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*The SASSCAL Ministerial Meeting was held in Windhoek on the 21st of September 2018, under the theme "Promoting Science for Sustainable Development" (page 3)*



Sponsored by the



## Message from the Executive Director

### *“Promoting Science for Sustainable Development”*

The SASSCAL Ministerial Meeting that was hosted by Namibia on the 21st of September 2018, chose the theme “Promoting Science for Sustainable Development”, for one simple but very important reason. For the sustainable use and management of our natural resources water, air, forests and timber, biodiversity, soils and minerals and others; for stabilising the climate system, and setting up effective mitigation actions and adaptation strategies, we require science. Science that is robust, relevant, demand-driven, interdisciplinary and science that is accessible in terms of the way it is written, packaged and disseminated. Moreover, the successful implementation of the United Nations Sustainable Development Goals (UNSDGs), requires science. Promoting science for sustainable development therefore is central to the future that we aspire to have. For several decades, the role of science, in informing policy, has lagged behind and has been strained by the complexity and inadequacy of scientific cooperation in view of, for example, the that impacts of most environmental challenges are felt locally, their origin and determinants could be cross border; while science is international (OECD, 2015: Scientific Advice for Policy Making).

For new scientific knowledge to be obtained, there must be institutions that are equipped with modern technologies, relevant study programmes, house high quality academics and an environment that enhances creativity and innovation. In southern Africa and Africa at large, there are commendable steps to support institutions that produce high quality science and academics. However, a recent publication on World University Rankings 2019, shows that Africa still lags behind. The report shows that the best University in Africa occupies 156<sup>th</sup> position on the world ranking. (<https://www.timeshighereducation.com>).

For Africa and the world to achieve such important global goals like the UNSDGs, execute Paris Agreement commitments, collaboration in terms of research , infrastructure and exchange programmes between researchers and academics in both developed and developing countries must be supported and given a priority in any social and political discourse. Evidence suggests a positive correlation be-

tween socio economic development and environmental protection that requires political and policy intervention to ensure some level of sustainability.

Climate change, SASSCAL’s focus, knows no geographic boundaries and through its member states , SASSCAL addresses this phenomenon on a regional scale. For a region that heavily relies on agriculture, there is need for immediate policy interventions. The meeting of SASSCAL Ministers provided an opportunity for the Ministers to echo their determination in addressing climate change at a regional level.

During SASSCAL Ministerial Meeting, , SASSCAL’s regional approach in addressing climate change and adaptive land management has been applauded. The Research Portfolio provided a multi-lateral programme which has become an important expression of science diplomacy in the region. It has brought together researchers and academics in pursuit of climate change adaptation solutions. The role of science in promoting sustainable development will only be realised when scientists, academics, and policy makers share platforms as happened at the SASSCAL Ministerial meeting in Windhoek, Namibia. Such platforms and interactions will bring closer the realisation of SASSCAL’s Vision “To be a leading regional centre in integrated climate change and adaptive land management science services for improved quality of life in Southern Africa”.

Dr Jane M Olwoch  
SASSCAL  
Executive Director





## SASSCAL Ministerial Meeting

### *“Promoting Science for Sustainable Development”*

Windhoek, Namibia

21 September 2018

The SASSCAL Ministerial Meeting was held in Windhoek on the 21st of September 2018. The meeting was hosted by the Namibia Ministry of Agriculture, Water and Forestry (MAWF) and was sponsored by the Germany Federal Ministry of Education and Research (BMBF) under the theme “Promoting Science for Sustainable Development”.

The objectives of the meeting, which was held for the first time since the signing of the Joint declaration to implement SASSCAL by the respective Ministers in 2012 were to:

- Report back to the Ministers on SASSCAL achievements for the last 5 years
- Unveil SASSCAL’s next Research Portfolio Strategy
- Provide an opportunity for the Ministers and their delegates to network and reflect on climate change challenges in the region
- To set in motion the agenda to transform SASSCAL into an international organisation

From its humble beginnings as a section 21 Company under the Namibia Law, the meeting set into motion the next phase of SASSCAL’s transformation into an International Organisation. Such a transformation is underpinned by the development of a demand-driven knowledge agenda, a highly skilled labour force, investment in technology infrastructure and the provision of products and services that have a positive impact on society. The transformation of SASSCAL into an international organisation with an appropriate legal status will increase its competitive advantage towards ensuring its long-term sustainability.

*Front row: From left: Francisco Bongo, Hon Anna Shiweda – Deputy Minister MAWF (SASSCAL Deputy Board Chair), Hon Katrina Hanse Himarwa – Minister of Education Namibia, Hon Maria Do Rosario Sambo – Minister of Higher Education, Science Technology and Innovation Angola, Dr Nangolo Mbumba – His Excellency Vice President of the Republic of Namibia, Hon Prof Nkandu Luo- Minister of Higher Education Zambia, Her Excellency Tshenolo Modise – Botswana High Commissioner to Namibia, Mrs Jane Mubanga Chinkusu, Director of Science and Technology in the Ministry of Higher Education Zambia (SASSCAL Board Chairperson Zambia),*

*Back Row: From left: Dr Elisam \_ Cardoso, Director of the Cabinet of the Minister for Angola, Mr Felix Monggae, Deputy Permanent Secretary (Botswana Board Member), Dr Gabriel Luis Miguel, position (SASSCAL Board Member Angola) Dr Wilfried Kraus – German Federal Ministry of Education and Research (BMBF) representative, Mr Peter J. Dery, WASCAL Board Chairman, Dr Thomas Auf Der Heyde, Deputy Director General Research Development and Support South Africa, Dr Jane Olwoch, SASSCAL Executive Director, Mr Succeed Mubanga, Dr Yonah Seleti, Director of Science and Technology (SASSCAL Board Member), Mr Abraham Nehemia, Deputy Permanent Secretary, Ministry of Agriculture, Water and Forestry, Namibia*





*Mr Abraham Nehemia, the Namibia alternate SASSCAL Board Member and Deputy Permanent Secretary in the Ministry of Agriculture Water and Forestry, in his remarks as the Master of Ceremonies noted that the meeting was a landmark event in the history of the organisation and a critical milestone.*

*SASSCAL Executive Director Dr Jane Olwoch thanked the delegates and the Council of Ministers for prioritising and availing themselves for the meeting. Dr Olwoch took the delegates through the journey of SASSCAL, what it is, what SASSCAL has done and its aspirations through the unveiling of the ‘SASSCAL- Promoting Science for Sustainable Development’ video:*

<http://www.sasscal.org/videos/>

*Top to bottom: SASSCAL Board Member, was the Master of Ceremony; the Ministerial representatives*

The SASSCAL Ministerial Meeting was officially opened by His Excellency, the Vice President / Acting President of the Republic of Namibia, Dr Nangolo Mbumba. In his opening speech, Dr Mbumba acknowledged that SASSCAL’s second phase and transformation into an international organisation will require political support, strong commitment and policy guidance of lead Ministers from its member states, the governing board as well as Germany. “Namibia remains ready to continue carrying out the mandate of ensuring that the southern African region will always address climate change with effective evidence-based scientific solutions”. SASSCAL’s strategic positioning as a “regional scientific advisory, information service and adaptive land management cen-





*SASSCAL is well positioned to provide scientifically backed information to inform policies, geared at combating climate change. Through its research component, SASSCAL produces knowledge-based services and products that can facilitate the urgent action required to combat climate change. SASSCAL through its recently concluded research portfolio 1, has strengthened the region's infrastructure and human capacity to better respond to climate change impacts through adaptive land management, among others.*

tre" enables it to provide products and services for policy makers. He further highlighted that SASSCAL's initiative is most opportune, as it generates the scientific knowledge techniques and skills that are required to minimize and mitigate the impacts of climate change in the region.

Dr Nangolo Mbumba applauded SASSCAL's prudent regional approach to addressing the effects of climate change. SASSCAL was formed in support of the UN-FCCC, Bali action plan, which supports global initiatives that are aimed at addressing challenges related to climate change. Thus, Dr Mbumba called on other member states to re-dedicate and intensify efforts to achieve UN Sustainable development goal 13, which is to 'Take urgent action to combat climate change and its impacts'.

## **SASSCAL 2.0**

The Ministers council expressed their excitement on the next phase of SASSCAL, SASSCAL 2.0. SASSCAL 1.0 has laid a good scientific and institutional foundation for the next phase. There was a joint consensus expressed on the need to sustain and build on the achievements of SASSCAL 1.0. The council of ministers expressed their hope that SASSCAL 2.0 will make meaningful progress in extending climate change services to grassroot levels and provide science services that could begin to tackle climate change related problems at societal levels. SASSCAL was urged to ensure implementation of impactful projects. Hon Sambo stated that Angola would like to see " more projects oriented to the social and human sciences included in the next call for proposals. Hon Khama impressed upon the nodes to plan and establish effective knowledge translation platforms and facilitate greater research uptake. Zambia reiterated on the need to evaluate lessons learnt on mapping the road map for SASSCAL 2.0 while Namibia emphasised that the move from SASSCAL 1.0 to SASSCAL 2.0 calls for more cohesion and moving in the same direction as a united team.



*Top to bottom: Dr Wilfried Kraus – German Federal Ministry of Education and Research (BMBF) representative, Dr Jane Olwoch, SASSCAL Executive Director; Kevin Stephanus (Human Capacity Development Coordinator) in engaged conversation with Dr Uwe Stoll (KfW Namibia Director); Gabin Ananou, German Aerospace Center - Head of Project Management Agency (DLR PT) for SASSCAL*

1. Food Security



2. Water Security



3. Biodiversity Conservation



4. Woodlands & Forest Sustainability



5. Climate Service Provision



The SASSCAL 2.0 call will encompass the following five priority areas: Climate services, agriculture and food security, biodiversity and ecosystem services, water and forests and woodlands.

The principles that will guide the selection of projects from the proposals are Excellence, Relevance, Transdisciplinary, Regional coverage, Innovativeness, Capacity building and Potential for impact on society

**Joint Statements**

The council of ministers and the Germany representative re-affirmed their commitment to the regional initiative and are in full support of SASSCAL transformation into an international organisation. The council of ministers pledged to take ownership of the shared responsibilities of the initiative. Germany was acknowledged and thanked for its support and funding towards SASSCAL and member state ministers agreed and pledged to join efforts in pursuit for alternate funding for operations including member country contributions. The Ministers council expressed their anticipation of the launch of SASSCAL 2.0 and urged SASSCAL to rather than only focus on mitigation, to also focus on adaption.

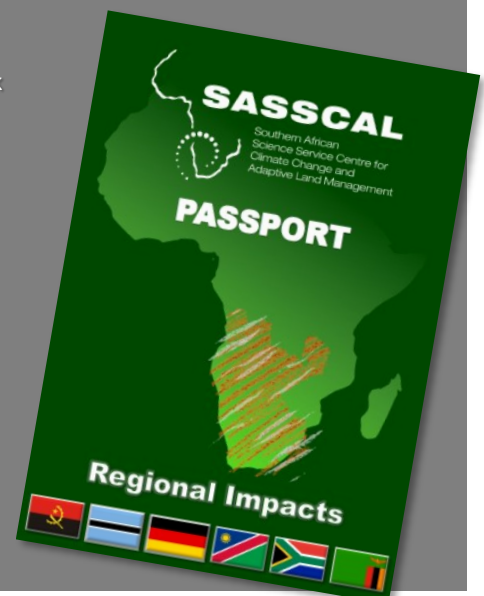
**Vote of thanks**

Mrs Jane Mubanga Chinkusu the SASSCAL Governing Board Chairperson delivered thanked the delegates, in particular the council of ministers, the German partners and the stakeholders for their commitment shown towards the regional initiative. Mrs Chinkusu pledged that SASSCAL will continue its pursuit for regional solutions with the board moving as a region and not as individual countries. SASSCAL will continue to build capacity in the region and implement projects that impact communities she added. Mrs Chinkusu informed the delegates that young people will be key in the next phase of SASSCAL.

*SASSCAL AIMS TO ADDRESS CROSS-BORDER CHALLENGES BY PROVIDING REGIONAL SOLUTIONS*

Regional products and services include

- a Global Urban Footprint
- Landsat composite, processed Landsat imagery for some 30 years, fire products of Angola, Botswana, Namibia and Zambia
- Biodiversity Observation Network (SASSCAL ObservationNet)
- Woody cover fraction map for Namibia, Zambia, South Africa
- SASSCAL WeatherNet
- SASSCAL Data and Information Portal
- Regional climate modelling system REMO and user-friendly version easyREMO
- Integrated land and water resources management support system
- Operational seasonal forecast system





## SASSCAL in Angola

Hon Maria Do Rosario Sambo the Angola Minister of Higher Education, Science Technology and Innovation in her statement noted that **“today SASSCAL is an unquestionable evidence of multilateral scientific cooperation between the member states and Germany”**. She added that **“for Angola, it is a great advantage to be part and actively participate in the SASSCAL initiative”**. Hon Sambo highlighted some of the benefits her country has attained from SASSCAL and these included:

### SASSCAL IN ANGOLA

13 SASSCAL-funded projects  
 € 2 623 041.03  
 5 Institutions  
 83 Individuals

- 19 scholarships (2 PhD, 12 master’s degrees and 5 undergraduate degrees)
- 18 automatic meteorological stations & recovery of 21 automatic meteorological stations
- Various institutions laboratories have been equipped
- 6 biodiversity observatories were established

Hon Sambo informed the delegates on her country’s commitment to honour its financial obligation to SASSCAL to guarantee its sustainability. Hon Sambo further challenged SASSCAL to ensure that the scientific research impact communities.

## SASSCAL in Botswana

The Botswana High Commissioner to Namibia, her Excellency Tshenolo Modise delivered a statement on behalf of the Minister of Environment Natural Resources Conservation and Tourism Hon Tshekedi Khama. In the statement Hon Khama stated that Botswana is a drought prone country and is therefore imperative that SASSCAL 1.0 research is made actionable to mitigate and minimise the most severe impacts of climate change. Hon Khama informed the delegates that the Botswana node has made significant progress in supporting problem oriented research with high potential for impact. Benefits accrued include:

- Launch of collaborative Master Degree in Earth Observation, GIS and Remote Sensing
- 59 graduates (4 PhD, 17 Master’s students, 30 Bachelor, 8 Certificate level) & 25 Technicians received specialised training
- 20 automatic weather stations

The Botswana node has contributed immensely in improving linkages between research and policy noted Hon Khama. He pledged to **‘utilise availed resources and knowledge to make sound policies with scientifically informed knowledge’**.

### SASSCAL IN BOTSWANA

14 SASSCAL-funded projects  
 € 2 861 686.00  
 16 Institutions  
 80 Individuals



### SASSCAL IN NAMIBIA

18 SASSCAL-funded Projects  
 € 4 383 550.00  
 31 Institutions  
 70 Individuals

## SASSCAL in Namibia

Hon Alpheus !Naruseb the Minister of Agriculture, Water and Forestry in a statement read on his behalf by the SASSCAL deputy Board chairperson and Deputy Minister Hon Anna Shiweda noted his satisfaction of SASSCAL’s accomplishments since its establishment. These include:

- 58 automatic weather stations, 9 FogNet stations, 9 rain gauge stations and 20 surface water data loggers
- 107 scholarships (10 PhD, 60 Master students, 25 Honours students and 12 Bachelor students)
- Launch of collaborative Master Degree in Earth Observation, GIS and Remote Sensing

**Hon !Naruseb informed the delegates that Namibia has availed land for the construction of the Regional Secretariat which is based in Windhoek, as well as the Namibia node offices.**



**SASSCAL IN SOUTH AFRICA**

5 SASSCAL-funded projects

€ 3 134 845.24

11 Institutions

80 Individuals

**SASSCAL in South Africa**

Dr Thomas Auf Der Heyde who represented the Minister of Science and Technology Hon Mmamoloko Kubayi-Ngubane painted a very vivid picture of the challenges of climate change in the region. Such challenges should be jointly addressed and thus applauded the regional initiative.

South Africa regards as very important its contribution to national, regional and international efforts to combat climate change and thus welcomed the SASSCAL initiative. Dr Auf Der Heyde emphasised on the need to understand where our greatest vulnerabilities are, and begin with those. Land-use, agriculture and rural communities receive high priority and it in this context that South Africa supports the SASSCAL initiative.

SASSCAL serves many very important purposes noted Dr Auf Der Heyde. Some of these are:

- **Multi-lateral programme which is an important expression of science diplomacy and brings together various parties in pursuit of climate change solutions**
- **Harnessing the power of science and technology to assist the region to understand climate change impacts so as to minimise its negative consequences**
- **Strengthen regional scientific endeavours, competencies and technologies and infrastructural platforms**
- **Human capacity development**

Dr Auf Der Heyde also acknowledged SASSCAL 1.0 achievements in South Africa from the 5 big projects implemented. These included human and institutional capacity developments and investments.

**SASSCAL in Zambia**

Hon Prof Nkandu Luo the Minister of Higher Education acknowledged the importance of SASSCAL to the region because of the pivotal roles climate change and land management play in the regional development process. “This means that the SASSCAL agenda falls squarely within the development agenda of Zambia” she added.

Hon Luo informed the delegates that Zambia places a very high premium on the success of SASSCAL as a regional body because of her country aspirations for industrialization. “It is therefore important for Zambia to keep an eye on prudent resources and climate change management in order to ensure sustainable development” she added. Zambia is pleased with the progress and achievements of SASSCAL 1.0 which include:

- Capacity development in climatology where curricula has been developed and training in Zambian Universities
  - Generation of information which is vital for evidence-based decision making and policy formulation
  - Community based extension services that impact communities

With the successes already recorded under SASSCAL 1.0 Hon Luo urged SASSCAL to review the past to ensure that unachieved milestones are addressed to create impetus to move forward.



**SASSCAL IN ZAMBIA**

14 SASSCAL-funded projects

€ 4 030 446.49

10 Institutions

179 Individuals

by SASSCAL Communications and Marketing Team



# Dr Olwoch presents Women in Science at 3rd Annual Women Conference

by SASSCAL Communication and Marketing Team

SASSCAL's Executive Director, Dr Jane Olwoch, presented "Women in Science" at the 3rd Annual Women Conference "Women in Leadership", in Windhoek, Namibia, on 17 August 2018.

The event forms part of a host of activities evolving around SADC Day, in the context of the 38th SADC Summit, being hosted by Namibia in Windhoek.

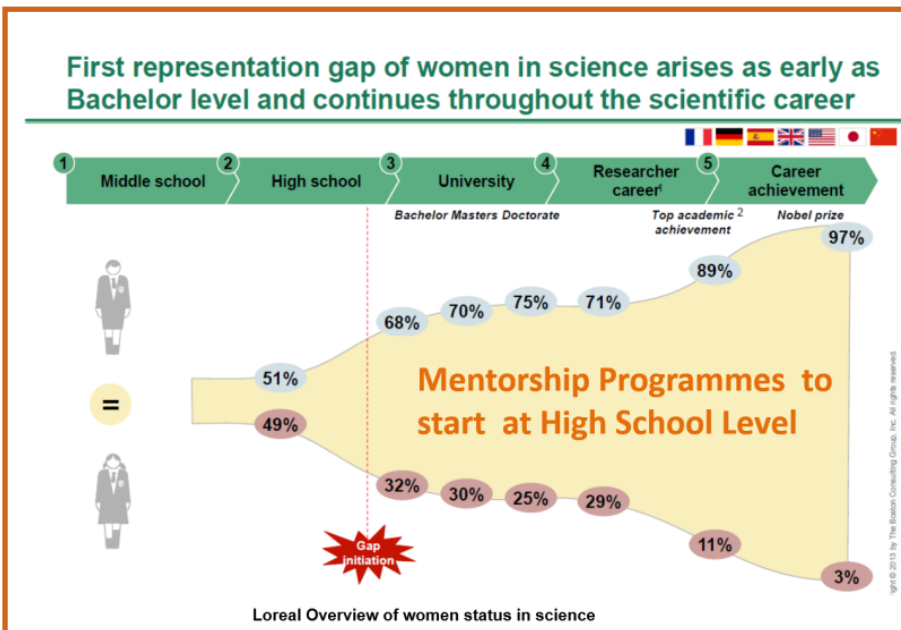
Dr Olwoch formed part of a remarkable selection of successful women, invited as key speakers during the event.

Dr Olwoch's presentation highlighted the

existing disparate between male and female professionals in the scientific sector. This disparate grows larger relative to the level of postgraduate qualifications, resulting with a dominance of male professionals with higher qualifications.

Dr Olwoch emphasised the need for women to remain persistent and unwavering in their strives. Whilst at the same time, maintaining a healthy, balanced life between career and family. The overall message communicated by Dr Olwoch was that women need to move past all the stereotypes and not be intimidated by the stereotypes.

(below) Dr Jane Olwoch, SASSCAL Executive Director, presenting "Women in Science" at the 3rd Annual Women Conference; (left) an extract from Dr Olwoch's presentation showing the decline of percentages of women in scientific careers, proportional to the level of graduation; (bottom), Dr Jane Olwoch with the SASSCAL ladies (Charity Angula, Johanna Mumangeni, Tracy-lee Van Wyk, Bianca Mutale, Nancy Makwatikizo, Sylvia Thompson, Chipo Chirefu Toto (Director of Finance and Administration) and Chenai Marangwanda)



## GMES & Africa Service Delivery

by SASSCAL Communication and Marketing Team



A GMES and Africa service delivery training workshop was held in Nairobi, Kenya from the 23<sup>rd</sup> July to the 25<sup>th</sup> July 2018. This training addressed service delivery methods from the user-needs point of view, in other words, understanding the demand before supplying the services, and ways of meeting the demand through marketing, communication, etc. The training was informed by the deficiency of tools, techniques and mechanisms of reaching the end users and aimed at informing the GMES consortia on appropriate best practices for delivering services.

SASSCAL's OADC Coordinator, attended the training in the context of the successfully awarded WeMAST project, for which SASSCAL plays a coordinating role in one GMES consortium.

In November 2017, the consortium being led by SASSCAL has been awarded the WeMAST (Wetland Assessment and Monitoring Platform for Transboundary River Basins in Southern Africa) project, which aims to put in place a Wetland Information System, Flood Information System, as well as platforms to assimilate vegetation phenometrics, water quality and wetland use for the Zambezi, Cuvelai, Okavango and Limpopo basin areas,

which span over seven countries Angola, Botswana, Mozambique, Namibia, South Africa, Zambia and Zimbabwe. Consortium partners include the University of Botswana, the University of the Western Cape, The South African National Space Agency (SANSA), The University of Zambia, the Midlands State University and the National Remote Sensing Centre of Zambia.

The GMES workshop provided participants with a clear understanding on service delivery, service packs and ways of disseminating information.

## Extended Freshwater and Terrestrial Environmental Observation Network to be established in South Africa

by SASSCAL Communication and Marketing Team

From 10 to 14 September 2018, the South African Environmental Observation Network (SAEON) hosted a workshop to deliberate on the advancement of carbon flux research and infrastructure in South Africa. The workshop brought together those interested or active in carbon flux research in South Africa and aimed to create further cohesion and co-learning in carbon research towards developing a community of practice in South Africa and guide the establishment of carbon research under the Extended Freshwater and Terrestrial Environmental Observation Network (EFTEON).

Together with SAEON, SASSCAL is an implementing partner of the EU-funded project 'Supporting EU-African Cooperation on Research Infrastructures for Food Security and Greenhouse Gas Observations' (SEACRIFOG). The SEACRIFOG consortium had been invited to participate in this workshop.

The workshop took place at Didima Camp at SAEON's long term ecological research site in the highlands of the Drakensberg Mountains in KwaZulu Natal, South Africa. The workshop attendants represented the core of the scientific community conducting carbon-related research in South Africa. The initial part of the workshop focused on obtaining an overview of the South African research landscape on carbon fluxes and cycles. Johan-

nes Beck, SASSCAL's Environmental Data Specialist, provided a presentation of SASSCAL's work in line with the SEACRIFOG project.

During the workshop, the needs, design, scope and focus of the EFTEON observation network to be established, were discussed. In addition, the workshop included a field visit to SAEON's environmental observation sites at Cathedral Peak. The unique grasslands in the Drakensberg mountain range bordering Lesotho play a crucial role for South Africa's freshwater supply and SAEON's work at this site is an excellent example of how long-term scientific research has been key to understanding, conserving and sustainably managing this landscape.

The workshop was highly relevant for SASSCAL's work in line with the SEACRIFOG project. While the workshop exclusively focused on carbon flux research in South Africa, it provided important insights to the research activities in the African nation with the best established observation infrastructure to date. Corresponding lessons and protocols can be applied when establishing research infrastructures in other African countries in order to achieve a high degree of harmonization of environmental observation across countries.



Field visit to a SAEON observation site in the grasslands of the Drakensberg Mountains at Cathedral Peak





**Greenhouse Gas  
Observation &  
Climate-Smart  
Agriculture**

## SEACRIFOG work package leaders convene on Cape Verde

by Johannes Beck  
SASSCAL Environmental Data Specialist



SASSCAL is an implementing partner of the EU-funded project 'Supporting EU-African Cooperation on Research Infrastructures for Food Security and Greenhouse Gas Observations' (SEACRIFOG). SEACRIFOG is implemented over a three-year period (February 2017 to February 2020) by a consortium of 16 African and European partner organizations. The SEACRIFOG project aims to design a pan-African greenhouse gas observation system.

The 2018 SEACRIFOG Annual Meeting took place at the Ocean Science Centre in Mindelo, Cape Verde, from 18 to 21 June 2018. Johannes Beck, who is responsible for SASSCAL's contributions to the SEACRIFOG project, participated in this meeting on behalf of SASSCAL.



The purpose of the meeting was to coordinate, present and discuss the progress of the various project work packages and agree on the way forward. SASSCAL is involved in line with various work packages and provides critical project contributions towards the design of a fully inter-operable integrated observation network for climate change and other environmental dynamics in the terrestrial, atmospheric and oceanic domain across the African continent. Since numerous tasks of SEACRIFOG partners build on SASSCAL's work, the meeting was a good opportunity for Johannes Beck to present and explain the work done by SASSCAL to date, facilitate corresponding discussions, and coordinate the next steps with the project partners.

The meeting proved fruitful in terms of both content and directly interacting with the project partners. From SASSCAL's perspective, a priority for the meeting was to discuss with the project consortium the 'ideal' and 'mandatory' variable sets to be considered by the observation network to be designed in line with SEACRIFOG. Corresponding information had been disseminated during the previous months and input had been requested via the specifically developed web-based 'SEACRIFOG Collaborative Inventory Tool'. The result of this effort was a 'mandatory' variable set based on a survey-based approach. The meeting participants agreed that such a list is a 'living' concept which will continuously undergo further iterations.

(left) Greenhouse gas measurements at the top of a 30-m tower at the atmospheric observation station on Cape Verde; (bottom) SEACRIFOG consortium partners and attendees of the SEACRIFOG Annual Meeting 2018





## Towards an African network for greenhouse gas observations

by Johannes Beck  
SASSCAL Environmental Data Specialist

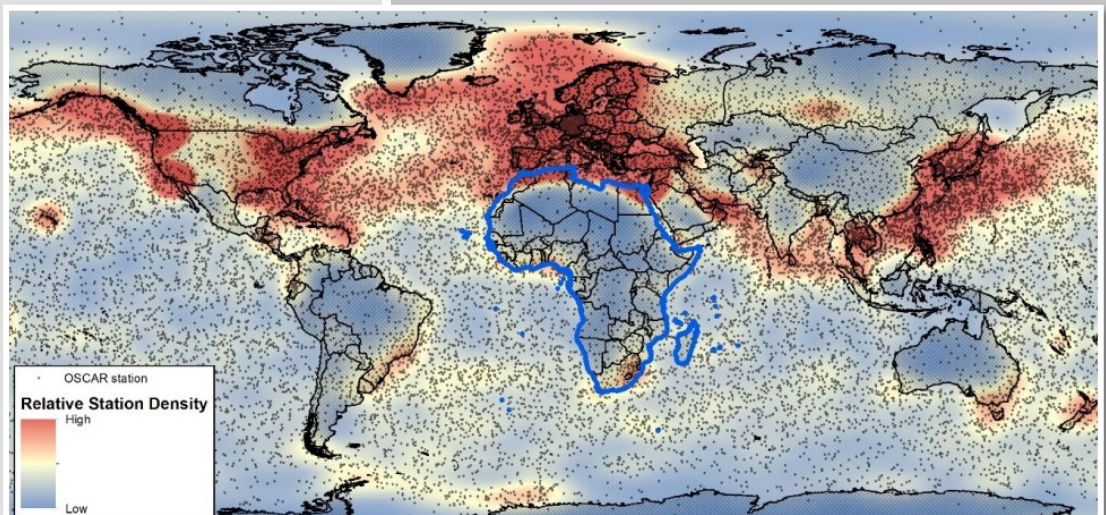
A new study titled "[Towards a feasible and representative pan-African research infrastructure network for GHG observations](#)" was published on 14th August 2018 in Environmental Research Letters (Reference Ana López-Ballesteros et al 2018 Environ. Res. Lett. 13 085003). SASSCAL crucially contributed to this publication in line with its work on the [SEACRIFOG](#) project.

The paper highlights the need for a systematic and long-term continental network of research infrastructures to observe greenhouse gas emissions across Africa and the surrounding oceans. In global comparison, climate-relevant observations across the African are very sparse, resulting in a high uncertainty about the continent's global greenhouse gas budget. An observation network tailored to African circumstances will not only allow for more accurate attribution and quantification of emissions, but also the development of viable climate change adaptation and mitigation strategies. This is particularly important in the African context, where a relatively large portion of continental greenhouse gas emissions is linked to land use, agricultural production and, eventually, food security.

The publication further presents the preliminary results of the work carried out by SASSCAL and its implementing partners towards the design of such an observation network. This comprises a first iteration of a set of 'essential' climatic and environmental variables to be observed systematically by this network. SASSCAL led the identification process of these variables covering the atmospheric, terrestrial and oceanic domain. SASSCAL further compiled an inventory of existing and planned observation infrastructures across the African continent and conducted a spatial analysis of the corresponding observational coverage of the various African biomes and ecosystems. This allows for the identification of observational gaps and forms the point of departure for the optimal design of the future network.

Top right: The Cubango-Okavango Basin

Bottom right: Worldwide distribution of weather or climate observation stations listed in the Observing Systems Capability Analysis and Review tool (OSCAR) of the World Meteorological Organization (WMO) as in April 2018. Source: Ana López-Ballesteros et al. (2018), Environ. Res. Lett., 13, 085003.

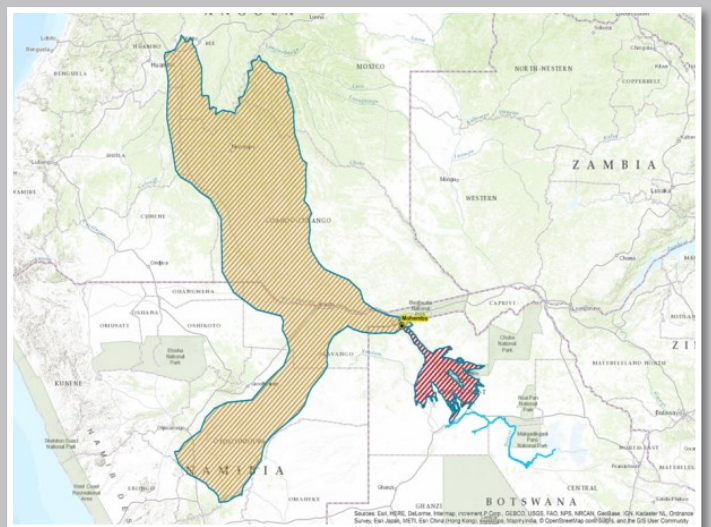


## Climate-Resilient Development Pathways for the Cubango-Okavango River Basin

by SASSCAL Communication and Marketing Team

On 6th and 7th August 2018, a workshop on Climate Resilient Development Pathways (CRDPs) of the Cubango-Okavango River Basin was organized by the Climate Resilient Infrastructure Development Facility (CRIDF) and the Permanent Okavango River Basin Water Commission (OKACOM) in Pretoria, South Africa. The CRDP process assessed different multi-sectoral development scenarios in the three riparian states Angola, Namibia and Botswana against the most likely climate projections in terms of their potential impact on hydrology and livelihoods in the river basin. The workshop brought together scientists, consultants and policy advisors to discuss the optimal way of using the CRDPs in supporting sound decision-making processes in the three riparian states. This is a crucial issue, because the uncertainty associated with climate projections does not allow for the unambiguous identification of a single optimal development pathway, but instead results in a relatively broad range of different policy and investment options to decide between.

SASSCAL took an active role in contributing to the workshop and facilitating various participatory discussion sessions. The corresponding stakeholder input will help CRIDF and OKACOM to tackle existing gaps, develop tailored tools to translate scientific findings into understandable climate information and feed these into the relevant channels.





## SASSCAL promotes open and online data and information at the 1st GIS NSDI Forum in Namibia

by SASSCAL Communication and Marketing Team

The Namibian Statistics Agency (NSA), together with Digital Globe and Hatfield Consultants, hosted the GIS-NSDI Forum under the theme “Unlocking the value of geospatial information in planning” from 26 to 27 July 2018.

The main aim of the event was “to create national awareness of the value of geospatial information in national development planning and efforts made by the Namibian government to establish an infrastructure for geospatial information”.

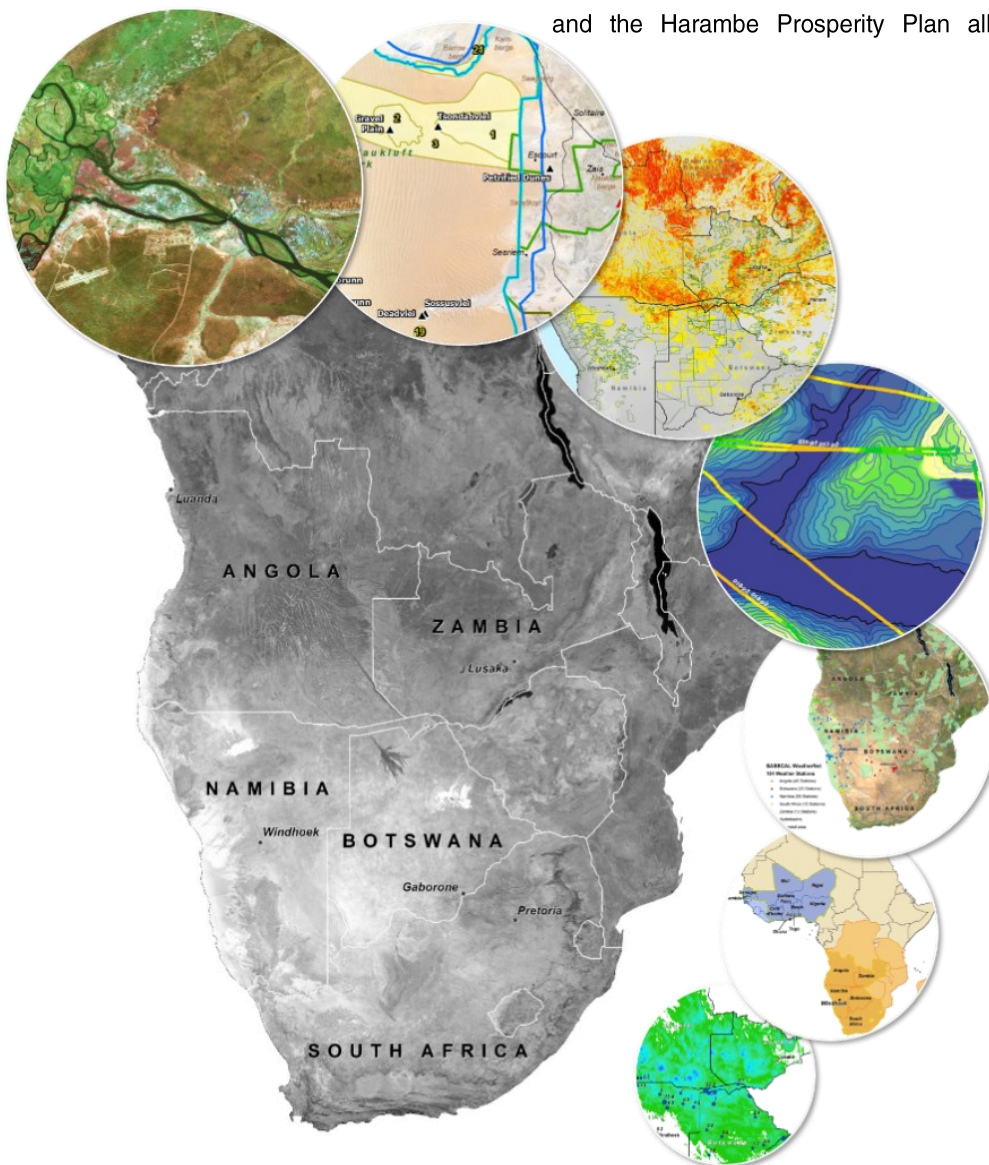
SASSCAL was invited to participate in the forum and had a well-attended exhibition booth at the event. The forum was officially opened by the Deputy Minister of Economic Planning, Honourable Pieter van der Walt. In his opening remarks,

Honourable van der Walt stated that the aim of the Forum was to create awareness and appreciation of the value of geospatial information, in coordinating efforts to grow the economy, improve government efficiency and decision making. To this effect Vision 2030, NDP5 and the Harambe Prosperity Plan all

have geographic and location components.

Sylvia Thompson, SASSCAL’s Spatial Analyst, presented “Meeting the Geospatial Needs for the Southern African Region” during the event. The presentation emphasised the contribution of SASSCAL to the GIS landscape and in particular, SASSCAL’s effort on providing free data sharing platforms, which is the responsibility of SASSCAL’s Open Access Data Centre (OADC). Sylvia also registered her concerns that despite the free availability of geoinformation products and services, complemented by related technological developments, many of them remain unexplored for providing regional solutions. The need to address the gap between science, research and decision making was also highlighted. After the presentation the participants during the question-and-answer session applauded SASSCAL for being visible in the region and transparent in its operations.

Participants could not resist enquiring about the SASSCAL 2.0 research call. The call will be announced soon through various media and the SASSCAL website.



The forum was attended by all key players in the Geospatial Industry in Namibia, and beyond, and raised some interesting discussion points on current technological trends, needs in capacity development, as well as underutilised technologies.

There is undeniable consensus among the speakers and the delegates on the potential of geoinformation technology in unlocking the value of geospatial data. The utilisation of geospatial information can facilitate and support the effective and sustainable implementation of programs that will enable the continent to achieve the SDGs (Sustainable Development Goals) in the southern African countries.

The launching of the National Infrastructure Atlas (<https://digitalnamibia.nsa.org.na/>) was the highlight of the opening ceremony. The Atlas is the first pilot study at NSA which is aimed at revealing some spatial relationships existing between and among different mapped infrastructures. The Atlas uses spatial analysis tools to calculate some basic spatial statistics that cannot be easily and accurately discerned from numerical statistics (Atlas foreword).

In her closing remarks, the Deputy Statistician General, Otilie Mwazi encouraged participants and stakeholders to play their part in the development and success of the NSDI in line with vision 2030. In conclusion Ms Mwazi emphasized the importance of data-driven decision making and the need for timely relevant spatial data dissemination.

*Impressions from the GIS-NSDI Forum: (left to right) Sylvia Thompson answering questions from the audience after her presentation "Meeting the Geospatial Needs for the Southern African Region"; the SASSCAL exhibition was well attended; Otilie Mwazi, Deputy Statistician General, Sylvia Thompson and Alex Mudabeti, Manager: GIS & NSDI Coordination, at the SASSCAL exhibition; SASSCAL colleagues engaging with visitors at the exhibition*





# SASSCAL contributes to the identification of key variables for Climate Change Observation across Africa

by Johannes Beck  
SASSCAL Environmental Data Specialist

In line with the EU-funded SEACRIFOG project ([www.seacrifog.eu](http://www.seacrifog.eu)), SASSCAL is contributing to the design of a continental network of research infrastructures for the monitoring of climate change and other environmental changes on the African continent linked to GHG emissions and food security. Among other tasks, SASSCAL has been leading the project's efforts to identify a minimal variable set to be observed systematically in order to sufficiently capture and quantify anthropogenic climate forcing as well as its interlinkages with agricultural production and food security in Africa and the surrounding oceans.

The identification of the key variables was based on a comprehensive consultative process, collecting the input from numerous experts from the field of environmental observation. An 'essential' variable set was derived from a broad set of possibly relevant variables through a survey-based assessment of each variable against the criteria of relevance, feasibility and cost in the African context. Most of this input was collected through the 'SEACRIFOG Collaborative Inventory Tool' (<https://seacrifog-tool.sasscal.org/>) specifically developed and hosted by SASSCAL. This approach was complemented by a systemic approach which focused on variables which are narrowly related to components and drivers of radiative forcing as described in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

Currently, a total of 58 variables have been identified as mandatory in the context of SEACRIFOG. This variable set is a combination of variables defined in existing sets such as the 'Essential

Climate Variables' of the Global Climate Observing System, the 'Essential Ocean Variables' of the Framework for Ocean Observing and the 'Essential Biodiversity Variables' by the Group on Earth Observation's Biodiversity Observation Network. In addition, further variables, mainly related to human activities, were identified. The systematic and long-term observation of these variables through a combination of in situ and remote sensing measurements has the potential to drastically improve the quantification and attribution of radiative forcing, refine transport models and thus regional climate change projections and inform the development of effective measures for adaptation and mitigation across Africa and the surrounding oceans. Many of the key variables are relevant to the monitoring and projection of agricultural production and thus production-based food security. Their systematic observation will thus also contribute to the refinement of food security related early warning systems and models.

Achieving a broad consensus on these variables is an iterative process based on continuous consultations and constant refinement. The list of key variables is thus considered a 'living document', with further input from interested institutions and individuals through the SEACRIFOG webtool (<https://seacrifog-tool.sasscal.org/>) being more than welcome.

Official report on Key Variables for Climate Change Observation across Africa, approved by the EU:

[https://www.seacrifog.eu/fileadmin/seacrifog/Deliverables/2018.08.18\\_SEACRIFOG\\_Deliverable\\_4.1.pdf](https://www.seacrifog.eu/fileadmin/seacrifog/Deliverables/2018.08.18_SEACRIFOG_Deliverable_4.1.pdf)

*'Ideal' and 'mandatory' (bold font) variables to be observed systematically across the African continent. For detailed information refer to the official report*

<p><b>Essential Biodiversity Variables</b></p> <ul style="list-style-type: none"> <li>Genetic Composition (10)</li> <li>Species Populations (47)</li> <li><b>Plant Species Traits (36)</b></li> <li>Community Composition (41)</li> </ul>	<p><b>Essential Climate Variables</b></p> <ul style="list-style-type: none"> <li><b>Land Cover (81)</b></li> <li><b>Ecosystem Function - Net Primary Production (48)</b></li> <li>Ecosystem Structure (45)</li> </ul>	<ul style="list-style-type: none"> <li><b>Above-ground biomass (82) incl. litter (36)</b></li> <li><b>Albedo (66)</b></li> <li><b>Fire (79)</b></li> <li><b>FAPAR (67)</b></li> <li>Glaciers (32)</li> <li>Groundwater (56)</li> <li>Ice sheets and ice shelves (41)</li> <li><b>Inland water extent (69)</b></li> <li><b>Land surface temperature (72)</b></li> <li>Latent and sensible heat fluxes (45)</li> <li>Leaf Area Index (74)</li> <li>Permafrost (15)</li> <li><b>River Discharge (55)</b></li> <li>Snow (46)</li> <li><b>Soil Organic Carbon (56)</b></li> <li><b>Soil Moisture (65)</b></li> <li><b>Precipitation (surface) (84)</b></li> <li><b>Pressure (surface) (67)</b></li> <li><b>Surface wind speed and direction (72)</b></li> <li><b>Atmospheric temperature at surface (88)</b></li> <li><b>Water vapor (surface) (71)</b></li> <li>Earth radiation budget (upper air) (54)</li> <li>Lightning (36)</li> <li>Temperature (upper air) (44)</li> <li>Water vapor (upper air) (49)</li> <li>Wind speed and direction (upper air) (42)</li> <li><b>Aerosols properties (50)</b></li> <li><b>Carbon dioxide, methane and nitrous oxide tropospheric mixing ratio (63)</b></li> <li><b>Cloud cover fraction (38)</b></li> <li>Ozone (47)</li> <li><b>Precursors (supporting the Aerosol and Ozone ECVs) (33)</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Reported Anthropogenic GHG emissions (55)</b></li> <li>Anthropogenic water use (54)</li> </ul>	<p><b>Anthropic Factors</b></p> <ul style="list-style-type: none"> <li><b>Land use/land use change (84)</b></li> <li><b>Human population (93)</b></li> <li><b>Economic development (81)</b></li> <li><b>Livestock population (73)</b></li> <li><b>Crop yield (78) by type</b></li> <li><b>Agricultural management (58)</b> <ul style="list-style-type: none"> <li>Area of Ploughed Land</li> <li>Manure Management</li> <li>Fertilizer Application</li> <li>Irrigation</li> </ul> </li> </ul>
<p><b>Essential Ocean Variables</b></p> <ul style="list-style-type: none"> <li>Particulate Matter (38)</li> <li>Dissolved Organic Carbon (39)</li> <li>Fish Abundance and Distribution (53)</li> <li>Zoo- (44) and Phytoplankton (48) Biomass and Diversity</li> <li>Marine turtle, bird and mammal abundance (47)</li> <li>Marine Habitat Properties (57)</li> </ul>	<ul style="list-style-type: none"> <li>Ocean Surface Heat Flux (50)</li> <li>Sea Level (84)</li> <li><b>Sea Surface Temperature (85)</b></li> <li>Sea State (55)</li> <li><b>Sea Surface Salinity (66)</b></li> <li>Sea Ice (49)</li> <li><b>Stable Carbon Isotopes (25)</b></li> <li>Subsurface Currents (32)</li> <li>Subsurface Salinity (52)</li> <li>Subsurface Temperature (57)</li> <li>Surface Stress (47)</li> <li><b>Inorganic Carbon (54)</b></li> <li><b>Nitrous Oxide (45)</b></li> <li><b>Nutrients (56)</b></li> <li><b>Ocean Color (65)</b></li> <li><b>Oxygen (68)</b></li> <li>Transient Tracers (18)</li> </ul>	<ul style="list-style-type: none"> <li><b>Net radiation (SW/LW) at surface (73)</b></li> <li><b>Below-ground biomass (44)</b></li> <li><b>Dimethyl Sulfide (Oceanic)</b></li> <li><b>Atmospheric /Planetary Boundary Layer (21)</b></li> <li><b>Biosphere- Atmosphere GHG flux</b> <ul style="list-style-type: none"> <li>CO<sub>2</sub> (55) – Net Ecosystem Exchange</li> <li>N<sub>2</sub>O (48)</li> <li>CH<sub>4</sub> (51)</li> </ul> </li> </ul>	<p><b>Ancillary/Other Variables</b></p> <ul style="list-style-type: none"> <li>Topography (84)</li> <li><b>Surface roughness (60)</b></li> <li>Ground/soil heat flux (48)</li> <li><b>Soil type (75)</b></li> <li>Soil quality/health (58)</li> <li>Dissolved organic (30) and inorganic (26) carbon (terrestrial)</li> <li>Atmospheric nitrogen deposition (39)</li> <li><b>Infiltration (45) and Runoff (54)</b></li> <li><b>Evapotranspiration</b></li> <li><b>Wild herbivores</b></li> </ul>	

## First MGEO programme students graduate in October 2018

by SASSCAL Communication and Marketing Team

In the context of SASSCAL 1.0 funded Task 303 Collaborative Master Degree in Earth Observation, GIS and Remote Sensing, a regional postgraduate Master programme was developed under the coordination of the Namibia University of Science and Technology (NUST) and with the collaboration of Cape Peninsula University of Technology (CPUT), the University of Botswana (UB) and the University of Zambia (UNZA).

Postgraduate masters programmes in Geoinformation Science and Earth Observation (MGEO) are available at few tertiary institutions and earth observation products are still not adequately explored to meet the regional decision-support needs. The MGEO programme is the first of its kind to be implemented at the respective tertiary institutions of higher learning. It will address the national and regional needs for capacity building in management and analysis of the regions' built environment and natural resources. "The programme will produce graduates who are skilled in spatial science investigations, evaluation and synthesis." said Frikkie Louw, Principal Investigator of Task 303.

The Master programme was first launched at NUST in Windhoek on 01 November 2016. At UNZA, it was launched in June 2017.

A total of 35 students, who are enrolled in this program, are/have benefitting from SASSCAL-funded scholarships. In addition to scholarships, SASSCAL also funded IT infrastructure for the programme.

In July, the first four students have submitted their thesis for examination and SASSCAL was invited for their oral examinations on 18 September at NUST in Windhoek and on 19 September at UNZA in Lusaka.

SASSCAL is thrilled to announce that all four students have successfully defended their oral examinations — congratulations and welcome to our southern African region's research community:

- Masauso Sakala titled "Validation of satellite derived rainfall products over a Namibian rainfall gradient"

- Bwalya Kawimbe, titled "A combined GIS and Remote Sensing analysis approach to map and predict gully erosion, in Namibia, using TanDEM-X derived digital elevation models"
- Edward Mukoya Muhoko, titled "Spatio-Temporal Analysis of Land Cover Change in the Perspective of Modelling Land Uses", who was also awarded Cum Laude for his degree
- Nicodemus Amelia Nauwanga, titled "Developing a Web based GIS for the Documentation of Historical Buildings in Namibia"

(bottom, from left to right) Dr Enock Nixon (UNZA), Dr Nichola Knox (NUST), Bwalya Kawimbe, Masauso Sakala, Agnes Kalaluka (UNZA), Mutukwa Musole (SASSCAL Zambia)

(bottom, front row, from left to right) Panduleni Hamukwaya (SASSCAL Namibia), Dr Vera de Cauwer (NUST), Amelia Nauwanga, Edward Muhoko, Dr Rolf Becker (NUST Dean Faculty of Natural Resources & Spatial Sciences), Nabot Mbeeli (also a successful SASSCAL-funded Master student of the Natural Resources group), Dr Ben Strohbach (NUST), (back row) Dr Carlos Dewasseige (NUST), Dr Meed Mbidzo (NUST), Dr Nichola Knox (NUST), Jens Wiedow (NUST), Kaleb Negussie (NUST), Kevin Stephanus (SASSCAL)





## Launch of the Master of Geoinformation Science and Earth Observation in Botswana

by SASSCAL Communication and Marketing Team

*The official launch of the Master of Geoinformation Science and Earth Observation (SASSCAL-funded Task 303) was held on 12 June 2018 at the Gaborone International Conversion Centre (GICC) in Gaborone, Botswana.*

The launch was attended by several high ranking officials including representatives of the Angola High Commission, Zambia High Commission, Deputy Vice Chancellor Academic Affairs, University of Botswana (UB), Acting Deputy Vice Chancellor: Research, Technology, Innovation and Partnerships from Cape Peninsula University of Technology (CPUT), Dean of Science, UB, Dean of the Faculty of Natural Resources and Spatial Sciences, Namibia University of Science and Technology (NUST), Dean of the School of Natural Sciences, University of Zambia (UNZA), the Executive Director of SASSCAL and the Acting Deputy Director of Meteorological Services (DMS). Also, in attendance were the SASSCAL-funded students, principal investigators of other SASSCAL Tasks, Senior Academic Staff from UB, representative from NUST Project Services Unit and representatives of media houses.

In his opening remarks, the Deputy Vice Chancellor of Academic Affairs, Prof David Sebudubudu expressed the excitement and gratitude of the UB about the launch of the Master programme, also emphasising the importance of the MSc Programme, as it will provide the much-needed skills and expertise in a field that has for a very long time been faced with a shortage of skills. He added that UB continues efforts to internationalise its campus and expand access to its programmes, thus the regional MSc Programme is a welcome development and is in line with the objectives of the strategic plan of UB of internationalising the institution and creating strong collaborations within the sub-region. He further thanked the German government, in particular the BMBF and SASSCAL for funding and launching the collaborative programme.

**The Collaborative Master Degree in Earth Observation, GIS and Remote Sensing (Task 303) was officially launched on 1 November 2016 at NUST, in cooperation with Cape Peninsula University of Technology (CPUT), the University of Botswana (UB) and the University of Zambia (UNZA). It has already been implemented in Namibia, Zambia and Botswana and aims to meet the capacity limitations in field of earth observation, geographic information systems and remote sensing. Moreover, a total of 35 students, who are enrolled in this program, are benefitting from SASSCAL-funded scholarships. In addition to scholarships, SASSCAL also funded IT infrastructure for the programme.**

The morning session proceeded with the launch remarks and handover of scholarships by Prof Sebudubudu to the nine students supported by SASSCAL. He thanked the sponsors and also encouraged the scholarship beneficiaries to use the opportunity calling it a rare privilege. He said "it is like a water current, you only see it once", and urged the students to commit to their studies, work hard and make partner Institutions and the funders proud. He encouraged the students to graduate and exit from the programme so that they could contribute to the economic development of the nation, region and the international community. He concluded his remarks by emphasising that the UB stands for excellence, so they will do their best to ensure successful implementation of the programme.

SASSCAL Executive Director, Dr Jane Olwoch, started her presentation by giving a few words of encouragement to the





scholarship beneficiaries. She also provided some background on SASSCAL, highlighting that SASSCAL was the first realisation of the Bali Action Plan (COP 13) (in 2007), which called for establishment of regional centres. She continued to highlight some key achievements of other SASSCAL Tasks and thanked the Department of Meteorological services for taking the lead in providing maintenance of the SASSCAL supported Automatic Weather Stations in Botswana. Dr Olwoch assured the meeting that the German Government has made a commitment to continue providing financial support to SASSCAL. She expressed delight when sharing with the meeting that the SASSCAL 2.0 Strategy and Science Plan has been approved and the Call for proposal, which will mark commencement of SASSCAL 2.0 will be announced in the near future. She advised Institutions to capitalize and build on previous successes to ensure even stronger teams to respond to the Call for Proposals. The call will integrate a nexus approach which will encourage interdisciplinary teams to find sustainable cross-sector solutions to pressing issues of Climate change within the region.

Continuing with her presentation, Dr Olwoch said that the MSc programme was launched at an opportune time when Africa is experiencing several challenges associated with climate change,

population growth and severe levels of poverty. She mentioned that the increasingly warmer and drier climate of Southern Africa together with a growing population threatens continued provision of ecosystem services and functions including food security, and water security in the region. She added that because all these ecosystem services and functions are cross boundary –an integrated regional approach is required to offer better scientific information that aids policy decisions. Dr Olwoch mentioned that the use of Earth Observation (EO) satellites for monitoring the environment is at the top of providing better and timely data.

In his remarks Dr Habatwa Mweene, Dean of the Faculty of Natural Sciences at the University of Zambia (UNZA), stressed the importance of collaboration between African Countries. Dr Mweene reported that the development of the MSc Programme started back in November 2013 with several workshops held in partner countries followed by curricular development workshops and culminated with signing of collaborative agreements with all partner universities in May 2015. He said the programme was launched at UNZA in June 2016 during that time the University of Botswana made a promise that the programme will be launched in Botswana in the near Future. He applauded the University of Botswana management for keeping the promise. The first intake at UNZA had a total of 21 students, 12 of which were funded by SASSCAL and the second intake will commence in August 2018, with mostly self-supported students. He added that this shows the potential sustainability of the programme beyond SASSCAL funding.

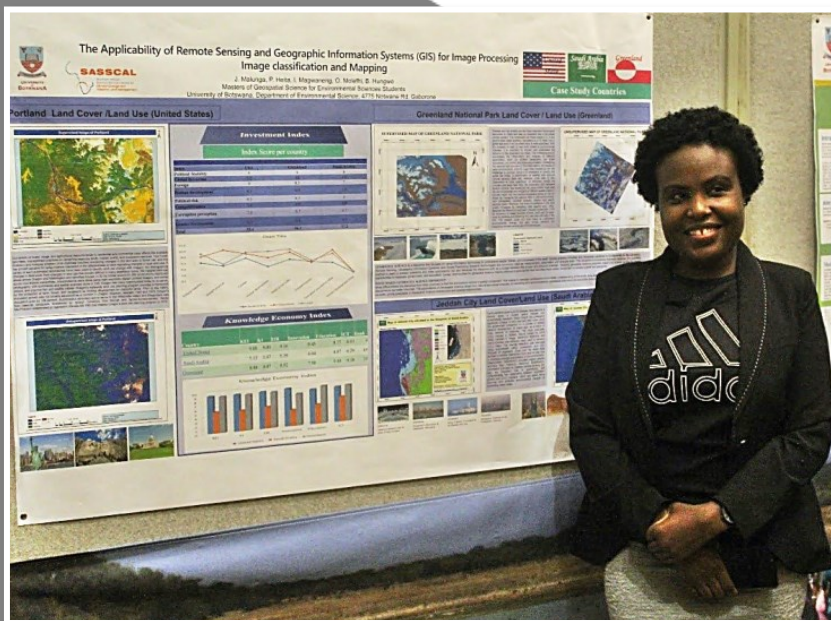
Dr Rolf Becker, the Dean of the Faculty of Natural Resources and Spatial Sciences, at NUST highlighted the importance of the regional collaboration, adding that new initiatives are never without challenges, which can easily be addressed if approached in the spirit of collaboration and resources pooling. He expressed his excitement, sighting that the Universities involved are of high repute and international standing. He thus looks forward to the first batch of graduates and congratulated UB for the launch.

Mr Frikkie Louw, Principal Investigator for SASSCAL Task 303, gave an overview of the task. The programme was launched at NUST in November 2016, followed by the launch at the UNZA in June 2017 and the current launch in Botswana. He added that they hope to launch the programme at CPUT in the near future and hopefully expand the Programme to other Institutions within the region.

The Deputy High Commissioner of Angola expressed his content to learn that there are students from Angola amongst the nine scholarship beneficiaries.

In Closing, Mr Frikkie Louw, gave the vote of thanks and closed the morning session.

*Top: Student presenting her poster and bottom: Dr Jane Olwoch and Prof Marshall Sheldon looking at a poster of one of the students*





## 1.5°C Global Warming: Projected Impacts in Southern Africa

by Johannes Beck  
SASSCAL Environmental Data Specialist

On the 8th of October 2018, the Intergovernmental Panel on Climate Change (IPCC) approved and published a special report on global warming of 1.5°C (<http://www.ipcc.ch/report/sr15/>). The report was prepared in response to the 2015 Paris Agreement, in which the international community committed itself to pursue 'efforts to limit the global temperature increase to 1.5°C'. The report summarises the current scientific knowledge regarding the projected impacts of global warming of 1.5°C above pre-industrial levels, considering related global greenhouse gas emission pathways and the required global response to climate change.

Notably, the report, in particular "Chapter 3: Impacts of 1.5°C global warming on natural and human systems" benefitted from the SASSCAL-funded research conducted by the research project 203 Climate Change and Impacts, conducted by the Council for Scientific and Industrial Research (CSIR), which supported the establishment of an extensive operational seasonal forecast system.

This article provides a brief overview of what the special report says about southern Africa.

To date, human activities are estimated to have caused a global warming of approximately 1°C above pre-industrial levels. If global warming continues at the current rate, it is likely to pass the 1.5°C mark around 2040. In order to maintain a realistic chance of containing global warming within 1.5°C in the long term, humanity has to drastically reduce global CO<sub>2</sub> emissions from 2020 onwards and reach net zero emissions by 2055 or earlier (see Figure below).

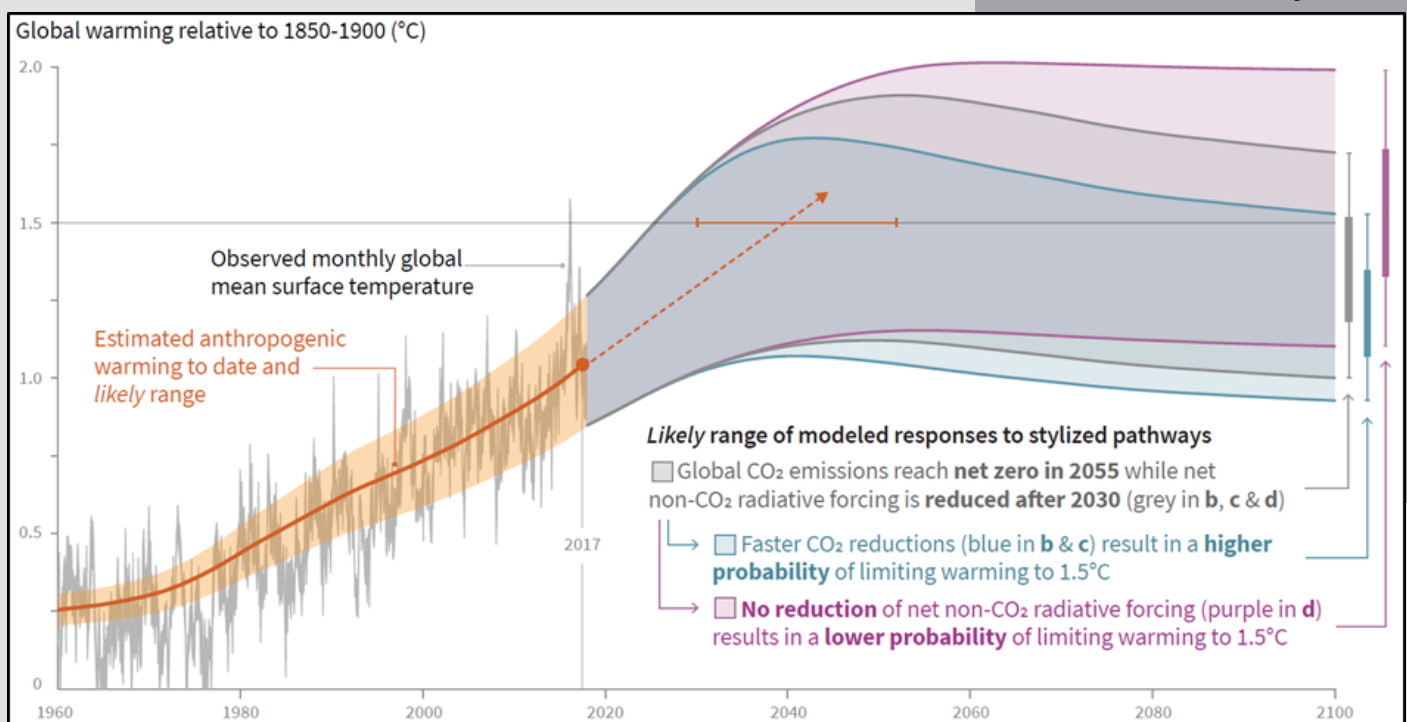
If the required emission reductions can be achieved and global warming can be contained within 1.5°C, climate-related risks for natural and human systems will be higher than at present, but significantly lower than for 2°C global warming.

The difference between a warming of 1.5°C and 2°C globally can imply substantial changes in regional climate. At regional scales, temperature increases in Sub-Saharan Africa are projected to be higher than the global mean temperature increase. Southern Africa is projected to be a climate change hot spot in terms of both hot extremes and drying, i.e. it is amongst the regions where the strongest warming of hot extremes is found and where risks associated with increases in drought frequency and magnitude are substantially larger at 2°C than at 1.5°C. At 1.5°C, a robust signal of precipitation reduction is found over the Limpopo basin and smaller areas of the Zambezi basin, in Zambia, as well as in parts of Western Cape, in South Africa, while an increase is pro-

jected over central and western South Africa as well as in southern Namibia. At 2°C, the region is projected to face robust precipitation decreases of about 10-20% and increases in the length of consecutive dry days with longer dry spells projected over Namibia, Botswana, northern Zimbabwe and southern Zambia. Conversely, the length of consecutive wet days is projected to decrease with robust signals over Western Cape. Projected reductions in stream flow between 5% and 10% in the Zambezi River Basin have been associated with increased evaporation and transpiration rates resulting from rise in temperature with issues on hydroelectric power across the southern African region.

Consequently, impacts on food and water security in Southern Africa would be more severe under 2°C global warming, as crop yields, livestock production and fisheries would be more affected with high confidence.

Global warming to date (orange line/shading) and projected future global warming trajectories for different anthropogenic emission pathways (grey, blue and purple lines/shading) which provide a good change to limit global warming to 1.5°C. All corresponding emission pathways require that global CO<sub>2</sub> emissions start declining rapidly from 2020 onwards and reach net zero by 2055 or earlier. If the current rate of warming continues, global warming will reach 1.5°C likely around 2040. Source: IPCC Special Report on Global Warming of 1.5°C.



When considering economic impacts, the largest reductions in economic growth at 2°C compared to 1.5°C of warming are projected for low- and middle-income countries and regions, i.e. the African continent among others.

The above differences in projected impacts between 1.5°C and 2°C of warming illustrate the importance of an immediate serious and concerted global effort towards meeting the 1.5°C target. Notably, Southern Africa is among the regions that would benefit most from limiting global warming to 1.5°C as opposed to 2°C with regards to drought risk. According to the report, such an effort would require rapid and far-reaching transitions in energy, land, urban, infrastructure and industrial systems in terms of scale. It would imply deep emissions reductions in all sectors, a wide portfolio of mitigation options and a significant upscaling of investments in those options. Importantly, land use and land-use change - key drivers of greenhouse gas emissions in Africa - emerge as a critical feature of virtually all mitigation pathways that seek to limit global warming to 1.5°C, e.g. through afforestation and reforestation.

The urgent need for mitigation action is further illustrated by projections which consider the case of inaction: In recent years, actual anthropogenic emissions have continued to increase and closely followed a high emission pathway (RCP8.5) rather than any of the above emission reduction pathways. The possible consequences of humanity continuing to follow such a high emission (i.e. low mitigation) pathway are highly concerning, in particular for Southern Africa, where temperature increases in the range of 6 degrees Celsius and

severe drying are projected for the end of the century (see figure below).

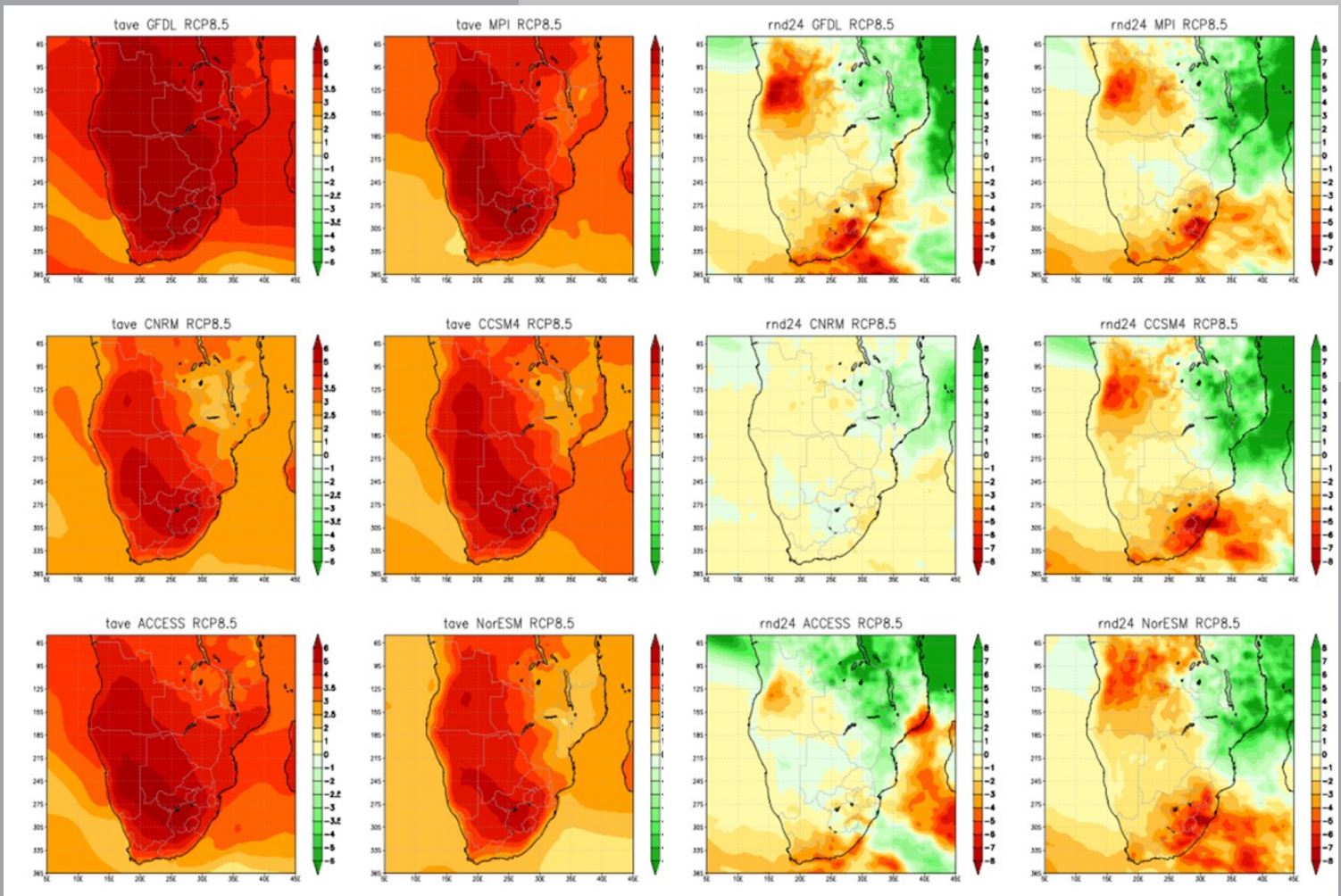
Besides the current special report, the IPCC will finalize two further special reports in 2019: the Special Report on the Ocean and Cryosphere in a Changing Climate and Climate Change and Land, an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. The IPCC's Sixth Assessment Report (AR6) will be finalized in the first half of 2022.

*(bottom left): CSIR-CCAM projected change in annual average temperature (degrees C) over southern Africa for the period 2070-2099 relative to 1971-2000 under low mitigation, suggest that the entire southern African region will become warmer.*

*(bottom right): CSIR-CCAM projected change in annual average rainfall (mm/day) \*10 over southern Africa for the period 2070-2099 relative to 1971-2000 under low mitigation, suggest that almost all of southern Africa will become drier. In the worst case scenario, it appears that South Africa and Angola will be most affected. Depending on the prediction model, Namibia and Zambia are also likely to become drier. The impacts are expected to affect vast agricultural areas and therefore suggest threads to the regional food security.*

*Moreover, in a region with great reliance on annual rains, to fill the numerous water supply dams, the thread of lower annual rainfall, coupled with higher temperatures and consequently aggravated evaporation losses, is likely to effect the water security of the region.*

*Source: Archer, E., Engelbrecht, F., Hänsler, A., Landman, W., Tadross, M. & Helmschrot, J. (2018) Seasonal prediction and regional climate projections for southern Africa In: Climate change and adaptive land management in southern Africa – assessments, changes, challenges, and solutions (ed. by Revermann, R., Krewenka, K.M., Schmiedel, U., Olwoch, J.M., Helmschrot, J. & Jürgens, N.), pp. 14-21, Biodiversity & Ecology, 6, Klaus Hess Publishers, Göttingen & Windhoek. doi:10.7809/b-e.00296*





## The SASSCAL Regional Secretariat

by SASSCAL Communication and Marketing Team

*Over the past months, the SASSCAL family has grown and the envisaged staff structure of the SASSCAL Regional Secretariat is almost fully implemented. The team of the Regional Secretariat has welcomed a number of new colleagues.*



The SASSCAL Regional Secretariat team: (front row, left to right) Nancy Makwatikizo (Finance & Admin), Elvi Aron (Office Assistant) Dr Jane Olwoch (Executive Director), Bianca Mutale (Executive Personal Assistant), Chipso Chirefu-Toto (Director of Administration and Finance), (middle row, left to right) Dr Prof Jörg Helmschrot (Director Science & Technology / Capacity Development), Greater Mukumbira (Communications and Marketing Officer), Mattie Otto (Human Resources Officer), Johanna Mumangeni (Administrative Secretary), (back row, left to right), Kevin Stephanus (Human Capacity Development Coordinator), Charity Angula (Group Admin Assistant), Chenai Marangwanda (Fundraising and Contracts Officer), Nikanor Nakaleke (Logistic Officer) Tracy-Lee van Wyk (Finance & Admin Officer) and Johannes Beck (Environmental Data Specialist) are absent from the photo.

## Upcoming Events

WHAT	WHEN	WHERE	INFO
International Data Week 2018 for Africa and for the World	5th to 8th of November 2018	Gaborone, Botswana	<a href="http://internationaldataweek.org/">http://internationaldataweek.org/</a>
AGSE Conference (Applied Geoinformatics for Society and Environment)	12 to 16 November 2018	Windhoek, Namibia	<a href="http://ocs.applied-geoinformatics.org/">http://ocs.applied-geoinformatics.org/</a>
6th Annual Science Conference, UNAM	14 to 15 November 2018	Windhoek, Namibia	<a href="http://www.unam.edu.na/conferences/6th-annual-science-conference-2018">http://www.unam.edu.na/conferences/6th-annual-science-conference-2018</a>
8th International Conference on Environment and Climate Change	22 to 23 November 2018	Bucharest, Romania	<a href="https://environmentclimate.conferenceseries.com/">https://environmentclimate.conferenceseries.com/</a>
World Summit on Climate Change & Global Warming	26 to 27 November 2018	Tokyo, Japan	<a href="https://www.meetingsint.com/conferences/climatechange">https://www.meetingsint.com/conferences/climatechange</a>
COP 24	3 to 14 December 2018	Katowice, Poland	<a href="http://sdg.iisd.org/events/unfccc-cop-24/">http://sdg.iisd.org/events/unfccc-cop-24/</a>
2018 SFSA	12 to 14 December 2018	Pretoria	<a href="http://www.sfsa.co.za/">http://www.sfsa.co.za/</a>
AGU 2018	10 to 14 December	San Francisco, USA (tbc)	<a href="http://agu2018.org/">http://agu2018.org/</a>
SYMPOSIUM Climate Change Research in Germany: fostering national and international climate change cooperation	18 December 2018	Hamburg, Germany	<a href="https://www.haw-hamburg.de/fileadmin/user_upload/FakLS/07Forschung/FTZ-ALS/Veranstaltungen/_PDF/German-Climate-Change-Symposium.pdf">https://www.haw-hamburg.de/fileadmin/user_upload/FakLS/07Forschung/FTZ-ALS/Veranstaltungen/_PDF/German-Climate-Change-Symposium.pdf</a>





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