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##### Message from the President

With the editorial team, I am pleased once again to invite you to learn about some developments in the world of scientific activity and remote sensing in Africa and around the world in this December 2019 edition of the AARSE Newsletter. This year is fast coming to an end and in hindsight I can say it has probably been one of the busiest and most remarkable...p3

##### Important News: AARSE Membership Subscriptions

The new AARSE website is now active and the online subscription and membership platform is up and ready! As a limited opening special we will not charge any extra fees or penalties for new subscribers or lapsed subscriptions. We accept Visa and MasterCard payments through our PAYGATE portal, but also have a free Online Naira option available plus a direct EFT option...p2

##### An invitation to the AARSE 2020 Conference

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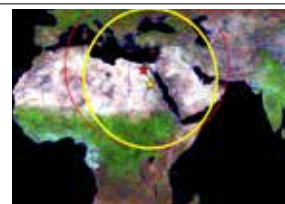
##### Focus on an African Personality in Space Science

Dr Adigun Ade Abiodun has spent a lifetime in service with distinction on numerous boards, commissions and associations to promote the application of space science technologies to the benefit of mankind and especially in Africa...p6



##### Discovery of an African Space Institution

The National Authority for Remote Sensing and Space Sciences (NARSS) is the pioneering Egyptian Institute in the field of remote sensing and space sciences, which established as a Remote Sensing Centre in 1972...p8



##### Flood hazard assessment and the role of citizen science

Citizen science is a form of collaborative research involving the public into scientific projects. There is a long tradition of using volunteers to provide information relevant to science, such as bird count in the United States which has been organised annually since 1900 by the Audubon Society. The authors of this article make a point of the importance of involving citizens...p10

##### Report of the Fifth Meeting of UN-GGIM: Africa

The Fifth UN-GGIM: Africa meeting took place in Kigali, Rwanda from the 18th to 22nd November 2019 as a back-to-back event with the AfricaGIS 2019. The main aim of the meeting was to review progress made on the recommendations...p12



##### Botswana's Okavango Delta under threat

The Okavango Delta in northern Botswana is a mosaic of water paths, floodplains and arid islands. The delta sits in the Okavango river basin, which spans three African countries: Angola, Namibia and Botswana...p13



From the Editor

The concepts of ‘global warming’ and ‘human population growth’ are bandied about a lot these days and cause for concern on many fronts. It is especially disturbing when one realises that one of Africa’s greatest treasures the Okavango Delta in northern Botswana is under threat for these two very reasons which we report on in this issue.

One shudders at the thought that this pristine piece of wetlands teeming with massive herds and large numbers of different African wildlife, bird, fish and plant species might be on the decline, mostly because of human intervention.

The fact that it was inscribed on the UNESCO’s World Heritage List in 2014 testifies it’s importance in the global arena.

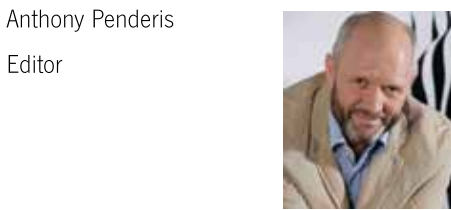
Equally important is the fact that as an iconic tourist destination it generates some 13% of Botswana’s GDP.

All conservationists would be in agreement that this valuable oasis should be jealously guarded and left in a healthy state for our descendants, but where’s the rub? It probably has to do with the fact that the Okavango Delta is surrounded by three countries Namibia, Angola and Botswana. Each one of these countries wants a piece of it and surely has the right to it.

Without pointing fingers to any country in specific it is a well-known fact that a great hydropower scheme is planned in the Okavango River which will regulate waterflow to the Basin. This combined with regional extraction of water for agricultural purposes, combined with decreased rainfall and rising temperatures brought on by global warming

as well as cattle farming encroaching on natural game grazing territory are but part of the negative factors to be taken into account.

Regional co-operation would therefore be important part of the strategy to safeguard the Delta’s future and from our perspective the remote sensing fraternity has the tools to be of great assistance in these endeavours. Unfortunately bureaucratic mangling of any such efforts could easily lead to the ultimate demise of this valuable piece of wetlands, one of Africa’s Seven Natural Wonders.



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The AARSE Newsletter is an official publication of the African Association of Remote Sensing of the Environment. During the year 2019 it will be published at least six times starting February 2019 and thereafter every second month until December 2019.

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Message from the President

Dear Readers

With the editorial team, I am pleased once again to invite you to learn about some developments in the world of scientific activity and remote sensing in Africa and around the world in this December 2019 edition of the AARSE Newsletter.

This year is fast coming to an end and in hindsight I can say is has probably been one of the busiest and most remarkable in the arena of remote sensing and the geosciences. Just about all the countries on this great continent of ours are now either planning to, or are already engaged in applying space technologies and geosciences for the betterment of their citizens. Thousands of Africans have put their minds to make use of the



latest technologies in their quest to improve the living conditions and quality of life of everyone on our continent. Not only has it also been instrumental in creating jobs over a wide spectrum of disciplines but we now also have a new generation in training to take the applications of satellite technologies to a whole new level. The official establishment of the African Space Agency this year tops it all.

Our management team consisting of AARSE Councillors, Africa Representative and other members are of course gearing up for our great biennial event the AARSE 2020 Conference set to take place from the 26th to 30th October 2020 in Kigali City, Rwanda.

The theme of the AARSE 2020 Conference “Space and geospatial technologies for the Africa we want” couldn’t sum up the wish we have for our continent better. It could prove to be a guiding light to where we should focus our energies and talents in the field of

remote sensing technologies and geospatial information sciences for the near future.

We know that the Local Organizing Committee of the [AARSE2020 Conference](#) are very busy preparing our 13th biennial conference to be once again one of the premier forums in Africa for the gathering of leading scholars, policy makers and entrepreneurs in our field. We wish them all the best in their endeavours and confirm that all AARSE Trustees, Councillors and Africa Regional Representatives are more than willing to assist where needed.

In closing I would like to thank all AARSE members for their support over the past year and wish everyone a peaceful holiday season and a blessed New Year.

Good reading.

**Prof. Kamal Labbassi**  
AARSE President - 2018 - 2022

Important News: AARSE Membership Subscriptions

The new AARSE website is now active and the online subscription and membership platform is up and ready! As a limited opening special we will not charge any extra fees or penalties for new subscribers or lapsed subscriptions. We accept Visa and MasterCard payments through our PAYGATE portal, but also have a free Online Naira option available plus a direct EFT option.

If you want to sign up or renew your membership follow this link and choose your option i.e. Student Member, Regular Member, Corporate Member, etc.  
<http://africanremotesensing.org/join-us/>.

Those who have current active subscriptions must please send proof of their last payment to [members@africanremotesensing.org](mailto:members@africanremotesensing.org) so we can confirm it against our bank statements.

If you experience any problems with payments or need additional information regarding membership please send a message to [members@africanremotesensing.org](mailto:members@africanremotesensing.org).

Membership Privileges: Reasons why you should join AARSE

1. You can make a bigger impact on remote sensing in Africa through the Association;
  2. You are joining a dynamic and respectable organization founded in 1994;
  3. Get exposure to many organizations, their publications and potential job opportunities;
  4. Be part of the important voice to address Africa’s remote sensing policies and research;
  5. Attend biennial AARSE Conferences at a reduced rate or even get sponsored;
  6. Get the AARSE-IEEE/GRSS Travel Fellowship Award to attend their conferences;
  - 7 Join our Technical Program Committee and assist with workshops and training activities;
  8. Utilize our partner resources provided on remote sensing, GIS and ICT training;
  9. Join our national or regional members to sit in or collaborate with international fora;
  10. Get subsidized subscription to partner journals;
  - 11 Corporate Members get an 30% reduction on advertising fees in our bimonthly newsletter.
- See more at <http://www.africanremotesensing.org/Why-Join-AARSE>

An invitation to advertise in the February 2020 issue of the AARSE Newsletter

The bimonthly newsletter of the African Association of Remote Sensing of the Environment (AARSE) offers an ideal opportunity to those who wish to expand their African footprint in the arena of Earth Observation Systems and Geo-information Technology. The newsletter is distributed electronically to a select audience of some 5 000 recipients whom include inter alia most African national space agencies, governmental space research institutes, and space technology companies. It is also published on the [AARSE website](#) and the [Facebook Page Space News Africa](#).

**Dimensions:** The A4 newsletter covers a minimum of 16 pages with content normally divided as follows: AARSE News (25%); Africa Space News (50%); International Space News (25%).

**Rates:** Please contact [editor](#) for standard rates and sizes.

**Discounts:** 15% discount on 3 or more placements; 30% discount per placement for AARSE Corporate Members.

**Invoicing:** This will be generated within a few days after a booking has been received.

**Payments:** Per EFT prior to placement on Materials Deadline Day.

**Material Specs:** Advertising material to be supplied in high resolution jpeg of pdf format.

**Layout Service:** AARSE’s editorial team can assist with layout and editing of Advertorials.

**Deadlines for the February 2020 Newsletter:**  
Booking Deadline: Friday, 31 January 2020  
Materials & Payments Deadline: Friday, 7 February 2020  
Publishing Target Date: Friday, 21 February 2020

See samples of previous newsletters [here](#)

See more detail on AARSE Advertising [here](#)

Please contact the editor [here](#) for more information.



Members of AARSE Council (2018 - 2022)

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Mahamadou Keita	Secretary General
Dr. Abel Ramoelo	Treasurer
Dr. Souleye Wade	Communications Manager
Mahamadou Keita	Councillor for West Africa
Prof. Islam Abou El-Magd	Councillor for North Africa
Dr. Yazidhi Bamutaze	Councillor for East Africa
Dr. Aboubakar Mambimba Ndjoungui	Councillor for Central Africa
Dr. Solomon Tesfamicael	Councillor for South Africa
Prof. Olajide Kufoniya	Immediate Past-President

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Prof. Peter Zeil	Trustee



# An invitation to the AARSE 2020 Conference



The 13th biennial international conference of the African Association of Remote Sensing of the Environment (AARSE), will be held in Kigali, Rwanda from 26th to 30th October 2020 at Kigali Conference and Exhibition Village (KCEV). It will be co-hosted by the Ines-Ruhengeri Institute of Applied Sciences.

The **AARSE 2020 Conference** will be a distinguished forum for interaction between international constituencies of Earth observation, geospatial information and spatial data infrastructure administrators, policymakers, scientists, users, politicians, developers, service providers, students and professionals. It will provide an opportunity to advance implementation of the Sustainable Development Goals, the UN-GGIM: Africa programmes including the Integrated Geospatial Information Framework, Agenda 2063 of the African Union, the new African Space Policy and Strategy and the promotion of the use of Earth observation and geospatial data in Africa.

AARSE was formed in 1992 with the aim of increasing the awareness of African governments and institutions, the private sector and society at large, about the empowering and enhancing benefits of developing, applying and utilizing responsibly the products and services of Earth Observation and Geo-information Technologies in Africa. In 2008, AARSE was registered as an international NGO under Section 21 of the South African Companies Act 61 of 1973.

As one of its objectives, AARSE conducts biennial international conferences across Africa. Up to date, AARSE, with the support of local and international organizations, has organized 12 such conferences in different parts of Africa, namely Harare (Zimbabwe) in 1996, Abidjan (Cote D'Ivoire) in 1998, Cape Town (South Africa) in 2000, Abuja (Nigeria) in 2002, Nairobi (Kenya) in 2004, Cairo (Egypt) in 2006, Accra (Ghana) in 2008, Addis Ababa (Ethiopia) in 2010, El Jadida (Morocco) in 2012, Johannesburg (South Africa) in 2014, Kampala (Uganda) in 2016 and Alexandria (Egypt) in 2018.

The AARSE 2020 Conference with “Space and geospatial technologies for the Africa we want” as the main theme will feature exhibitions, technical plenary and parallel sessions on various sub-themes, side-events as well as pre- and post-conference workshops or seminars.

Therefore, companies and agencies offering remote sensing and geospatial products and services, environmental products and services or general information and communication technology products and services (local, regional and international) are invited to the AARSE 2020 Conference. Participants will gain exposure through distributed conference materials and the website and be provided with the opportunity to come into direct contact with their target groups by means of a booth and literature distribution at the booth and in the conference welcome bag. Breaks



*Keynote speaker : Rwanda Minister of Environment Hon. Dr. Mujawamariya Jeanne D'Arc*

will be provided in the Exhibition Hall where exhibitors can demonstrate and show their solutions, products, and services to conference participants.

The keynote speakers that have confirmed so far include inter alia the Rwanda Minister of Environment Hon. Dr. Mujawamariya Jeanne D'Arc and the Director General of RCMRD Dr. Emmanuel Nkurunziza.

Acceptance of selected abstracts and invitations for submission of papers will be communicated by 22nd May 2020. Deadline of submission of abstract is 27th March 2020 at 00:00 GMT, notification of acceptance will be on 22nd May 2020 at 00:00 GMT and deadline for full paper submission for inclusion in the conference will 31st July 2020 at 00:00 GMT.



*Keynote speaker : Dr. Emmanuel Nkurunziza Director General RCMRD*

## Call for abstracts

Interested parties are invited to submit abstracts for the AARSE 2020 Conference and should take the following into account.

### Main Theme

Space and geospatial technologies for the Africa we want.

### Sub-themes

1. Remote sensing for natural resource management
2. EO and geospatial information for sustainable human security
3. Geospatial information for smart city development
4. Space and geospatial technologies for land administration and management
5. Space technology for environmental monitoring and sustainability
6. Space technology in natural hazard and disaster management
7. Integrated geospatial technologies in agriculture and food security
8. Remote sensing climate change adaptation and mitigation strategies
9. African Space Development under the African Space Agency
  - a. Space Capacity building and utilization
  - b. Innovative space technologies
10. Big data analysis and spatial data infrastructures

Abstracts should be submitted in Microsoft Word format before 27th March 2020 at 00:00 GMT. Abstracts have to include enough information on the thematic focus, methodology, contribution to knowledge, policy making, implementation, etc. to be considered for review.

Find the abstract form and submission link [here](#).

# Make the most of Rwanda land of a thousand hills

**Attendees of the AARSE 2020 Conference should make use of the opportunity to visit some of the most popular tourist destinations in Rwanda which can be done within a week as the country is relatively small. Here's a wrap-up of some of the most popular spots.**

## Kigali

Ideally positioned in the centre of Rwanda, Kigali extends across several hills and valleys, with good road links to the rest of the country. The verdant capital city is pleasantly low key yet dynamic and progressive, with just over one million inhabitants.

First-time visitors to the bustling and colourful centre often remark how clean the streets are, a matter of pride across every community throughout the country.

## Volcanoes National Park

Situated in the far northwest of Rwanda, Volcanoes National Park protects the steep slopes of this magnificent mountain range – home of the endangered mountain gorilla and a rich mosaic of montane ecosystems, which embrace evergreen and bamboo forest, open grassland, swamp and heath.

Volcanoes National Park is named after the chain of dormant volcanoes making up the Virunga Massif: Karisimbi – the highest at 4,507m, Bisoke with its verdant crater lake, Sabinyo, Gahinga and Muhabura.

Tracking endangered mountain gorillas through the mysterious intimacy of the rain forest, alive with the calls of 200 species of colorful birds and chattering of the rare golden monkey, is only one of the truly unique experiences in the area.



## Akagera National Park

The relatively warm and low-lying plains of Akagera comprise savannah, woodland, wetland and a dozen lakes. In partnership with African Parks, we aim to transform the National Park into a world-class location to experience a safari.

The largely open expanse is ideal for game viewing, and we are taking steps to ensure the Big Five roam the park in greater numbers over the course of time.

Since 2010 we have cut poaching to an all time low, with the introduction of a helicopter, a canine unit and rhino trackers.

A family of lions from South Africa is settling in well, and breeding successfully, and 18 eastern black rhinos have also been reintroduced.

## Lake Kivu

Part of Africa's Great Rift Valley, Lake Kivu in the west of Rwanda is surrounded by magnificent mountains and has deep emerald green waters covering a surface area of 2,700 sq km. It is Rwanda's largest lake and the sixth largest in Africa.

## Canopy Walkway

Suspended above a ravine in the lush montane rainforest of Nyungwe National Park, the canopy walkway provides an exhilarating perspective on the ancient treetops and wildlife. The 160m long and 70m high suspension bridge is accessible as part of a guided tour along the Igishigishigi trail, or to those hiking the Imbaraga or Umuyove trails.

## Ethnographic Museum

A gift from Belgium's King Badouin in the late 1980s, the Ethnographic Museum now



houses one of Africa's finest ethnographic collections.

Seven galleries display historical, ethnographic, artistic and archaeological artefacts accompanied by visual aides, giving visitors a rich insight into the Rwandan culture.

The exhibits open with geographical and geological displays, moving on to items used in hunting, agriculture, animal husbandry, pottery, weaving and woodwork.

Traditional clothing and architectural methods are also illustrated, as well as the social importance of cattle. Descendants of the royal herd can be seen to this day at the King's Palace in nearby Nyanza.

The final room reveals traditional customs and beliefs, history, culture, poetry and oral tradition and cosmology.

There's also a highly regarded craft centre on site.

Source <https://www.visitrwanda.com/tourism/>  
Images: <https://www.visitrwanda.com/>



# Focus on an African Personality in Space Science and Technology



Dr Adigun Ade Abiodun has spent a lifetime in service with distinction on numerous boards, commissions and associations to promote the application of space science technologies to the benefit of mankind, especially in Africa. He also lectured and published extensively on different aspects of space science and technology and is the author of *Nigeria’s Space Journey – Understanding its Past, Reshaping its Future* (May 2017) and founder of the African Space Foundation.

## Dr Adigun Ade Abiodun

Adigun Ade ABIODUN was born in the Village of Araromi Abiodun, Ogun State Nigeria and was educated in Nigeria, the USA and Canada. He obtained his Ph.D. in 1971, in civil engineering, from the University of Washington, Seattle, USA and was a post-doctoral research fellow at the Canada Centre for Remote Sensing in Ottawa, Canada.

From his academic post at the University of Ife, he was seconded, in 1977, by the Nigerian government to the United Nations Outer Space Affairs Division (OSAD), since renamed Office for Outer Space Affairs (OOSA) and relocated to Vienna, Austria. He was appointed in 1981 as the United Nations Expert on Space Applications and served the organization in that capacity until his retirement in September 1999.

With the goal of building indigenous capacity and capability in space science and technology in the developing countries, he led the United Nations efforts to establish the United Nations affiliated Regional Centres for Space Science and Technology Education in India, Brazil/Mexico, Morocco and Nigeria. He also led the efforts of the United Nations in the development of A Space-Based Cooperative Information Network (COPINE) which linked scientists, educators, professionals and decision makers in Africa.

After his retirement from the United Nations, he served, from March 2000 – June 2003, as the Senior Special Assistant to the President of Nigeria on Space Science and Technology with the hope of having an impact on the space policies and programs

in his own country. Thereafter, he continued with his international engagements, including being a Member of the College of Commissioners of the United Nations Monitoring, Verification and Inspection Commission on Iraq (UNMOVIC) from 2000 -2007.

He served as the Chairman of the United Nations Committee on the Peaceful Uses of Outer Space from June 2004 - June 2006. He also served as one of the 20 global panelists that explored, in June 2006, Humans and Space: The Next Thousand Years, at the Foundation for the Future, Bellevue, State of Washington, USA. He was a Member of the Association of Space Explorers’ (ASE) Panel on the Mitigation of Asteroids Impact from 2007 to 2008 that produced the report: Asteroid Threats: A Call for Global Response.

He also served as a Trustee of the International Society for Photogrammetry and Remote Sensing. He is a member of the Board of Directors, World Space Week Association (WSWA), which he once chaired and also a member of the African Union Space Working Group.

Ade Abiodun has lectured and published extensively on different aspects of space science and technology. He is the author of *Nigeria’s Space Journey – Understanding its Past, Reshaping its Future* (May 2017) and founder of the African Space Foundation.

### Q: What do you occupy yourself with these days?

I am moderately busy with a focus on my continuing contribution to Africa’s space future.

### Q: What are your visions for space technology applications in Africa?

The economic case for investments in a national space program is on the ground – with downstream applications and services that can enhance the wellbeing of the citizenry, lead to many new jobs, and result in overall economic development. Such downstream applications and services, in Africa, call for an educated understanding and effective use of the data acquired by Earth Observation satellites to enhance a nation’s productivity.

Downstream applications of space technology include natural resources management, communications, national security, surveying and mapping, satellite navigation and transportation, precision agriculture, tele-education and tele-health, amongst others. Above all, such an approach to a nation’s initial engagement with space will lead to a better appreciation of what space can do for the nation and in the process dictate the proper direction the nation’s space program should take.

### Q: What have the benefits been so far from space technology applications in Africa (and Nigeria)?

Communication: The biggest space technology application in almost all the African countries, including Nigeria, today, is communication, with related services that include radio, TV, and Internet on which mobile telephone, electronic mail services and on-line banking depend. Programs in tele-education and tele-health/tele-medicine are in different stages of experimentation in several countries.

Education: Rwanda has launched a satellite named Lcyerekezo that brings Internet connectivity to students in rural schools in Rwanda where internet access does not exist. The goal is to bridge the digital divide.

The Pan-African e-Network Project that links Africa’s regional leading universities with 53 centers in 53 countries of the continent. The Pan-African e-Network Project set up by India as a fiber-optic network currently links

Africa’s regional leading universities with 53 centers in 53 countries of the continent. It provides satellite connectivity for tele-medicine and tele-education to participating African countries.

Agriculture: Plans for precision agriculture are on the way in Kenya and Zambia, and are being discussed in Nigeria and are already working well in South Africa.

Africa’s coastlines: Through the International Oceanic Commission (IOC) of UNESCO, African countries with coastlines are being exposed to the use of space technology to manage their coastal and marine resources.

Governance: LocatelT, a Kenya Company is successfully using the power of positioning, navigation and timing (PNT) to enhance governance at the local level in Kenya. In the process, the company is successfully addressing in Kenya what it calls the “Common inconveniences and Malfunctions” within our rural and urban communities.

### Q: What recommendations do you have for the youth, authorities and policy makers?

The Youth: Our youth should know that they are their own ambassadors and the world sees you as you present yourself. Let your integrity be unassailable. As a policy, always associate with those who can inspire or motivate you, so that it enables you bring out the best in you. Above all, strive to make a difference as well as be an agent of change, no matter where you live, serve, or get your education. And, on education, if you find space science and technology a field where you will like to make your mark, you are welcome. It demands self-discipline, hard work and an unalloyed commitment to STEM education, research and practice. You will be happy you did.

Authorities and policy makers: Presently, at the African Union level, efforts are on-going on establishing an African Space Program. The success of this particular program depends on the understanding and appreciation of these leaders of the role of space in development. Opportunity to gain such an understanding should be provided by the African Union Commission to African leaders at various levels of responsibility.

These leaders need a better understanding of the impact of space on the different

aspects of a nation’s economy, an exposure that should demonstrate to them, through examples, how the outer space environment is being used, globally and locally, to improve the human condition, here on Earth. The knowledge gained in such a process should pave the way for an appreciation of what it takes to achieve a meaningful and successful space program including the choice of appropriate priorities to focus on.

The general public and the political leaders, in Africa, equally need an extended and continuing space-awareness program that will enable them to understand and appreciate the role of space in their own daily lives; to increase their awareness of the world they live in and of their own immediate environment, and to understand the role of outer space in that environment, including our inter-connectedness with the rest of humankind and the universe.

### Q: What do you regard as relevant in the domain of peaceful applications of space technologies in Africa?

Here in Africa, we can use space tools to resolve a number of our major problems, including the following:

- Identify sources of conflicts before they develop into major crises;
- Monitor and verify compliance with the terms of agreement arrived at by the combatants;
- Locate buried landmines and subsequently de-mine the entire African landscape;
- Monitor and identify mobile units and terrorists that transfer firearms across national borders;
- Track the movements of refugees fleeing from conflict zones so as to locate them as well as provide them with essential support;
- Arrest the depletion of Africa’s living and non-living resources, both on land (particularly our forests) and in the oceans around the continent;
- Arrest the degradation of Africa’s marine environment and landscape; and
- Resolve pastoral land management problems that are associated with the age-long unregulated pastoral practice of herdsman particularly in Nigeria and other West African countries. Such an effort is critical to the establishment and sustenance of communal peace in each of the affected countries of the sub-region. Cattle herding is a business and needs to be recognized and treated as any other business in the state of origin of the cattle owner/herdsman.



In our series Discovery of an African Space Institution, in this issue, we focus on the National Authority for Remote Sensing and Space Sciences (NARSS) in Egypt.

See more at <http://www.narss.sci.eg/>

## Discovery of an African Space Institution



Text supplied by  
Prof. Islam Abou  
El-Magd; NARSS  
Professor of Remote  
Sensing

The National Authority for Remote Sensing and Space Sciences (NARSS) is the pioneering Egyptian Institute in the field of remote sensing and space sciences, which established as a Remote Sensing Centre in 1972 under the Egyptian Academy of Scientific Research and Technology. Since 1994, this center has been transformed into a governmental research institute under the Ministry of Scientific Research to promote the use of state-of-the-art space technologies, which were to serve the rapid development of the national projects in the country and to introduce high technological capabilities at national and regional scales. Therefore, NARSS has focuses on two domains namely Earth Observation (EO) and Space Technology applications.

In the area of EO applications, NARSS has a core of more than 100 highly qualified academics, scientists and professionals plus a 100+ specialists and junior researchers in different thematic disciplines in eight major scientific divisions, which are:

- Geological and Mineral resources;
- Water resources;
- Agriculture and marine;
- Environment and land-use planning;
- Survey;
- Digital data receiving stations;
- Space strategies technologies; and
- Training.

In the area of Space Technology applications NARSS launched their space program in 1998 which has grown consistently over the last two decades. More than 150 engineers and professionals in space technology are currently working in the space program, which in 2018 was named the Egyptian Space Agency. Some 250 staff consisting of HR, finance and other administration personnel are serving both sectors.

*NARSS keeps a close watch on the effects of erosion in their coastal zone as this image clearly shows how the shoreline has receded from 1965 to 2008.*



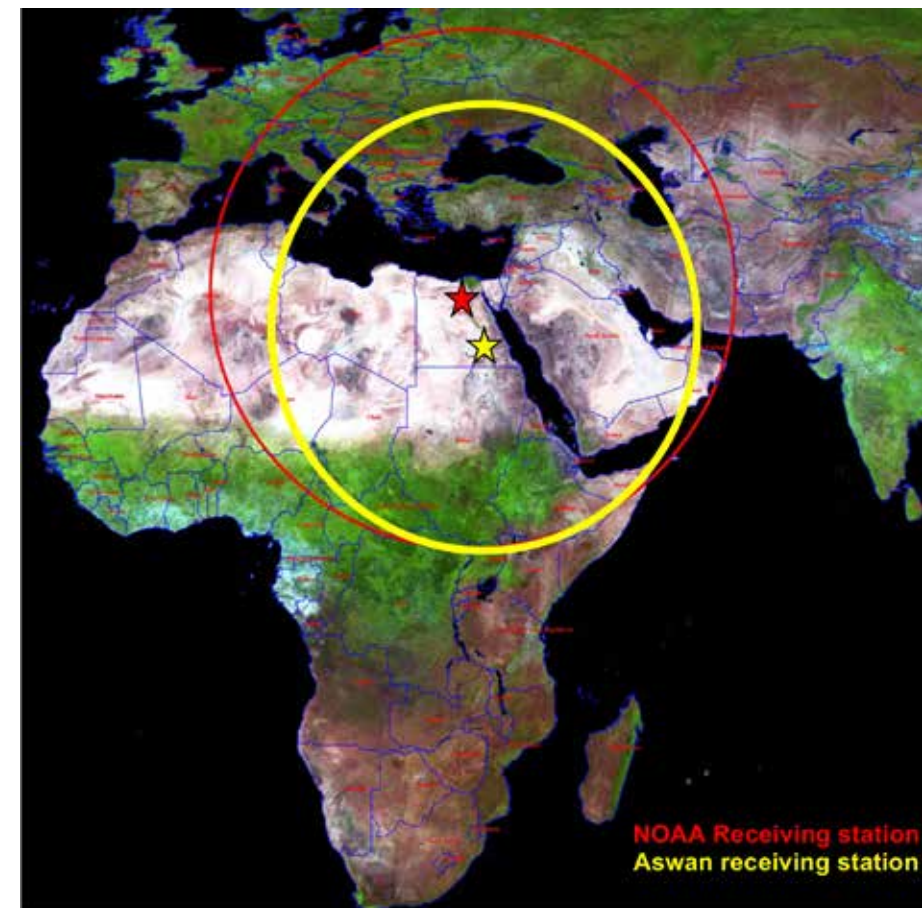
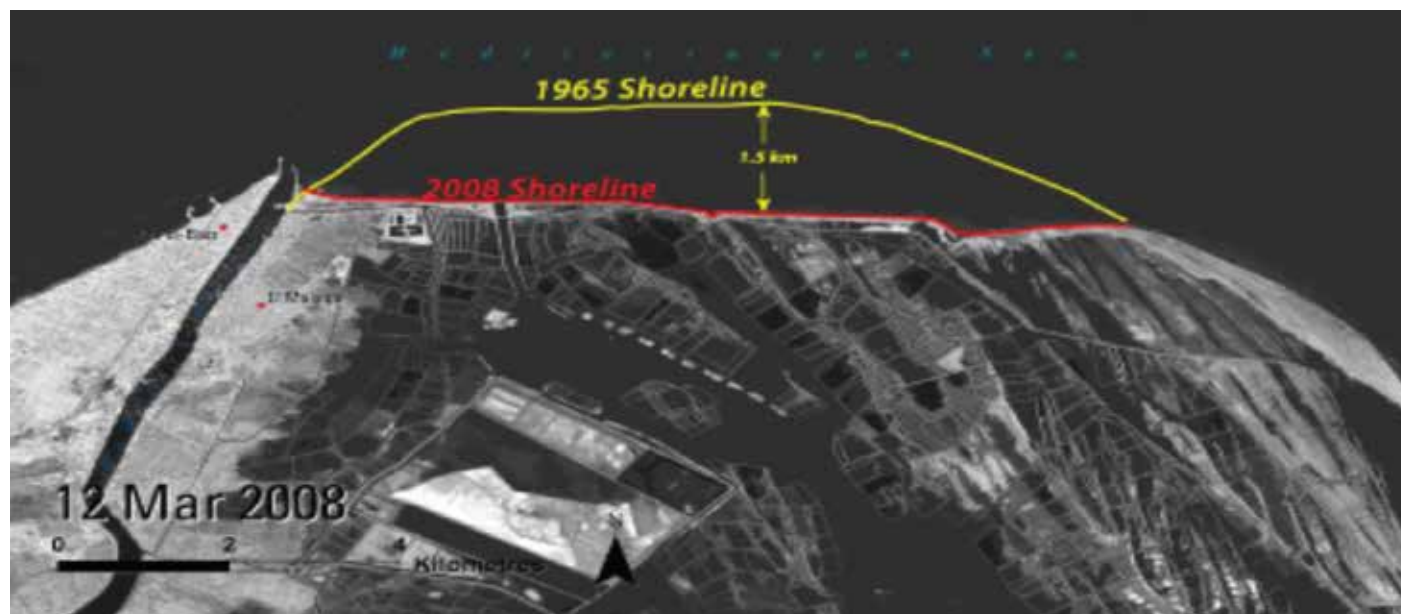
### The NARSS Vision

The vision of NARSS is to be the regional leader in space science and technology, conduct outreach research and developments and innovation for the benefits of the society, and expand space technology and remote sensing applications in the local and regional market.

### NARSS Mission

The mission of NARSS is to focus on the following:

- To pursuit and transfer outreach research results and development in the field of Remote Sensing including a) Optical RS (Low, Medium, High Resolution and Hyperspectral Images), b) Thermal RS, c) Radar RS, and d) LiDAR;



*Position of the two NARSS Receiving Stations which receive data from LandSat, EgyptSat, Spot and other smaller satellites covering southern Europe and northern Africa including Nile Basin countries.*

CODIS and related African Earth Observation and geoinformatics issues. NARSS has shared in the development of the African Space Policy and Strategy and led the successful Egyptian proposal to host the African Space Agency in Egypt which will be launched soon.

### Examples of Applications

#### a) National services

NARSS is generating regular services on national level such as surface temperature, albedo, land use, land cover, etc. This is based on satellite data, modelling and in-situ information for validation.

#### b) Dust storms and suspended matter

Egypt faces regular seasonal dust storms that affect human health particularly children and elderly people who suffer from lung diseases. NARSS provides regular services of the dust storm pathways and the presence of 2.5µm and 10 µm size particulate matter in the air. This is done in partnership with the Egyptian Environmental Affairs Authority (EEAA) and the Ministry of Health to warn the people.

#### c) Food security and Fish farming

Food nutrition and security is a global topical issue. NARSS contributes to the national development plan of monitoring fish farms and aquaculture to promote protein food at low cost and foster socio-economic development in the coastal zone.

#### d) Coastal erosion and climate changes

The northern coastal zone of Egypt is vulnerable to sea level rise and climate changes and experiences large erosion incursions. NARSS therefore submits regular reports on the vulnerable areas and the erosion scale with its impact on the coastal zone.

#### e) Monitoring land subsidence with SAR data

Data sensors are quite important to estimate land subsidence and its impact on infrastructures. SAR data is therefore continually applied to monitor the northern Nile Delta and estimate the land subsidence up to a millimeter level.

- To conduct research and development in essential earth observation services for socio-economic benefits including environmental, agricultural and resource management;
- To improve the local stakeholders in remote sensing applications by training initiatives;
- To pursue, transfer, and provide the most recent outreach research and development and innovation in space technology and to launch EO satellites in different applications.

### Resources

NARSS is equipped with modern facilities including an aircraft with an aerial camera and laser system data acquisition equipment, a digital data processing laboratory (for processing satellite imageries and aircraft digital data), a photographic laboratory (for production of topographic and planimetric maps from aerial, terrestrial and space photographs). It also has a Training Department equipped with up-to-date facilities for remote sensing and Geographic Information Systems (GIS) training i.e. workstations, software and inter/intranet communications.

In the early 1990s NARSS installed a receiving station in Aswan (Southern Egypt), which has a footprint of the Nile Basin countries as well as southern Europe. This station receives inter alia Landsat, SPOT and other data. The availability of the data in this station has enabled to advance NARSS in these technologies and the applications. NARSS then expanded its strategies in space technology and launched its own EO satellites. It therefore launched the first Egyptian EO Satellite EgyptSat-1 that covers part of northern Africa and southern Europe. This was followed by a series of satellites of different weights and scales.

### Receiving stations

NARSS has currently 2 receiving stations namely the NOAA for climate data and a second one in Aswan which receive data from satellites such as LandSat, SPOT and the EgpSsat Series.

### International relations

NARSS has a wide network with 50+ regional and international institutions and organizations for research and project development. It has integrated with African societies and initiatives, has membership of AARSE, EEIS,



# Citizens can make valuable contributions to the management of natural disasters

Citizen science is a form of collaborative research involving the public into scientific projects. There is a long tradition of using volunteers to provide information relevant to science, such as bird count in the United States which has been organised annually since 1900 by the Audubon Society.

The authors of this article make a point of the importance of involving citizens to overcome the shortcomings of remote sensing especially for acquiring ground data in the case of flooding events for instance. The advent of modern technology in the domain of the telecommunications, various web platforms and GPS systems have even made it easier for the general public to play an important role in gathering essential data to assist in the assessment of natural disasters.

*This is the second article in our series of re-publishing well-researched articles in which the tools of remote sensing applicable to the African continent are discussed. All information used on this summary is with permission from the authors.*  
 Editor

## Flood hazard assessment and the role of citizen science

- some abstracts see full article at <https://onlinelibrary.wiley.com/doi/10.1111/jfr3.12519>

Natural phenomena of geological, hydrological, or meteorological related origins cause substantial loss of lives and economic impacts. Between 1997 and 2016, the Emergency Events Database (EM-DAT), an international disaster database maintained by the Centre for Research on the Epidemiology of Disasters (CRED), recorded 5,415 natural disasters worldwide, which claimed 1.02 million lives or almost 51,000 lives on average each. The EM-DAT criteria for a disaster are: 10 or more people killed, 100 or more people reported affected, a declaration of a state of emergency, a call for international assistance. In terms of floods, the EM-DAT recorded, for the same period, amounts to 2,471 flood disasters, which killed 102,665 people, affected 103 million people and caused more than \$470 million of economic losses in the world.

Floods are the prevalent type of disasters across the world which affect Asia and Africa more than other parts in the world. Different mechanisms are responsible for floods, which, in some cases, can also be influenced by human activities. The major types are: river floods, flash floods, storm surges, or groundwater flooding, the latter caused by the rise of water table above surface.

Consequently, there is a need to strengthen the capacities in disaster risk reduction (DRR) and climate change adaptation. In 2015, some 187 countries adopted the Sendai Framework for DRR for the 2015–

2030 period with seven objectives, including understanding disaster risk and improving disaster risk governance.

Defining scenarios, that is, understanding the chain of events that can lead to flooding is not an easy task. Ground measurements, remote sensing analysis, and/or hydrological modelling (in this paper, hydrological modelling includes both hydrological and hydraulic modelling) are the current tools applied in flood hazard assessment. As such, these classical tools present some specific constraints related to their intrinsic characteristics or the context of use. For ground data acquired by instruments, spatial and temporal coverage is a challenge, both in terms of maintenance of a representative network and data processing costs. Remote sensing can compensate for some of these aspects. However, other issues, such as weather conditions influencing the quality of satellite images, potential lack of images covering the areas of interest, or the processing algorithms used in data mining can impede the spatial coverage of areas of interest. As for hydrological modelling, it is very sensitive to the quality and quantity of input data influencing the accuracy of the result.

In order to overcome these shortcomings, several attempts have been made in recent years to apply citizen science in the field of hydrology or flood assessment, either during flood response or in near real-time mapping of flooding events. Citizen science is a

form of collaborative research involving the public into scientific projects. Participatory approaches to research and governance are not new. There is a long tradition of using volunteers to provide information relevant to science, such as bird count in the United States, which has been organised annually since 1900 by the Audubon Society.

What is new and different is the widespread diffusion of Internet-based networks and social media. This innovation has been rendered possible thanks to broadband Internet, web 2.0 as “an architecture of participation” using technologies for data management, display, exchange, and interconnection of multiple users, the development of mobile communication, the progress in global positioning in particular with portable GPS receivers, which are inexpensive and often implemented with camera in smartphones or tablets together with other useful sensors. Therefore, data shared by citizens through social media (Twitter, Flickr, and Instagram) have become a useful source of information. Consequently, nowadays, citizen scientist engagement can take different ways, depending on the level of implication, from simple data acquisition to analytical task.

### Potential role of citizens in flood scenario

Identifying processes that can lead to the occurrence of damage during floods is usually based on field visits in the study

area. However, field visits are, in most cases, achieved by specialists coming from outside the concerned zone and some shortcomings can occur, both technical and temporal and spatial knowledge of the area influencing the understanding of the situation. Integrating the onsite knowledge of citizens living in the surroundings can be key to assess the potential floods or understand past events better. On the one hand, they have a better knowledge about their environment and current issues such as dike maintenance, jams, bridge crossing, which might aggravate the phenomenon. On the other hand, they are eyewitnesses during events, and therefore a valuable source of information on chain of events, which can be retrieved either by calling their explicit memory through interviews, focus groups or participatory-mapping or through their photos and high-quality video recordings of flood events, which are in most cases with geolocation and time.

### Potential contribution in basic data acquisition

The acquisition of basic data for flood hazard assessment faces problems related to spatial and temporal coverage, precision, and update as well as cost for instrumental network installation and maintenance.

Involvement of citizens can help to reduce these issues. For example, when dealing with rainfall data, rain gauges can be installed using low cost material and citizens can collect, manage, and share measurements across website or social media in order to fill spatial and temporal hydrological network data gaps. Social media also can be used to monitor rainfall in real time. For example, Twitter messages combined with official rainfall data to detect rainfall patterns in real time. Other promising crowdsourcing approaches for assessing areal rainfall patterns use optical sensors or wipers of moving cars or the attenuation of radio signals by rain between transmitters and receivers of cellular communication networks. Regarding discharge, as it is often missed or poorly recorded by ground-based gauges, citizen science can be a valuable option to obtain discharge data that can then be used for model calibration. Indeed, the rise of sharing various types of information on extreme events like floods through social media, in particular videos, provide raw data that can be postprocessed using image analysis techniques like large-scale particle image velocimetry to derive stream discharges.

### Flood hazard assessment and the role of citizen science

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**Abstract**  
 Flood hazard assessment is at the core of flood risk management. In order to develop an efficient flood hazard assessment, it is of primary importance to have a well-defined flood scenario encompassing all processes that could occur during an event. Understanding and assessing these processes requires meteorological, topographical and land-use data as well as historical observations. Nowadays, flood delineation is based upon hydrological and hydraulic modelling, ground data collection, and remote sensing. Despite the advantages of these tools, they also present some specific limitations, either intrinsic to the approaches or linked with constraints of the local context. With the rapid advancement of web 2.0 technologies (e.g., Flickr and Wikimapia) and the increase of the use of participatory research, citizen science has the potential to provide valuable and complementary information at all levels of flood risk management and in particular for flood hazard assessment. After reviewing the capabilities and limitations of the current tools used in flood hazard assessment, this paper demonstrates the role that citizen science can play in providing key information on factors leading to flooding and on flood hazard parameters.  
 See full article at: <https://onlinelibrary.wiley.com/doi/10.1111/jfr3.12519>



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# Report of the Fifth Meeting of UN-GGIM: Africa

The Fifth UN-GGIM: Africa Meeting took place in Kigali, Rwanda from the 18th to 22nd November 2019 as a back-to-back event with the AfricaGIS 2019. The main aim of the meeting was to review progress made on the recommendations and actions of the previous meetings of UN-GGIM: Africa.

The meeting therefore acted as a platform for reviewing and sharing knowledge and best practices on the development of geospatial information for the continent; raising awareness on the benefits to be derived through the utilization of geospatial information for its sustainable development; looking at policies, measures and steps that African countries could take in order to ensure a successful implementation of the UN-GGIM initiative in the region; promoting networking among institutions and practitioners in geoinformation; and generate synergy at national level to facilitate its management as well as ensuring linkages with partners and other regional subcommittees.

Issues addressed during the meeting included and were not limited to: fostering Member States participation in the UN-GGIM at national, regional and global levels; alignment

and prioritization of the region's work program with that at the global level and also in line with the United Nations global agenda; Africa's participation in the work of various Expert and Working Groups; updates, issues and opportunities; defining the means of implementation of the activities outlined in the Action Plan of UN-GGIM: Africa and their mainstreaming in the Integrated Geospatial Information Framework (IGIF); engaging the Working Groups to effectively develop activities on the ground; making effective the governance and functional mechanisms for the management of UN-GGIM: Africa with a clear strategy for resources mobilization and the integration of statistics and geospatial information.

The meeting of the Regional Committee featured plenary sessions and workshops. The structure of the sessions allowed a mix of parliamentary oversight work (the sessions on procedural issues) and exchange of ideas and learning (the sessions on partners and industry and other special topics).

The meeting was attended by over 80 participants, including delegates from 27 African countries, as well as observers from international organizations including the Economic Commission for Africa (ECA),

the African Union Commission (AUC), the UN-GGIM Secretariat, academia, industry organizations and the private sector.

Also in attendance were resource persons and observers from Airbus Defense and Space, the African Regional Institute for Geospatial Information Science and Technology (AFRIGIST); the African Association of Remote Sensing of the Environment (AARSE); the Centre d'Étude de Recherche et de Production en Information pour l'Environnement et le Développement Durable (CERPINEDD, Burkina Faso); the Global Monitoring for Environment and Security in Africa (GMES & Africa); EIS-Africa; ESRI; Geoscience Australia; GTOPIC Sarl (Morocco); Natural Resources (Canada); PAASCO Corporation (Japan); the United Nations Statistics Divisions (UNSD); The United Nations Population Funds (UNFPA); and the University of Rwanda.

A goodwill message was delivered on behalf of the President of AARSE by Prof. Olajide Kufoniyi. Further information about the UN-GGIM: Africa and its fifth meeting can be obtained from the UN-GGIM: Africa Secretariat, in care Mr. Andre Nonguierma at [nonguierma@un.org](mailto:nonguierma@un.org) or [anonguierma@uneca.org](mailto:anonguierma@uneca.org).

Report by Prof. Olajide Kufoniyi

Some AARSE members who attended the 5th meeting of UN-GGIM: Africa in Kigali, Rwanda from 18 - 22 November 2019 were from left dr. Abel Ramoelo (AARSE Treasurer), Mahamadou Keita (AARSE Councillor for West Africa), a staff member of the Convention Centre, prof. Olajide Kufoniyi (AARSE Immediate past-president) and Germain Muvunyi (AARSE2020 LOC member).



# Botswana's Okavango Delta under threat

The Okavango Delta in northern Botswana is a mosaic of water paths, floodplains and arid islands. The delta sits in the Okavango river basin, which spans three African countries: Angola, Namibia and Botswana.

Because it's an oasis, in a semi-arid area, it hosts a rich array of plants and attracts a huge variety of wildlife. As a unique ecosystem, in 2014 it was placed on UNESCO's World Heritage list and it is an iconic tourist destination, which generates 13% of Botswana's GDP.

But it's a fragile natural area. It's controlled by deformations of the Earth's crust over a long time (thousands to millions of years) and by annual water flows and evaporation. The size of the flooded delta from year to year varies between 3,500km<sup>2</sup> and 9,000km<sup>2</sup> because of weather fluctuations which control its water supply.

Any change to the processes that form the delta will have an impact on the wildlife and local economic activities. Its grassy floodplains are food for grazing animals in the dry period. Losses of this habitat will cause declines in wildlife and livestock. It's therefore imperative to understand what creates and sustains the delta for the future management of the system.

We have conducted several studies that cover how the Okavango basin was formed and the way dissolved chemicals are withdrawn from the delta's surface. The dynamic history of the Okavango Delta's waterways and floodplains tells us that the interplay between geology, water and plants makes the delta resilient, but vulnerable.

Some imminent changes are expected that are of concern. One is higher temperatures, which will boost evaporation and transpiration. Another is the pumping of water for irrigation in Namibia. Both of these changes will reduce the water needed to sustain the delta's floodplains.



The Okavango Delta flanked by three countries Angola, Nambia and Botswana is an unique ecosystem which in 2014 was placed on UNESCO's World Heritage list and as an iconic tourist destination generates 13% of Botswana's GDP.

The Okavango Delta is continually being shaped by complex interactions of natural processes. If something happens to change the balance of these processes, it could destabilise the system.

The most important dynamic for the delta is inflowing water. The two main rivers in Angola, the Cubango and the Cuito, join to form the Okavango river, which feeds the delta. These two rivers are hydrologically quite different. The Cubango, to the west, first flows rapidly down steep, narrow paths characterised by incised valleys, rapids, waterfalls and valley swamps. The Cuito, to the east, with shallow valleys and large floodplains, gets its water from groundwater seepage.

The manipulation of these rivers – in the form of dams and irrigation – will affect the water flow and change its annual distribution. Both of these form part of current and future development planning in Angola and Namibia.

A decrease in water supply will affect the vegetation growth and the wildlife. An increase in water would inundate the islands and

could dissolve the salts at the centre of them, releasing chemical elements that would change the water quality.

In addition to declines in water flow induced by global warming and human activities, ground deformation is also happening because of shifting continental plates. This could change the paths of the water flowing by changing the ground slopes. Measurements of ground deformation with Global Positioning Systems displays reveal very slight changes in local slopes that can modify the paths of the water flowing to the delta.

To sustain the Okavango Delta it's imperative that management integrate all the components of the system. All governments are involved and must integrate scientific expertise, from upstream catchment to the downstream Delta.

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Source <https://theconversation.com/>  
Images: [botswanatourism.co.bw](http://botswanatourism.co.bw)





# International Space Conference Diary

We have assembled the details of the most important international and African conferences in the arena of remote sensing, satellites and geotechnical applications scheduled for the next few months. Please visit their individual websites for more information on submission criteria for papers, deadlines for registration, etc.



## Space to Connect 2020

January 14, 2020  
Queen Elizabeth II Centre, London, UK  
<https://www.eventbrite.com>

Space to Connect a day-long event now in its third year, presents the opportunity to meet new companies, organisations, and individuals who are innovating at the forefront of the Space Applications sector, as well as others new to this journey. There will be thematic sessions from wider industry with presentations and information updates throughout the day, including best practice sessions to help turn space application ideas into reality. Entry is free.



## SmallSat Symposium

February 3 - 6, 2020  
Silicon Valley, San Francisco, USA  
<https://2019.smallsatshow.com>

Hosted by Satnews Publishers since 1983, it focuses on new technologies and the business environment shaping the implementation of smallsat constellations, launchers, the challenges facing the smallsat developer and actors and the benefits of these advanced technologies to our world. More than 100 speakers will attend.



## Satellite 2020

March 9 - 12, 2020  
Washington DC, USA  
<https://2020.satshow.com>

Touted as the most important annual satellite and space event in the world the Conference and Exhibition features more than 15,000 attendees from 100+ countries, along with the latest products and newest innovations from more than 340 companies and 300 experts speaking at the event. A wide spectrum of satellite application possibilities are covered.



## Laureates Aviation Week

March 12, 2020  
Washington DC, USA  
<https://laureates.aviationweek.com/>

Aviation Week Network's 63rd Annual Laureate Awards recognize the extraordinary achievements of individuals and teams in the industry whose accomplishments embody the spirit of exploration, innovation and vision that inspire others to strive for progress, change and leadership in aviation and aerospace. The Laureates categories are Business Aviation, Commercial Aviation, Space and Defence.



## Space Tech Expo

May 18 - 20, 2020  
Long Beach, California, USA  
<http://www.spacetechempo.com/>

A showcase of space-related technologies and innovations from systems and sub-systems, components, testing and manufacturing technologies for civil, military and commercial space applications. For the first time in its history, the conference will be free for all attendees. More than 250 exhibitors are expected. A masterclass on manufacturing and implementing industry 4.0 technologies will be offered.



## Satellite & Space Missions 2020

July 15 - 16, 2020  
London, UK  
<https://satellite.insightconferences.com>

The conference is an amalgamation of research professionals from universities, space centres, research labs, spacecraft industries and other space research organizations creating an atmosphere conducive for information exchange between academia and industries. It provides a platform for researcher scholars, scientists and academicians to share while business sectors can promote their products.

## 71st International Astronautical Congress

October 16 - 20, 2020  
Dubai, UAE  
<http://iac2020.org/>

The IAC draws in over 4000 participants from around the world each year. This includes top space agency officials and delegations, astronauts, industry stalwarts, scientists and engineers, researchers and academics, young professionals and students, the press and members of the public. It provides an opportunity for participating organisations to share their innovations in the space sector.



## AARSE 2020

October 26 - 30, 2020  
Kigali, Rwanda  
[www.aarse2020.org](http://www.aarse2020.org)

The 13th AARSE International Conference AARSE 2020 will be held in Kigali, Rwanda, organized by the Institut d'Enseignement Supérieur de Ruhengeri (Ines-Ruhengeri). It is the premier forum in Africa for research on remote sensing technologies and geospatial information science gathering leading scholars from the remote sensing and related communities to discuss challenges in space and geospatial technologies.



## GIS Congress 2020

November 23 - 24, 2020  
Barcelona, Spain  
<https://gis-remotesensing.environmental-conferences.org>

This 6th International Conference with the theme "Application of GIS and Remote Sensing Techniques" will feature valuable keynote presentations, talks, poster presentations and exhibitions. Researchers, scientists, academic fellows, exhibitors and contributors in the field of Remote Sensing, Geographic Information Systems (GIS), Techniques and Technology, Renewable Energy Sources, etc are invited.

# Space Snippets

The space industry is not called "burgeoning" for nothing. There is so much happening that it's difficult to keep track of all the new developments all the time. In this issue we bring you once again a number of the most interesting announcements we could find.

## India aims for next Moon landing attempt by November 2020

In July 2019, India attempted to be the first country to land a robotic mission at the moon's South Pole. The lunar mission, named "Chandrayaan-2", failed when engineers lost contact with the "Vikram" lander in September.

India is gearing up to launch its third lunar mission "Chandrayaan-3" by November 2020 as the Indian Space Research Organisation (ISRO) has started preparing for the mission, media reports said last month.

The new mission will include only a lander and a rover, as the Chandrayaan-2 orbiter was planted successfully into the moon's orbit during the mission and is functioning well. However, its lander lost contact with the ground station while on its descent to soft-land on the moon.

The ISRO has started forming multiple committees comprising an overall panel and three sub-committees and has conducted four high-level meetings since October, reported The Times of India.

"The overview committee met to review the configuration of the Chandrayaan-3. It also looked into the recommendations of sub-committees on propulsion, sensors, overall engineering, navigation and guidance," the report stated.

"Work is in full flow," said a scientist. "So far, the ISRO has looked at ten specific aspects of the mission, including landing site selection, absolute navigation and local navigation."



*Lift-off for Chandrayaan-2 on 22 July 2019. The mission is to be repeated with Chandrayaan-3 in November 2020. Image ISRO*

Another scientist said the top priority is "strengthening the legs of the Vikram Lander" so that landing can be made possible even at high velocity. Reportedly, the ISRO will build a new lander and rover.

Meanwhile, US space agency the National Aeronautics and Space Administration (NASA), through the images taken by its moon orbiter's latest flyby, made attempts to locate the Indian lunar lander, however, so far, no traces were found.

A successful soft landing on the moon surface would have made India only the fourth country - after the United States, Russia and China - to achieve the feat.

Chandrayaan-1, launched in October 2008, was India's first lunar probe. The task, regarded as the country's most ambitious space mission, aimed to place an orbiter in the moon's orbit and deliberately crash-land a probe on the lunar surface. The Chandrayaan-1 spacecraft entered the moon's orbit - making India one of the countries to taste success in its maiden attempt.

Source  
Staff Writers/New Delhi (Sputnik) Nov 15, 2019  
<http://www.moondaily.com/>

*Part of the enthusiastic crowd who watched the launch of Chandrayaan 2 on 22 July 2019 at the Sriharikota Space Centre in India. Image ISRO*

## Mars water ice map released

NASA recently released a map of water ice just under the Martian surface in its exploration of finding an ideal landing site for a future human mission to the planet. Liquid water does not last long in Mars' thin atmosphere. Landing near water trapped as ice just under the surface will make it possible for future missions to use water especially to produce hydrogen and oxygen for rocket fuel.

NASA's Mars Reconnaissance Orbiter (MRO) and Mars Odyssey Orbiter have provided the data of where to find water ice trapped under the Martian surface.

The Space Launch System (SLS) that will be used for the planned Moon landing in the early 2020s will be tested for suitability to send astronauts further on to Mars but the health implications of the 36 month round trip are still being evaluated by scientists.

Source  
<https://www.extremetech.com>

## Did sugar arrive from outer space?

Did our favourite sweeteners originally arrive from outer space? Researchers from Tohoku University and Hokkaido University, the Japan Agency for Earth Science and Technology and NASA Goddard Space Flight Center seem to think so. In a paper published in the PNAS journal on December 3, 2019 they came to the conclusion that "evidence of extraterrestrial ribose and other bio-essential sugars in primitive meteorites. Meteorites were carriers of prebiotic organic molecules to the early Earth; thus, the detection of extraterrestrial sugars in meteorites implies the possibility that extraterrestrial sugars may have contributed to forming functional biopolymers like RNA". Ribose is an essential building block of RNA a catalyst for primitive life on earth.

Source  
<https://www.pnas.org/>



## Arrokoth new name for most distant object

The most distant world ever explored in our solar system 4 billion miles away finally has an official name: Arrokoth. That means “sky” in the language of the Native American Powhatan people, NASA said last month.

NASA's New Horizons spacecraft flew past the snowman-shaped Arrokoth on New Year's Day, 3 years after exploring Pluto. At the time, this small icy world 1 billion miles (1.6 billion kilometers) beyond Pluto was nicknamed Ultima Thule given its vast distance from us.

“The name ‘Arrokoth’ reflects the inspiration of looking to the skies,” lead scientist Alan Stern of Southwest Research Institute said in a statement, “and wondering about the stars and worlds beyond our own.”

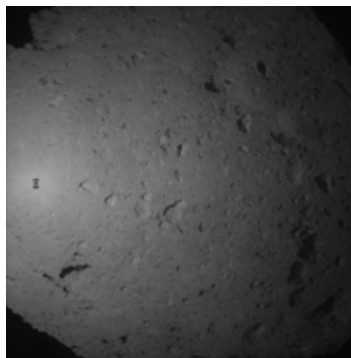
The name was picked because of the Powhatan's ties to the Chesapeake Bay region. New Horizons is operated from Johns Hopkins University's Applied Physics Lab in Laurel, Maryland.

The Hubble Space Telescope — which discovered Arrokoth in 2014 — has its science operations in Baltimore. The New Horizons team got consent for the name from Powhatan tribal elders and representatives, according to NASA. The International Astronomical Union and its Minor Planet Center approved the choice.

Source  
<https://www.newsgram.com>



*The two-lobed Arrokoth floating in the Kuiper Belt at the edge of our solar system 4 billion miles away is about 21 miles (33 km) lengthwise in size. Image NASA*



## Hayabusa heads home with asteroid samples

Japan's Hayabusa 2 spacecraft is heading home after orbiting the asteroid Ryugu 180 million miles from Earth for 18 months, blasted a hole in it with explosive to turn up dust, landed, collected samples and then took off on a year journey back to Earth. The artificial crater created on the asteroid in April 2019 blasted up the material needed to be collected by the spacecraft.

Hayabusa 2 will not land again on Earth but zoom past in December 2020 headed for another mission while it drops off a capsule which is due to land in the Australian Outback. Hayabusa 2 was launched in 2014 and arrived at Ryugu in the mid-2018s.

The mission is to help scientists study the origin of the universe.

Source  
[geekwire.com/JAXA](http://geekwire.com/JAXA)

*Photo: A close-up of Ryugu asteroid about half a mile wide. The shadow of Hayabusa 2 flying by can be seen mid-left. Image JAXA*

## China's aims to have own space station by 2022

China plans to complete the construction of a space station and have it put into operation around 2022, said Zhou Jianping, the chief designer of China's manned space program, at a forum held in south China's Guangdong Province.

The space station is designed to weigh 100 tonnes and accommodate three astronauts, which could be enlarged if needed, according to Zhou.

“The main goal of the construction of the space station is to enable China to become a country independently mastering the technology for long-term manned flight in near-Earth space, and having the capability to carry out long-term manned scientific experiments in near-Earth space and comprehensive development and utilization of space resources,” said Zhou at the 4th China Summit Forum on Human Factors Engineering, which was held at Sun Yat-sen University.

The space station will be built as China's main platform for space science research, with the purposes of mastering the technologies in constructing and operating large space facilities, the technologies that guarantee life and health of astronauts who often fly in orbit, and the construction of a national space lab, according to Zhou.

Source  
<http://spacedaily.com>

## Solar Probe reveals startling new Sun details

NASA's Parker Solar Probe has revealed some startling new details about our Sun in the two closest flybys ever by a satellite at a distance of 15 million miles from the Sun, closer than the planet Mercury. This has helped scientists to rewrite the models they use to understand and predict the space weather around our planet to study our Sun up closely. This information will be vital to protecting astronauts and technology in space. The sample graph at the top shows a burst of high-energy protons, each with more than 1 million electron-volts of energy on the 321st day of the year as observed by the Parker Solar Probe.

Credit: NASA/Princeton

