



SCAR SRP

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Responsible:

SCAR Executive Committee Meeting 2017

Brno, Czech Republic, July 2017

Astronomy and Astrophysics from Antarctica 2016-2017 Report

Report Author(s):

Professor Anna Moore, Australian National University, on behalf of the AAA steering committee

Summary of activities from 2016-17 and any other important issues or factors (<150 words):

The AAA SRP continues to satisfy the goals of the 2014-2018 operational plan. During the 2016-17 period, AAA convened and supported both a half day science session and business meeting at the SCAR open science conference in Kuala Lumpur. Four members of the steering committee were rotated as previously presented to SCAR ExCom. The steering committee unanimously endorsed the fourth AAA workshop to be hosted by the National Astronomical Research Institute of Thailand (NARIT) in Chiang Mai, Thailand on July 31- Aug 4, 2017. Approximately fifty participants will attend this meeting from all over the globe to present their work in Antarctic Astronomy at this international forum. There is significant participation from the astronomical community of Thailand and the south-east Asia region. The SCAR AAA website has been significantly updated during this period to produce a web portal for all astronomical researchers to access existing data.

Recommendations that EXCOM and Scientific Group Chief Officers should consider (if any): *Please indicate if approval is necessary or if they are just asked to note information.*

Progress and Plans:

Major Activities and Significant Progress from the past year (<500 words):

AAA can report the following major activities and progress from the past 12 months:

- A half-day session on Astronomy and Astrophysics from Antarctica was convened at the **SCAR Open Science Meeting in Kuala Lumpur** in August 2016. The oral presentations were heavily oversubscribed so an additional poster session was organized to accompany the session. Additionally, several young researchers presented at the session as a result of travel awards supported by the SCAR AAA budget.
- A SCAR AAA SRP **business meeting** was held during the OSC. A large fraction of the steering committee attended this meeting, and it was the last to be chaired by Professor John Storey. Four of the steering committee members were rotated at this meeting as previously planned. The venue of the biannual SCAR AAA workshop was agreed by the committee to be in Chiang Mai, Thailand, following a very strong bid by our colleagues at the National Astronomical Research Institute of Thailand (NARIT). The NARIT hosted workshop will be the fourth and last in a long and productive series after Sydney (2011), Sienna (2013) and Hawaii (2015). Finally, the committee discussed the future of Astronomy and Astrophysics from Antarctica post 2018 and the steps required to gain community input in the process. This subject will form a large component of fourth workshop discussions.
- A modernization of the **AAA website** and home of the Antarctic data repository began in November 2016 and will be completed mid-2018. The goals of the work are to permit easy searching of the extensive data set contributed by our SRP community over the early stages of the SRP, and to add a new feature which is to permit researchers to easily access current groups working in Antarctic Astronomy. This was felt extremely beneficial to early career researchers and to researchers from developing Antarctic countries. The breadth of Antarctic Astronomy research is large, encompassing instruments for particle, neutrino, cosmic rays, and wavelengths including radio, sub-mm, microwave, infrared and optical and little infrastructure exists around the world to capture and disseminate this information. *This is a perfect activity for the SCAR AAA SRP to undertake.*
- The **fourth SCAR AAA workshop** will be hosted by NARIT in Chiang Mai, from July 31 – Aug 4, 2017. Nearly 50 people are scheduled to attend this meeting, including the majority of the steering group. The workshop provides an international forum for Antarctic astronomy researchers to present their work, and the SRP allocates a large fraction of its yearly budget to support early career researchers in particular to attend this workshop. The workshop this year will highlight Antarctic Astronomy in Thailand and this community's future

aspirations. It also provides a convenient forum to create new ventures with our Thai colleagues.

- While the SCAR AAA SRP does not fund instrument activities in Antarctica, it has certainly provided a means **for international groups to convene, plan and discuss large scale projects**. The past year has seen the announcement from the Chinese government for a 2.5m class optical/infrared telescope (KDUST) and a 5m class sub-mm telescope (DATE5) to be built and located at Dome A, Antarctica. The South Pole Telescope joined the Event Horizon Telescope (EHT) to directly image the regions surrounding the black hole at the centre of our galaxy and that of nearby galaxy M87. The IceCube telescope continues to monitor high energy neutrino events from the heavens. These are only a fraction of the successful projects in Antarctic Astronomy with announcements over the past 12 months.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years (<500 words):

- The AAA SRP has a little under 1.5 years remaining and planning for the future beyond 2018 is underway. This topic will be a major theme at the upcoming workshop in Chiang Mai. We aim to develop this plan over the next 6 months, well ahead of the Open Science Conference in Davos, Switzerland.
- The SCAR AAA updated website and data link repository will be completed by mid-2018 and will go online shortly thereafter.
- The AAA SRP will continue to support joint activities in both the Arctic and Antarctica. Over the next year this includes aiding in the discussion and proposal development for projects at all high plateau sites, including Dome A, Ellesmere Island, Dome C, Dome F and the South Pole. Bringing together interested parties to form collaborations is one of the major outcomes of the AAA workshops and science sessions at the SCAR OSC.
- AAA SRP science and business meetings will be convened during the SCAR Open Science Conference at Davos, Switzerland in mid-2018 and we will be supporting participation from our colleagues from around the world to attend these meetings.
- Finally, we will be supporting the SCAR AAA booth at the General Assembly of the International Astronomical Union (IAU) in Vienna, Austria, in August, 2018. Our first SCAR AAA booth appeared at the IAU general assembly in Oahu in 2015 and was a great success.

Please list any new outputs and deliverables (including publications and products that your group feels are part of your achievements):

There have been several hundred papers published in the past 12 months in the area of Astronomy and Astrophysics from Antarctica. The papers below highlight the diversity of the area, and work which has benefited directly from SCAR AAA activities.

1. "Optical Sky Brightness and Transparency during the Winter Season at Dome A Antarctica from the Gattini-All-Sky Camera", Y. Yang et al, *Astrophysical Journal* (2017), **154**, 1. A joint China-US-Australia investigation into the multi-year optical sky brightness measurements above the Dome A site. The paper formed part of a PHD thesis defence.
2. "IceCube Seeks to Expand", Francis Halzen and Spencer Klein, *CERN Courier* **56** (2016) 40-41, no. 6, July/August 2016, "PINGU: A Vision for Neutrino and Particle Physics at the South Pole, IceCube-Gen2 Collaboration: M. G. Aartsen et al, *Journal of Physics* **G44** (2017) 054006.
3. "Terahertz and far-infrared windows opened at Dome A in Antarctica", Shi, S.-C., Paine, S., Yao, Q.-J., Lin, Z.-H., Li, X.-X., Duan, W.-Y., et al. *Nature Astronomy* (2016), **1**, 1.
4. "Variable Stars Observed in the Galactic Disk by AST3-1 from Dome A, Antarctica", Wang, L., Bin Ma, Li, G., Hu, Y., Fu, J. et al, *The Astronomical Journal* (2017), **153**, 1.
5. "The AST3 controlling and operating software suite for automatic sky survey", Hu, Y., Shang, Z., Ma, B., & Hu, K. (2016). In G. Chiozzi & J. C. Guzman, (Vol. 9913, pp. 99130M–7). Presented at the SPIE Astronomical Telescopes + Instrumentation, SPIE.
6. "Atmospheric seeing measurement from bright star trails with frame transfer CCDs", Ma, B., Shang, Z., Hu, Y., Hu, K., Pei, C., & Yuan, X. (2016).. In H. J. Hall, R. Gilmozzi, & H. K. Marshall, (Vol. 9906, pp. 99060A–7). Presented at the SPIE Astronomical Telescopes + Instrumentation, SPIE.
7. "Operation of AST3 telescope and site testing at Dome A, Antarctica", Shang, Z., Hu, Y., Ma, B., Hu, K., Ashley, M. C. B., Wang, L., & Yuan, X. (2016).. In A. B. Peck, R. L. Seaman, & C. R. Benn, (Vol. 9910, pp. 991023–8). Presented at the SPIE Astronomical Telescopes + Instrumentation, SPIE.
8. "The data acquisition system of the Latin American Giant Observatory (LAGO) "Sofo Haro, M.; Arnaldi, L. H.; Alvarez, W.; Alvarez, C.; Araujo, C.; Areso, O.; Arnaldi, H.; Asorey, H.; Audelo, M.; Barros, H.; Bertou, X.; Bonnett, M.; Calderon, R.; Calderon, M.; Campos-Fauth, A.; Carramiñana, A.; Carrasco, E.; Carrera, E.; Cazar, D.; Cifuentes, E.; Cogollo, D.; Conde, R.; Cotzomi, J.; Dasso, S.; De Castro, A.; De La Torre, J.; De León, R.; Estupiñan, A.; Galindo, A.; Garcia, L.; Gómez Berisso, M.; González, M.; Guevara, W.; **Gulisano, A. M.**; Hernández, H.; Jaimes, A.; López, J.; Mantilla, C.; Martín, R.; Martínez-Mendez, A.; Martínez, O.; Martins, E.; Masías-Meza, J. J.; Mayo-García, R.; Melo, T.; Mendoza, J.; Miranda, P.; Montes, E.; Morales, E.; Morales, I.; Moreno, E.; Murrugarra, C.; Nina, C.; Núñez, L. A.; Núñez-Castiñeyra,

- A.; Otiniano, L.; Peña-Rodríguez, J.; Perenguez, J.; Pérez, H.; Perez, Y.; Perez, G.; Pinilla-Velandia, S.; Ponce, E.; Quishpe, R.; Quispe, F.; Reyes, K.; Rivera, H.; Rodriguez, J.; Rodríguez-Pascual, M.; Romero, M.; Rubio-Montero, A. J.; Salazar, H.; Salinas, J.; Sarmiento-Cano, C.; Sidelnik, I.; Haro, M. Sofo; Suárez-Durán, M.; Subieta, M.; Tello, J.; Ticona, R.; Torres, I.; Torres-Niño, L.; Truyenque, J.; Valencia-Otero, M.; Vargas, S.; Vásquez, N.; Villasenor, L.; Zamalloa, M.; Zavala, L. Nuclear Inst. and Methods in Physics Research, A, Volume 820, p. 34-39.2016.
9. "Typical Profiles and Distributions of Plasma and Magnetic Field Parameters in Magnetic Clouds at 1 AU". L. Rodriguez, Jimmy Joel Masías-Meza, S. Dasso, P. Demoulin, A.N. Zhukov, **A. M. Gulisano**, M. Mierla, E. Kilpua, M. West, D. Lacatus, A. R. Paraschiv, M. Janvier .Solar Physics, Volume 291, Issue 7, pp.2145-2163.
 10. "Characteristics of Four Upward-pointing Cosmic-ray-like Events Observed with ANTA". P.W.Gorham, J.Nam, A.Romero-Wolf, S.Hoover, P.Allison, O.Banerjee, J.J.Beatty, K.Belov, D.Z.Besson , W.R.Binns, V.Bugaev, P.Cao, C.Chen, P.Chen, J.M.Clem, A.Connolly , B.Dailey, C.Deaconu, L.Cremonesi, P.F.Dowkonnt, M.A.Duvernois, R. C.Field, B.D.Fox, D.Goldstein, J.Gordon, C.Hast, C.L.Hebert, B.Hill, K. Hughes, R.Hupe, M.H.Israel, A.Javaid, J.Kowalski, J.Lam, J.G.Learned , K.M.Liewer, T.C.Liu, J.T.Link, E.Luszczek, S.Matsuno, B.C.Mercurio, C .Miki, P.Miocinovic, M.Mottram, K.Mulrey, C.J.Naudet, J.Ng, R.J.Nichol , K.Palladino, B.F.Rauch, K.Reil, J.Roberts, M.Rosen, B.Rotter, J.Russ ell, L.Ruckman, D.Saltzberg, D.Seckel, H.Schoorlemmer, S.Stafford, J. Stockham, M.Stockham, B.Strutt, K.Tatem, G.S.Varner, A.G.Vieregg, D.Walz, S.A.Wissel, F.Wu. Phys. Rev. Lett. 117, 071101 (2016).

Significant Deviations from the Implementation Plan, if any:

None to report.

Steps taken to address individual points from your External Review, if any:

Steps to address external review comments were presented in the last report to ExCom in 2015. These are summarized below.

- I. Create an Antarctic Plateau International Astronomical Observatory (APIAO);
- II. Extend the current site testing searchable database to become a data portal;
- III. Increase outreach activities directed towards the general public and the international astronomical community, especially in those countries with less developed astronomical programs in Antarctica.

Items II and III are well underway with the ongoing updates and extension of the capabilities of the AAA website and data repository. The updates to the

website planned will fully suffice steps II and III prior to the end of the AAA SRP in 2018.

Item I is an ambitious goal which we as a committee fully embrace and are committed to achieve. Initial conversations were started on this topic at the SCAR OSC meeting in August 2016. A specific implementation plan to achieve the creation of an Antarctic International Astronomical Observatory (APIAO) will occur at the SCAR AAA fourth workshop in Chiang Mai, and significant focus will be placed on this during the remaining 1.5 years of the AAA SRP. *The goal of the steering committee is to announce the formation of the Antarctic International Astronomical Observatory in late 2018.*

If your SRP produces data, please report any new data generated and links to inclusions to the Antarctic Master Directory, etc.

We will keep SCAR updated of AAA links for inclusion in the Antarctic Master Directory.

Budget

Planned use of funds for 2017 and 2018

Month/Year (MM-YY)	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
08-17	Travel awards for AAA 4 th workshop (Chiang Mai)	\$7,400	Details to be provided separately	anna.moore@anu.edu.au or james.madsen@uwrf.edu
09-17	Professional salaries (early career) for AAA website and data portal renovation	\$6,800	Anna Moore	anna.moore@anu.edu.au or james.madsen@uwrf.edu
01-18	Professional salaries (early career) for AAA website and data portal renovation	\$6,800	Anna Moore	anna.moore@anu.edu.au or james.madsen@uwrf.edu
06-18	Travel awards for AAA science and business meetings at SCAR OSC 2018, Davos	\$12,000	Details to be provided separately	anna.moore@anu.edu.au or james.madsen@uwrf.edu
08-18	Travel and booth costs for AAA booth support at the International Astronomical Union General Assembly, Vienna, August 2018	\$9,000	Details to be provided separately	anna.moore@anu.edu.au or james.madsen@uwrf.edu

Briefly describe what the funds will be used for and what the desired results are:

2017:

- \$7,400 for travel awards to attend the SCAR AAA fourth workshop in Chiang Mai, Thailand (a detailed budget per awardee will be sent to SCAR shortly)
- \$6,800 for professional salaries (early career) for developing the AAA website portal which will significantly update the existing website, provide straightforward navigation of the data portal, and permit our colleagues from around the world to access an up to date collection of active groups with contact details.

2018:

- \$6,800 for (continued) professional salaries (early career) for developing the AAA website portal, with benefits as described above in the 2017 line item
- \$12,000 to support attendance from the Antarctic Astronomical community to attend the science and business meetings of the AAA SRP during the SCAR OSC in Davos, 2018
- \$9,000 to support the SCAR AAA booth and outreach at the General Assembly of the International Astronomical Union (IAU) in Vienna, Austria, 2018

Provide an estimate on the % of the budget to be used for support of early career researchers:

2017: 82%

2018: 50%

Provide an estimate on the % of the budget to be used for support of scientists from countries with developing Antarctic programmes (as listed here: <http://www.scar.org/finances/contributions>):

2017: 14% - 79% (higher rate if website developer is located in NARIT as currently planned)

2018: 25% (goal)

Linkages

Please describe any direct support you receive for your activities beyond SCAR (eg. Funds from another organization for a workshop):

- Our colleagues at the National Astronomical Research Institute of Thailand (NARIT) are graciously hosting the upcoming AAA fourth workshop. NARIT contributed around 284,000 THB for 4 days venue, lunch, break, dinners (welcome, cultural, royal project), local transportation local, excursion, bag, badge and accessories.
- This amount would normally be covered by the SRP annual budget. This means we are able, for example, to be much more ambitious in our development of a new website and data portal for the Antarctic astronomical community.
- Many steering committee members have travel funds supported or co-supported by other means, including institutional contributions. We will not list each one individually here, but the total amount is at least \$20,000.

Please list any major collaborations your SRP has with other SCAR groups and with organisations/groups beyond SCAR:

The SCAR AAA has close association with the International Astronomical Union, and logistical agencies such as the Polar Research Institute of China (PRIC). The IceCube Collaboration has a representative on the steering committee and actively promotes SCAR AAA.

Outreach and Capacity Building

Please describe your outreach, communication and capacity building activities. Also provide information on activities that demonstrate effectiveness as a network. (coordinating activity for your discipline/topic, i.e. mailing list and diversity of scientists involved) (<250 words):

The SCAR AAA SRP is committed to expanding its reach and diversity. This starts with recruiting and appointing members to the steering committee from a wide range of countries and institutions, with a deliberate effort to include early career scientists. The twelve steering committee members come from eight different countries and five continents. The AAA workshops, held bi-annually, are fundamental part of AAA activities and provide an opportunity to build capacity. The upcoming workshop in Thailand continues the tradition of the last three---all have been held on a different continent with significant percentage of the budget going to support travel awards. This allows those with interest in doing research in Antarctic but limited funds to attend.

The fourth SCAR AAA workshop, hosted jointly with NARIT, has attracted a large number of Thai participants. The attendees range from those working with large, established international projects to single investigators hoping to establish research Antarctic astronomy or astrophysics research programs. Working in Antarctica introduces an extra dimension of difficulty. The SCAR AAA SRP is a great starting point to make connections for both new and established researchers. For example, Steering committee member Madsen worked with an early career Thai scientist who submitted a proposal for a SCAR fellowship that would allow her and two undergraduates to work for a summer in the USA on data from Antarctica, and develop ideas for continued Antarctic research.

In addition to the workshops, SCAR AAA has a continual on-line presence through its website. These resources are undergoing significant revisions to better serve science and outreach goals. Opportunities for early career scientists, such as SCAR fellowships mentioned above, will be promoted. The data portal will allow access to Antarctic astronomy and astrophysics research as well as highlighting the unique opportunities the continent provides for exploring the universe.

Going forward, we are working to leverage resources to increase astrophysics and astronomy research in Antarctica. Having support internally from the science community is essential for establishing new facilities such as the APIO. SCAR AAA will continue to support this effort. One way we will reach

beyond current Antarctic researchers is by attending and staffing a booth at the International Astronomical Union Astronomy 2018 meeting in Vienna, Austria. The 2018 SCAR OSC meeting in Switzerland will be another venue where SCAR AAA will host a science session and members will also participate in outreach and communication sessions that promote SCAR AAA activities to a broader audience.

In Latin America, we are encouraging Argentinean young researchers to join APECS and get more involved in the Antarctic Astronomy activities.

The LAGO collaboration is generating a series of on-line courses within the collaboration to perform cosmic rays simulations among the nodes (including the Antarctic one) to have a critical mass of Latin American researchers in high energy Astronomy and cosmic rays studies.

As part of SCAR's Capacity Building efforts, such as the Fellowships and Visiting Professor Awards, we are looking for people from all the SCAR groups including SRPs to form a 'review panel' so if applications in your field are submitted we have people to contact to help assess relevant applications. **Please list one or more people (name and email address) from your SRP who would be willing to serve as reviewers for the next few years.**

- Professor Anna Moore, anna.moore@anu.edu.au
- Professor James Madsen, james.madsen@uwrf.edu

Membership

Leadership

Role	First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Chair of AAA steering committee	Anna	Moore	Australian National University	Australia	anna.moore@anu.edu.au	11-14	12-18
Member of AAA steering committee	Jenni	Adams	Uni of Canterbury	New Zealand	jenni.adams@canterbury.ac.nz		12-18
Member of AAA steering committee	Michael	Ashley	Uni of New South Wales	Australia	m.ashley@unsw.edu.au		12-18
Member of AAA steering committee	Elia	Battistelli	La Sapienza, Roma	Italy	elia.battistelli@roma1.infn.it		12-18
Member of AAA steering committee	Jennifer	Cooper	Cornell/University of Kansas	United States	jrc323@cornell.edu		12-18

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(APECS Representative)						
Member of AAA steering committee	Nicolas	Crouzet	Instituto de Astrofísica de Canarias	Spain	ncrouzet@iac.es	12-18
Member of AAA steering committee	Adriana	Gulisano	Instituto Antártico Argentino	Argentina	adrianagulisano@gmail.com	12-18
Member of AAA steering committee	James	Madsen	Uni of Wisconsin, River Falls	United States	james.madsen@uwrf.edu	12-18
Member of AAA steering committee	Naomasa	Nakai	Uni of Tsukuba	Japan	nakai@physics.px.tsukuba.ac.jp	12-18
Member of AAA steering committee	Zhaohui	Shang	NIAOT, Nanjing	China	zshang@gmail.com	12-18
Member of AAA steering committee	Charling	Tao	Tsinghua Uni	China	tao@cppm.in2p3.fr	12-18
Member of AAA steering committee	Lifan	Wang	Texas A&M	United States	lifanwang@gmail.com	12-18

* Please include any APECS representative / Junior Officers

Other members

First Name	Last Name	Affiliation	County	Email

Requests to the Secretariat:

If there are specific administrative tasks you would like help with such as your webpages, mailing list, online meeting tools, etc., please include them below:

No requests at this time.