

**Keynote Speech by Dr Peter Martinez at the  
4<sup>th</sup> Africa Space Generation Workshop  
Accra, Ghana, 25-26 Feb 2021  
Delivered by video conference**

Greetings to all of you! It is my great pleasure to address a few remarks to you on the occasion of the 4<sup>th</sup> Africa Space Generation Workshop being held in Accra, Ghana. I remember very well my last trip to Ghana for the ALC in 2013 and the enthusiasm and excitement of the students and young professionals eager to contribute to the development of the African space arena and wish I could be there with you in person today.

I would like to thank the SGAC and the organizers of this meeting for giving me this opportunity to contribute a few thoughts as you begin your deliberations.

Let me begin by recalling the theme of this workshop – ***“A United Africa for Space Innovation: A Step Towards Our Common Future”***.

This is a very appropriate and timely theme. It contains within it the ideas of cooperation, innovation and a shared vision of a common future. Certainly, these ideas could be seen as an aspirational set of values that could guide your deliberations over the next two days for the progressive development of the African space arena.

So, let me then look at the five focus areas of this workshop through the lens of this theme.

The focus areas are:

1. Space governance
2. Space business and entrepreneurship in Africa
3. Big data and astronomy
4. Space Applications and Technologies to Support the SDGs
5. The role of space technology in a post-COVID 19 Africa

## **SPACE GOVERNANCE**

Starting then with space governance, let me begin by emphasizing the obvious, namely that African countries really need to ramp up their efforts to develop their national capacities in the policy and regulatory domain for space activities.

The need for regulation arises from the need to meet international obligations of the space treaties, which many African countries have ratified at a time when they were not yet space actors. These include obligations such as the registration of space objects, the authorization and on-going supervision of space activities, to name but a few.

The second reason is to provide regulatory certainty to commercial space actors and investors in space activities. The lack of regulations creates uncertainty, which drives away investment and innovation to other countries.

The third reason to build regulatory capacity is to enable African countries to engage purposefully in currently ongoing discussions in multilateral fora such as the United Nations on topics such as space resources utilization, space traffic management and space situational awareness. Right now, countries are discussing the rules of the road for future space activities and African countries should be actively engaged in the shaping of these new rules.

Then there are also technology safeguard reasons why African countries would want to regulate space technologies, which are inherently dual-use technologies that can be used for civilian or military purposes. Speaking of military applications of space, as more countries become critically reliant on space systems for their national security and defence, they are taking steps to increase the resilience of such systems against potential attacks and there are worrying trends in the proliferation of counterspace capabilities, which if tested in orbit, could produce threatening clouds of space debris that would pose a hazard to the satellites on which African countries rely. Therefore,

African countries should play a role in the progressive development of international norms and rules governing such activities in outer space.

Lastly, let us recall that the theme of this conference refers to a common vision and cooperation among African countries. The recently established African Space Agency is still in its formative stages and there is a need for clarifying the roles and responsibilities of the national space programs versus the continental space program. This is an important point because the space capabilities in Africa reside in industry and the space agencies of the individual countries. A key challenge will be to decide how to harness these national level capabilities in support of the continental level mandate of the African Space Agency in a synergistic manner. The last thing we would want to see is the agency acting independently of the national actors. If all the African space agency becomes is a sort of aggregator for demand for space services that is fulfilled by space actors from outside the continent, then it will have failed in its mission, in my view. Therefore, in your deliberations, I encourage you to think of the role of governance to make the continental-level and national-level space activities mutually reinforcing.

## **SPACE BUSINESS AND ENTREPRENEURSHIP IN AFRICA**

The space sector is growing very rapidly, and a number of African space actors are making their mark on the world stage. For example, there are companies based in South Africa that are providing space hardware products for the international space market.

You can get a sense of the breadth of African private sector activity from the African Space Industry Annual Report. The 2020 edition of this report valued the size of the African space sector at around \$720 million.

The so-called New Space sector has been growing at a tremendous pace worldwide. According to a 2020 study by Bryce Space and Technology, space industry start-ups

attracted \$5.7 billion in financing in 2019, a 62% increase over the \$3.5 billion record set in 2018. About 71% of this \$3.5 billion was venture capital. While the lion's share (nearly 70%) of this money went to four of the largest ventures, namely SpaceX, Blue Origin, OneWeb and Virgin Galactic, the remaining \$745 million was spread among another 130 companies around the world. At the start of the COVID-19 pandemic, there were fears that investment in New Space would dry up, but this appears not to have been the case. I believe that African New Space start-ups can position themselves to attract VC funding, especially if there is a close partnership between universities and these new companies.

Perhaps in your deliberations, under this focus area, you can think of ways that the academic community, government and industry could cooperate to establish and sustain a space ecosystem in Africa.

Speaking of government, the role of government does not end with pronouncing policies that contain broad statements in support of a domestic space industry. Such statements will in and of themselves not attract investment, unless government puts its money where its mouth is and supports and nurtures the development of an indigenous African space industry. This can happen in various ways, such as innovation grants, tax breaks for start-ups, promoting national companies at trade fairs and international conferences, and most importantly procuring the products and services of these companies to help them build product heritage that inspires confidence in potential investors and clients.

## **BIG DATA AND ASTRONOMY**

Africa has some of the world's best sites for ground-based astronomy. This geographical advantage has been leveraged to attract major international astronomy projects, such as the Southern African Large Telescope, an optical telescope in Sutherland, South Africa, the High-Energy Stereoscopic System (HESS), a gamma ray astronomy observatory in Namibia, and the MeerKAT radio telescope in South Africa,

and continent-spanning Square Kilometre Array projects, to name just a few. The complete list of international facilities on the continent would be a long one.

These are all examples of the successful leveraging Africa's geographical advantage of dark skies and good sites for astronomy to attract major international science projects. With these projects comes investment in infrastructure, both scientific and logistical, and an accompanying economic boost to the surrounding areas. But perhaps the most significant investment is in the intellectual capital of the host countries through the development of a highly trained scientific and technological workforce, which can then apply their skills in other areas to promote Africa's development.

But it goes further than this.

These large astronomy projects are Big Data projects that require novel ways to collect, process, store, analyse, and this is the really important part, to systematically extract information from with data sets that are too large or complex, or collected too rapidly to be dealt with by traditional methods. These characteristics of Big Data amplify the collateral benefits of hosting large scientific facilities enormously.

Traditionally, the pursuit of astronomy has not been linked to addressing practical questions of the here and now, but Big Data is one area where astronomy can make real contributions to Africa's development in the short term.

Big data analysis challenges include validation, visualization, querying and updating. The analytical techniques developed to deal with these astronomical data sets and the data processing skills acquired by Big Data practitioners can be used in a very wide variety of practical applications outside of astronomy. Bear in mind that nowadays the number of sources of data is vast and includes mobile devices, information-sensing Internet of Things devices, radio-frequency identification (RFID) readers and wireless sensor networks. Data from these and other sources can be mined using

advanced data analytics methods to identify trends and make predictions with significant societal and economic impact.

Also, there is a convergence of Big Data approaches in different communities. For more than a decade now, astronomers have been developing so-called virtual observatories, with many Big Data capabilities. The Earth observation community has been developing EO data portals and analysis tools and platforms. These developments have been happening largely in independent silos, with one community looking up, and the other community looking down.

For a long time, it has seemed to me that there could be benefit by bringing these two communities together to share best practices and lessons learnt. From a government perspective, investments in Big Data infrastructure might yield more societal dividends through promoting more inter-disciplinary cooperation. Areas that come to mind include fintech, healthcare analytics, smart cities and urban informatics, and business informatics, not to mention a host of scientific applications in areas such as climate change, environmental management, and so on.

Networked projects, like the AVN and SKA bring together people from a wide number of African countries to help build the intra-African cooperation alluded to in the theme of this conference. I encourage you to discuss ways in which to harness the collaboration potentials of the Big Data aspects of these projects to broaden their societal impact.

## **SPACE APPLICATIONS AND TECHNOLOGIES TO SUPPORT THE SDGS**

The next focus area is space applications and technologies to support the SDGs. Many of the SDGs address issues that are intrinsically of a trans-frontier nature, and so meeting these goals will require intra-African cooperation, and smart young people such

as yourselves to figure out solutions to the common problems facing all African countries.

If you have not yet done so, I urge you to visit the Space4SDGs pages on the website of the UN Office for Outer Space Affairs, which provides an excellent overview of the ways in which space applications can support the attainment of the SDGs.

The SDGs are global in scope, but there are many local manifestations of the SDGs in African countries, with unique African challenges. This is one area where smart young space professionals can help to develop creative new space applications that address these SDGs.

When we talk about space applications and technologies to address the SDGs, let us be clear that we are not necessarily talking about building more satellites.

Many of these applications will rely on access to the Big Data sets and analytics that I talked about previously.

African governments should seek ways to support the emergence of African start-ups that focus on providing solutions to these issues, using the data that is already plentifully available.

Speaking of financial support, Africa is replete with examples of successful pilot projects that demonstrate the utility of space applications. The problem is how to sustain these successful projects once the start-up or donor funding for the pilot phase ends. This has been one of the major challenges confronting the operationalization of space applications in Africa and needs attention from African governments and the development sector, such as development banks. I encourage you to give some thought to overcoming the challenges to operationalizing space applications in Africa.

## **THE ROLE OF SPACE TECHNOLOGY IN A POST-COVID 19 AFRICA**

This brings me to the final focus area of this conference, the role of space technology in a post-COVID 19 Africa. To some extent, we are already beginning to enter this phase and today's event is an example of things to come. This event is partly in-person, and partly virtual, with participants from all over the continent and elsewhere. One of the things about COVID-19 is that it has accelerated underlying trends that were already emerging for remote work, telepresence, etc. To me, one of the greatest surprises of the COVID-19 pandemic is just how well the internet infrastructure held up during the pandemic. If you had asked me at the beginning of 2020 whether I thought the internet as it was then would have been able to cope with a situation where a very large fraction of the world's population moved their work and educational activities completely online, I would have been sceptical that the systems in place would have been able to cope with the surge in demand. And yet they did. This has changed fundamentally the way that people think about their work place and the need to travel to attend meetings in person.

In Africa, the vast distances have been barriers to cooperation in the past. The internet has been a great equalizer, providing equal access to the world's accumulated knowledge. It is now possible for Africans to access sources of data and literature that were previously only accessible to people in the most developed countries. Many of you on this call today are too young to have a memory of Africa before the days of the internet and ubiquitous access to information. These shackles of isolation that made it so hard for Africans to keep up with progress and to cooperate with each other have been removed in your generation and you have shown how adept you are at using the new capabilities provided by the ICT revolution. SGAC has been a great example of this and I encourage you to discuss how to build on your experiences of COVID-19 to define a new normal for the role of space technology in post-COVID Africa, where geographical distance is no longer a barrier to effective communication and cooperation.



In closing, I want to remark that Africa is a very rich continent, endowed with many resources, but its dynamic youth is its richest resource. I thank you for the opportunity to deliver these remarks. I wish you fruitful deliberations in the coming two days and I look forward to seeing the outcome of your discussions.

Thank you.