress on such part-time amateur projects is affected by personal circumstances, no end dates are currently projected. To date (apart from ScopeX), no formal communal projects have been initiated within the Section. However, the 24" and the telescope control projects remain likely to evolve into collaborative ventures. The Director has put together a portable telescope and camera

control system for astrophotography in the field, largely employing off-the-shelf components to ease construction and integration so that others could possibly replicate it for their own purposes. An article on the subject has been submitted to MNASSA. Johan Smit has built the requisite equipment and expertise to collimate binoculars, a vital capability sorely needed in this country.

In July, the Director represented southern African telescope making interests as an invited speaker and optical judge to Stellafane, the renowned annual convention in Springfield, Vermont, USA. As the convention attracts visitors from around the world, it is anticipated that face to face encounters with many advanced practitioners will result in fruitful bidirectional exchanges.

Observing and Outreach Reports

Kos Coronaios

I have included both Observing and Outreach reports in one, the two often going hand-in-hand.

Observing and Outreach events during the past were advertised and posted using the various channels available, namely the ASSA Facebook page, web page and Discussion group. Sighting reports have been answered using input from specialists, Tim Cooper, Greg Roberts and Shallow Sky Director, Clyde Foster. For their help, I would like to extend a warm thank you. A special word of thanks to Tim for co-ordinating the meteor/fireball reports, especially 15 June event where we were both inundated with emails for well over a week, and he had the task of sifting through and analysing the data.

Once again Pretoria Centre's Michael Poll is thanked for submitting the Centre's observing reports.

Outreach queries and calls for assistance have come from many parts of the region, including Namibia, and these have all been routed through to the Discussion group. I have been actively involved in some of these requests for assistance, the last one being on the evening of the 5 July at ATKV-Goudini Spa in Worcester. This was a presentation on Space and Stargazing attended by 95 Matric students and a handful of teachers from 17 schools in the W. Cape.
For novae and variables I would like to thank Specialist Dave Blane for keeping us up to date. The 2016 – 2017 observing year started nicely with comet X1 PANSTARRS visible in small to medium sized telescopes, followed by the subsequent outburst of Comet C/2015 ER 61 PANSTARRS, which I was fortunate to capture.

Two outreach as well as observing events that received much exposure via the various channels as well as in the media, were the partial solar eclipse in September 2016 and International Observe the Moon Night in October 2016. The ASSA community, Centres and astronomy Clubs throughout the country contributed to promoting these events assisting in many ways from web page creation and design, to live streaming, and of course to organizing venues, guest speakers and telescopes.

There were many observing opportunities during the course of the year with ASSA members having various successes in observing and or imaging these. Of these, one that really stands out for me was the close pass of Asteroid 2014 JO25. I've had the privilege of seeing a number of astronomical events over the years and have also had many of them clouded out. Observing/imaging Asteroid 2014 JO25, ranks right up there with some of the best ones.

Having recently relocated with my family to the Western Cape, I'm excited to be getting involved in new communities, seeing a new perspective of our southern skies, and meeting all our Cape members.

In conclusion I would like to wish everyone clear skies and encourage you to submit your observations to the relevant ASSA sections. I look forward to promoting astronomy in SA, the Society and working closely with Hermanus Centre during the course of the following year.

Photometry and Spectroscopy Section

Percy Jacobs

With regards to this section, unfortunately, due to work commitments, nothing much has happened.

The only major activity was the offering of training sessions, for Spectroscopy and Photometry, offered on-line via Skype, in November 2016. About 23 people attended these two training sessions.

They were split into two 1hr sessions each. The first session was the theory, and the second session was the practical on the how. Dave Blane kindly assisted by offering his knowledge on photometry and hosted the training sessions on that subject. I hosted the sessions on spectroscopy.

The vision of this section is to get people interested in the subjects, show them how easy and simple it is, show them where to submit their observations for peer comment, and then hopefully they progress into providing real science to the professional community.

On both these subjects, practice is needed and then one can progress into real positive observations. In the coming year, more attempts at motivating people shall be carried out.

Report from the Scholarships Committee

ASSA administers two scholarships:
ASSA Scholarship – one available, for BSc 2nd year to BSc (Hons); currently R19 000;

HartRAO-ASSA Scholarships – three available, for BSc (any year); currently R16 000.

2017 Awards

As was done in 2016, one of the HartRAO-ASSA Scholarships was split between two awardees, due to one of the two, studying part-time, not utilizing the full amount. The final awards for 2017 are:

Scholarship	Awardee
ASSA	Luca Sella-Rolando 2nd year UCT student studying astronomy, mathematics and physics
ASSA-HartRAO (partial)	Francois Botha 2014, 2016 awardee, expects to complete a BSc in astronomy, mathematics and physics at UNISA this year
ASSA-HartRAO	Jeremy Smith 2015, 2016 awardee 4th year BSc (Engineering) at UCT
ASSA-HartRAO	Mvelo Dhlamini 2016 awardee 2nd year BSc student at Wits
ASSA-HartRAO (partial)	Sumari Hattingh final year BSc student at NWU (Potchefstroom)

Thanks again to HartRAO for their continued support. HartRAO has indicated it will fund three HartRAO-ASSA Scholarships in 2018.

News from 2016 Awardees

Brandon du Preez, 2015 - 2016 ASSA Scholarship holder, obtained his BSc from UCT with distinction last year, including 94% for Mathematics.

Verlon Etsebeth (2015 – 2016 HartRAO-ASSA Scholarship holder) passed his final three Physics modules at UNISA with distinction, and has completed his BSc degree.

Scholarships Committee
Andrew Gray has retired from the committee.

The current committee comprises:
Claire Flanagan (Convenor)
Maciej Soltynski
Marion West (HartRAO)
Sivuyile Manxoyi (SAAO)
Vanessa McBride (SAAO/UCT/OAD)
Ian Glass
Claire Flanagan (*ASSA Scholarships Convenor)*

Shallow Sky Section Report

Clyde Foster

Since the author took over this section there have been a number of highlights, most notably:

- Building relationships within the South African Astronomical Community including the ASSA Council and members, SAAO, the Shallow Sky specialists, Boyden Observatory/UFS Physics dept, and various social media forums
- Extensive ongoing international interaction, on a number of forums, on high resolution planetary and lunar imaging.
- Submission of articles/images to MNASSA and Sky Guide, as well as BAA and ALPO journals internationally.
- Pro-Am collaboration supporting the NASA Juno mission at Jupiter and SAAO/NASA New Horizons mission (2014MU69 occultation)

- Tim Cooper's current and ongoing analysis of the widely observed Bolide/Fireball on 15 June.
- Invitation for the author to present a paper on his Mars Observations (2015-2017 apparition) at the European Planetary Science Congress in Latvia in September 2017.

Media

The author represented ASSA in two live TV News interviews;

- The SABC channel 404 on 24 October 2016. Two segments on Mars were broadcast. The first provided background to the planet itself and the second explored the implications of humans surviving on Mars.
- The eNCA on 23 February 2017. This was related to the NASA press release on the discovery of the Trappist-7 exoplanet system.

Both were reported in MNASSA.

Asteroids

Jerome Jooste reported on 8 October, 2016 that using image sets from the PanSTARRS 1 telescope I identified a NEO which was given the preliminary designation P10udus. In follow up image sets the NEO was again detected and orbital elements calculated by the Minor Planet Centre. It was confirmed to be the same object and then given the provisional designation of 2016 GQ26. Once sufficient observations are made over a period of years and the orbital elements refined the IAU will approve the renaming of the asteroid by the discoverer. This is only one of many preliminary discoveries I have made using data from PanSTARRS 1 and other telescopes engaged in NEO searches.

Meteors/Meteorites

The most public and important event of the year was the Fireball/Bolide that was widely observed across the eastern, central and northern regions

of the country on the morning of 15 June 2017. Tim Cooper (Shallow Sky Meteor specialist) has done extensive analysis and has estimated the point of entry was in the Eastern Cape, somewhere south of Dordrecht at an altitude of about 120km. It travelled NNE over the Drakensberg, passing overhead at Fouriesburg before disintegrating in the north eastern Free State, possibly in the location of Frankfort. Tim will complete his report on this event in due course.

My appreciation to Tim and Kos Coronaios for their support in dealing with the numerous reports from the public.

Satellites

The past year satellite wise was relatively uneventful as far as South Africa was concerned and the section handled the usual odd enquiry about a satellite or lights seen; the bright flashing TELKOM 3 satellite, a failed communications satellite launch and left stranded in a useless orbit 266 by 5017 km. Then there were the usual Iridium flares and other bright satellites but nothing dramatic as far as re-entries etc .
Daylight reports of satellite trails in the sky were all identified as aircraft contrails. Other reports of very bright objects turned out to be the landing lights of approaching aircraft etc.

Planetary work

Mars

The authors Mars imaging programme from 2015-2017 continued until February 2017. The apparition[1] has been notable (notorious?) for its lack of significant dust storm activity. The planet will be exceptionally well placed from SA for the 2018 apparition with the major dust storm season being closer to opposition, providing an ideal opportunity to capture the initiation and development of any

[1] An apparition of an object is a period of weeks or months during which it is visible in the night sky; a cyclical event for all planets.

global scale storms. Submissions are made to:

- BAA Mars section
- ASSA Astrophotography section
- Association of Lunar and Planetary Observers(ALPO), USA, Mars Yahoo group
- ALPO-Japan, Mars section
- Communication in Mars Observations(CMO)/The International Society of the Mars
- Observers(ISMO), Japan PACA (Professional-Amateur collaboration in Astronomy) Mars group this was by invitation only.
- Des Etoiles plein les Yeaux- France
- Planetary Virtual Observatory and Laboratory(PVOL), Europe

Mars was imaged on well over 200 days/nights during the apparition, a figure only rivalled by Paul Maxson in the USA and Efrain Morales in Puerto Rica, highlighting the fact that conditions in SA are very favourable, particularly if planets are in the southern skies.
The author has been invited to present a paper on his Mars observations at the European Planetary Science Congress which will be held 18-22 September 2017 in Riga, Latvia.

Jupiter

The author of this report has been extensively involved in submitting Earth based images in support of the NASA Juno mission at Jupiter. An article on this Pro-Am work was published in the MNASSA May edition.
I was able to capture hi-res images for Juno Perijove in its orbit 4 on 2 February, of the target areas that the Juno spacecraft was scheduled to fly over, and the Junocam to image, one rotation(+-9h) before closest approach.
At the request of John Rogers, Director of the Jupiter section of the BAA, I have been added to the Jupos submission team. This team, primarily based in Europe, generates a comprehensive record of

Jupiter's dynamic atmosphere, with global maps being generated on a roughly two weekly basis. The best amateur images worldwide are used to generate the maps. Jupiter images are submitted to:

- BAA Jupiter section
- ASSA Astrophotography section
- ALPO-Japan, Jupiter section
- PACA (Professional-Amateur collaboration in Astronomy) Jupiter group by invitation only.
- Des Etoiles plein les Yeaux- France
- NASA- Junocam mission
- Jupos
- Planetary Virtual Observatory and Laboratory (PVOL), Europe
- HST Jupiter Collaboration group- by invitation

Saturn

Saturn has been followed through the latest apparition. With the NASA Cassini mission soon coming to a close, high quality amateur imaging of Saturn will again become a focus over the next few years.

Moon

High resolution imaging is continuing and further images have been published in various international forums and journals. I am interacting with various individuals to assist them in developing lunar imaging skills. This is an area where developing amateurs can really get excited and produce rewarding results relatively quickly and easily, with guidance. This aspect will be included in the "Introduction to Planetary and Lunar imaging" presentation as mentioned below.

Solar Eclipse report

A report on the September partial solar eclipse was completed and published in the October MNASSA.

ASSA Shallow Sky Webpage

The webpage requires a further update, and this is on my priority list. It is anticipated that the Solar Eclipse report that was produced for MNASSA can also be utilised on the ASSA Solar Eclipse webpage - an area for which the author needs to find some time.

Interaction with the Members/Centres

Positive interaction is continuing, most notably with Bloemfontein, UFS, Boyden Observatory and ASSA Johannesburg Centre. Further communication with Cape and Durban Centres is planned. The writer is currently preparing a presentation (or possibly webinar) on introducing observers to high resolution planetary and lunar imaging.
The author has been involved in a number of interactions with various individuals, mainly on FB forums, where I have provided specific input and advice on planetary and lunar imaging, and anticipate that this will continue.

Visit to BAA - Burlington House 22 Nov 2016 (See MNASSA **, 76**, 5).

Occultation of 2014MU69

Details of this were described in the previous and current issue of MNASSA. My sincere appreciation to SAAO and especially David van Jaarsveld and Prof Matie Hoffman for their support and hospitality. Also to the ASSA Council for their enthusiastic support.

Conclusion

It has been an exciting, and busy, first year of involvement with ASSA. There is still plenty of work to do and it is hoped that further interest can be generated in the local Astronomical community in this exciting sector of Astronomy.

I would also like to take this opportunity to thank the Shallow Sky Specialists that have provided input throughout the year. Their contribution and support is greatly appreciated.

Letter from ASSET Trustees.

Peter Cramb, on behalf of the Trustess

The Trustees of the ASSA Endowment Trust have written this letter to the members of ASSA, informing them as to why there have been no recent reports about The ASSA Endowment Trust, known as ASSET for some time, and to update them on its present status. The Trustees at present (as agreed by ASSA) are Tim Cooper, Peter Cramb and Ian Glass. The Trust Secretary is Cliff Turk (who has expressed a desire to retire, but is willing to remain in office until matters have been settled). Peter Cramb is the acting secretary.

A complication to the trust at present has occurred because FICA requirements have become much more onerous and also that the records of the Trust at the office of the Master in Cape Town are far from complete for reasons unknown to us.

Two of the original three Trustees died some time back, viz. Jack Bennett, (1990) and PAT Wild (2012). Further, Andrew Gray has resigned as a Trustee, effective 1 July 2017. A copy of Jack Bennett's death certificate is still outstanding and has been applied for from the Master in Pretoria (this may take a long time). To regularise matters with the Master's Office, Cape Town, two death certificates, one resignation latter and three J417 forms for the present Trustees, together with an affidavit from Andrew Gray, were lodged with the Master in Cape Town Yesterday (1st August 2017). These seemingly simple requirements are in fact quite onerous and time-consuming, requiring many face-to-face contacts with the relevant officials as well as certified documents etc.

Because of all the above outstanding paperwork we have not been able to access the Trust accounts at ABSA bank for some considerable time and therefore do not know precisely where we stand financially. As, among other things, there is likely to be income tax owing, we have approached the Trustee Dept of ABSA to have access to our accounts as a matter of urgency. Regretfully, they can do little without the requisite Registration Document from the Master's Office, but are sympathetic to our cause.

We are proceeding as quickly as circumstances permit.

Colloquia and Seminars

These form an important part of a research facility, often as a sort of pre-publication discussion or a discussion of an individual's current research, and as such it is virtually impossible to "publish" this material. However by recording the topics discussed in the form below does indicate to those, who are unable to attend, what current trends are and who has visited to do research: it keeps everyone 'in the loop' so to speak

Also included in this section are the colloquia/seminars at the SAAO, UWC, the Astrophysics, Cosmology and Gravity Centre at UCT, ACGC and the NASSP lectures, aimed the at the students and interested astronomers. In addition there are the SAAO Astro-coffees which are 15-20min informal discussions on just about any topic including but not limited to: recent astro-ph papers, seminal/classic publications, education/outreach ideas and initiatives, preliminary results, student progress reports, conference/workshop feedback and skills-transfer.

SAAO

Title: Dark Matter Searches with XENON1T
Speaker: Jacques Pienaar (Purdue University)
Date: 29 June
Time: 11h00 – 12h00
Venue: SAAO Auditorium

Abstract: The content of the universe is well known from astrophysical observations, from which we concluded that about 27% of the universe consists of dark matter. Current theories of what a particle physics candidate for dark matter might behave like, provide several avenues for detection of this missing component of our universe. The current best limits on properties of potential particle physics candidates for dark matter are set by direct dark matter detectors using high purity crystals of Ge, or liquid noble gas time projection chambers (TPCs). XENON1T is a two-phase xenon TPC for the direct detection of dark matter. The target mass is 2 tons of liquid xenon. The detector was commissioned in the middle of 2016, and completed its first science run in January 2017. During the science run the detector has achieved the world's lowest background among comparable experiments. This talk will present the detector performance, calibration, and background studies which are paving the way towards the world's most sensitive dark matter search, and present the results of the first science run.

Title: Testing cosmological isotropy with the large-scale structure
Speaker: Dr. Carlos Bengaly (University of the Western Cape)
Date: 24 August
Time: 11h00 – 12h00
Venue: SAAO Auditorium

Abstract: The current standard model of cosmology, called ΛCDM, assumes that its background metric is Friedman-Lemaître-Robertson-Walker (FLRW) and the Universe is approximately homogeneous and isotropic on large scales, a feature of the so-called 'Cosmological Principle' (CP). Despite the good agreement between ΛCDM and a plethora of cosmological observations, direct tests of the CP need to be performed in order to assess whether it is a valid hypothesis or just a mathematical simplification. In this talk, I will focus on a test of the cosmic isotropy using the angular distribution of WISExSCOS galaxy number counts (GNCs), in which we use the dipole anisotropy of these GNCs for this purpose, verifying if its amplitude is consistent with sets of ΛCDM-based mocks, and

also if its direction agrees with other low-z probes. We obtain no strong evidence against the isotropy assumption, but we are still very limited by the systematics of the data,besides the possibility of large unaccounted low-z inhomogeneities especially in the $z < 0.15$ range. I will also briefly discuss other analyses I carried out with galaxy clusters and Type Ia Supernovae, in addition to future expectations of CP tests with the SKA.

Astro-Coffee

Title: Team Talk

1 Extragalactic Radio Sky Simulations including HI and continuum (using hydrosimulations)

2 CHPC Support for Astronomy

3 SKA-readiness: Computing development in African partner countries

Speakers: Catherine Cress, Sean February, Matthew Cawood & Israel Tshililo

Date: 29 June

Time: 13h00 – 14h00

Venue: 2nd floor auditorium SKA office, Pinelands

Title: A network of inexpensive lightning RF detection stations

Speaker: David Saroff: Astrophysics department of Rochester Institute of Technology.

Date: 11 July

Time: 12h00 – 13h00

Venue: 2nd floor auditorium SKA office, Pinelands

Abstract: A new cooperative network of inexpensive lightning RF detection stations provides location and timing of lightning events with GPS accuracy in time and location. Coverage is good in Europe, North America and Japan, but absent in Africa. I propose extending the network to SA. Participating stations receive a return stream from the network servers with time and location solutions for lightning events. This will be useful for

tagging RFI interference in observational radio telescope data, and providing advance warning of approaching lightning storms to observatory operators so the antennas can be parked in safe mode.

Title: The Exoplanet Revolution: NASA's Kepler Mission and the Search for Earth-like Planets

Speaker: Howard Isaacson: Research Scientist, University of California, Berkeley, & Breakthrough Listen

Date: 13 July

Time: 12h00 – 13h00

Venue: 2nd floor auditorium SKA office, Pinelands

No abstract given.

Sky Delights: A Sky Princess

Magda Streicher

According to ancient inscriptions Andromeda was the daughter of King Cepheus and Cassiopeia and was chained by her father between the heavenly stars for several reasons. The happy ending was that she was rescued by Perseus, who married her.

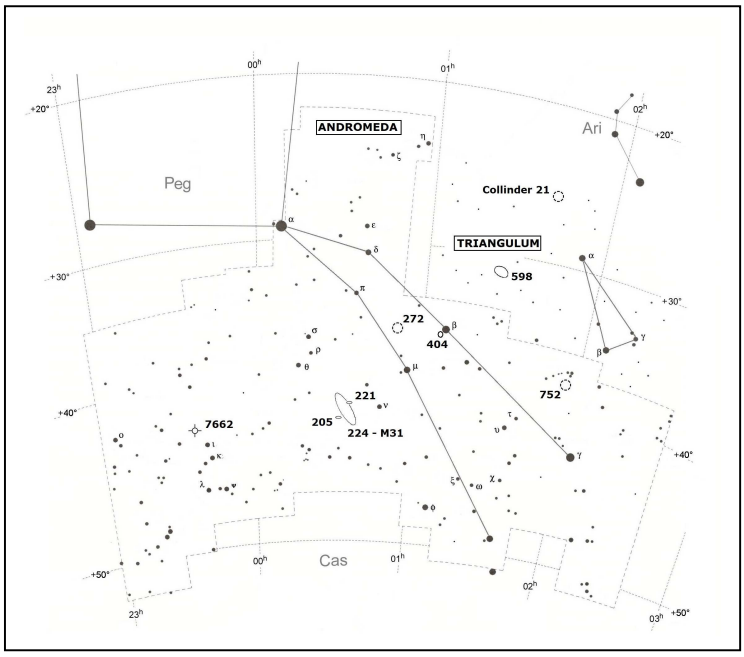

Fig 1. Andromeda sky map

Although the fact that Andromeda is fairly far to the north, it can be in reach for some further up north even though they may be in the southern hemisphere. Andromeda contains a lot of favourite objects to be observed. Of course, the constellation is well known

for the “Great Andromeda Nebula”, better known as Messier 31.

The Andromeda figure can be seen located northwards from the constellation of Pegasus, with the rectangle’s north-eastern star being alpha Andromedae. The image can be easily identified as it forms clear lines northwards with reasonably bright stars, including the yellow-coloured magnitude 3.2 delta Andromedae and magnitude 2 beta Andromedae. The latter boasts a strong orange colour.

Form a triangle southward with beta and mu Andromedae find an open star cluster standing out fairly clearly against the background stars. **NGC 272** displays an L-shaped asterism in a north-western to south-eastern direction. Six of them vary in brightness, between magnitude 10 and 11, while the corner magnitude 9 star of the L-shape has a magnitude 13 companion, giving the impression of a double star. The grouping is more representative of a star string than a genuine star cluster as it is rather dubiously classified in various catalogues.

The lovely bright beta Andromedae has the galaxy **NGC 404** for company which can be found just 6’ north-west of this beautiful star. But beware of trying to observe both in one eyepiece field of view, as attempting it could be a challenge. The star brilliancy dims the appearance of the galaxy. No wonder it has been popularly called Mirach’s Ghost. However, when one manages to spot this dwarf lenticular galaxy of type SO, it displays a round shape with a bright nucleus. A surprise was to spot the very faint star on the northern rim. But don’t be afraid of the ghost – it is a safe 10 million light years distant – whereas beta Andromedae is only 200 light years away from us.

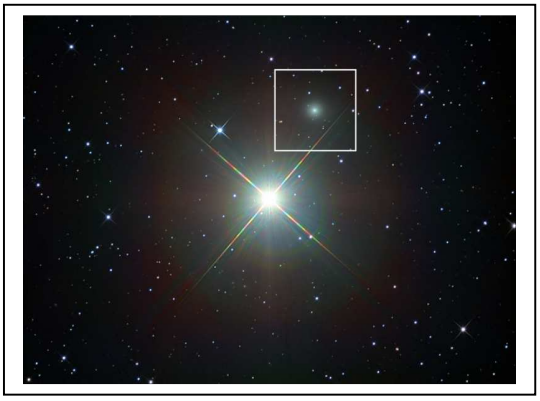

Fig 2. Mirach’s Ghost.

In the western part of the constellation the planetary nebula **NGC 7662** takes its place in a galaxy "world". Popularly known as the Blue Snowball nebula it truly reflects a lovely greenish-blue-coloured snowy oval ring with traces of a darker inner part. The distance to this nebula is not known with any real accuracy. Leland S Copeland noted this nebula with the appearance of a light blue snowball in 1960, and it is therefore now also known as Copland's nebula.

A cluster which is not scared of ghosts and presents itself nice and clearly is the grouping **NGC 752** situated in the eastern part of the constellation 2° from the border with Triangulum. The cluster displays bright scattered stars interspersed with fainter members, somewhat elongated in a north-eastern to south-western direction. The eastern part of the grouping is dominated with a block of brighter stars, and most prominent is the yellow-coloured magnitude 7 star towards the southern edge. The galaxy IC 179 is situated only a few arc minutes away towards the north-east, although just what appears to be a faint speck of dust is visible.

Doing justice to beautiful women, Andromeda displays her prize object **NGC 224** (Messier 31), better known as the Andromeda galaxy, in its full glory. It is situated less than a degree west of the magnitude 4.5 star mu Andromedae. What is it about this galaxy that fascinates us so much? It is bright and easy to observe to start with! One does not have to search far to realise that there are millions of star cities out there similar to our own home galaxy. Because we cannot observe our galaxy from "the outside", it is worth looking at galaxies very similar to ours. Among our local group of galaxies, which contains some 35 members, the largest member is NGC 224 (M31), which gives us a ringside seat. This amazing, large and abundant glow is situated some 2.1 million light years away from us; it is the remotest object visible to the naked eye. The nucleus appears smooth, dusty and bright, and displays a surface character to admire. Astronomers suspect that this distant island universe has had a violent past and contains many stars with heavy elements. M31 also contains some 300 billion suns and is spread across 130 000 light years, rushing

towards us at nearly 300 km per second. It has probably grown by swallowing up smaller galaxies, just like our own Milky Way still showing signs of cannibalism, but on a smaller scale.

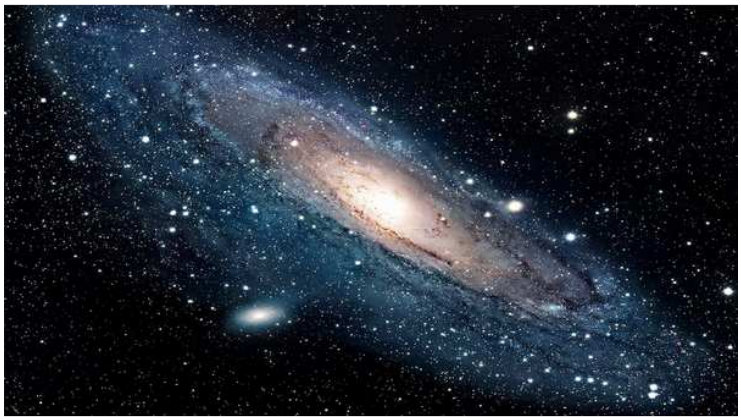

Fig 3. The well-known Great Nebula in Andromeda (M31)

In 1923 astronomer Edwin Hubble studied photographic plates of the Great Nebula in Andromeda. Cepheids take their name from the constellation Cepheus, where astronomers discovered the first example, delta Cephei, of this new class of variable stars. In 1908 Harvard College Observatory astronomer Henrietta Swan Leavitt first noted a relationship between the average brightness of Cepheids and the periods of their fluctuations. George Bond at Harvard was the first to clearly map spiral structure in M31, but he could not tell what they were. Isaac Roberts was the first to definitively detect the spiral arms in photographs he made in the late 1880s. Edwin Hubble was the first to resolve M31 into stars using the 100-inch Hooker telescope and, on the basis of the periods of Cepheid variables that he found, he calculated the first roughly correct distance and helped to prove that M31 was an exterior island, or galaxy.

Part of the family is **NGC 221**, better known as Messier 32, which displays a magnitude 8 out-of-focus round outstanding haze situated snugly close to the south-eastern outer hazy rim of M31. This elliptical oval patch displays a ball of hazy light well seen. Its star-like nucleus is even brighter than that of M31.

Independently discovered by Caroline and Charles Messier, **NGC 205**, also known as M110, is the north-western companion of M31 just 6’ away.

This beautiful soft oval covered in haziness displays a rather bright nucleus. Caroline was barely 33 years old, a fragile young lady, and surely bathing in joy when she discovered it, a still unknown galaxy. Though Charles Messier, a comet hunter of renown, had, however, already laid eyes on this object some 10 years earlier.

Thinking of the great nebula in Andromeda, another famous galaxy, **NGC 598**, better known as Messier 33, comes to mind, also part of the local galaxy cluster – a lovely open spiral situated 6° in the neighbouring constellation Triangulum. Popularly known as the Pinwheel Galaxy, it is a close neighbour and can be seen with just the aid of binoculars in very dark skies, however, small scopes will reveal it perfectly. M33 is an open spiral with a very low surface brightness, but with care the brighter emission patch catalogued as NGC 604 comes to the fore. It is very close to three brighter stars towards the north-western section of the spiral arm. Overall the galaxy reveals lumps and darker knots with faint stars on its surface.

The first quasar conclusively identified as such was discovered in the constellation Triangulum, 2° north of M33. The quasar 3C48 was the first in the *Third Cambridge Catalogue of Radio Sources* for which an optical identification was found by Allan Sandage and Thomas A Matthews through radio interferometry in 1960. Jesse L. Greenstein and Thomas Matthews found that it had a redshift of 0.367, making it one of the highest redshift sources then known. It was not until 1982 that the surrounding faint galactic "nebulosity" was confirmed to have the same redshift as 3C48, cementing its identification as an object in a distant galaxy. This was also the first solid identification of a quasar with a surrounding galaxy at the same redshift (Wikipedia). Three years later 3C273 in the constellation Virgo was detected visually as a magnitude 13 object and it is still the brightest QSO known.

Still in Triangulum, between masses of galaxies, the grouping **Collinder 21** is fighting for a place. The cluster is situated just 7’ north of the very faint

galaxy IC 1731 in the far southern part of Triangulum. It is a special outstanding group of a dozen various-magnitude stars in the shape of a half-moon or a lopsided horseshoe of sorts. This outstanding asterism is now better known as Sir Patrick's Putter.

OBJECT	TYPE	RA	DEC	MAG	SIZE
NGC 205 Messier 110	Galaxy	00h40m.4	+41°41'.5	8.1	19.5'x12.5'
NGC 221 Messier 32	Galaxy	00h42m.7	+40°51'.6	8	11'x7.3'
NGC 224 Messier 31	Galaxy	00h42m.8	+41°16'.6	3.4	185'x75'
NGC 272	Cluster	00h51m.4	+35°50'	10	4'
NGC 404	Galaxy	01h09m.4	+35°43'.4	11.2	3.5'x3.5'
NGC 598 Messier 33	Galaxy	01h33m.9	+30°30'.3	5.7	67'x41'
Collinder 21	Open Cluster	01h50m.2	+27°04'.8	8.2	7'
NGC 752	Open Cluster	01h57m.9	+37°40'.9	5.7	50'
NGC 7662	Planetary Nebula	23h25m.9	+42°33'	9	2.2'

The **Astronomical Society of Southern Africa** (ASSA) was formed in 1922 by the amalgamation of the Cape Astronomical Association (founded 1912) and the Johannesburg Astronomical Association (founded 1918). It is a body consisting of both amateur and professional astronomers.

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Membership: Membership of the Society is open to all. Potential members should consult the Society's web page assa.saao.org.za for details. Joining is possible via one of the local Centres or as a Country Member.

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ISSN 0024-8266

mnassa

monthly notes of the astronomical society of southern africa

Volume 76 Nos 7 & 8 **August 2017**

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