

Symposium 2010 report

Johan Smit, Chairman, Pretoria Centre, ASSA.

The Pretoria Centre hosted the Biennial ASSA Symposium from 7-9 October 2010, at the Silverton campus of the Council for Geosciences, and although the theme of the Symposium was “Light and Spectrum Pollution”, a wide range of papers were presented with topics as diverse as “Mining in Space” and the problems facing “Science Journalism” in South Africa.

The first day opened with a tour of the Council for Geosciences, where delegates were introduced to the seismology department, and briefly discussed the seismic readings picked up from the meteor which streaked across Southern African skies late last year, and saw a real time read out from all the seismometers located around South Africa. Delegates were also shown the laboratories and a host of impressive equipment used by the geosciences.

After a warm welcome by the ASSA president, **Michael Poll**, opened proceedings. Andrie van der Linde, chair of the organising committee, informed delegates of the practical arrangements for the next three days.

Professor Phil Charles, Director of the South African Astronomical Observatory (SAAO) delivered the first paper. The last 18 months had seen SALT “stood down” while major repairs and upgrades

were done, a process that was completed at the end of August 2010. Delegates were thus privileged to be one of the first audiences to hear this good news. Since the inauguration of SALT, the two major problems that had plagued SALT’s performance were identified. These were a sharp cut-off in the ultraviolet region of the Robert Stobie Spectrograph, and a focus gradient across the field of view. Professor Charles described how the problems were investigated, analysed and tackled, almost entirely by SAAO astronomers and engineers. A future issue of *MNASSA* will carry the complete report by Dr Darragh O’Donaghie, whose team is to be congratulated on an outstanding effort. Professor Charles continued by outlining major new developments in the other international facilities at Sutherland, which are shifting heavily towards robotic operation, so expanding research facilities, especially the search for extra-solar planets. He concluded his address with a brief overview of the implications and progress of a proposed new wind-electricity plant near Sutherland.

Dr Hubrecht Ribbens, who spoke on “Techniques to Observe and Analyse Celestial Objects and Phenomena”. This was a large and ambitious topic and time constraints meant that he could only gloss over the topic. All our discoveries create data which must be

stored or catalogued. Currently there are several sextillion (trillion-trillion-trillion) objects that are waiting to be catalogued. This alone is a challenge and new discoveries continually create more data. Dr Ribbens then described how celestial objects are catalogued and which techniques are used to detect them. He touched on the subject of the need for one all-inclusive catalogue of all celestial objects and phenomena.

The final speaker for the morning was **Hendrik van Heerden**, of the University of the Free State. Hendrik is involved in a project to build a museum at the site of the historic Boyden Observatory which has continuously produced valuable astronomical observations for over a century. A summary of his talk appears elsewhere in this edition of *MNASSA*.

After an excellent lunch, the afternoon session was opened by Percy Jacobs, who introduced **Johan Smit**, the Chairman of the Pretoria Centre, who presented an entertaining talk on “The Dark Side of Light – Light and Spectrum Pollution”. While active campaigners against light pollution would have been familiar with much of what Johan had to say, he managed to present the material in a compelling way, and made excellent use of photographs to demonstrate the negative effects of light pollution. He was also able to illustrate counter-

intuitive aspects of light pollution: for example, security lights are more likely to aid criminals than home-owners and security staff! He finished off by giving some pointers on how to raise the subject with local government. Johan stated that the main argument to present to perpetrators of light pollution is that it is a symptom of wasted energy. Prof Charles supported this by showing some before and after photos of towns in Chile that went “dark sky friendly”. The effects were dramatic, and one fact that came across was that these towns saved back the initial cost of upgrading to “sky friendly lights” within 3 years. This is why Chile is probably the richest country in the world in terms of world class observatories. South Africa has some way to go, as Prof Charles pointed out: the brightest spot on the horizon at Sutherland is Cape Town’s light bubble.

Next on the agenda was **Michael Poll**, President of ASSA. Astronomical events and phenomena are frequently depicted in cartoons and cartoon strips



Conversations over dinner at the Mohka Restaurant

in newspapers and magazines and they often reflect public perceptions of the Sun, Moon and stars. Michael took us on an entertaining tour through examples of these cartoons and analysed the astronomy in them, and he pointed out how these could be used for educational purposes.

The final session for the afternoon was a **Workshop on laser safety and regulation** in South Africa. This was an important and useful workshop that will be presented in a future edition of *MNASSA*, when all the collected data from feedback has been collated and processed.

The day was concluded with a dinner at Mohka Restaurant at the Pretoria Botanical Gardens. Good food, wine and conversation did much to renew friendships and make new ones.

Danie Barnardo, Vice-Chairman of the Pretoria Centre of ASSA, chaired the first session of the second day, which started with a presentation by **Prof Barbara Cunow**. She started observing Saturn in 1980 with a small telescope and has continued this right through to the present. In other words, she has followed Saturn through a full Saturn year, and recorded all four seasons on Saturn. The detail captured in her

drawings showed that this was definitely a labour of love and perseverance. We salute a true professional amateur! Her observations of the complete 30-year cycle will be completed as this issue goes to press, and a full, illustrated report will be published later.

Allen Versfeld was the next speaker, presenting a paper on Astronomy Outreach in the Digital Age. He said that traditional outreach methods are here to stay, but the Internet is beginning to its place as a default first-choice for more and more people. Unfortunately for those wishing to use the Internet to bring astronomy to the public, there are no hard and fast rules – the medium is too young and changes too fast. He introduced Urban Astronomer.com as an example of his own work in the field and discussed where he had gone wrong, and what lessons could be learned.

Allen was followed by **Case Rijdsijk**, who spoke briefly on the topic of stellar



(left) Barbara Cunow and Allen Versfeld (above)

evolution. Case walked us through the recently discovered very massive star's lifecycle, and looked at various possible endings, from neutron stars to black holes to quark stars and other even more exotic possibilities. Thanks to Case most of the delegates will now have to update most of their own presentations about stars to include these previously unknown large stars.

After the tea break, **Professor Matie Hoffman** (University of the Free State) took the podium. He spoke on "The Assessment of the Expected Impact on Observing Conditions at Boyden Observatory of Light Pollution Associated with the New Developments in the Area". As discussed the previous day by Hendrik van Heerden, Boyden is a working observatory with a long international history. Boyden is actively involved in work on accretion disks, and in making multi-wavelength observations. Proposed new housing developments and the Maselspoort resort near the observatory threatened to increase light pollution levels to the point where they would severely impact on the observatory's usefulness. Professor Hoffman spoke at length on the report compiled by his department as part of the Environment Assessment Report required for construction of new projects. Prof Hoffman was pleased to report that the developers were receptive to the report and were eager to follow through on his suggestions on how to mitigate the effects of light pollution and light trespass. He also took a few minutes to announce the plans to build a



Prof Matie Hoffman

new planetarium / dome theatre on the site of the observatory.

The next speaker was **Heinrich Bauermeister** from MMS Technology, the company contracted to build the antennae for the MeerKAT radio telescope array. He gave a detailed technical presentation on how the antenna dishes were designed and fabricated. Moulds were prepared on site and the dishes were then constructed one layer at a time using modern aerospace technology. In reply to a question as to how quickly these dishes could be made, Heinrich replied that production could be increased to one dish per week, which raised the question as whether the three thousand dishes of the SKA could be constructed on time! See reports on MeerKAT in this issue.

After lunch Johan Smit introduced **Danie Barnardo**, of the Pretoria Centre of ASSA, who is also a geologist at the Council for Geosciences. Danie spoke on “Meteorites, Impacts and the Tswaing Impact Crater”. Danie explained the geological makeup of the various types of meteorite found on Earth, and discussed the formation of impact craters. After a description of the different rock formations found at various well known impact sites around the world, Danie then focussed on the Tswaing impact crater, which is near Pretoria. After a detailed description of the history of the crater, he showed a number of photographs and maps of the area.

Danie also discussed the effect of impacts and – everyone’s favourite topic— what are the chances of something like this happening again. Some interesting statistics were highlighted: Meteors of more than 1 metre in diameter enter the atmosphere about once a week. Most break up in the atmosphere (as a result of friction with the air molecules) and never reach the Earth’s surface. Of the ones that do reach the Earth’s surface, about three quarters fall into the oceans. So, only worry about the other quarter! About 7 reasonably large craters (about 100 meters in diameter) were created during the last 10 000 years. Expect something bad to happen once every 1 500 years.

The next speaker was **Michael Neale**, from the University of Pretoria’s

Department of Mining and Engineering. Michael recently returned from the Space Resources Roundtable XI / Planetary & Terrestrial Mining Sciences Symposium at the Colorado School of Mines. He spoke to the delegates about the need for South African involvement in “*In Situ* Resource Utilisation” (ISRU), which means the mining and collection of resources from space, for use in space. The most challenging aspect of space flight is lifting material out of Earth’s gravity well. This is a hugely expensive enterprise, which severely limits the amount of tools, resources and materials which astronauts can take with them. The principle of ISRU is that the mineral wealth of the Moon, Mars and the Asteroids vastly exceeds that of Earth and should be much cheaper to harvest in space. He reported that there is a lot of interest from the mining industry internationally, and it seems likely that the next stage of human expansion into space will be led by miners and prospectors.

Case Rijdsijk then returned to deliver a second paper: “Reporting Science”. Case discussed the rift in between journalists and scientists, and considered various causes. He then showed presented some examples of bad science reporting and suggested a few ways on how scientists could improve their relationship with the press. He also explained that the problem in SA was exacerbated by the lack of trained science journalists

The final paper of the symposium was presented by **Professor Derck Smits**, from Unisa, on the topic of Cosmic Masers. Although 2010 was widely celebrated as the 50th anniversary of the laser, the maser was discovered first, seven years earlier, in 1953. After briefly explaining how masers are formed, through the stimulated emission of photons from excited atoms, Prof Smits gave us a bit of history about the first discovery of a cosmic maser. In 1965 astronomers found a highly compact source of OH emission radiation, which was eventually identified as a maser occurring naturally in a vast cloud of ionised OH gas. Cosmic masers have also been identified as coming from the atmospheres of red giant stars and the cores of active galaxies. Derck then discussed some of his own recent work in trying to identify the sources of some interesting cosmic masers which so far remain a mystery.

After thanking all the speakers for their time and effort, Johan Smit then **formally closed** the symposium. Delegates met up later for a casual evening's stargazing at the Pretoria Centre's observatory. The 12.5 inch f/9.8 reflector in the Bennett observatory entertained us with splendid views of Jupiter. This long focus Newtonian telescope with its excellent optics is particularly suitable for planetary viewing. Some viewers reported seeing up to eight cloud bands on the surface of Jupiter.

Excursions

The following day, some of the delegates were given a tour of the Hartebeeshoek Radio Astronomy Observatory (HartRAO) in the morning and the Tswaing impact crater in the afternoon. We were joined by Doug and Andy from the Blackburn Leisure Astronomy Society [BLAS] in Brough, England, giving the symposium some international flavour.



Delegates inside the Tswaing crater

At **HartRAO** we were met by Dr Marion West who guided us through this very impressive facility. A slide show introduced the delegates to the facility and astronomy in the radio frequency range. A guided tour through the

observatory, including the control room was conducted. Watching the 200 ton 26 meter telescope move was very impressive, especially for the technically inclined delegates. What impressed me most was the fact that they are doing observations in bright sunshine. We were fortunate to see the telescope move as one of its main equatorial bearings seized some time ago and was only recently repaired, see last edition of *MNASSA*. The fact that these repairs were done by South African expertise is more evidence that we as a country have much to be proud about.

The delegates then drove to the **Tswaing crater** where Danie Barnardo met and 15 delegates who drove to within 400m from the main lookout point on the Tswaing hiking trail which reduced the walking distance 7km to about 4 km. The main look-out point is also known as the Shoemaker Viewpoint, where there is a plaque in honour of Eugene Shoemaker, co-discoverer of Comet Shoemaker-Levy, which slammed into Jupiter in July 2004. Most of the participants had not seen Tswaing before and everybody was suitably impressed by the 1.13 km diameter, 60 metres deep impact crater that can be seen in all its glory from the Shoemaker viewpoint. Delegates then entered the hiking trail, which leads into the crater and along the way Danie explained that Tswaing has a brine lake, rich in soda-ash, in its centre, which makes this impact crater unique. According to impact scientists, the cra-

ter was formed 220 000 years ago by a 40 – 50 metre diameter stone meteorite, which slammed into the earth at a velocity of about 16 km/sec., resulting in an explosion with 500 times the magnitude of the Hiroshima nuclear device. Most living things within 40 km from the site would have been destroyed.

Finally, Allen Versfeld summed up the 2010 Symposium in these words: “Overall, the symposium was a great success, with a number of very interesting and informative papers presented. We all look forward to the next symposium in 2012!”

Acknowledgements

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