



## President's Welcome

Dear IAF Community,

It is with great pleasure that I welcome you to this December edition of the IAF Newsletter.

This edition focuses on exciting news from the IAC 2018 which took place in Bremen, Germany last October. I would like to thank each and every participant for helping to make IAC 2018 a record-breaking congress. Over 6.500 delegates from 81 countries took part in the Congress and helped to make it a hugely memorable event that brought together the global space community in a spirit of cooperation.

In the following pages, you will also find news on the upcoming IAF Global Conference on Space for Emerging Countries, GLEC 2019 to take place in Marrakech, Morocco on 24-26 April 2019, the IAF Membership, the next IAF Spring Meetings and much more.

We are also delighted to share exciting news about the upcoming IAC 2019 to take place on 21-25 October 2019 in Washington, D.C. to properly celebrate the 50<sup>th</sup> anniversary of the Apollo Moon landing and the 70<sup>th</sup> anniversary of the IAC.

I look forward to working with all of you in 2019 for a year full of celebrations and new beginnings.

All the best.

Dr. Jean-Yves Le Gall  
IAF President



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*Driss El Hadani, Director, The Royal Centre for Remote Sensing (CRTS), Morocco*

*Jean-Pascal Le Franc, Director of Planning, International Relations and Quality, Centre National d'Études Spatiales (CNES), France*

*Val Munsami, CEO, South African National Space Agency (SANSA), South Africa*

#### IMPORTANT DATES:

- **Deadline for nominations:**
  - IAF World Space Award – 23 December 2018
  - Allan D. Emil Memorial Award – 23 December 2018
  - IAF Hall of Fame – 23 December 2019
  - Frank J. Malina Astronautics Medal – 23 December 2019
  - IAF Emerging Space Leaders Grant Programme – 8 February 2019
  - IAF Young Space Leaders Recognition Programme – 8 February 2019
  - IAF Excellence in Industry Award – 11 February 2019
  - IAF Excellence in "3G" Diversity Award" – 13 February 2019
- Closing of IAC2019 Call for Plenaries – 25 January 2019
- Closing of IAC Call for Special Session Proposals – 18 February 2019
- Closing of IAC Call for Abstracts – 28 February 2019
- Closing of IAF Abstract Mentor Programme – 19 February 2019
- Closing of GNF Session Proposals – June 2019
- Spring Meetings 2019: 26 – 28 March 2019
- GLEC 2019: 24 – 26 April 2019
- IAC 2019: 21 – 25 October 2019
- IAC 2020: 28 September – 2 October 2020
- Call for Hosting IAC 2022 - Deadline for notices of intent to submit proposals: 22 February 2019



Platinum



Gold



Silver



Bronze



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*The changing season is a herald of new beginnings, wishing you and your loved ones a season full of joy and cheer.*

*We're so glad to have you as a member of our IAF Community and look forward to seeing you in 2019.*

## IAF President, Jean-Yves Le Gall awarded with the International Von Karman Wings Award

On November 8, 2018 Dr. Jean-Yves Le Gall, President of the International Astronautical Federation (IAF) and President of the Centre National d'Études Spatiales (CNES), the French Space Agency, received the prestigious International Von Karman Wings Award presented by the Aerospace Historical Society and Graduate Aerospace Laboratories California Institute of Technology, at Caltech's Athenaeum.

Dr. Pascale Ehrenfreund, Chair of the Executive Board, German Aerospace Center (DLR), Incoming IAF President and IAF Vice-President for Communications, Publications and Global Conferences, was present to honour Dr. Le Gall.

Dr. A. S. Kiran Kumar, former Chairman of the Indian Space Research Organization (ISRO) was also awarded with the International Von Karman Wings Award.



TEAM GERMANY SUPPORTS



69<sup>TH</sup> INTERNATIONAL ASTRONAUTICAL CONGRESS  
BREMEN | 1-5 OCTOBER 2018



#INVOLVING EVERYONE

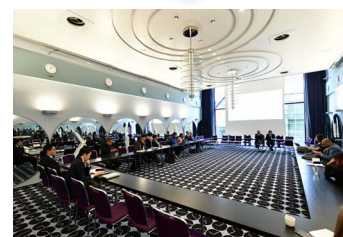
## IAC 2018

Bremen, Germany – The 69<sup>th</sup> International Astronautical Congress will from now on be remembered as the IAC of all records!

Indeed, the IAC 2018 holds the newest record of delegates attendance with more than 6.500 delegates from the record number of 81 countries registered for the whole five days of the congress. Additionally, more than 10.000 participants attended the public day on Wednesday 3 October to tune-in live to the International Space Station (ISS) for a live session with Alexander Gerst, the second ESA and first German commander of the ISS in the twenty years of its existence.

It will also be the IAC with the most loved and twitted theme ever as #InvolvingEveryone has been the real protagonist having been mentioned and brainstormed in all the events and mostly having been implemented by the huge participation of the Bremen public, largely composed of pupils from disadvantaged neighborhoods. This confirms once again the true engagement of the IAF in carrying out its mission of *Connecting @All Space People*.

The IAC 2018 programme was also a record itself with, alongside the usual seven Plenaries, three Highlight Lectures, and one Late Breaking News, the IAF Global Networking Forum (GNF) offering the record number of 46 sessions with eight streamed and new topics and formats (arts, culture, and pitch session). In addition to the Technical Programme that included the record numbers of 17 Keynotes, 179 Technical Sessions, 360 Interactive Presentations, and the newest entry, 31 Special Sessions.





View the photos from Wednesday



View the photos from Thursday



View the photos from Friday



Watch all IAC 2019 videos:

Click here to watch all videos



## IAF Bureau - News

During the IAC 2018, an impressive record came on the last day of the congress from the IAF General Assembly: **Prof. Pascale Ehrenfreund** was elected **Incoming President** of the Federation.

Prof. Ehrenfreund is the first woman to represent the Federation since its creation, in its role of promoting space for the benefit of humanity and will assume the IAF presidency as of October 2019. Currently, Prof. Ehrenfreund is the Chair of Executive Board of the German Aerospace Center (DLR) and IAF Vice-President for Communications, Publications and Global Conferences.

It is not without saying that Dr. Jean-Yves Le Gall, current IAF President made a point of honour to his Global Agenda's main focus – diversity – by handing over to a lady.

During the IAC, on behalf of the Federation, Dr. Jean-Yves Le Gall warmly acknowledged four outgoing Vice-Presidents for their outstanding contributions to the IAF, and welcomed four new Vice-Presidents: **Mohammed Al Ahabbi**, Director General, UAE Space Agency – the first IAF Vice-President from the Middle East, **Bruce Chesley**, Sr. Director, Strategy, Space & Launch, The Boeing Company, **S. Somanath**, Director of the Liquid Propulsion Systems Center (LPSC), Indian Space Research Organization (ISRO), and **Minoo Rathnasabapathy**, Research Engineer, Space Enabled Research Group, Massachusetts Institute of Technology (MIT) – the first ever Young Professional to be elected IAF Vice-President.



## International Space Forum – The Latin American and Caribbean Chapter (ISF 2018) Buenos Aires, Argentina

The successful series of International Space Forums at Ministerial Level (ISF), started in Trento in 2016, thanks to the cooperation of the International Astronautical Federation (IAF) and the Italian Space Agency (ASI), continued this year with a new regional chapter. In 2018, the ISF moved to Latin America and the Caribbean. Representative from the region's countries engaged in an interesting discussion about the role space technologies could play in facing some of the challenges in the area, and the opportunities that the development of the space sector could bring for the socio-economic development.

This year's Forum was jointly organized by the IAF, ASI and the Comisión Nacional de Actividades Espaciales (CONAE), and took place in Buenos Aires on 1<sup>st</sup> November 2018. As in previous years, the ISF 2018 brought together representatives from Governments, Space Agencies Universities, and other Institutions involved in the Space Programmes. In total, 17 delegations from Latin American and the Caribbean and 11 from International Organizations and Space Agencies from all over the world got together in Buenos Aires to discuss about

space development and to report on the experience of their own countries.

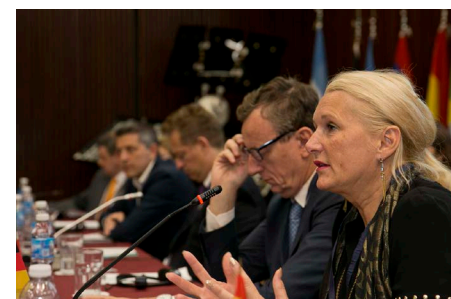
The Forum was opened by **Lino Barañao**, Secretary of Government for Science, Technology and Productive Innovation of Argentina, who welcomed the participants and emphasized the importance of international cooperation to achieve regional goals. On behalf of the Federation, **Pascale Ehrenfreund**, recently elected IAF Incoming President, greeted the delegations and launched the discussion on space for a better solution of Latin American and Caribbean Challenges.

Three prominent keynote speakers were carefully selected to present pivotal topics for the region's space development and to stimulate a positive and disruptive discussion within the Forum.

The first keynote, by **Jan Woerner**, Director General of the European Space Agency, underlined the important role of space assets in the "Management of Natural Resources and the Prevention of Disasters". Climate extremes have become more and more frequent in Latin America and the Caribbean and space-based Earth

observation could support not only in an early phase of monitoring and prevention, but can also be used as an effective tool to assess damages and support reconstruction plans after disasters such as hurricanes, earthquakes, and floods. Nicaragua and Honduras delegations corroborated these statements with examples of past natural disaster and extreme weather conditions causing deaths that could have been easily avoided with the use of space technologies. On a different note, Uruguay, highlighted the important role that space has also in the daily management of agriculture, which is also particularly sensitive to climate.

To effectively use space technologies, it is vital for emerging space countries to rely on the more experienced ones. This important aspect was presented by the Chair of the 2018 – 2019 UNCOUOS, **Rosa María Ramírez de Arellano y Haro**, in her keynote speech on "Space Partnerships". Latin American and Caribbean countries should cooperate within the region and with the rest of the world to maintain or develop the knowledge required to properly exploit space assets and further improve the well-being of the whole region. Knowledge development







should not be pursued solely through international cooperation, but also by further promoting the synergies between local academia and other local space actors such as companies, governments and agencies. These thesis were strongly endorsed by the delegations present; Paraguay reported on the need for strengthening international coordination to truly achieve all the beneficial effects that space can have for one country's economy; while the representative from the Korea Aerospace Research Institute (KARI) reminded the Forum about its recent agreement with the Peruvian National Commission for Aerospace Research and Development (CONIDA). The importance of intersectoral partnerships, was emphasized by Brazil, which mentioned the creation of governmental programmes aimed at encouraging cooperation between Research and Development institutions and companies.

The significant role of education in the development of the space sector was highlighted by by **Raúl Kulichevsky**, Executive and Technical Director of CONAE, during his keynote speech on "Education and Capacity Building". In his

presentation, the host underlined that in order to obtain the advantages that space technologies and earth observation can bring, it is necessary to have technicians and communities who are capable of transferring scientific knowledge into everyday life, for example by supporting the decision process of policy makers. In addition, the representative of Mexico, called the attention to the fact that the space sector is rapidly changing, opening up to new actors who, if integrated in an efficient network, could contribute even more to the growth and development of Latin America and the Caribbean.

All the topics addressed during the ISF 2018 were included in the **Buenos Aires Page**, the final ISF 2018 document endorsed by the delegations at the end of the Forum, which was then added to the Trento Space Statement (ISF 2016) together with the Nairobi Page (ISF 2017).

The ISF 2018 was officially closed by **Alejandro Finocchiaro**, Minister of Education, Culture, Science and Technology of Argentina, who thanked the delegations for their participation.

**Gabriella Arrigo**, IAF Vice President for Science and Academic Relations, announced that next year's International Space Forum at Ministerial Level will be dedicated to the Mediterranean Region, focusing on the role that space plays in the management of maritime transport and security. The academic community together with local and regional Authorities will be involved during the ISF 2019 – The Mediterranean Chapter.

On the 2<sup>nd</sup> of November, delegates were offered the opportunity to visit the Teofilo Tabanera Space Center (CETT) in Córdoba. The Center hosts the Mission Operations and Control Center of SAOCOM 1A, CONAE's recently launched L-Band SAR satellite, as well as the Córdoba Ground Station, used for several international missions. Participants were also introduced to the Instituto Gulich, located in the same area, which embodies the importance of cooperation for capacity building: the technicians that are formed at the Instituto count on the unique and joint support of the University of Córdoba, CONAE and ASI.



## The IAF's role in support of APSCO as a bridge between Asia-Pacific and the rest of the world

On 14 – 15 November 2018, IAF President, Dr. Jean-Yves Le Gall and IAF Executive Director, Dr. Christian Feichtinger addressed the audience of the APSCO 10<sup>th</sup> Anniversary High Level Forum & 9<sup>th</sup> International Symposium in Beijing, China. These meetings offer a first opportunity to convey the IAF's role in support of APSCO as a bridge between the Asia-Pacific region and the broader global arena.

During his speech, Dr. Le Gall highlighted the great importance of Asia-Pacific as being the fastest growing economic region in the world. Indeed, in the last two decades, progress in space technology and its various applications has been significant and impressive, making the Asia-Pacific region one of the most dynamic areas in the field of space technology and development. Only 10 countries in the world have the ability to launch satellites, and three of these countries in Asia, India, China and Japan, have either placed a spacecraft in orbit around the Moon, or have landed one on the lunar surface.

The IAF and APSCO play an important role in fostering multilateral cooperation between countries across the Asia-Pacific region and beyond. Regional space cooperation needs to be promoted at multiple levels. Space policy cooperation and dialogue at government level will foster a mutual understanding of space programmes and policies in the region and help identify potential agendas for future space cooperation. On this basis, regional space cooperation at national space agency level could be further promoted within the framework of the IAF and APSCO. Regional space cooperation could also involve greater participation from the private sector in the future.

Building on the global commitment expressed at UNISPACE+50, the IAF calls for partnerships to exploit the full potential of space technology and applications through enhanced regional collaboration and information sharing for a stronger and more resilient Asia-Pacific. The IAF will, through the Global Innovation Agenda for 2016-2019, maintain closer links and — by strengthening collaboration with all members with an interest in

the Asia-Pacific region — will continue to play a catalytic role in maintaining, complementing and extending the framework for cooperation in the region.

The IAF will also seek the expansion of cooperation through systematic analysis by experts and stakeholders in different countries and greater awareness of potentials, opportunities, risks and possible solutions. Such systematic evaluation and exploration by thought leaders and engagement in forums will add value to the efforts to achieve the objectives of the SDGs.

With these goals in mind, the IAF and APSCO have agreed to enter a Memorandum of Understanding to further strengthen cooperation and promote constructive dialogue in the Asia-Pacific region and beyond.

This in turn will contribute positively to education and learning, and help promote, develop and reinforce links between scientists in the APSCO member states and the IAF user community in the various fields of space science.



## IAF Awards – 2019 Call for Nominations

IAF World Space Award – **Deadline: 23 December 2019**

The IAF World Space Award is the Federation's most prestigious award which recognises a most eminent person with exceptional merit in space science, space technology, space medicine, space law or space management who has made a fundamental and global impact upon the world's progress in astronautics.





The award consists of a medal and the recipient will also be included into a special section of the IAF Hall of Fame. The registration fees of the International Astronautical Congress (IAC) will be waived for the year of induction.

The detailed nomination process is available [here](#).  
[More information about the IAF World Space Award.](#)

## Allan D. Emil Memorial Award – Deadline: 23 December 2019



The Allan D. Emil Memorial Award recognises an internationally-renowned person for their outstanding contribution or contributions in space science, space technology, space medicine or space law that involved the participation of more than one nation and/or which furthered the possibility of greater international cooperation in astronautics.

The Allan D. Emil Memorial Award comprises a certificate from the IAF and a grant of US\$5000 offered by the Family of Allan D. Emil. The registration fees of the International Astronautical Congress (IAC) will be waived for the year of induction.

The detailed nomination process is available [here](#).  
[More information about the Allan D. Emil Memorial Award.](#)

## Frank J. Malina Astronautics Medal – Deadline: 23 December 2019



The Frank J. Malina Astronautics Medal recognises outstanding contributions to space education by an educator who promotes the study of astronautics and space science. The most important criterion for this award is that an educator “has taken the fullest advantage of the resources available to him/her to promote the study of astronautics and related space sciences”.

The Frank J. Malina Astronautics Medal comprises an engraved commemorative medal and a certificate of citation.

The detailed nomination process is available [here](#).  
[More information about the Frank J. Malina Astronautics Medal.](#)

## IAF Hall of Fame – Deadline: 23 December 2019



The IAF Hall of Fame recognises eminent individuals who have contributed substantially during the course of their careers to the progress of astronautics (including space science, space technology, management of space projects and space benefits to mankind) within the framework of the IAF activities.

The IAF Hall of Fame comprises a certificate. The registration fees of the International Astronautical Congress (IAC) will be waived for the year of induction.

The detailed nomination process is available [here](#).  
[More information about the IAF Hall of Fame.](#)

## IAF Excellence in “3G” Diversity Award – Deadline: 13 February 2019

The IAF Excellence in “3G” Diversity Award is intended to recognize IAF member organizations (industry, government, academia) worldwide for outstanding contributions to the fostering of “3G” (Geography, Generation, Gender) Diversity within the space sector. It is an annual award presented at the IAC, but is given only when nominations of exceptional merit are received. Only IAF member organizations in good standing can be eligible to receive the award.



The award consists of a statue and a certificate which will be presented to an official representative of the awarded organization during the annual IAF IDEA “3G” Diversity Luncheon at the IAC. The awarded organization will be given a speaking opportunity at this event.

The detailed nomination process is available [here](#).

[More information about IAF Excellence in 3G Diversity Award.](#)

## IAF Excellence in Industry Award – Deadline: 11 February 2019

The IAF Excellence in Industry Award is intended to distinguish an industry organization, member or non-member of the IAF, worldwide for introducing innovative space technologies to the global marketplace and is recognized throughout space industry for successfully executing a landmark space mission.

The award consists of a statue and a certificate which will be presented to the CEO or senior executive officer of the awarded organization during the Industry Luncheon.

The detailed nomination process is available [here](#).

## IAF Emerging Space Leaders Grant Programme – Deadline: 8 February 2019

To all students and young professionals below 35 years of age! Apply now for the 2019 IAF Emerging Space Leaders Grant Programme on <http://www.iaf-grant-programme.org/> and get the opportunity to participate in the #IAC2019, present a paper, network with other students and YPs from all around the world and personally meet the IAF President!

## IAF Young Space Leaders Recognition Programme – Deadline: 13 February 2019

The International Astronautical Federation (IAF) is pleased to announce its 2018 Young Space Leaders Recognition Programme that will provide opportunities to recognise students and young professionals who are demonstrating exceptional leadership in their academics or early careers.

Detailed information on the call for nominations is available here: <http://www.iafastro.org/iaf-young-space-leaders-ysl-recognition-programme/>.

Nomination material should be sent before the respective deadlines to the IAF Secretariat, preferably by email at [award@iafastro.org](mailto:award@iafastro.org). For further information about the IAF Honours and Awards programmes, please contact the IAF Secretariat at [award@iafastro.org](mailto:award@iafastro.org). More information is available [here](#).

### SAVE THE DATE



From 26 – 28 March 2019 in Paris, France the IAF community is invited to gather in Paris at the NEW CAP Event Center (3 Quai de Grenelle, 75015 Paris). For three days IAF Administrative and Technical Committees will meet, and the International Programme Committee will select the abstracts to be presented during the IAC 2019!







## GLEC 2019

The International Astronautical Federation (IAF) and the Centre Royal De Télédétection Spatiale (CRTS) with the support of the Centre National d'Études Spatiales (CNES) are pleased to invite you to the first ever Global Conference on Space for Emerging Countries – GLEC 2019 from 24 – 26 April 2019 in Marrakech, Morocco.

First Conference of its kind, #GLEC2019 aims at actively engaging emerging countries in the space scene by highlighting the socio-economic benefits of space applications; by understanding the various financial models for the optimal resourcing of national space programs; by identifying opportunities for technology and skills transfer; by creating awareness about the base infrastructure requirements needed for operationalizing national space programs and by creating awareness on the essential legislative and policy elements that must be considered in establishing the foundation for national space programs.

The Conference programme is designed to bring together the international community, including senior representatives of the major space agencies, industry, governments, policy makers, academia and NGOs. These leaders in the field will converge in Marrakech to present results, exchange ideas, debate roadmaps, and discuss the future opportunities provided by space activities to emerging nations.

More information is available on [www.glec2019.org](http://www.glec2019.org)



## IAC 2021 in Paris!

The IAF General Assembly selected Paris, France as Host City for IAC 2021 on Friday 5 October 2018. The Hosting Organization is the Centre National d'Études Spatiales (CNES), a member of IAF since 1981.

Paris hosted the first IAC ever in 1950, then in 1963 and lastly in 1982 and now with the IAC 2021 will be holding the record of the city with most IACs hosted.

*Space for @ll*



## IAC 2019

The International Astronautical Federation (IAF) is pleased to invite you to Save the Date for the 70<sup>th</sup> International Astronautical Congress (IAC) to take place in Washington, D.C., United States from 21 – 25 October 2019. The IAC 2019 will be hosted by the American Institute of Aeronautics and Astronautics (AIAA), an IAF Member since 1952.

With the theme “Space: The Power of the Past, the Promise of the Future”, the IAC 2019 provides a focus for the international space community to reflect on its accomplishments since the landmark Apollo Moon landing and to imagine the future of this global enterprise. The capital of the United States will be the place to be to properly celebrate the 50<sup>th</sup> anniversary

of this extraordinary engineering, scientific, and political achievement as well as the international accomplishments and partnerships that have become the hallmarks of space exploration.

The IAC 2019 will also be a unique occasion to celebrate the 70<sup>th</sup> anniversary of this congress, a one-of-a-kind event which, since its creation, not only gathers year after year an exceptional amount of space professionals to dig deeper into what can be done in space, but also continuously draws the general public's attention to space and its undeniable benefits for humankind.

The IAC is a professional event that supports the International Astronautical

Federation in its mission to advance knowledge about space and to foster the development of space assets by facilitating global cooperation.

More information on the IAC 2019 programme will soon be available [here](http://www.glec2019.org).



## IAC 2019 Call for Special Session Proposals - Deadline: 18 February 2019

The International Programme Committee solicits proposals for Special Sessions (SpS) within the technical scope of the congress.

IAC 2019 Special Sessions will be a very useful tool in order to supplement the regular technical programme of the congress and provide a sample of the state-of-the-art research or development in both academia and industry in special, novel, challenging and emerging topics in the field of space. Special Sessions that emphasize on multi-disciplinary and transversal aspects, as well as cutting-edge topics are especially encouraged and welcome.

Prospective organizers of special sessions should submit proposals at [www.iafastro.net](http://www.iafastro.net).

Questions should be addressed to [sps@iafastro.org](mailto:sps@iafastro.org)



## IAF Abstract Mentor Programme - Deadline: 19 February 2019

The International Astronautical Federation has implemented an Abstract Mentor Programme (AMP): an extra support for authors with limited or no experience of submitting an abstract for the International Astronautical Congress.

The goal of the mentor programme is to help authors present their material clearly and concisely, before their abstracts are submitted for the formal abstract review process.

The deadline to submit your draft abstract for the AMP is 19 February 2019, 23:59 CET.

More information can be found at <http://www.iafastro.org/activities/iaf-abstract-mentor-programme/>  
Questions should be addressed to [amp@iafastro.org](mailto:amp@iafastro.org)





## IAC 2019 Call for Abstracts - Deadline: 28 February 2019

The IAC 2018 Call for Abstracts will run until 28 February 2019. The International Programme Committee looks forward to receiving high-quality submissions that will help shape a vibrant future in space and encourages you to contribute to a world-class technical programme across a wide variety of topics to be chosen from 180 Technical Sessions.

Abstracts must be submitted online at [www.iafastro.net](http://www.iafastro.net)

More information about the technical programme is available here: <http://www.iafastro.org/events/iac/iac-2019/technical-programme/>.

Questions should be addressed to [support@iafastro.org](mailto:support@iafastro.org).



## New IAF Members

The importance of the International Astronautical Congress (IAC) for the IAF is not only due to the event itself, which allows the international space community to get together. It is also due to the fact that it is the occasion for the Federation to officially welcome its new members.

On 1<sup>st</sup> October 2018, during its first Session, the IAF General Assembly had the opportunity to approve the organizations that applied throughout the year and which were recommended by the IAF General Counsel, bringing the total number of members to 366.

This year's General Assembly has been remarkable in terms of numbers (29 approved new members), geographical variety (from Paraguay to Poland, from United States to China) and categories (industries, universities, space agencies and associations).

### From Europe:

Adriatic Aerospace Association, Croatia  
Alma Mater Studiorum – University of Bologna, Italy  
bavAIRia e.V., Germany  
Black Engine Aerospace UG, Germany  
European GNSS Agency (GSA), Czech Republic  
European Organization for Nuclear Research (CERN), Switzerland  
Fraunhofer INT, Germany  
Hermes Engineering, Bulgaria

Italian Mars Society, Italy  
MEDES – IMPS, France  
Moon Village Association (MVA), Austria  
PTScientists, Germany  
Polish Space Agency, Poland  
SpaceForest, Poland  
Valispace, Germany  
WEPA - Technologies GmbH, Germany

### From Asia:

Azercosmos, Azerbaijan  
Beijing SpaceD Aerospace Application and Science Education Co. Ltd., China  
Infostellar, Japan

LandSpace Technology Corporation Ltd., China  
Tsinghua University, China  
Zhuhai Orbita Aerospace Science & Technology Co. Ltd, China

### From Northern and Latin America:

Colombian Space Agency, Colombia  
Firefly Aerospace Inc., United States  
High Technology Unit (UAT) Faculty of Engineering – UNAM, Mexico

Northrop Grumman Corporation, United States  
Paraguayan Space Agency, Paraguay  
Space Flight Laboratory (SFL), Canada  
SpaceExcess LLC, United States

The Federation would simply cease to exist without its members, and we would like to take this occasion to thank you all once again, for supporting us and for cooperating with us every day. We look forward to a new year filled with interesting conferences, networking opportunities, and fulfilling events, which will all be possible thanks to the amazing contribution of our members.

## SpaceOps



In Spring 2018, the IAF and the SpaceOps Organization announced an agreement where the IAF would be a partner and supporter of the SpaceOps Organization, and its biennial SpaceOps Conferences. The SpaceOps Organization was formed in 1990 to provide an organized community and technical forum for the large number of people involved in space mission operations, and to provide the broadest possible interchange among stakeholders in the space operations community, including space agencies, academia and industry.

From 27 to 30 November 2018, the IAF supported the SpaceOps Organization as its Secretariat at the SpaceOps Fall Meeting in Tokyo, Japan. The meeting was hosted by the Japan Aerospace Exploration Agency (JAXA), and was

attended by more than 40 representatives from SpaceOps Member space agencies and partners. During the meeting, Dr. Christian Feichtinger (IAF Executive Director) presented the development of the SpaceOps Directory, the SpaceOps conference submission system, and outreach plans for the organization. The meeting also included presentations from 16 space agencies and partner organizations on space operations activities, and addressed preparations for the SpaceOps 2020 Conference in Cape Town, South Africa on 18-22 May 2020, hosted by the South African National Space Agency (SANSA). The meeting also



included a visit to JAXA's headquarters and the operations facility, the Tsukuba Space Center.

More information is available on [www.spaceops2020.org](http://www.spaceops2020.org)

## Call for Hosting IAC 2022

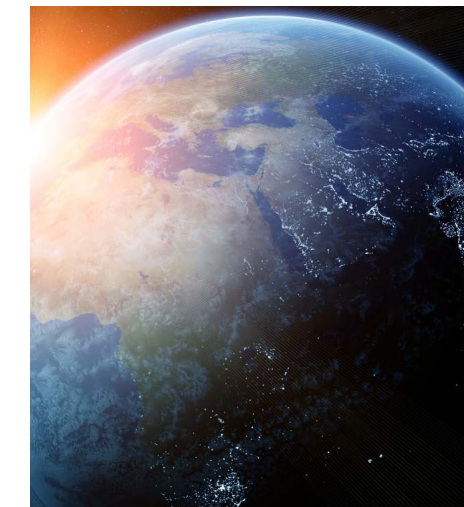
Each year the International Astronautical Federation (IAF) – in collaboration with the International Academy of Astronautics (IAA) and the International Institute of Space Law (IISL) – organizes the International Astronautical Congress (IAC). The IAC is held in different countries of the world with an IAF member organization serving as its host. In recent years, the event attracted more than 4500 participants including up to 3000 full paying participants, retired participants and press representatives as well as more than 1500 students and young professionals. The IAF is seeking proposals from IAF member organizations interested in serving as the host of the 73<sup>rd</sup> IAC which will be held in 2022.

The schedule for the selection of the site of the 73<sup>rd</sup> IAC is as follows:

- Deadline for notices of intent to submit proposals: 22 February 2019
- Deadline for submission of proposals: 26 April 2019
- Selection of finalist candidates (if applicable): 28 June 2019
- Site Inspections: July – August 2019
- Deadline for submission of updated proposals from the candidates: 20 September 2019
- Finalist presentations: during the 70<sup>th</sup> IAC in Washington, D.C., USA: 21 – 25 October 2019
- Selection of the Host by the IAF General Assembly: 25 October 2019

Note: The IAF may – at its discretion – modify the above schedule and notify the concerned organizations of the schedule changes.

More information is available [here](#).





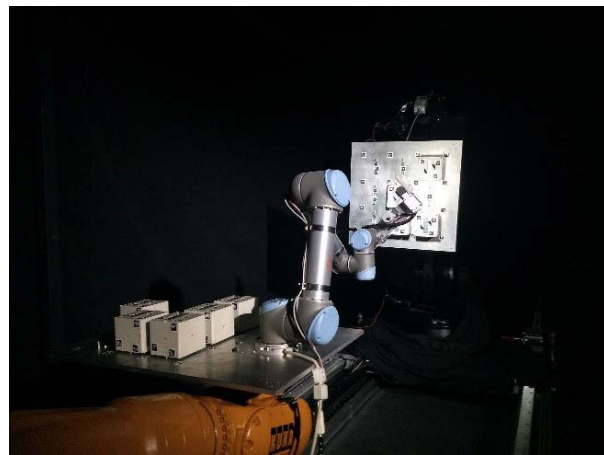
## NEWS!



### GMV leads an ambitious campaign of space robotics trials

Since mid-September the technology multinational GMV has been taking part in the final field tests of the projects included under the European Commission's (H2020) Strategic Research Cluster (SRC) programme. These tests are due to run until December 15<sup>th</sup>.

GMV is leading 3 of these technology building blocks: the European Space Robotics Control and Operating System-OG1 ([ESROCOS](#)), centering on the creation of operational software capable of controlling a space robotics system in all mission phases; the European Robotics Goal-Oriented Autonomous Controller-OG2 ([ERGO](#)), the block designed to develop an ambitious goal oriented autonomy system for planning, scheduling and overseeing the execution of elementary activities of surface and orbital robotics systems; and Facilities for Testing Orbital and Surface Robotics Building Blocks-OG6 ([FACILITATORS](#)), for providing the orbital and planetary scenarios for the rest of the projects, including the preparation of facilities for validation of robotics systems and the organization of field testing campaigns.

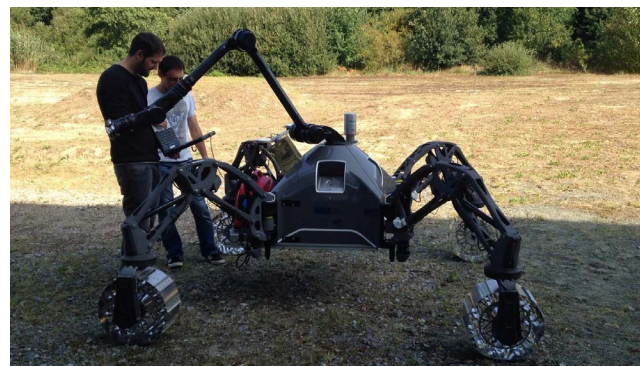


In September the Test Readiness Reviews (TRR) of the three projects were conducted; this marked the completion of the software-development and -integration activities and the start of the field test campaign led by the FACILITATORS project, which will validate the framework of the projects in scenarios representative of space robotics.

GMV's *platform-art* testbed is playing a key role in on orbit-servicing scenarios validation: **ESROCOS** framework simulated there the inspection of a berthed satellite using a robotic manipulator equipped with a camera. **ERGO** ran its orbital scenario field tests on GMV's *platform-art*. The tests involved the repair of an artificial satellite in orbit (the target), using a service spacecraft (chaser) that approached the satellite to repair it by means of a robotic arm. The **IBDS project**, led by Thales Alenia Space, also validated its technologies in GMV's *platform-art* testbed. The suite of sensors developed in this project has been tested under conditions representing an in-orbit servicing scenario, using a mock up with realistic details and the testbed's mobile lighting system, which provided many different lighting angles.

The Moroccan desert, as a Mars-like terrain, is chosen as the terrestrial validation scenario of space robotics technologies

Finally, from mid-November to mid-December the northern tip of the Sahara desert in Morocco staged the final tests of ERGO and INFUSE (the latter led by the Belgian firm Space Application Services). In this field test campaign, held under the FACILITATORS project and coordinated by the German Research Center for Artificial Intelligence (Deutsches Forschungszentrum für Künstliche Intelligenz GmbH, DFKI), the robotics technologies developed under SRC PERASPERA will be tested outside the laboratories. The robotic platform in charge of field testing the technology developed by both projects will be the Rover SherpaTT, a desert veteran.



### Space Months in Hungary



Hungarian Astronautical Society

Every summer since 1994, the Hungarian Astronautical Society (MANT) organizes a Space Camp for students at ages of 13–18 years. The 2018 Space Camp visited the south-western town Zalaegerszeg, the birthplace of Imre Izsák, a famous celestial mechanic who became leading scientist at NASA in the

1960s. Among the various activities and topics of the week-long camp, worth mentioning are the lectures and team contest preparing for the 50<sup>th</sup> anniversary of the Apollo Moon program, sky watching, and excursions to nearby attractions.

The target age group of the second major event, the MANT Space Academy is 18–35 years. The annual series has been going on since 2015, the location is the town of Gödöllő. The goal is to train the future generation of space researchers and to strengthen their professional and personal ties. This year, the 4-day event was again attended by university students and young professionals passionate about space exploration. This time the main topic was the status of university-level space education in Hungary. The participants listened to lectures from experts and worked on a proposal for improving the situation. Their results have been presented to the decision-makers at the annual Space Day conference in October. The Space Academy series is organized in collaboration with the Space Generation Advisory Council (SGAC).

Our next international conference, the H-SPACE 2019 will be organized on February 27-28, 2019 in Budapest. Call for abstracts is open at <http://space.bme.hu>



### 2018: 50 Years Ago the Rocket Research Institute, Inc., became a Member of the IAF

In October 1968, at the 19<sup>th</sup> International Astronautical Congress held in New York City, the Rocket Research Institute, Inc., was honored to be elected a member of the International Astronautical Federation by a vote of the General Assembly.

Subsequently, at the same Congress the late Professor Luigi

Napolitano, then President of the IAF, recognizing the need for international coordination of safe hands-on student space related educational programs, asked George S. James, of the RRI, Inc., and the late Lise Blosset, of the French Space Agency CNES, to organize and co-chair the Safety in Youth Rocket Experiments (SYRE) Study Group as an adjunct to the IAF Education Committee. This was approved by the IAF General Assembly and SYRE became the first international forum for the discussion of safe and educational practices for educators, students and young professionals in the space sciences. Initial SYRE members represented over a dozen IAF member nations and included as advisors three 1935-1945 rocket pioneers, the late Frank J. Malina, the late Irene Sanger-Bredt, and the late Robert C. Truax.



The members of SYRE held their first full study group meeting in Mar del Plata, Argentina, at the 20<sup>th</sup> IAC and had six presentations by authors from France, Sweden, and the U.S. In the following decades over 300 papers, representing the space science related educational programs in 29 IAF member countries, were presented at SYRE sessions during the International Astronautical Congresses.



### Wherever gravity is a factor, knowledge and business opportunities arise: your Space and Time is now, in Mauritius, with SpaceLand !

Given the amount of disciplines and entities involved in Microgravity S.T.E.M., the 4<sup>th</sup> SpaceLand Forum has been postponed to the end of May 2019, as requested by the local Universities and involved Authorities, in order to further expand its scope and benefits for the whole area of South-East Africa and the Indian Ocean.





The event will focus on SpaceLand group's microgravity educational and research programs which are going to revolutionize Mauritius' approach to science research, technology innovation and education, bringing the tropical Country to become a leader in weightless and low-gravity STEM.

Speakers from all over the planet will converge in such a paradise island to present their recent developments in respective fields, from weightless biomedicine to satellite and robotics' dynamic applications for the Moon and Mars, from orbital debris capture systems to microgravity test facilities supporting planetary exploration and ground-based zero-G STEM.

Organized as follow-on event after the success of previous workshops and events endorsed by, among other top level institutions, the V-President of the European Commission (see Italian Space Agency's website link [www.asi.it/sites/default/files/PROGRAMMA%20SL.pdf](http://www.asi.it/sites/default/files/PROGRAMMA%20SL.pdf)), the Forum enjoys the support of IAF, the Italian Council of Engineers of Torino and local Universities, to also feature a multi-media presentation of the new SpaceLand Center in Mauritius.

De facto, with all its Moon & Mars-gravity laboratories and analogs, resembling an actual Mars-base, the SpaceLand Center of Excellence for Microgravity will systematically provide local and international users, all-year-round, with open-door ground, underwater and flight activities in low-gravity and weightless conditions, generating a new virtuous system leading to a new Space awareness in that part of the world.

The program's benefit will be relevant also in terms of social technologies, holistic health and life sciences, including biology, biomedical, pharmacology, bioengineering, biotechnology, 3-D weightless surgery, gene and other anti-aging and life-extension therapies, and in general all those aspects and domains, as presented at the Forum, which can be best developed by microgravity STEM research, training and education, to have a new Space-knowledge-economy thrive in that beautiful part of Africa and the Indian Ocean.

Thus, get a new tropical flavour to your New Year by preparing your journey to stunning Mauritius: welcome to the SpaceLand Forum, on 28-29 May !

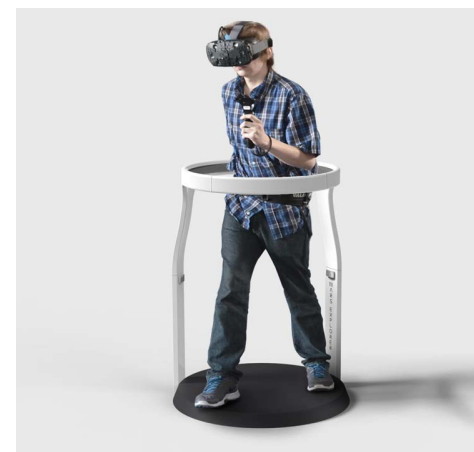
For info, please write to [SpaceLand@SpaceLand.it](mailto:SpaceLand@SpaceLand.it)



Mars Planet Research and Innovation develops a complete set of Virtual Reality treadmills to enable the simulation of space exploration in Virtual Reality.

The treadmills are developed by means of the spin-off Virtual Space Systems ([www.virtualspace.com](http://www.virtualspace.com))

The technology can be used for scientific simulation in the Space Sector but also as tool for Education in Space and medical application.



## EU Top Science Award for CT of Clouds: Nano-Satellites Will Reveal the Secrets of Small Clouds

*A formation of ten nano-satellites that use medically-inspired CT (computed tomography) algorithms to answer climate questions wins a €14 million ERC Award*

Inspired by medical CT, which observes and maps the interior of a patient, the designers are using 10 nano-satellites (of about 3 kg mass each) for creating a system that will reveal detailed images of clouds' internal 3D structures and properties. By probing small



## Per aspera to Von Karman line: USC's rocket lab continues their quest to the stars



The University of Southern California's (USC) student run Rocket Propulsion Lab (RPL) attempted their second spaceshot on September 29, though they are unsure whether or not the rocket finally reached the 100 km Von Karman line where space begins.

Formed in 2004, RPL, a group of undergraduate USC Astronautics students, have been designing, building, and launching each year increasingly sophisticated solid-propellant rockets.

In three previous attempts in 2011, 2014, and 2015, their missiles malfunctioned – an all too familiar story for engineers in rocketry. But the lessons were learned. In 2017, they launched a subscale test rocket that reached nearly 44 km, setting the world record for the highest altitude of a vehicle designed and manufactured entirely by students and proving that hard work and determination pay-off.

This past September, RPL attempted another spaceshot. However, due to a procedural failure, the avionics system was not properly armed before the flight, preventing ground communication and parachute deployment. When the rocket was retrieved a week later, broken into many pieces due to impacting the ground at supersonic speed, students were unable to recover any flight data but determined that the rocket remained intact during the flight and reentry.

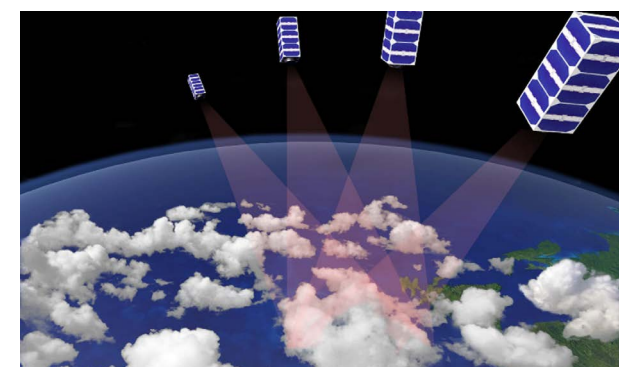
cloud fields that are generally missed by today's remote sensing technologies, the mission may resolve some major uncertainties that limit current atmospheric modelling and climate prediction. Clouds have a key role in Earth's energy balance and its water cycle; even small errors in assessing clouds' properties can lead to major inaccuracies in climate predictions.

This space mission, called CloudCT, was selected by the European Research Council (ERC) for a Synergy Grant with the maximum sum possible. Three investigators lead this unique interdisciplinary project: Prof. Yoav Schechner from Technion (Haifa) is an expert in computer vision and computed tomography, Prof. Ilan Koren is an expert in cloud and rain physics at the Weizmann Institute of Science (Rehovot), and Prof. Klaus Schilling from the Center for Telematics (Würzburg) is a leader in the field of small satellite formation technology.

Images in CloudCT will be taken simultaneously from many directions around the clouds. This will be made possible by the networked self-organizing formation of multiple, affordable, very small and very agile satellites.



*The award winners Ilan Koren (atmospheric physics), Yoav Schechner (computed tomography) and Klaus Schilling (formations of nano-satellites) in front of the precision dynamics simulator of the Zentrum für Telematik in Würzburg during preparation of these research activities.*



*CloudCT uses the Sunlight as illuminator to characterize the interior of clouds. The scattered reflections are detected from different orientations by 10 nano-satellites to reconstruct by elaborated software related 3D structures.*





### WEPA-Technologies (WEPA)

WEPA-Technologies did present its current commercial and development activities at the IAC in Bremen in October. Strong customers' interest has been noticed with respect to the following technologies:

#### Hydrogen Peroxide Production plants (90 – 98 %, HTP)

WEPA-Technologies delivers HTP plants covering a broad range of production capacities between laboratory and industrial size (semi continuous 0,5 kg / h up to continuous 60 kg / h).

The scope of activities does encompass the full range starting with project definition, process design, safety analysis, sourcing of equipment, assembly and commissioning. Specific customer requirements, as for example fast relocation of plant to different production sites by using containerized designs can be considered.

Feedstock used is low cost, commercial grade 30 – 60 % Hydrogen Peroxide. Stabilizers and impurities present will be removed within one of the process units; therefore the product can be used with standard catalysts.

#### Turbo Pumps

WEPA is able to develop customer specific Turbo Pumps working with LOX, H<sub>2</sub>O<sub>2</sub>, Liquefied Natural Gas (LNG), Kerosene and Alcohol. Most of the propellants listed have been asked for by different parties during IAC Fair.

At present a technology demonstrator pump using LOX / LNG is being manufactured. This pump is to be matched with a 6-ton, LOX / LNG rocket engine being developed in a currently released collaboration with BlackEngine Aerospace, German Aerospace Center (DLR), WEPA-Technologies, University of Stuttgart and Kaiserslautern University of Technology. First tests are planned to commence in mid 2019.



### Black Engine Aerospace

An over-view of the technologies under development at Black Engine Aerospace (BEA) in a currently released collaboration with German Aerospace Center (DLR), WEPA-Technologies (WEPA), the University of Stuttgart and of Kaiserslautern University of Technology was given:

A 6-ton thrust, technology demonstrator rocket engine using LOX / Liquefied Natural Gas (LNG) was presented. Feeding of engine will be provided by a Turbo Pump manufactured by WEPA.

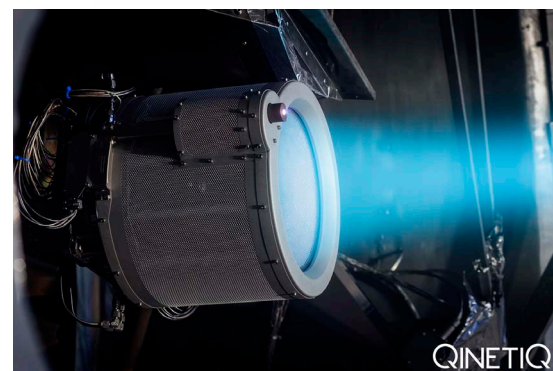
The thrust chamber is based on transpiration cooled, advanced ceramic materials. This technology has been thoroughly developed and qualified for example by DLR and shows a high potential of multiple re-usability. Due to the segmented design and avoidance of traditional metallic structures manufactured by electrodeposition, low cost and fast-track development of thrust chambers is possible.

Using LNG – instead of Kerosene - as fuel component results in several advantages at the engine- and overall system level crucial to re-usable and lower cost propulsion units:

- increased cooling capability of LNG enabling re-usable thrust chambers
- no deposition of solids caused by cracking of fuel components and avoidance of subsequent blocking of cooling channels or turbine blades
- increased overall performance; facilitated design of rocket stages by full cryogenic system (common bulkhead of tanks; less stringent isolation requirements)
- Injector systems under consideration are based on an innovative, low cost and low part-count cone injector technology developed by DLR and – as a back-up – more traditional coaxial injector technologies.

First tests are planned to commence in mid 2019.

### QinetiQ Space nv



### Interview with GLEC 2019 IPC Co-Chairs

#### Driss El Hadani, Director, The Royal Centre for Remote Sensing (CRTS), Morocco



#### 1. What is the main focus of Morocco in space development?

Morocco has been involved for many years in a series of national sector-based strategies and programs to accelerate its development and enhance its international competitiveness.

The implementation of this strategies development and projects in the fields of infrastructure,

agricultural and water resources management, environment protection as well as climate change adaptation, is based widely on a deep knowledge of the territories and resources.

Indeed, whether it relates to oceans, forests, climate phenomena, water resources, food security, land planning, their management requires technical means and tools to measure them, map their geographical distribution, and assess their evolution in time and space.

In this perspective, satellite Earth observation and more broadly, space technologies have become an essential tool for the implementation of these strategies, in particular when there is a need to regularly observe the territory, monitor the spatial and temporal evolutions, assess the impacts and provide recurrent and relevant information to support management and sectoral decision-making.

#### Jean-Pascal Le Franc, Director of Planning, International Relations and Quality, Centre National d'Études Spatiales (CNES), France



#### 1. What main actions Europe is currently taking to bridge the space divide in emerging countries?

Europe is leading many actions to help emerging countries use and develop space applications based on their specific needs. These actions cover three main aspects: programmes, partnership/capacity building and support for sustainable development.

#### Programmes

Copernicus is a cornerstone programme headed by the European Commission to which France is a leading contributor.

#### 2. What do you expect GLEC 2019 will bring to Morocco and emerging countries?

The GLEC2019 Conference is for us an important milestone in the process of developing space activities and uses in our country. It will give a new impetus to space activities in Morocco. Given the challenges facing space emerging countries the GLEC 2019, it will be an opportunity for emerging countries to create a platform To initiate cooperation and joined programs and jointly explore current and future opportunities, as well as discuss solutions to the challenges faced by emerging countries.

#### 3. Why should the IAF Community attend GLEC 2019?

This event is even more interesting because it takes place at a time when space activities are undergoing profound changes, with the double effect of technological innovations and the emergence of new actors.

The expected contributions of participants representing space agencies, industry, academia and the younger generation, will undoubtedly help to provide collective insight to the challenges facing emerging countries. We hope this will create opportunities for more collaborations and networking that will strengthen the links of cooperation and exchange between the actors in the global space venture.

It provides a unified system through which vast amounts of data are serving a range of fields in six main categories: land management, the marine environment, atmosphere, emergency response, security and climate change. These data are free of access. The development of a specific roadmap of the Copernicus programme for the African continent gave rise to the GMES & Africa initiative in 2007, a general framework for Earth-observation applications in Africa. This is a typical example of how European space programmes can help emerging countries in a number of domains in which space can be a major asset.

Other initiatives such as the International Charter on Space and Major Disasters, promoted by CNES and ESA within the framework of the United Nations in 1999, deliver satellite imagery quickly in the event of natural disasters to support rescuers all over the world. The Charter now has 17 member



space agencies and has been activated more than 580 times since its inception. It is a successful reality serving the Sendai Framework for Disaster Risk Reduction, in particular in those countries—frequently emerging countries—hard hit by the consequences of extreme natural events.

CNES promotes the development of space-based services for the benefit of institutional users (e.g. the development of a prototype water resource management service in Uganda through the FASEP project - Fonds d'étude et d'Aide au Secteur Privé).

### Partnership/Capacity Building

Agreements between space agencies and governments or agencies in emerging countries are increasing in number. They are frequently linked to partnership with development agencies (e.g. French Agency for Development – AFD). I would like to give you some examples for Asia and Africa.

CNES and VAST (Vietnam Academy of Science and Technology) signed an agreement in 2016. Several studies on oceanography and the observation of land surfaces are being conducted by laboratories affiliated to CNES, in partnership with Vietnamese organizations. CNES is also providing training on the treatment of Copernicus data to Vietnam on forest and rice culture mapping (Datacube).

At COP22 in Marrakech in 2016, seven French institutions (AFD, CNES, OIEau, CNR, IRD, Irstea, BRLI) signed a group agreement under the patronage of the Ministry of the Environment in charge of International Relations on Climate. These institutions have agreed to work together on new approaches to monitoring water resources by integrating spatial data.

French firm CLS is working to develop space applications for monitoring fishing vessels and coastal survey. Exchanges of personnel, which are part of these agreements, are already contributing to acquisition of skills in specific and innovative space domains. Education and nanosat programmes are also already benefiting nations around the world.

### Sustainable development

Climate action is also a promising area of cooperation, in particular with emerging countries that need to develop in a sustainable way. For sure, climate change poses a lot of economic challenges, but the first priority is to measure effects and show them to society and decision-makers. CNES has proposed to pool the resources of the world's space agencies to deliver more information and provide a framework for cooperation between scientists working on climate change through the Space Climate Observatory (SCO). The SCO aims to provide a coordinating mechanism for the diverse community activities related to the monitoring of the impacts of climate change. As a primary objective, SCO will produce and distribute relevant, timely and accurate information on the effects of climate change at national and regional scale through the use of space-based, in-

situ measurements and appropriate modelling combined with socio-economic indicators.

Space is vital to understanding the behaviour of our planet and is a major concern of emerging countries, which are showing increased interest in joining this initiative.

### 2. Where do you see emerging countries in the space business in 20 years from now?

Space services are now reaching a large number of users in domains such as agriculture, fisheries, land planning, communication, navigation, ocean and land surface monitoring, health and natural resources management. These are all domains of interest for emerging countries.

Emerging countries have few infrastructures that can be used to develop specific applications. In this context, space assets can be easier and more profitable to develop. This is the case for the telecommunications satellite market, a domain where France excels and which is growing exponentially to meet demand for Internet connectivity. The two key challenges facing us in this regard are to extend Internet connectivity to populations around the world and to ramp up operational Galileo services. This can be very profitable to emerging countries. For instance, CNES and CLS recently formed a new firm called KINEIS that has the ambition to become a major connectivity player. This connectivity is being offered by an unprecedented constellation of nanosatellites developed with Thales Alenia Space, Nexeya and Syrlinks. The constellation will be in orbit by 2021. Logistics, fishing, agriculture and outdoor recreation are all sectors seeking affordable global connectivity, especially in emerging countries. Promising domains in which emerging countries can start developing space business are nanosats and space services. Start-ups can play a role here. European and French organizations (CNES in particular) begin to help start-ups from emerging countries to develop their business and skills to compete in the growing markets for space applications. For instance, the French start-up Pixstart and the Senegalese start-ups AfricaSpace/ Geomatica, set up together a project for the identification and geo-localization of Agro-Sylvo-Pastoral sources in Senegal and Africa.

CNES is also working on the ActInSpace initiative to promote the use of space abroad. Conducted in association with ESA and Aerospace Valley, it is the top international competition for ideation of space applications (use of patents, technologies and space solutions) and is attracting a growing audience. The aim is to develop entrepreneurship among young people using technologies and data from space. The third ActInSpace (2018) involved African partners such as Morocco, South Africa, Somalia, Ethiopia, Kenya and Tanzania.

Emerging countries have a fertile environment to develop space business in the next 20 years, leveraging the new space context to apply available technology in an affordable and efficient way. The conditions are there to democratize access to sustainable space.

## Val Munsami, CEO, South African National Space Agency (SANSA), South Africa



**1. #GLEC2019 aims at actively engaging emerging countries in the space scene through different aspects such as highlighting the socio-economic benefits of space applications, or understanding the various financial models for the optimal resourcing of national space programs. In the current general context, what do emerging countries need to focus on the most, in order to develop and prosper in space business?**

The IAF Working Group on Developing Nations and Emerging Countries have identified a set of challenges that embattle emerging countries and which they need to specifically focus on, and these include:

1. Political support – lack of political support is a major stumbling block towards the formalisation of national space activities. It is important that political principles understand the associated benefits that accrue from space science and technology activities.
2. Financial resourcing – lack of adequate financial support is a limiting factor in achieving the full scope of initiatives needed to ensure optimal impact to the user base of emerging countries.
3. Technology maturity levels – early stage developments imply a steep learning curve with limited access to intellectual capital and technology know-how, which impacts the choices made with respect to technology based platforms, both space and non-space.
4. Human capital – early stage developments also imply a sub-critical mass of experts and emerging nations have a critical requirement for building such capabilities as quickly as possible.
5. Infrastructure – the core infrastructure to support space missions and the development of space application products and services is still at an embryonic stage and there is a need to inform the most optimal approach to embedding infrastructure within national space activities.

These challenges also form the cornerstone of the GLEC2019 and have informed and shaped the Plenary Sessions of this important Conference, which is intended to inform and build the intellectual capacity among emerging countries. In addition, a sixth session has been introduced that relates to Policy and Law, as this is also an important consideration for undertaking space activities that have both international reach and global security implications, especially with regards to the development and use of dual-use technologies. The IAF, acting in concert with the United Nations Treaties and Conventions, has a responsibility to promote the peaceful use of outer space activities to optimise the benefits of

space applications in developing nations and emerging countries. This is in keeping with the IAF's 3G (Generation, Geography, Gender) diversity principles and specifically relating to emerging countries where the intention is to:

- Involve stronger participation of emerging countries in the IAF activities,
- Provide knowledge and expertise support to these countries, and
- Produce benefits for these countries.

### 2. How could emerging countries strengthen their relations between themselves in order to encourage a better cooperation with developing nations?

As emerging countries face a number of issues that to a large extent have been overcome to varying degrees by developing and developed nations, conferences like GLEC2019 become important platforms for bringing these stakeholders together so that such issues could be debated and discussed. Such a platform also serves to enlighten emerging countries, without them having to relive past experiences, which could be both time consuming and capital intensive. However, this also requires emerging countries to organise themselves to optimise how this knowledge is shared among each other, and how capacity building and technology transfer initiatives could be pursued in a more integrated manner rather than severally. This is where, for example, the IAF Working Group on Developing Nations and Emerging Countries becomes an invaluable forum, as it provides a platform for emerging countries to share their challenges and experiences, and collectively identify opportunities and activities to strengthen their individual efforts. In addition, the establishment of regional blocs could also assist greatly and we have seen the emergence and importance of these fora within the IAF, for example, through the IAF African and GRULAC (Group of Latin America and the Caribbean) Regional Groups..







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*Connecting @ll Space People*

The next newsletter will be issued in March 2019