

A satellite view of Earth from space, showing the Americas and surrounding oceans. The text is overlaid on the image.

OFFICE OF ASTRONOMY FOR DEVELOPMENT

2018







TABLE OF CONTENTS

1. HISTORY

- 06 Introduction
- 07 Astronomy to promote Development
- 08 Bidding for the OAD
- 09 OAD Launch
- 10 First Stakeholder Workshop

2. PROJECTS

- 11 Funded projects
- 41 Astrosense
- 42 AstroVARSITY

3. REGIONAL OFFICES

- 43 ROADs/LOADs

4. AWARDS AND RECOGNITION

- 55 Edinburgh Medal
- 56 Science Forum Award

5. KEYNOTES AT MAJOR EVENTS

- 57 SKA-Driven Big Data Challenge in Africa
- 57 International Conference on Research Infrastructures

- 58 White House Frontiers Conference
- 58 Communicating Astronomy with the Public

6. OAD-TEAM

- 59 Staff
- 60 Interns, Fellows and Volunteers

7. GETTING INVOLVED

- 61 Call to Action

8. PARTNERS



INTRODUCTION



The International Astronomical Union (IAU) is the largest, global body of professional astronomers in the world whose mission is “to promote and safeguard the science of astronomy in all its aspects through international cooperation.” Key activities of the IAU include the organization of scientific meetings, definition of fundamental astronomical and physical constants as well as promotion of education, development, and outreach.

In the wake of the massive success of the International Year of Astronomy in 2009, which reached over 800 million in 148 countries, the IAU drew up a strategic plan to use astronomy in facilitating education and capacity building and in furthering sustainable development throughout the world. The IAU Strategic Plan 2010 – 2020 “**Astronomy for the Developing World - Building from IYA2009**” was adopted at the IAU General Assembly in August 2009.

The Office of Astronomy for Development (OAD) was born out of this plan. The mission of the OAD is to help further the use of astronomy, including its practitioners, skills and infrastructures, as a tool for development. The OAD is tasked with mobilizing the human and financial resources necessary in order to realize the field’s scientific, technological and cultural benefits to society. This is primarily implemented through funding and coordinating projects that use Astronomy as a tool to address issues related to sustainable development. Since 2013, more than 120 projects have been funded through the OAD’s Annual Call for Proposals. The OAD has also established 10 Regional Offices and Language Centres around the world who share the OAD vision but focus their activities within a geographic or cultural or language region.

This book highlights key moments in the history of the OAD with a number of examples of activities supported by the office.

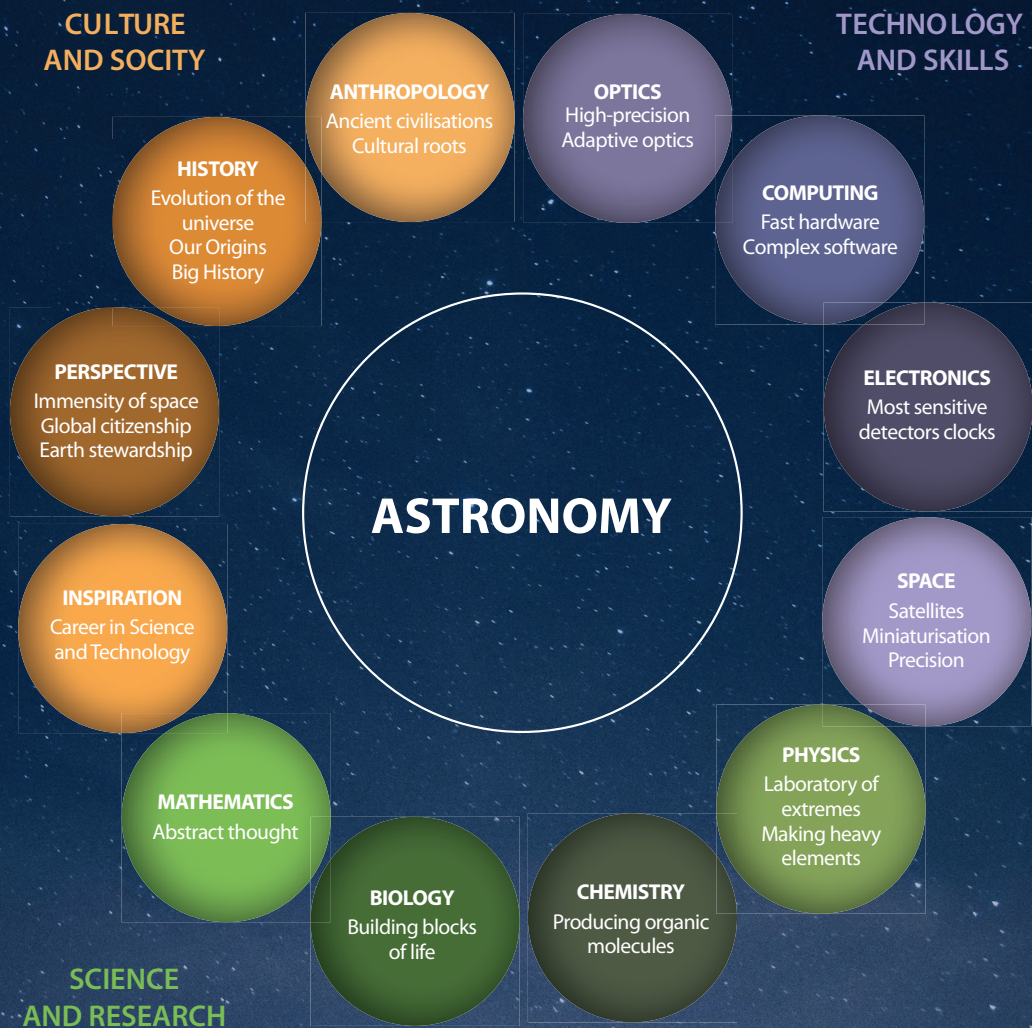
ASTRONOMY TO PROMOTE DEVELOPMENT

George Miley, then IAU Vice-President of Education and Development spear-headed the IAU Strategic Plan 2010 - 2020 to use astronomy to promote development. Over two years, the IAU consulted with stakeholders such as United Nations Office for Outer Space Affairs (UNOOSA), the Committee on Space Research (COSPAR) and the International Union of Radio Science (URSI). The Strategic Plan was approved by resolutions at the IAU General Assembly at Rio de Janeiro on 13 August 2009.

The slogan adopted for the IAU decadal plan was “Exploring our Universe for the benefit of humankind”.

The diagram on the right captures the interdisciplinary nature of astronomy which offers possibilities to use it to further sustainable development globally.

“Astronomy is a unique and cost-effective tool for furthering sustainable global development, because of its technological, scientific and cultural dimensions.”





BIDDING FOR THE OAD

The IAU Strategic Plan called for the establishment of a dedicated office of implementation. In October 2009, the IAU issued a global announcement of opportunity to host this office. From 20 proposals, the South African Astronomical Observatory (SAAO) was selected as the host site. At the time, South African astronomy was advancing internationally through projects such as the Southern African Large Telescope (SALT), Karoo Array Telescope (MeerKAT) and the bid to host the Square Kilometre Array (SKA). The country had also implemented a successful ‘astronomy for society’ program, established during the construction of SALT. The SALT Collateral Benefits Program took advantage of a large, international astronomy project to promote “education enhancement, science communication, socio-economic development and public engagement” and contribute to the improvement of quality of life of communities nearby.

LAUNCH OF THE OAD

Following South Africa's successful bid, an agreement was signed between the IAU and the South African National Research Foundation (NRF) with the support of the South African Department of Science and Technology (DST).

The office was launched in April 2011 at the South African Astronomical Observatory in Cape Town in the presence of then Minister of Science and Technology, Grace Naledi Pandor, who said, "We chose to invest heavily in science and astronomy, because of its role in development, not only within South Africa, but all across Africa." Kevin Govender, who had been the manager of the SALT Collateral Benefits Programme, was appointed as the Director of the OAD.

The first meeting of the OAD Steering Committee took place immediately after the launch event and the OAD was established with a vision of "Astronomy for a better world". In August 2012, at the IAU General Assembly in Beijing, an updated version of the strategic plan was released including an update on implementation. The title was more appropriately updated to "Astronomy for Development"



FIRST STAKEHOLDER WORKSHOP

The OAD held its first stakeholders workshop from 12 – 14 December 2012 at the SAAO in Cape Town. Fifty-five participants attended the workshop from 28 different countries including representatives of IAU commissions and programs and external organisations interested in contributing to the implementation of the IAU Strategic Plan. The workshop sought input on the establishment of Task Forces, Regional Offices, and other structures and actions required to initiate astronomy-for-development activities. It was an essential stepping-stone on the road to implementing the IAU Strategic Plan. The second meeting of the OAD Steering Committee was held directly following the workshop.







PROJECTS

Every year, the OAD invites proposals for projects that use Astronomy as a tool to address issues related to sustainable development. The call is open to anyone from anywhere in the world. Development is framed by the United Nations Sustainable Development Goals (SDG), which are a set of globally adopted priorities to end poverty, preserve the planet and promote peace and prosperity for all.

It can be difficult to conceptualise how astronomy, an esoteric and specialised science, can contribute to the very immediate and real challenges facing society today. Below are some of the ways in which past projects have tried to influence the SDGs.

The majority of the OAD funded projects have focused on capacity building in education by conducting workshops, schools, trainings etc. targeting especially those communities and regions which are disadvantaged or under-represented. These actions directly impact on **SDG #4 Quality Education** and **SDG #10 Reduced Inequalities**. Projects have also used astronomy at school and university level to teach skills in programming and data science. Some projects have included a focus on **SDG #5 Gender Equality** using astronomy as a catalyst. In another case, community programs run by an astronomical observatory have encouraged sustainable use of resources such as water and energy, contributing in some way to **SDG #6 Clean Water and Sanitation** and **SDG #11 Sustainable Cities and Communities**. Astro-tourism has gained traction in recent years: the idea that astronomical sites (historical & heritage sites, observatories, dark sky reserves etc.) can be systematically promoted as points of interest and work together with the tourism industry to contribute to the local economy. This relates to **SDG #8 Decent Work and Economic Growth** and **SDG #9 Industry, Innovation and Infrastructure**. Astronomy has been used in various contexts to bring people together. Taking it a step further, astronomy as a tool for diplomacy brings together communities separated by conflict which relates to **SDG #16 Peace, Justice and Strong Institutions**.

Since 2013, the OAD has funded more than 120 projects globally. The next section briefly describes some of the projects.

CHINESE ANCIENT POETRY ASTROPHOTOGRAPHY, CHINA

The Chinese Ancient Poetry Astrophotography project encouraged people to take pictures of the night sky according to ancient Chinese poems. In 2014, a competition was organised, resulting in a lot of positive feedback. This effort was expanded for the International Year of Light (IYL) in 2015. A Sky Poetry Competition was later organised in which the reverse was done. Participants selected an image from "A Universe of Images" (project of IYL2015) and then wrote poems for these images. This helped to bring an artistic element into astronomy and more people could appreciate the connection between humans and the sky as well as the ancient and modern sky.

诗 意 星 空

温家宝

列天文科普活动

协办:

中国科学院国家科学图书馆
中国自然科学博物馆协会天文馆专业委员会
中国科技馆文津经典诵读

真情华夏
温家宝

诗 意 星 空
温家宝



ASTRONOMY FOR HIMALAYAN LIVELIHOOD CREATION, INDIA

Global Himalayan Expedition (GHE) is an organization in India that seeks to provide clean energy access, digital education and livelihood access through solar power for remote unelectrified Himalayan communities (via DC solar micro-grids). The energy access intervention has acted as a tool for further development and growth in these remote areas and has led to an increase in income and livelihood creation through the promotion of Eco Tourism over the years. GHE has helped to setup 30 solar Himalayan homestays run by local village women, which are promoted as off-beat destinations for tourists.

Given the pristine skies in the region, this project is adding an astronomy component to this setup. Local village women entrepreneurs will be educated on the basics of astronomy and trained to use telescopes. They will each be provided with a telescope which can be promoted as an additional feature of the homestay and help bring additional tourism and income. Thus astronomy can be leveraged as a key tool for creating a holistic development model for these communities in a sustainable and scalable manner.

DEVELOPMENT OF ASTRO TOURISM IN SOUTH WEST ASIA

Astronomical tourism involves sites of astronomical interest, historical and archaeological sites, modern research organizations (observatories, astronomical institutes), educational centres, space museums, planetariums, etc. Armenia and neighbouring countries are rich in sites of ancient astronomy, as well as modern research institutions, and may be regarded as centres for astronomical tourism.

As a first step to develop astro tourism, the project team conducted study visits to astro tourism centres in Uzbekistan, Kazakhstan, Tajikistan, Iran and Georgia. Visits to Scientific Tourism Centres were organized for representatives of travel agencies, tourist guides, and journalists. A conference on “Scientific Tourism in the South West Asian Region” brought together the tourism and science communities. The Byurakan Astrophysical Observatory (BAO) photobooklet was published to promote the site and a website for “Astro Tourism in South West Asia” created to provide information on astro tourism centres, tour packages, travel agencies etc.

The project continues to reach out to other stakeholders and expand the idea.



Help diagnose common eye conditions

80% of blindness is curable - you can help people see again

ACCESSIBLE CITIZEN SCIENCE FOR THE DEVELOPING WORLD, UNITED KINGDOM/ KENYA

The Zooniverse platform is home to a wide variety of citizen science projects, including many astronomy ones. Such projects are mostly accessible for people who use browsers on high-speed connections in Western Europe and North America. This has created a bias over the years that has led to a mostly English-speaking volunteer base and a skew away from low-bandwidth compatibility and nonstandard accessibility. This project addressed that by improving Zooniverse inhouse translation tools, reaching out to a greater diversity of

volunteer translators and adding greater default accessibility functionality to the standard Zooniverse project toolset. It also created a pilot project directly connected to Africa called RE/ VISION: KENYA. In collaboration with the PEEK Retinal Imaging project and London's Moorfields Eye Hospital, the project developed a citizen science project to help diagnose common eye defects. Although it was only a pilot and never used in the field, it provided a whole new avenue for Zooniverse to work in the future.



COMMUNITY DEVELOPMENT AROUND TIMOR OBSERVATORY, INDONESIA

Partisipasi dalam Pembangunan Observatorium

This community development project is developing a symbiosis between a prospective astronomical observatory in Timor, Indonesia, and its surrounding community. It aims to empower the local community with STEAM (Science, Technology, Engineering, Art, Mathematics) knowledge and skill, management capability, help them procure clean water and energy, while at the same time requiring their understanding and commitment to preserve their natural environment for their sustainability. The project is conducted by astronomers of Institut Teknologi Bandung and community development experts of Indonesian Institute for Energy Economics.

With OAD support, a needs assessment survey was completed in the first year of the project. Public gatherings were held to introduce the community to the astronomical observatory, its impact on the local community, and the community development project. Since then, the project has continued to engage with the community and conduct training visits while building the astronomy observatory.



LAMBA INDIGENOUS ASTRONOMY, ZAMBIA

The project seeks to preserve the indigenous astronomy knowledge of the Lamba people in Copperbelt Province in Zambia. It plans to produce a documentary, a book and audio clips as a means to store information that has traditionally been passed down by word of mouth. Knowledge of traditional astronomy levels is high among the elderly people

but is declining in the younger generation. So there is a need for documenting this knowledge before it fades away. A previous study has assessed the oral astronomy knowledge, culture and beliefs. This project will extend that work and record the findings in a documentary.

27/09/2014 15



COLUMBA-HYPATIA: ASTRONOMY FOR PEACE, CYPRUS

The Columba-Hypatia project aimed to inspire the children of Cyprus, through astronomy, to learn more about science and the universe, promote a culture of peace and non-violence, and facilitate contact between children from all the communities of Cyprus. The project conducted educational astronomy activities with the goal of inspiring a sense of global citizenship "under the same sky" and to look beyond borders by promoting cultural exchange. Through the program, children from the

Greek Cypriot and Turkish Cypriot communities came together in the buffer zone in Cyprus and learned about astronomy and the universe, as well as about each other and their common history and heritage, through fun games and activities. The project was run by GalileoMobile and the Association for Historical Dialogue and Research. A follow up project, Columba Herschel, is being carried out in 2018, supported by other partners.

ASTROBABIES: ASTRONOMY IN EARLY CHILDHOOD, COLOMBIA

Astrobabies is an initiative of the Planetarium of Bogota in Colombia to bring to children, aged 0 to 3 years, the knowledge, skills and attitudes of science, specifically astronomy and related sciences through music, playful and sensorial activities. The audience includes teachers, psychologists, special educators, social workers, parents and caregivers. At regular monthly sessions, children are exposed to topics such as Earth, Moon, Planets, Stars etc. They are encouraged to use simple tools like a magnifying glass to explore their immediate surroundings, identify basic features of the Moon such as colour, appearance, and find differences and similarities in the planetary models.





GAZA ASTRONOMY TECHNO APPS CHALLENGE, GAZA

The Gaza Astronomy Techno Apps (GATA) Challenge connected astronomy to business and innovation. It brought together groups of amateurs and professional astronomers and computer programmers, designers, storywriters etc to develop technological applications that support astronomical cultural content in Arabic. The project invited interdisciplinary teams for an open competition to innovate by technological means. The challenge

was held in the form of a 3 day camp where the competing teams were supported by professionals in different fields such as design, marketing, programming. The teams received tips and training on idea design, game design, marketing, finance etc. Finally, on the last day, each team was provided ten minutes to pitch their project to a judging panel. The winners of this challenge are currently working on completing their projects.

AN ASTRONOMICAL KIT FOR THE VISUALLY IMPAIRED, MULTIPLE COUNTRIES

Under the name “A Touch of the Universe”, this project developed and distributed a kit with different astronomical activities to help communicators and teachers in reaching children with visual impairments. The kit consisted of a planetarium program, half-sphere with constellations engraved, tactile 3D moon, booklet of moon activities, braille sheet and a book on tactile astronomy. It was sent to developing countries through Universe Awareness (UNAW), Astronomers without Borders (AWB) and Global Hands-On Universe (GHOU) networks.

Currently the follow-up project, “A Touch of Venus”, is developing 30 planetary science resource kits which include a 3D tactile model of planet Venus from NASA's Magellan data and a book of peer-reviewed educational activities.



SIGN LANGUAGE UNIVERSAL ENCYCLOPEDIC DICTIONARY, GLOBAL

Sign language is now officially practised in almost every country, but diverse heritages and different cultures independently developed specific signs to designate common objects or identical situations. Many astronomical words have no equivalent hand sign in any sign language. This project developed a unique glossary of astronomical terms for the hearing impaired worldwide. It gave special attention to the basic terms linked with the International Year of Light 2015, for example light, light year, star, sun, among others. The development of this universal sign language of astronomical terms, the related multimedia material and the encyclopedic dictionary will also be useful in countries with different languages, making it possible to carry out the same activities anywhere without the need for being translated. The Encyclopedic Dictionary of Astronomy for Sign Languages has been translated into English and Spanish.

ASTRONOMY



ASTRONOMY WITH ALL SENSES, COLOMBIA

"Astronomy with all senses" is a traveling exhibition designed for people with physical impairments. The aim is to let them know about astronomy and other space sciences and inspire them with the wonders of the universe. For people with normal abilities, it highlights the importance of all the senses. The exhibition materials (which fit into a backpack) can be used to run 13 activities organized into three modules: Earth-moon system; Solar System sizes and distances and stars; constellations and nebulae. A digital handbook for the materials, containing background information on each activity as well as how to use it, is available online in Spanish.



Our Musical Universe

Created by Matt Russo and presented by the
Dunlap Institute for Astronomy and Astrophysics

SYSTEM SOUNDS: BRINGING THE MUSIC OF THE SPHERES DOWN TO EARTH, CANADA/ONLINE

SYSTEM Sounds is a science-art project which translates astronomical systems and data into music and sound, and integrates them into high quality videos with broad public appeal. A natural translation to music is possible in many astronomical systems due to the frequent appearance of resonances and periodic signals within and beyond the solar system. The project team has already created musicalizations of the TRAPPIST-1 planetary system and Saturn. With this project, they plan to extend this to other systems with a focus on well known objects and newsworthy astronomical discoveries. The project will also aim to improve accessibility to the blind and visually impaired, who are in a unique position to benefit from astronomical musicalizations. In addition, descriptive narrations will be created for the videos which will be integrated into a new planetarium show.



DARK SKIES OUTREACH TO SUB-SAHARAN AFRICA

This project implemented the successful Dark Sky Rangers/ GLOBE at Night citizen scientist program in 12 sub-Saharan African countries. The GLOBE at Night program, hosted by the U.S. National Optical Astronomy Observatory (NOAO) is an international citizen-science campaign to raise public awareness of the impact of light pollution. The worldwide campaign

invites citizen-scientists to record the brightness of the night sky by visually matching the appearance of a constellation like Orion with star maps or using meters to obtain more precise measurements. Measurements are submitted to a central website by paper, computer, or smart phone. From these data, an interactive map of all worldwide observations is created. The

program helped participants in the target countries identify wasteful and inefficient lighting and provided ways to reduce consumption and to keep energy costs in check. It also inspired them to be responsible stewards in helping their community safeguard a natural resource – a dark night sky.

**DOCUMENTARY SERIES ON
ASTRONOMY RESEARCH,
INDIA**

The documentary series on Astronomy Research in India aims to record and document the various aspects of research and development in the field of astronomy, astrophysics and space sciences in India and also highlight the facilities such as research laboratories, observatories and state of the art instrumentation. The documentary project plans to create awareness of Indian astronomy research and inspire students towards the field. The first film published in the series, "From Dust to Stars", is an infotainment film about the formation of stars. The film is in the public domain, free for download and usage. The project team is working on creating more films in astronomy research.

FROM DUST TO STARS

28th FEB 2017

Directed / Edited : RAKESH RAO

Music Composition / Production: ASHISH AJGAONKAR

Research: SONAM ARORA RAO

Narration: PANKAJ KUDTARKAR

Script Editor: GOVIND POTEKAR Technical Support: SAGAR ARORA

Supported by: OFFICE OF ASTRONOMY FOR DEVELOPMENT - INTERNATIONAL ASTRONOMICAL UNION

Institutional Support: INDIAN INSTITUTE OF ASTROPHYSICS, PHYSICAL RESEARCH LABORATORY,

INTER-UNIVERSITY CENTRE FOR ASTRONOMY & ASTROPHYSICS, NATIONAL CENTRE FOR RADIO ASTRONOMY, TATA INSTITUTE OF FUNDAMENTAL RESEARCH,
ARYABHATTA RESEARCH INSTITUTE OF OBSERVATIONAL SCIENCES, M. P. BIRLA INSTITUTE OF FUNDAMENTAL RESEARCH



AN ASTRONOMY CENTRE IN BANGLADESH

This pilot project developed an Astronomy Outreach Centre in Bangladesh. The centre is the first of its kind in the country and aspires to use astronomy in promoting global tolerance and citizenship, and for inspiring careers in science and technology. In preparation, several astronomy camps were held to educate students and the general public regarding basic astronomy. The centre will be integrated with local

schools and colleges for regular observation and small-scale research. The facility will be used to train local children and their teachers with hands-on observing sessions, astrophotography, observing of variable stars, etc. This will enhance the children's understanding of the world and convey the scale and beauty of the universe, thus providing a broader perspective on our place in the universe.



GIRLS ASTRONOMY CAMP, NIGERIA

The project hosted an astronomy camp for girls in Abuja, Nigeria to address the challenge of gender inequality in school enrollment, particularly across the northern part of the country. Around fifty girls were selected from different primary schools in Abuja for this camping exercise. The astronomy camp gave

the children a first taste of space science and technology. It was supported by Astronomers Without Borders (AWB), Universe Awareness (UNAW), VIXEN Co. Ltd, National Institute for Astrophysics (INAF), Milan, Italy, and National Space Research & Development Agency (NASRDA).

THE TRAVELLING TELESCOPE, KENYA

The Traveling Telescope project promotes science learning at Kenyan schools in various locations through direct observations of celestial bodies using state of the art telescopes and various hands-on activities. Supported by the OAD, the team conducted an outreach campaign in rural, coastal Kenya,

visiting schools and teaching students. In addition to direct observing, students and teachers were exposed to science using various hands-on activities and astronomy software. During 3 weeks, the project reached 32 schools and as many as 13000 students and around 200 teachers.





EDUCATIONAL TELESCOPES FOR HIGH SCHOOLS IN MONGOLIA

In Mongolia, astronomy is not part of the standard high school curriculum and only a few schools even address it as part of the physics class and few schools have telescopes. Therefore, in order to promote the teaching of astronomy and science in general, this project supplied educational telescopes to various

public high schools in the capital city of Ulaanbaatar and rural countryside schools. A detailed manual on how to operate the telescope was written in Mongolian language and training events for teachers were also organized as part of the project.



GALILEOMOBILE CONSTELLATION, SOUTH AMERICA

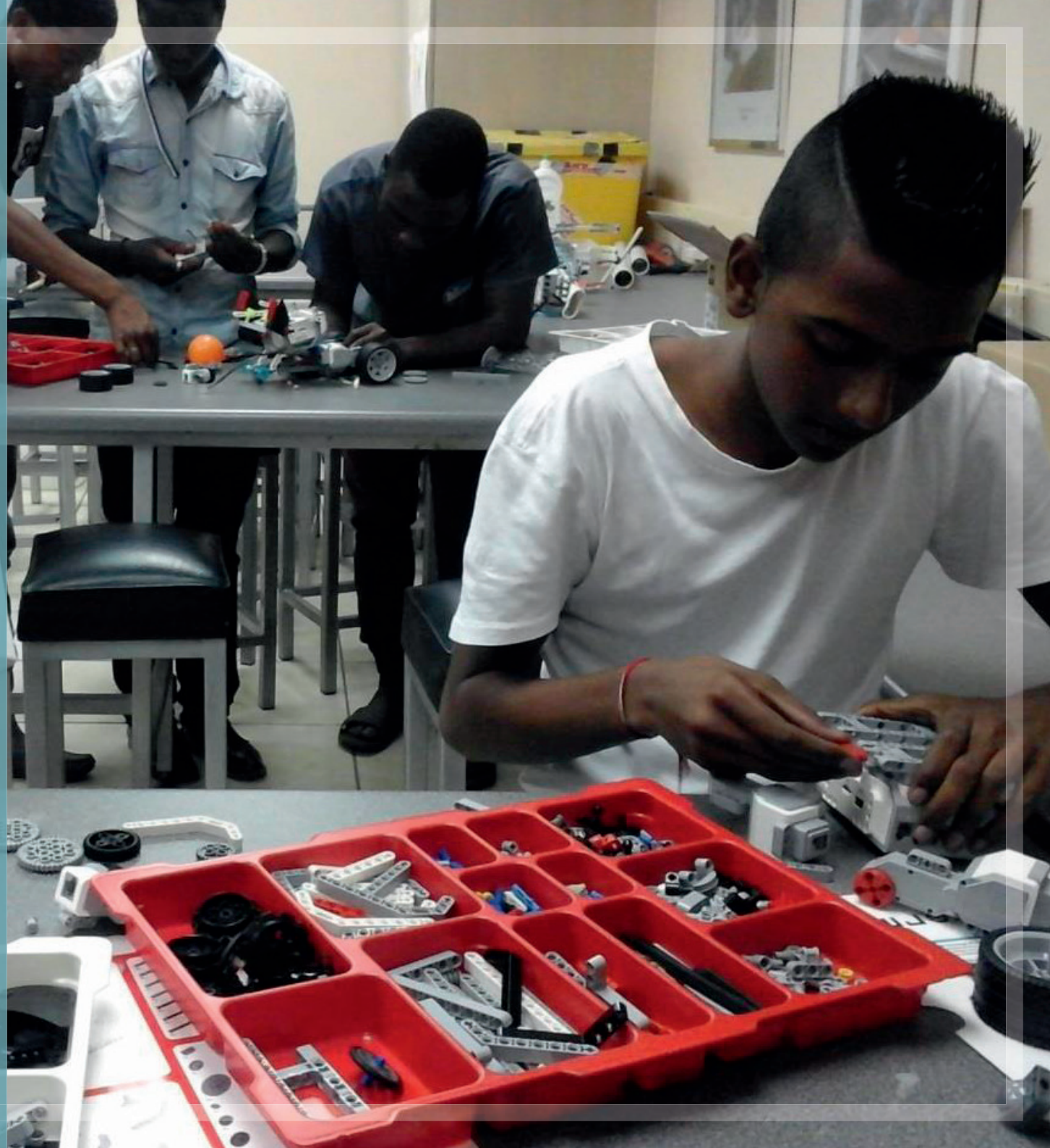
GalileoMobile is a non-profit, itinerant education initiative that brings Astronomy to young people in areas with limited access to outreach programs. Constellation was a year-long program of astronomy activities that was carried out in 20 schools located in 6 countries across South America. The project focused on bringing astronomy to regions with little or no access to

science outreach, in remote, developing, or economically challenged areas in South America. By motivating young people to engage in science activities and by bringing them in contact with local and international astronomers, seeds for their future development were planted, possibly inspiring some of them to pursue a career in science. The project team carried out 4

expeditions to schools in Brazil, Colombia, Peru, Chile and Argentina reaching over 2000 students across the continent. The schools are connected through a dedicated online platform and through social media, so that they can exchange their thoughts and experiences.

COSMIC CODE: FIRST CONTACT, SOUTH AFRICA

Coding is the language of the 21st century, where nearly everything in modern society is driven by coding. Astronomy is no exception, where coding is used to explore the universe. Whether it is through telescopes, satellites or robots exploring planets, coding is an essential instrument of astronomy. The project aimed at introducing coding within an astronomy setting to rural communities of KwaZulu-Natal, South Africa and beyond. This project served as the “first point of contact”, introducing computers through coding. The program consisted of a workshop in which participants programmed miniature Raspberry Pi robots using Python coding. By combining the Python coding with Raspberry Pi robots, it allowed participants to see tangible applications of the code they write. This has a direct link to how astronomy uses coding to control telescopes and other instrumentation. The program also included a detailed workshop on career advice.





ASTRONOMY FOR LITERACY, SIERRA LEONE

Astronomy for Literacy (AFL) worked to enhance literacy, numeracy and other foundational skills among struggling junior secondary school students in Sierra Leone by adapting and developing high quality curriculum resources across literacy, math and science. The project used astronomy-related content to teach foundational reading and numeracy skills while at the same time igniting an interest in astronomy and teaching in an engaging way the core concepts in astronomy that are part of Sierra Leone's national curriculum for science. The AFL project has developed detailed, highly structured lesson plans that enable relatively low-skilled teachers with limited subject knowledge to still deliver high quality learning opportunities. AFL also invested in finding appropriate supplementary digital resources, including videos, presentations and other offline content, and purchased 20 low-cost tablet devices that will allow groups of students to access this content.



PUBLIC LIBRARY ASTRONOMY CORNERS, SOUTH AFRICA

The project was undertaken by the library of the South African Astronomical Observatory (SAAO) to promote astronomy awareness in disadvantaged communities. Astronomy is part of the primary school curriculum in South Africa but statistics show that communities in previously disadvantaged areas are always left behind, especially in science and technology development. The aim of this project was to create science awareness with emphasis on astronomy in these communities. The SAAO worked with the public library in Sutherland, South Africa to create a space dedicated for astronomy and enhance astronomy awareness in all those who use the library.



AD ASTRA ACADEMY, BRAZIL

Ad Astra Academy brings the excitement of exploration to students in poor regions of the world. It exploits curiosity, an essential human trait, to promote inquiry-based learning and unlock students' potential. Twenty kids from Rio de Janeiro's City of God favela will, through a hands-on curriculum, develop reasoning skills and learn about Astronomy. Ultimately, through an arrangement with NASA, students will join the frontiers of

exploration and select targets on Mars to be imaged by NASA HiRISE mission. An after-school program will also be offered and students will be paired with local professionals for internships. With empirical skills and empowerment, they can embark on a lifelong journey that will boost their economic prospects and promote social mobility through education.



BIG DATA IN ASTRONOMY: A TOOL FOR SOCIAL INNOVATION, MAURITIUS

Big Data and data driven innovations have been put into practice to help solve social problems. However, small emerging countries in this field are often struggling. This can be due to lack of resources (human and technology) or inadequate use of resources available. This project presented a new ecosystem for social innovation through Astronomy education and Big Data Analytics. The workshop fostered research techniques

and tools to aid students in their current area of research and broaden their exposure to topics in astronomy and data analytics. Astronomy was used as a springboard towards building skills and competence in Data Analytics and Big Data and participants learned to apply these skills to contribute to the betterment of society.



STARLIGHT IN THE UNIVERSITY – ASTROLAB (NIGERIA, RWANDA, ZAMBIA, ETHIOPIA, SOUTH AFRICA)

Astrolab is a low cost, enquiry-based lab for undergraduate students in science. Students plan and perform real-time observations with robotic telescopes and transform those observations into a scientific result under the guidance of tutors. The goal of this project is twofold: a) to introduce students to the scientific research method by working through project development and preparation, data acquisition and reduction, analysis and conclusions. b) to enhance interest in

science studies by making them more attractive and getting the students involved in the learning process. This model allows students to partake in scientific research without the need for research level infrastructure. Astrolab has been implemented in Rwanda, Nigeria, Zambia, Ethiopia. The latest project in South Africa will train tutors who can run the Astrolab program at their universities and thus expand this program.



JOINT EXCHANGE DEVELOPMENT INITIATIVE FOR AFRICA (JEDI), SEVERAL COUNTRIES

Astronomy has grown significantly in recent years and the amount of scientific data available online has exploded. Astronomers have been doing data mining for centuries, characterizing the known, assigning the new and discovering unknowns. These skills are more critical than ever especially with new facilities coming online. The Joint Exchange Development Initiative (JEDI) is a concept to enhance development and education via direct transfer of skills and expertise in any

specific field. This is achieved by bringing stakeholders: students, postdocs and staff together in an informal but intense research environment to tackle unsolved problems. The JEDI has a very scalable concept and has been carried out among undergraduate students, postgraduate groups and among staff scientists from all around the world. JEDI workshops have been held in Mauritius, Namibia, Mozambique.

HAITI ALL SKY CAMERA, HAITI

The Haiti All-Sky Camera (HASC) project installed a specialized camera in Haiti to view and record the night sky. Students from Université Quisqueya (UNIQ) and Ecole Supérieure d'Infotronique d'Haïti (ESIH) along with students from University of Maryland (UMD) collaborated on coding (python) to automate the image collection, process and inventory the images (build a database of interesting observations), and showcase the results on the web. The collected imagery will also serve as a hook to teach students (and the public) about meteors, constellations, motions of the night sky, light pollution, and other aspects of astronomy.

A one week 1-credit class "Python and Astronomy" was taught at ESIH which was instrumental for operating the all-sky camera. Utilizing an all-sky-camera offers a simple and effective way to combine teaching basic astronomy (constellations, sky motions, meteors) with training in practical computing skills.





ASTROVARSITY

The AstroVARSITY project was started with the intention to provide course and tutorial resources to use astronomy to enhance Maths and Physics teaching at undergraduate level. The project aimed to support physics departments to eventually start an astronomy module.

A pilot project in South Africa targeted historically black universities. Several workshops were held from 2013 to 2016, offering lecturers hands-on activities and exercises based on an off-the-shelf telescope and instruments package to conduct practical experiments and research.

A close collaboration was established in particular with the University of Zululand where a workshop was held to present astronomy teaching material, discuss potential format of an introduction course and get them started with a small telescope and CCD. Another workshop was held on "The use of Virtual Observatory (VO) in Astronomy". Currently the university is working with various partners and the government to setup a research telescope as well as initiate an astronomy program.

ASTROSENSE

"AstroSense tries to use the potential of astronomy to cause wonder in people to contribute to the development of human capacities for all. In other words, the initiative is dedicated to contribute to skill development. Because unlimiting the skills will give people the freedom of choice that imparts a voice. This motivates the capabilities, voice and autonomy of people to participate in the processes that are natural to the scientific endeavour and opportunities to progress in that field. AstroSense does that symmetrically for research, higher

education, school and outreach. In the case of humans skills, it is extra challenging because we are moving beyond the framework of one set of rules for everyone. That is impossible, what works for one does not work for everyone. In astro-sense, we want equal participation by supporting the ways each individual has to perform at their own maximum.

While exploring how to apply other sensorial techniques to the exploration of measurements, the project collaborates

with the teachers of special education schools and lecturers trying to defragment the disciplines that the learners and higher education students are exposed to in the classroom. AstroSense hopes this may serve to build relationships that will bring lecturers, teachers, researchers and students to design experiments and contextualised User Centred Designed tools that are needed for data exploration."

– Dr. Wanda Diaz-Merced, Project Lead, AstroSense



*BESIDES THE ANNUAL CALL FOR PROPOSALS, THE OAD
ALSO COORDINATES AND COORGANIZES ACTIVITIES WITH
THE HELP OF ITS STAFF, VISITORS, COLLABORATORS
AND PARTNERS ACROSS THE WORLD.*



REGIONAL OFFICES

Regional Offices and Language Expertise Centres are based around the world with similar objectives as the OAD but with regional focus. These offices work closely with the OAD in order to implement the IAU

Strategic Plan. “Regions” which they focus on could be geographical (neighbouring countries) or cultural (language or cultural similarities spread over a large geographic region).

ANDEAN REGION

The Andean Regional Office of Astronomy for Development (ROAD) gathers 20+ institutions in Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela. The office coordinates activities at university and school level as well for the general public. In 2016, the ROAD organized a workshop on the theme of 'Astronomy for Development' at the Latin American Regional IAU Meeting (LARIM) in Colombia. In 2018, Peru will host the 3rd Andean ROAD Workshop.

HOST COUNTRY – Colombia and Chile

HOST INSTITUTION – Universidad de Los Andes, Parque Explora-Planetario de Medellín and Sociedad Chilena de Astronomía

COUNTRIES UNDER THE OFFICE – Colombia, Chile, Bolivia, Ecuador, Peru, Venezuela

COORDINATORS – Germán Chaparro, Farid Char, Jaime Forero, Angela Pérez

www.andean.astro4dev.org



ARAB WORLD AND ARABIC LANGUAGE

The Arab Regional Office and Arabic Language Expertise Center (LOAD) was inaugurated on December 2–3, 2015 in Amman, Jordan. The ROAD actively conducts astronomy outreach activities with members of the Jordanian Astronomical Society (JAS) & Arab Union of Astronomy and Space Sciences (AUASS). Recently, the Arab Regional Office co-hosted the 12th Arab Conference on Astronomy and Space Sciences in Amman, Jordan in May 2018.



HOST COUNTRY – The Hashemite King Dome of Jordan

HOST INSTITUTION – Arab Union for Astronomy and Space Sciences, United Nations Regional Centre for Space Science and Technology Education for Western Asia

COUNTRIES UNDER THE OFFICE – Kingdom of Saudi Arabia (KSA), Jordan, United Arab Emirates (UAE), Bahrain, Tunisia, Algeria, Comoros, Djibouti, Sudan, Syria, Somalia, Iraq, Oman, Palestinian Authority, Qatar, Kuwait, Lebanon, Libya, Egypt, Morocco, Mauritania and Yemen

COORDINATOR – Dr. Awni Al-Kasawneh

www.aw-road.auass.com

EAST AFRICA

In 2014, Ethiopia became the host of the first OAD Regional Office on the African continent with the support of the Ministry of Science and Technology, Ministry of Education, Ethiopian Space Science Society and Addis Ababa University. The region has created a pool of growing astronomy researchers and students. In 2017, the fourth Middle East and African IAU Regional meeting (MEARIM) was jointly hosted by Ethiopian Space Science and Technology Institute (ESSTI)- Entoto Observatory & Research Center (EORC) and East African ROAD.

HOST COUNTRY – Ethiopia

HOST INSTITUTION – Ethiopian Space Science and Technology Institute

COUNTRIES UNDER THE OFFICE – Ethiopia, Burundi, Comoros, Djibouti, Democratic Republic of Congo, Eritrea, Kenya, Rwanda, Uganda, Somalia, Sudan, South Sudan, Seychelles, Tanzania

COORDINATOR – Alemiye Mamo

www.eastafrica.astro4dev.org



EAST ASIA AND CHINESE LANGUAGE

The East Asian Regional Office and Chinese Language Expertise Centre were the first ROAD/LOAD to be established. The main institutes in the consortium are supported in their efforts by various partners including the National Astronomical Observatories of the Chinese Academy of Sciences (NAOC), the East Asian Core Observatories Association (EACOA), and Pyongyang Astronomical Observatory (PAO). The regional office works with rural schools and universities and conducts regular activities such as physics days for children of migrant families.



HOST COUNTRY – China

HOST INSTITUTION – Xi'an Jiaotong-Liverpool University (XJTLU), Beijing Planetarium and Yunnan Astronomical Observatory

COUNTRIES UNDER THE OFFICE – People's Republic of China, Mongolia, Democratic People's Republic of Korea

COORDINATORS – Thijs Kouwenhoven (EA-ROAD co-director), Ziping Zhang (EA-ROAD co-director), Jun Lin (Chinese Language Center)

www.eastasia.astro4dev.org

EUROPE

In February 2018, the European ROAD was brought into existence at a signing ceremony at Leiden University in the Netherlands in the presence of Grace Naledi Pandor, then South African Minister of Science and Technology. The ROAD was officially launched during the European Week of Astronomy and Space Sciences (EWASS 2018) which provided an opportunity to engage with the community on the plan and vision of the European ROAD.

The office will cover all of Europe, excluding countries that are covered by established ROADs. The ROAD will maintain close relations with neighboring ROADs and LOADs (e.g. South West and Central Asia, located in Armenia and the Portuguese Language LOAD in Portugal).

HOST COUNTRY – Netherlands

HOST INSTITUTION – European Astronomical Society and Leiden University

COORDINATORS – George Miley, Pedro Russo



PORTUGUESE LANGUAGE

The Portuguese-speaking countries are home to more than 240 million people located across the globe, having cultural similarities and a shared history. The vision of Portuguese Language Expertise Centre for OAD (PLOAD) is to establish a strong collaborative scientific and educational network across the Portuguese speaking community, and ultimately to use Astronomy as an engine for a sustainable growth in the involved economies. The office was officially launched at the IAU General Assembly in Honolulu, Hawaii on 13 August 2015.

Recently, PLOAD members from Cape Verde, Brazil, Portugal and Sao Tome and Principe joined the “Starry Nights in Cape Verde - Astronomy reaches out West African Islands” project in a collaborative and intensive journey through four cape verdean islands with teacher training, student activities and public sessions.



HOST COUNTRY – Portugal

HOST INSTITUTION – Núcleo Interativo de Astronomia (NUCLIO), in collaboration with the Institute of Astrophysics and Space Sciences

COUNTRIES UNDER THE OFFICE – All Portuguese speaking countries including Portugal, Angola, Brazil, Cape Verde, Mozambique, Guinea-Bissau, Sao Tome and Principe, East Timor as well as Portuguese-speaking community

COORDINATORS – Joana Latas, João Retrê, Nuno Gomes, Rosa Doran (PT); Alan Alves-Brito, Patrícia Figueiró Spinelli (BR); Ivanilda Cabral (CV); Joyn Tioló, Manuel Penhor (STP); Valente Cuambe (MZ); Gabriela Silva (ET)

www.pload.org

SOUTH EAST ASIA

National Astronomical Research Institute of Thailand (NARIT), host of the South East Asian Regional Office (SEA-ROAD), plays a major role in the development of astronomy in the region. In 2017, NARIT became host of the International Training Centre in Astronomy (ITCA) under the Auspices of UNESCO, which aims to incubate the knowledge of astronomy and related sciences with a “strong commitment to build a better world using astronomy as a mechanism for Technology Transfer and Capacity Building.”

SEA-ROAD and ITCA have conducted 21 workshops and meetings in 2017–18 with more than 700 participants from 25 countries. These include schools in radio astronomy, ethno astronomy, astroparticle physics, astrophysical masers as well as astronomy camps and public lectures.

HOST COUNTRY – Thailand

HOST INSTITUTION – National Astronomy Research Institute of Thailand (NARIT)

COUNTRIES UNDER THE OFFICE – Thailand, Brunei, Cambodia, Indonesia, Laos PDR, Malaysia, Myanmar, Philippines, Singapore, Vietnam

COORDINATORS – Wichan Insiri, Supaluck Chanthawan, Sulisa Chariyalertsak, Setthawut Thongmee

www.narit.or.th/en/index.php/sea-road



SOUTH WEST AND CENTRAL ASIA

The South West and Central Asian regional office (SWCA ROAD) coordinates astronomy for development activities in Armenia and the South Caucasus countries (Armenia, Georgia and Azerbaijan), Iran, Turkey, Israel and Central Asian countries (Kazakhstan, Tajikistan, Uzbekistan, Kyrgyzstan and Turkmenistan). In addition, in the frame of the European Eastern Partnership program, Armenia plays a role in the link between Europe and Eastern countries. In addition to its regular activities, the ROAD undertakes specific projects.



HOST COUNTRY – Armenia

HOST INSTITUTION – Byurakan Astrophysical Observatory (BAO)

COUNTRIES UNDER THE OFFICE – Armenia, Georgia, Iran, Kazakhstan, Tajikistan, Turkey

COORDINATORS – Areg Mickaelian (Director of SWCA ROAD, Armenia), Maya Todua (Georgia), Habib Khosroshahi (Iran), Rashit Valiullin (Kazakhstan), Gulchehra Kohirova (Tajikistan), Asylkhan Bibosinov (Kazakhstan) and Sinan Alis (Turkey)

www.iau-swa-road.aras.am/eng/index.php

SOUTHERN AFRICA

The Southern African Regional Office of Astronomy for Development (SAROAD) was established on 14th August 2014. It aims to realise the global societal benefits of astronomy in the Southern African region. The establishment of this regional node was significant as this part of the continent is very active in terms of the development of world class astronomy facilities including the Southern African Large Telescope (SALT), the Square Kilometer Array (SKA) and the gamma-ray High Energy Stereoscopic System (HESS).

HOST COUNTRY – Zambia

HOST INSTITUTION – Copperbelt University

COUNTRIES UNDER THE OFFICE – Zambia, Botswana, Lesotho, Namibia, South Africa, Swaziland, Zimbabwe, Mozambique, Malawi, Madagascar, Mauritius, Angola, Democratic Republic of Congo, Ghana (SKA partner) and Kenya (SKA partner)

COORDINATORS – Prosperity Simpemba

ADMIN OFFICER – Lenganji Mubanga Mutembo

www.southernafrica.astro4dev.org



WEST AFRICA

The West African Regional Office was launched in November 2015 in Enugu, Nigeria. The office is involved in significant projects to advance astronomy and utilize astronomy for development. Examples include the West African International Summer School for Young Astronomers (WAISYA) which uses an inquiry based method focused on student learning, Hands on Basic Space Science Training for teachers, and the Astronomy camp for girls.



HOST COUNTRY – Nigeria

HOST INSTITUTION – Centre for Basic Space Sciences (CBSS), National Space Research and Development Agency (NASRDA) University of Nigeria

COUNTRIES UNDER THE OFFICE – Nigeria, Benin, Burkina Faso, Cape Verde, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Senegal, Sierra Leone, Togo, Sao Tome and Principe

COORDINATOR – Bonaventure Okere

www.westafrica.astro4dev.org



AWARDS AND RECOGNITION

EDINBURGH MEDAL

The 2016 Edinburgh Medal was jointly awarded to Kevin Govender from the IAU Office of Astronomy for Development and the International Astronomical Union at the Edinburgh International Science Festival, for “the creation and practical establishment of the Office of Astronomy for Development, which integrates the pursuit of scientific knowledge with social development for and with those most in need.”

Past winners of the Edinburgh Medal include stalwarts such as Professor Abdus Salam, Professor Jane Goodall, Sir David Attenborough, and Professor Peter Higgs and CERN, to name a few.

The Edinburgh Medal is a prestigious award given each year to men and women of science and technology whose professional achievements are judged to have made a significant contribution to the understanding and well-being of humanity.





SCIENCE FORUM AWARD

At the Science Forum South Africa (SFSA) 2017, the Honourable Minister of Science and Technology, Naledi Pandor, presented awards of recognition to Phil Charles, Patricia Whitelock, Khotso Mokhele, and Kevin Govender for their contributions to South Africa being selected as the host of the IAU Office of Astronomy for Development.

SFSA aims to create a platform for a vibrant debate on the role of science, technology and innovation in society and promote international STI partnerships. It is an initiative by the South African Department of Science and Technology.

KEYNOTES AT MAJOR EVENTS

SKA-DRIVEN BIG DATA CHALLENGE IN AFRICA

Dr. Vanessa McBride was an invited speaker at the recent workshop on “SKA-Driven Big Data Challenge in Africa: Science, Innovation and Opportunity” held in May 2018 in Madagascar.

The conference brought together postgraduate students, researchers, data scientists, technologists, and other stakeholders in the African partner countries to discuss the opportunities and challenges of data-intensive astronomy in the SKA era.

INTERNATIONAL CONFERENCE ON RESEARCH INFRASTRUCTURES

OAD Director, Kevin Govender, delivered the keynote address at the International Conference on Research Infrastructures (ICRI 2016), an international forum to encourage cooperation on research infrastructures domain. ICRI2016 was organized in Cape Town from 3 to 5 October 2016 by the South African Department of Science and Technology and the European Commission. The overall objective of ICRI 2016 was to explore the move towards a reinforced cooperation on globally-relevant Research Infrastructures and to discuss concrete steps in this direction.



WHITE HOUSE FRONTIERS CONFERENCE

In 2016, OAD post-doctoral researcher, Dr. Wanda Diaz-Merced, was invited to the White House Frontiers Conference hosted by US President Obama in Pittsburgh, USA. Co-hosted by the University of Pittsburgh and Carnegie Mellon University, the conference explored the future of innovation in the US and around the world. Wanda's speech on "Making Space Exploration Accessible to All" discussed the need for inclusiveness in science, including high tech areas such as space exploration and astronomy.

COMMUNICATING ASTRONOMY WITH THE PUBLIC

Dr. Wanda Diaz-Merced was an invited speaker at the 2018 Communicating Astronomy with the Public (CAP) conference in Japan. Her talk was titled "Human factors to foster equal participation".

The CAP Conference series is organised by the International Astronomical Union (IAU), through Commission 2 – Communicating Astronomy with the Public.



OAD-TEAM

The OAD team is based at its headquarters at the South African Astronomical Observatory in Cape Town. While the core team is small, we have a number of interns and fellows working with us throughout the year, contributing in various ways. We are also indebted to the staff at the SAAO who assist us on a daily basis, the Regional Offices, OAD reviewers, the Steering Committee members, other partners and collaborators, and various volunteers.

Here are a few of the faces who have been contributing to the OAD.

STAFF



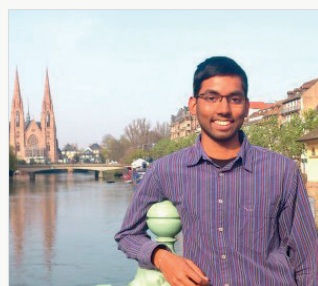
KEVIN GOVENDER
Director



NUHAAH SOLOMON
Administration Officer



VANESSA MCBRIDE
Astronomer

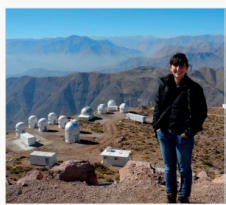


RAMASAMY VENUGOPAL
Operations Manager



WANDA DIAZ-MERCED
Post-doctoral researcher

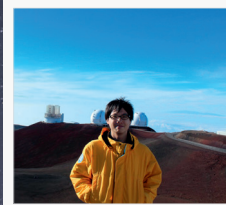
INTERNS, FELLOWS AND VOLUNTEERS



MAYA BARLEV
USA



RAJEEV MANICK
MAURITIUS



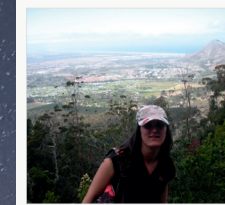
KODAI FUKUSHIMAI
JAPAN



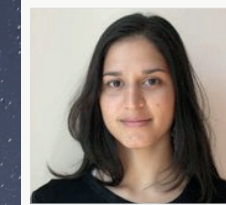
ELI KASAI
NAMIBIA



RAJIN RAMPHUL
MAURITIUS



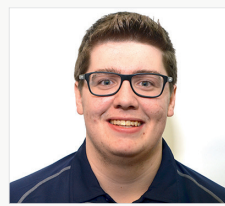
LAURE CATALA
FRANCE



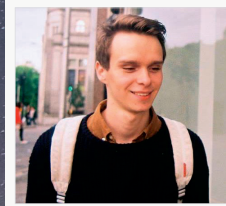
TIBISAY SANKATSING NAVA
ARUBA



SILVIA VERDOLINI
ITALY



EUAN BRODERICK
UK



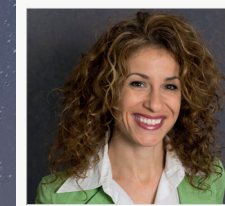
JAMIE FERGUSON
SCOTLAND



ALEX GAGLIANO
USA



JACK HARVEY
USA



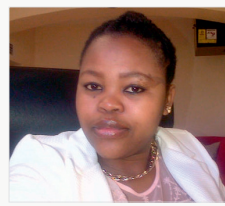
TARA BATISTA
USA



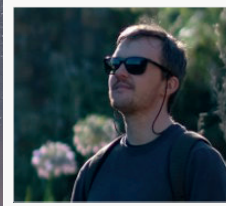
ELI GRANT
USA/UK



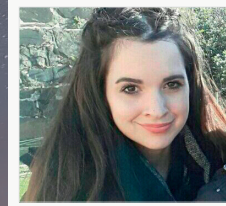
SAHAR MOHY-UD-DIN
BOTSWANA



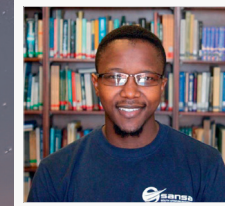
KARABO MAKOLA
SOUTH AFRICA



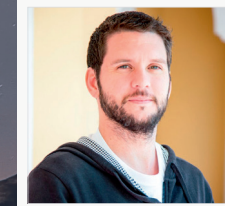
PAUL A. WILSON
NORWAY/UK



ANNIKA MÜLLER
GERMANY



MELO MTOMBENI
SOUTH AFRICA



PIERRE-YVES LABLANCHE
FRANCE



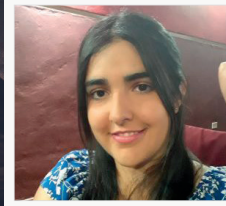
MUNIRA HOOSAIN
SOUTH AFRICA



JANE CHOI
SOUTH AFRICA



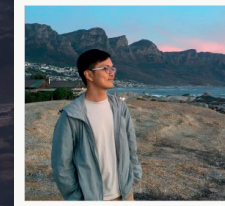
SAMYUKTA MANIKUMAR
KENYA



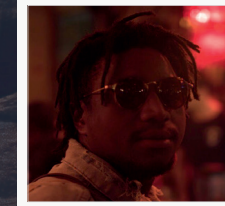
JOHANNA CASADO
ARGENTINA



KATHY EASTWOOD
USA



NGUYEN TAN VU
VIETNAM



SUKUMA MKHIZE
SOUTH AFRICA



TAWANDA CHINGOZA
ZIMBABWE



CALL TO ACTION

Volunteering with the OAD offers opportunities to make new friends and develop international collaborations, travel, develop new skills, learn about science for development, publish in peer-reviewed journals, be recognised for your contributions, and, most of all, use your time and energy **TO MAKE A DIFFERENCE.**



PERFORM RESEARCH AT OAD



VOLUNTEER



BECOME AN OAD INTERN OR FELLOW



PARTNER WITH OAD



PROPOSE A PROJECT



ADOPT A PROJECT



FUND A PROJECT



SET UP A REGIONAL OFFICE

GETTING INVOLVED

There are many ways to engage with the OAD. We welcome your ideas and input towards the vision of Astronomy for Development. The bulk of the implementation of projects is carried out by volunteers, supported by the OAD and the ROADS/LOADs, with advice and guidance from the OAD reviewers, and oversight by an international Steering Committee.

The greatest resource enabling the OAD to achieve its vision is therefore its volunteer community!

Assistance is sought on an ongoing basis from professionals, amateurs, educators, students or members of the public anywhere in the world. There is an active call on the OAD

website for volunteers to register their skills, preferred target regions and interests so that the OAD can match volunteers with opportunities. You may also contact us directly to discuss specific project ideas. Depending upon needs and availability of funding, OAD also offers a limited number of visiting fellowships each year.



PARTNERS

The OAD has established several partnerships and collaborates with organisations sharing common interests. These partnerships include visiting scientist programs, funding of workshops, scholarships, joint funding proposals, sharing of expertise and provision of staff time.

Below are some of the organizations that the OAD has partnered with historically.



IMPRINT

OAD COFFEE TABLE BOOK 2018

STREET ADDRESS

OAD Building
South African Astronomical Observatory
1, Observatory Road, Observatory
Cape Town
South Africa 7925

POSTAL ADDRESS

IAU – Office of Astronomy for
Development
P.O. Box 9, Observatory, Cape Town
South Africa 7935

EMAIL info@astro4dev.org
TELEPHONE +27 (0) 21 460 6297
MAILING LIST www.astro4dev.org/emaillists

DESIGN AND LAYOUT

Annika Müller

PHOTOS

OAD, Alex Gagliano, Annika Müller, pixabay
All activity photos used were submitted to the
OAD by the respective project leaders. More
information on project leaders and photo
credits can be found on www.astro4dev.org.

PUBLICATION DATE

August 2018

www.astro4dev.org

FACEBOOK facebook.com/astro4dev
TWITTER @astro4dev
YOUTUBE Astronomy for Development







science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



National Research
Foundation

SAAO

South African
Astronomical Observatory