African Association of Remote Sensing of the Environment
Association Africaine de Télédétection de l’Environnement

NEWSLETTER • OCTOBER 2019

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From the Editor

Creeping desertification of the African continent is a measurable phenomenon where the accelerated pace of land degradation in fragile and semiarid areas caused by greater numbers of people and livestock is quite obvious. This has been labelled as a monstrous challenge facing Africa in the domain of human health, food security and economic activity. If this is not enough bad news we are now also receiving warnings from Earth Observation specialists that Africa might soon face a serious water crisis which should climate projections for global warming realize.

A study recently published by four academics which we report on in this issue warns that some 85% of Africa’s population will experience a dangerous water scarcity by 2050 should the population double as expected and climate change causes water resources to decrease by as little as 10%. What’s more is that these researchers did not only take data such as rainfall, rivers and lakes into account, but also underground aquifers some of which are currently not being accessed due to technical and economic limitations. The deteriorating water quality of Africa’s big freshwater lakes is another trend in this tale with global warming adding again the big bad wolf. Researchers have now provided evidence that higher global temperatures cause accelerated growth of toxic producing phytoplankton which can make water unsuitable for human consumption. Lign of Africa’s biggest lakes are already included in this list of 72 vulnerable freshwater lakes worldwide. At least is what the solution? Clearly it has to with planning and for this we need information. Fortunately that information is flowing down in a steady stream from Earth observation vehicles, mostly satellites, while the sophistication and quality level of this is improving by the day.

Africa, however, is a big continent with a total of 55 countries. It will necessitate coordinated efforts as non-one can go it alone. What happens to your neighbour will happen to you. Food and water are a human being’s absolute first necessity. The need, such as education and medical care only becomes visible if this first need is looked after. Africans have created several instruments to coordinate their efforts with the African Union loading the pack. Their Agenda 2063 is for transforming Africa into a future global powerhouse, we trust with enough food and water. At least we have been forewarned. There are no excuses.

Anthony Penders
Editor

Important News: AARSE Membership Subscriptions

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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/online/

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

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 on or collaborate with international fora;
10. Get subsidized subscription to four partner journals;
11. Corporate Members get an 80% reduction on advertising fees in our bimonthly newsletter.

See more at http://www.africanremotesensing.org/Why-Join-AARSE

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 October 2019 edition of the AARSE Newsletter.

Firstly, may I extend my congratulations to the team who were responsible for the upgrade of our website. It is indeed a pleasure to view and read the new look content. We are also proud to be able to present it in our main working languages French and English, with even Dutch and Portuguese as extra options. I trust this will entice members old and new to subscribe to our organization.

This past month’s meeting of AARSE Councilors and Trustees was indeed an uplifting and inspirational experience judged by the inputs we received from our various representatives in over Africa. Their concerns about and dedication to all the challenges we face on this continent of ours certainly shine through. I thank them all for their unsung contributions.

Next year of course is our biennial milestone event the AARSE 2020 Conference which is set to take place from the 26th to 30th October 2020 in Kigali City, Rwanda. The 13th conference since the first one in 1996 in Harare, will once again be the premier forums in Africa for the gathering of leading scholars, policy makers and entrepreneurs from the remote sensing and related communities to share their views on remote sensing technologies and geospatial information science. Our best wishes to the Local Organising Committee of the UNESCO-Ruengen Institute for all the hard work that lies ahead.

Next month I have the pleasure to attend the UN/GI/GM in Africa where I intend to meet some of my AARSE councilors as well. Please feel free to look me up should you also attend the meeting.

Good reading,

Prof. Kamal Labbass
AARSE President
2018 - 2022

AARSE Editorial Contact Details

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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AARSE Newsletter on the African Continent

An invitation to advertise in the December 2019 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 who include alien and most African national space agencies, governmental space research institutes, and space technology companies. It is also published on the AARSE website http://africanremotesensing.org/current-newsletters/ and the Facebook Page Space News Africa https://www.facebook.com/space_news_za/.

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

Rates: Please contact the editor for standard rates and sizes at newsletter@africanremotesensing.org

Discounts: 15% discount on all 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 Spec.: 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 Advertisements.

Deadlines for the December 2019 Newsletter:

Booking Deadline: Friday 22 November 2019
Materials & Payments Deadline: Friday 29 November 2019
Publishing Deadline: Friday 6 December 2019

See samples of previous newsletters here: http://africanremotesensing.org/current-newsletters/
See more detail on AARSE Advertising here: http://africanremotesensing.org/advertising-options/
Please contact the editor here: newsletter@africanremotesensing.org for more information.

Members of AARSE Council (2018 - 2022)

Prof. Kamal Labbassi
President
Secretary General

Communications

Councillor for West Africa
Councillor for North Africa
Councillor for East Africa
Councillor for Central Africa
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Message from the Chairman: AARSE2020 Conference

Dear AARSE family,

Warm greetings from the Land of a Thousand Hills. On behalf of the Local Organizing Committee, I would like to deeply express my appreciation to the African Association of Remote Sensing of the Environment (AARSE) for giving us the opportunity to organize their AARSE2020 Conference in Kigali, Rwanda. With a record number of participants expected next year, we are delighted to see that this 13th biennial conference is becoming larger and more substantial.

I am equally excited about the record number of sessions, and wide array of ideas that scholars and practitioners will bring to our fold. The exciting academic, scientific research and policy brief conference under the theme “Space and Geospatial Technologies for the Africa We Want” will be a major event in the African and international community of Earth observation and geospatial information science in 2020. This conference will be organized by AARSE and the Institut d’Enseignement Supérieur de Ruhenzi (INES-Ruhenzi).

The main objective of AARSE2020 is to bring together scholars and professionals from the African and international community to present their latest achievements, discuss challenges and share experiences in space and geospatial technologies. The conference program will feature keynote speeches delivered by leading policy makers, scholars, technical sessions with reports of the latest research outcomes, discussion sessions on operational topics such as capacity building, Space Data Infrastructure (SDI), space policy, programmes and projects, as well as commercial exhibitions showing the latest products and services in remote sensing and geospatial information technologies.

Rwanda is a country where remote sensing is used to manage natural resources, register land and increase people’s tenure security, reduce land and natural resources conflicts, and increase environment protection. This conference will therefore be a good platform to share experiences and learn from our sister African countries but also to share Rwanda’s experiences. We therefore call upon everybody and all familiar with remote sensing not to miss this great event.

The hosting of this conference would not have been possible without tremendous work and efforts of Mr. Jossmi Potal and his team. I am therefore very grateful and thank the conference organizing committee members for the work they are continuing to do for the successful organization of the AARSE2020 Conference.

I call upon all well-wishers, remote sensing organizations and families to lend us a hand through moral and financial support for the better preparation of this conference.

All in all, I would like to thank you, the participants for enriching this biennial event by your presence, it is a tradition with AARSE conferences. I hope you will enjoy the content, renew old friendships, make new friends, get new ideas, and above all, have a good time in Rwanda.

Dr. Fr. Fabian Hagenimana
Vice-Chancellor INES-Ruhenzi
Chair of the AARSE2020 Conference

Focus on an African Personality in Space Science and Technology

Dr. Tidiane Ouattara

An unmistakable leader who sets the pace for innovation in space policies, science and technology on the African continent but is one way to describe the dynamic Dr. Tidiane Ouattara our choice for this month’s African Personality in Space Science and Technology. In this article we cover only some of his background and achievements thus far - Editor.
AFRICA SPACE NEWS

In our series Discovery of an African Space Institution, in this issue, we focus on the Center for Ecological Monitoring (CSE) based in Dakar, Senegal. See more at www.cse.sn.

Discovery of an African Space Institution

CSE interventions cover diverse areas including support for land-use planning, urban, coastal, bushfires, rangeland, forest and sustainable land management, agricultural yield production, environmental and social assessment, mapping and monitoring of basic social services, climate change vulnerability assessment, monitoring of SDG indicators, etc.

Professively, CSE interventions have extended beyond Senegal’s borders, covering many countries in Africa. In this regard, CSE is among the pioneers and leader organizations in Africa in the promotion and use of geomatics and geo-spatial data for environmental monitoring. CSE is a member of several regional or international initiatives, including the Executive Committee of GLO (Group of Earth Observations) and ABEGEO in Senegal, CSE is a founding member of

the inter-institutional Group in charge of conducting Senegal’s National Geomatics Plan.

Certified ISO 9001 in 2015, CSE was accredited as an implementing entity by the Adaptation Fund in 2010 and by the Green Climate Fund in 2015. As such, CSE activities are expanding, covering now the administration of financial resources and overseeing the implementation of large-scale projects and programs on adaptation and/or mitigation of climate change impacts.


Current CSE flagship activities at the regional level include:

• The project West African Coastal Zone Observation Mission (Mission d’Observation du littoral Ouest Africain, WOCOA) entrusted by UEMOA to CSE in 2011.
• The project Monitoring coastal risks and soft solutions in Benin, Togo and Senegal financed by the French Global Environment Facility (FGF).
• The project WACA (West Africa Coastal Areas Resilience Investment Project) under the World Bank, to work on the establishment of a Regional Observatory on coastal risks in West Africa.
• Under the Global Monitoring for Environment and Security and Africa (GMEAS & Africa), CSE coordinates one of the 13 funded consortia to implement a project on wetlands management in 8 West African countries.
• CSE is active in the establishment of the Regional Observatory of the Program for Biodiversity and Management of Protected Areas (BIOPAMA) funded by the European Union and jointly implemented by IUCN and the European Commission.
• Under the SERVIR-West Africa, funded by USAID and NASA in collaboration with the Agymad Center and partner institutions, CSE is in charge of the development of a satellite data-based service for monitoring episodic wetland bodies in the Ferkessédougou Region (Senegal).
• CSE is an active partner of the NEPAD Land Governance Program, providing support for the promotion of geospatial data and information for strengthening good land governance in Africa.

As outlined above, CSE has positioned itself as a well-established resource center and continues to maintain its institutional position by providing high-quality products and services while diversifying its partners and networks. In this regard, CSE as active member of the OECD community is contributing to increase the wide use of Earth observations for strategic decision-making and its impact at all levels of decision-making.

Regional Workshop in Abidjan, November 08, 2018. Launching the West African Coastal Area Project (WACA).
Africa could face a dangerous water scarcity crisis by 2050

“By 2050, assuming no change in available water resources, we project that 19 countries in Africa will face water scarcity and another nine countries will be water-stressed. However, if climate change were to cause Africa’s water resources to decrease by 10%, which is within the range of several climate projections for some African countries, then approximately 85% of Africa’s population will experience a dangerous water scarcity situation.”

This is the disturbing conclusion by the four authors Emad Hassanzadeh, Anouchka Tatloul, Yang Hong and Benier Moore III, who have co-written a published peer-reviewed article with the title “Assessment of Physical Water Scarcity in Africa Using GRACEL and TRMM Satellite Data” recently published in the MPS Open Access Journal for Remote Sensing.

This is the first in a series of forthcoming well-researched articles in which the tools of remote sensing applicable to the African continent are demonstrated. All information used on this page is with permission from the authors.


We use satellites to measure water scarcity

Article by Aedonover Tatloul; Published in The Conversation Africa Edition

Today, more than 700 million people around the world drink water from unsafe or untreated sources, such as wells, springs and surface water.

Abdul of these people live in sub-Saharan Africa, in fact, in more than 65 African countries, fewer than 20% of the people have access to safe drinking water.

Climate change is likely to worsen the situation by making water less available in some locations and by changing the amounts and timing when water is available.

Determining whether a region has sufficient water to satisfy the needs of people who live there is a complicated and imperfect process. Our research team has developed a new approach to measure water scarcity by using satellites hundreds of miles up in space.

How to measure water scarcity

To estimate water scarcity, hydrologists, the people who study the science of water, build what they call a “water budget.”

They estimate all of the water entering the country—from rivers, rainfall, groundwater and man-made sources—and then subtract all of the water exiting the country. This produces an estimate of the available water in the country or region.

By dividing the available water by the population in the region, hydrologists can tell whether there is sufficient water to meet people’s needs.

Generally, in the U.S., the average person uses between 300 and 400 liters of water per day for basic needs—like drinking, sanitation, bathing and food preparation.

Across Africa, a country is said to experience a serious water scarcity problem if it has less than 100,000 liters of water per person per year, to meet both their daily needs and agricultural needs.

This water budget process works if accurate data are available for each source of water. However, in many developing regions, such as Africa, the data required to calculate water budgets are not available.

Yet Africa critically needs accurate information on its water scarcity status. As the second most populated continent, Africa is projected to have a population of 2.4 billion by 2050, approximately double the current estimated population. Such rapid population growth will exert considerable stress on the continent’s available water resources, worsening the already acute water scarcity situation.

So, assessing the potentially available water resources is essential for the future.

Look to the skies

Our study takes a new approach to assessing water scarcity.

We used data from two satellite systems. The first is called the Tropical Rainfall Measuring Mission, operated since 1997 by the U.S. and Japan. The Tropical Rainfall Measuring Mission uses several instruments—including a precipitation radar, microwave imager, visible and infrared scanner—to estimate rainfall. Getting the rainfall estimate right is critical, because this is the most important source of water for human use.

The second type of satellite data is from the Gravity Recovery and Climate Experiment, a joint mission between the U.S. and Germany. First launched in 2002, the Gravity Recovery and Climate Experiment is a twin satellite mission that uses the changes in the Earth’s gravitational fields to infer changes in the global water resources, from the Earth’s surface to the deepest groundwater aquifers.

We combined data from these two satellite systems to calculate the monthly potential available water for all sources of water for each country in Africa from 2002 to 2016. By dividing this value by the population in each country, we obtained a new measurement of available water storage per capita. Because the Gravity Recovery and Climate Experiment satellite data also estimates water in deep groundwater aquifers, which may not be accessible due to technical or economic limitations, we refer to this new estimate as potential available water storage.

Measuring water faster

We compared our results with the data currently used by the United Nations Food and Agricultural Organization. Their method relies on conventional water budgets accounting to estimate the total renewable water resources in a country. It then classifies each country into one of four categories: water-sufficient, vulnerable, water-stressed or water scarce.

Of the 48 African countries studied, our method classified 26 in the same category as the U.N.’s method; 12 were classified as having more water than indicated and 10 as less.

These differences are not surprising. Our estimate includes also water in aquifers deep underground that the U.N.’s method does not account for. Their method likely underestimates the total available water for countries that have substantial groundwater reserves.

On the other hand, the accuracy of our method can be affected by the size of a country. Countries smaller than the Gravity Recovery and Climate Experiment footprint, approximately 200,000 square kilometer blocks that the Gravity Recovery and Climate Experiment estimates can be made with confidence — are much more likely to be in error.

By 2050, assuming no change in available water resources, we project that 19 countries in Africa will face water scarcity and another nine countries will be water-stressed. However, if climate change were to cause Africa’s water resources to decrease by 10%, which is within the range of several climate projections for some African countries, then approximately 85% of Africa’s population will experience a dangerous water scarcity situation.

In general, we think that our method has several advantages over existing methods. It circumvents many of the limitations related to data unavailability and reliability in Africa. The data are more temporally and spatially continuous, as well as easier for researchers to access. As a result, estimates of water scarcity can be carried out more rigorously for the entire continent.

Satellites will gather new data in the coming years. We plan to take advantage of such data improvements as they become available to refine our method in terms of accuracy and water scarcity assessment at the sub-country level, not only in Africa but globally.
“Assessment of Physical Water Scarcity in Africa Using GRACE and TRMM Satellite Data”

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Received: 15 February 2019; Accepted: 11 April 2019; Published: 13 April 2019 in the MSP J. Open Access Journal for Remote Sensing

Abstract

The critical role of water in enabling or constraining human wellbeing and socio-economic activities has led to an interest in quantifying and establishing the status of water (in)sufficiency over space and time. Falkenmark introduced the first widely accepted measure of water status, the Water Scarcity Index (WSI), which expressed the status of the availability of water resources in terms of vulnerability, stress, and scarcity.

Since then, many indicators have been introduced, but nearly all adopt the same basic formulation; water status is a function of “available” water resource—by the demand or use. However, the accurate assessment of “available” water is difficult, especially in data-scarce regions, such as Africa.

In this paper, therefore, we introduce a satellite-based Potential Available Water Storage indicator, PAWS. The method integrates GRACE (Gravity Recovery and Climate Experiment) and TRMM (Tropical Rainfall Measuring Mission) to estimate Total Water Storage (TWS) measurements with the tropical rainfall measurements to derive the Potential Available Water Storage (PAWS). PAWS divided by the population density to derive the PAWS per capita. Following the Falkenmark thresholds, 54% of countries are classified in the same water vulnerability status as the AQUASTAT Inlanden Renewable Water Resources (IRWR) method. Of the remaining countries, PAWS index leads to one or two categories shifted (left or right) of water status.

The PAWS index shows that 14% (~160 million people) of Africa’s population currently live under water scarcity status. With respect to future projections, PAWS index suggests that a 10% decrease in future water resources would affect ~37% of Africa’s 2050 population (~500 million people), and 57% for 2050 projections (~1.4 billion people).

The proposed approach largely overcomes the constraints related to the data needed to rapidly and robustly estimate available water resources by incorporating all stocks of water within the country, as well as underscores the recent water storage dynamics. However, the estimates obtained concern potential available water resources, which may not be utilizable for practical, economic, and technological issues. See full article at https://www.mdpi.com/2074-2922/11/6/904

E.O Clinic open to assist African Development Professionals

The European Space Agency (ESA) has launched the E.O. Clinic (Earth Observations Clinic), a rapid-response mechanism for small-scale and temporary uses of satellite EO information in support of a wide range of projects and activities specific to international development. The E.O. Clinic consists of one-call technically pre-qualified teams of E.O. service providers and satellite remote sensing experts in ESA member states. They are ready to help development projects with a comprehensive range of skills and experience in terms of geospatial product generation and analysis, based on a large variety of satellite data.

African development professionals can also tap into this resource as the European Commission and the African Union Commission are pursuing E.O. activities in a number of areas of common interest and cooperate in the framework of the GMES and Africa partnership.

The E.O. Clinic is open for assistance for the next two years with support teams ready to meet the short delivery timescales often required by the development sector, targeting a maximum of 3 months from request to solution.

This activity is also an opportunity to explore more innovative E.O. products related to developing or improving methodologies for deriving socio-economic and environmental parameters and indicators. This is an ideal support tool for users in managing land, marine and environmental resources in Africa.

Development professionals requiring support can send them a message to register and also fill in the standard questionnaire on their website listed below.

Sources: https://eoscociety.esa.int/EO-clinic/
**AFRICA SPACE NEWS**

**African lakes threatened by global warming?**

Eight African lakes are listed as under threat of intense lake phytoplankton blooms in a worldwide study of 72 freshwater lakes conducted by Jeff Ho and Anna Michalka from the Department of Global Ecology, Carnegie Institution for Science, Stanford, and NASA’s Nina Pahlevan and published by Nature this month.

Freshwater phytoplankton blooms in high intensity and can produce toxins with harmful effects on drinking water quality, aquatic food production, recreation and tourism.

The researchers used three decades of high-resolution Landsat imagery to investigate the long-term trends in intense summer-time near-surface blooms and found that 68% of these lakes reveal an exacerbation globally of bloom conditions. Only 8% of the lakes studied showed a decrease in bloom conditions.

The research paper states that the reasons for this increase is unclear at this stage as “temporal trends do not track consistently with temperature, precipitation, fertilizer-use trends, or other previously hypothesized drivers.”

The authors do however suggest that there is a correlation with climate warming and suggests that water-quality management in the affected areas should be stepped up to find the interaction between climate change and local hydrological conditions.

The eight African lakes listed in the study with the countries adjoining them are Catonga Bassa (Mozambique, Zimbabwe, Kenya), Lake Zambie, Zambia; Lake Victoria (Uganda, Tanzania, Kenya); Lake Victoria (Uganda, Kenya); Lake Turkana (Kenya, Ethiopia); Lake Edward (Zaire, Uganda); and Lake Albert (Uganda, Zaire).

![Satellite image of Lake Victoria, which is adjoined by three countries Tanzania, Uganda and Kenya. Global warming may affect water quality, food production, tourism and recreation dependent on this water source.](https://maperry.com)

**GMES and Africa Forum Report**

The first GMES and Africa Forum Report held in Lubumbashi, DRC from 19 to 23 November 2018 is now available online. The Forum brought together more than 400 Earth Observation service and data providers, grass-roots level users, decision makers, academics, the private sector, research institutions from Africa and all over the world with the aim of addressing how to unlock the potential of Earth Observation services for the socioeconomic transformation for the achievement of the “Africa We Want”, as articulated in the Agenda 2063.

See download link at [https://au.int/en/documents](https://au.int/en/documents)

**INTERNATIONAL SPACE NEWS**

**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.

**DCSG 2019**

November 4 - 5, 2019
Arlington, Virginia, USA
https://2019.dcs5g.com

Launched in 2017 at the request of the community and after two successful years, the organizers are forging ahead to find objective, problem-solving discussions tackling 5G infrastructure. The aim of the event is to outline realistic steps for organizations to build and implement next generation wireless services.

**CyberSat Summit**

November 7 - 8, 2019
Reston, Virginia, USA
https://2019.cybersatsummit.com

CyberSat Summit is the only satellite security event in the world that fuses satellite, space, cyber and government to discuss cyber-specific threats that could impact satellites and ground infrastructure. How does the mind of a hacker work that targets your infrastructure? This Summit is preceded by a Classified Day on 6 November.

**African Space Leadership Congress**

December 2 - 4, 2019
Addis Ababa, Ethiopia
http://asl.casa.gov.et

The 8th African Space Leadership Congress (ASLC) will be hosted by the Ethiopian Space Science and Technology Institute. The main focus areas are: assessment of space programs in Africa; space research and development; space policy, strategy, implementation and participation of youth and women in aerospace.

**GRSG 30th Anniversary & AGM**

December 10 - 12, 2019
Frascati, Italy
http://www.grsg.org.uk/agm30th

“Exploring New Frontiers” is the title of 2019 special event marking both the GRSG (Geospatial Remote Sensing Group) 30th anniversary and Annual Conference. Looking at past and future geometric remote sensing, especially focusing on both large-area and aerial / InSAR applications. Tickets to the event can be purchased online.

**CIEDG 2019**

December 16 - 19, 2019
New Delhi, India
http://ciedg19.com

This first International Conference on the Exploitation of Geospatial Data (CIEDG) will be hosted by the Algerian Space Agency Centre for Space Technology. It will bring together experts in the field of Earth observation, geomatics and space geodesy to discuss interoperability, satellite and ground infrastructure, and the impact of new technologies on national applications. For more information, see [http://ciedg19.com](http://ciedg19.com)

**SMallsat Symposium**

February 3 - 6, 2020
Silicon Valley, San Francisco, USA
https://2020.smalssatnow.com

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

**AARSE 2020**

October 26 - 30, 2020
Kigali, Rwanda
www.aarse2020.org

The 18th AARSE International Conference, AARSE 2020 will be held in Kigali, Rwanda, organized by the Institut d’Enseignement Supérieur de Ruhaungutana (IRES-Ruhaungutana). 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.
INTERNATIONAL SPACE NEWS

Space Snippets

The space industry is not called “boulevard” 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.

Juno avoids Jupiter’s sun-starved shadow

NASP’s Juno mission to Jupiter successfully executed a 10.5-hour propulsive maneuver on September 30 and ending on October 1 to achieve a mission-ending safe mode by Jupiter on the spacecraft during its next close flyby of the planet on Nov. 3, 2019. Using the spacecraft’s narrow-angle thrusters, the propulsive maneuver lasted five times longer than any previous use of that system. It changed Juno’s orbital velocity by 126 mph (203 kph) and consumed about 150 pounds (73 kilograms) of fuel. Without this maneuver, Juno would have spent 12 hours in transit across Jupiter’s shadow — more than enough time to drain the spacecraft’s batteries. Without power, and with spacecraft temperatures plummeting, Juno would likely succumb to the cold and be unable to awaken upon exit.

Juno has been navigating deep space since 2011. It entered an initial 53-day orbit around Jupiter on July 4, 2016. Originally, the mission planned to reduce the size of its orbit a few months later to decrease the period between science flybys of the gas giant to every 14 days. But the project team recommended to NASA to forge the main engine burn due to concerns about the spacecraft’s fuel delivery system. Juno’s 53-day orbit provides all the science as originally planned; it just takes longer to do so. The spacecraft’s longer life at Jupiter is what led to the need to avoid the gas giant’s shadow.

Boeing’s Starliner prototype capsule getting its finishing touches before testing is about to begin.

Source: https://www.wired.com/

Starliner

NASA confirmed target dates on which Boeing will conduct test on its Starliner space capsule program destined to take humans into outer space. The target dates announced are:

- Boeing Pad Abort Test: Nov. 4, 2019 at White Sands Missile Range in New Mexico;
- Boeing Orbital Flight Test: Dec. 17, 2019 at Space Launch Complex 41 on Cape Canaveral Air Force Station in Florida.

NASA’s Commercial Crew Program has worked with several American aerospace industry companies to facilitate the development of U.S. human spaceflight systems since 2010. The goal is to have safe, reliable, and cost-effective access to and from the International Space Station and foster commercial access to other potential low-Earth orbit destinations.

NASA selected Boeing and SpaceX in September 2014 to transport crew to the International Space Station from the United States. These integrated spacecraft, rockets and associated systems will carry up to four astronauts on NASA missions, maintaining a space station crew of seven to maximize time dedicated to scientific research on the orbiting laboratory.

Source: https://blogs.nasa.gov/commercialcrew/2019/10/

First Arab astronaut visits ISS

Hazza Al Mansouri, the UAE’s first astronaut, returned to the country on Saturday, 12 October 2019 after becoming the first Arab to visit the International Space Station (ISS) for a stay of 37 days orbiting Earth 128 times and covering a distance of 4.9 million kilometers in space.

Al Mansouri, 35, and his backup UAE astronaut Sultan Al Neyadi, 38, as well as a team from the Mohammed Bin Rashid Space Centre were received at a heroes’ welcome at Abu Dhabi’s Al Bateen airport by Abu Dhabi Crown Prince Sheikh Mohammed bin Zayed Al Nahyan.

Some of the milestones of Hazza’s eight days in space were inter alia:

- Hazza and his colleagues, Russian commander Oleg Skripochka and NASA astronaut Jessica Meir, blasted off to space at 5.57 pm on September 25. It was a flawless docking and the crew, including Hazza entered the ISS at 12.12 am, UAE time.
- On his second day in space, Hazza made his first live space-to-Earth voice call with Dubai speaking to His Highness Sheikh Mohammed Bin Rashid Al Maktoum, UAE Vice President and Prime Minister and Ruler of Dubai.
- He conducted a total of four live video sessions and one radio call with students, along with one radio call with heads of UAE media organisations.
- Hazza conducted a total of 16 experiments, with many focusing the effects of zero gravity on his body. These experiments include Stand U1, Odontology, motor control, time perception in microgravity, Fluidics (fluid dynamics in space), and DNA-Age.
- While in space, Hazza took advantage of the opportunity to take snaps of the Earth. He shared photos of the UAE, specifically the coastlines of Abu Dhabi and Dubai, a photo of Mecca, and other parts of the world.

While on board, the former military pilot donned Emirati dress and treated crew members to local snacks. He returned to Earth on October 3.

Source: https://www.mnn.com/transportation/food-policy/2019/10/11

Rosalind Franklin Mars Rover almost ready for launch

The European Space Agency’s ExoMars Rover now named after Rosalind Franklin the English chemist and DNA pioneer is nearing completion in readiness for its launch from Earth in July 2020 and eventual touchdown on Mars in March 2021.

According to a media release by the UK Space Agency the “Rosalind Franklin, which is the result of cutting edge work from UK, European and Canadian scientists and engineers will now be shipped from the Airbus factory in Stevenage, Hertfordshire to Toulouse in France for testing. To ensure it survives its launch from Earth next summer and the freezing conditions of Mars when it lands on the planet in March 2021.”

Dr Graham Turner, CEO of the UK Space Agency, said: “This is a major milestone for this exciting project which demonstrates the UK’s leading capabilities in robotics, space engineering and exploration, as well as our ongoing commitment to the European Space Agency. As we hand the rover over to Rosalind for final testing, we should celebrate the huge efforts of the hundreds of people across the UK who have been involved in the design and build of the rover and its instruments, which will look for life on Mars.”

ExoMars is an ESA program in cooperation with Russia’s Space Agency Roscosmos with contribution of NASA. The UK Space Agency is the second largest European contributor to the ESA-Roscosmos ExoMars mission, having invested £23.8 million in the mission and £4 million on the instruments. This, in addition to successful negotiations with ESA, secured key mission contracts for the UK space sector.

Once landed and operational on Mars the seven-tonne rover will embark on a seven-month journey in search of past and present life on the red planet.


Rosalind Franklin after which the ESA rover for Mars is named, is distinctly speaking the discoverer of the double helix DNA and should have received the Nobel Prize for her work in this field. Unfortunately she died of ovarian cancer in 1958 at the age of 37 and Nobel Prizes are not awarded posthumously.

The honour eventually went to James Watson, Francis Crick and Maurice Wilkins who shared the 1962 Nobel Prize in Physiology or Medicine for their discoveries concerning the molecular structure of DNA. Watson did however suggest that she deserved at least the Nobel Prize in Chemistry for her work in this field.

Image: https://www.history.com
Stratolaunch gets a new owner

On April 13, 2019 Stratolaunch successfully completed the first flight as the world’s largest all-composite aircraft. With a dual fuselage design and wingspan greater than the length of an American football field, the Stratolaunch aircraft took flight at 0658 PDT from the Mojave Air and Space Port in California. During the test flight it achieved a maximum speed of 189 miles per hour and flew for 2.5 hours over the Mojave Desert at altitudes up to 17,000 feet. As part of the initial flight, the pilots evaluated aircraft performance and handling qualities before landing successfully back at the Mojave Air and Space Port.

Source: www.stratolaunch.com

This doubled fuselage gigantic aircraft with a wingspan longer than a football field (385 feet/117 metres) intended as a mobile launch platform for small satellites has acquired a new owner possibly a group of investors after its founder Paul Allen died last year.

The latest statement issued on their website stratolaunch.com states the following: "Stratolaunch LLC has transitioned ownership and is continuing regular operations. Our near-term launch vehicle development strategy focuses on providing customizable, reusable, and affordable rocket-powered testbed vehicles and associated flight services. As we continue on our mission, Stratolaunch will bring the carrier aircraft test and operations program fully in-house. We thank Vulcan Inc and Scaled Composites for turning an ambitious idea into a flight-proven aircraft."

Although no details are yet available about the new owners they also advertised 10 new jobs on LinkedIn for the project which include test pilot, safety engineer and quality manager.

The late Paul Allen who founded Microsoft with Bill Gates unveiled the Stratolaunch project in 2011 as an air-launch platform for satellites. His motivations were inter alia that it would give customers more flexibility to escape bad weather conditions which often hamper launches and also make it possible to launch closer to the equator with access to more orbital inclinations. In Allen’s opinion popular launch sites such as Vandenberg Air Force Base in California and Kennedy Space Centre in Florida were also getting crowded.

Stratolaunch made its first successful test flight on April 13 this year form the Mojave Air and Space Port in California.

CAPSTONE

The Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment (CAPSTONE) is expected to be the first spacecraft to operate in a near rectilinear halo orbit around the Moon. NASA has awarded a $13.7 million contract to Advanced Space of Boulder, Colorado, to develop and operate a CubeSat mission to the same lunar orbit targeted for Gateway - an orbiting outpost which astronauts will visit before descending to the surface of the Moon in a landing system as part of NASA’s Artemis program.

In this unique orbit, the CubeSat will rotate together with the Moon as it orbits Earth and will pass as close as 1,000 miles and as far as 43,500 miles from the lunar surface. The 12-unit CubeSat is about the size of a small microwave oven. Onboard is a communications system capable of determining how far CAPSTONE is from NASA’s Lunar Reconnaissance Orbiter and how fast the distance between the two spacecraft is changing. The inter-spacecraft information will be used to demonstrate software for autonomous navigation, allowing future missions to determine their location without having to rely exclusively on tracking from Earth. The launch could be as early as December 2020.