INTERVIEW: DR. MOHAMED ARGOUN

'Bring the Benefits of Space To Developing Countries'

Dr. Argoun: The AfricaSat project is the way for African countries to develop capabilities in space technology by working together to build satellites.

Dr. Argoun is the former director of the space program of Egypt, the National Authority for Remote Sensing and Space Sciences (NARSS). He is currently professor of Aerospace Engineering at Cairo University. After presenting his paper, "Recent Design and Utilization Trends of Small Satellites in Developing Countries," at the International Astronautical Congress (IAC) in Prague, he was interviewed on Sept. 29 by EIR *Washington bureau chief, William Jones, on his proposal for a continent-wide satellite project, to help industrialize Africa.*

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Question: I'd like to ask you about the project you talked about yesterday in your presentation at the IAC. You stated that this project would help bring space technologies to Africa, and expand them to serve as a wedge toward economic development in a very hard-hit part of the world.

The project is called Africasat. This is an effort, or a project, to bring the developing countries in Africa into space technology. Several countries in Africa have tried to build small satellites.

Question: How many African countries involved in space technology are there now?

South Africa is well-advanced in that direction. Egypt has an EgyptSat program. Nigeria has Nigeria-Sat, with two satellites, I believe. And Algeria. Also, Morocco has built a small satellite some years ago.

As I was saying in my talk, in 1990, there emerged a move to get developing countries into the space business. Basically, the theme is to bring the benefits of space to developing countries. One direction of this, was learning space technology, making the engineers, the technical people, acquiring all the ins and outs of this type of thing, thereby enhancing the industry and the scientific research, and the public awareness of space, and eventually, using the applications and the technologies. So this was a technology-oriented type of project, as opposed to an application-oriented type, as opposed to using the images for development, which is another track of space applications.

On the technology aspect, many countries started building small satellites, and especially remote-sensing satellites, simply because they are simpler, easier to build, they don't cost much to launch, and they're smaller in size. So that is a way of getting into space technology without getting into very large satellites. For most of these countries, the years between 1992 and 2002, approximately, during that period of 10 years, became the period of launching many small satellites. It was pioneered by companies in the United Kingdom and in South Korea, who offered the technology to these countries, through cooperation and training programs.

The point is, that after a while, government support for these programs became less enthusiastic.

Question: Is that because of the expense?

Because of the expense. Also these countries don't have a very strong industrial base in high-tech. Therefore, these space programs exist generally as an island in the industrial space of these countries. It's difficult to support this and keep it going, because in order to keep it going, you need a lot of input from a strong industry. Governments support these programs because they promise a lot of industrial development particularly, but the economic return is kind of slow in coming, because the infrastructure for using space technology or space applications in these countries is not very strong.

You have satellites and they have advantages, but nobody uses them as much as they do elsewhere. So the satellites are there, but the satellites are only a tool of the technology.

When you come to second-generation satellites, then you have a gap of government support. And this threatens the initial successful move of getting these countries into an initial industrial stage, basically through space technology. They begin to wonder—these things are difficult, they can't be done, they

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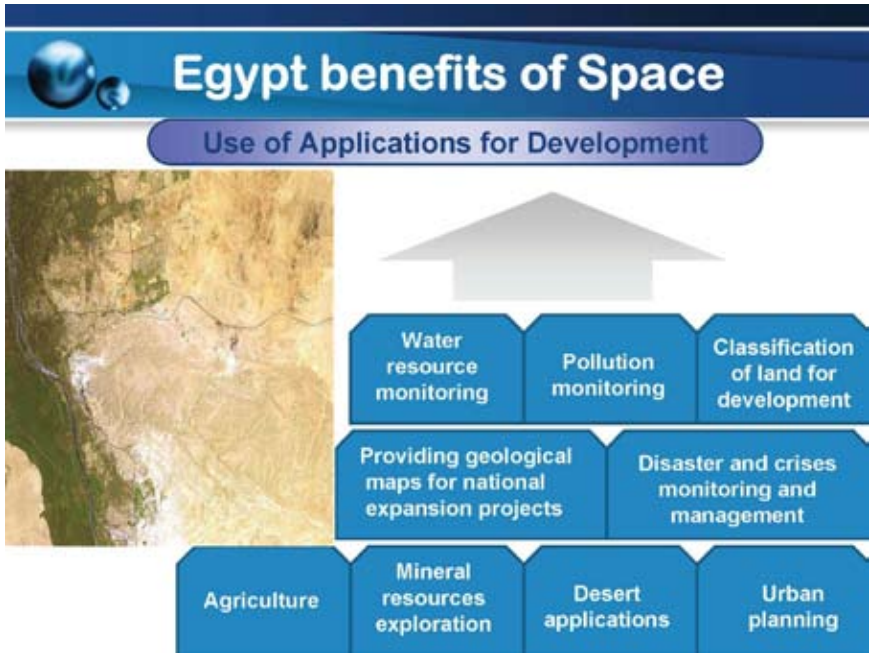
EgyptSat-1, here in an artist's drawing, is a minisatellite project of Egypt's NARSS (National Authority for Remote Sensing and Space Science) and the Yuzhnoye State Design Office of Ukraine. Yuzhnoye provided technical expertise, on-the-job training, and technology transfer to 60 Egyptian engineers and experts. EgyptSat-1 was launched in April 2007 from the Baikonur Cosmodrome.

haven't the background or the education in these countries, and so on. But, if you make a satellite, you can eventually make anything else. It is a way of transforming these developing countries into an industrialized country, in a way.

So when the interest wanes or fades a bit, these programs stop, many of them, or at least slow down. So the idea I was promoting in the AfricaSat project is that the way for these countries to continue getting into space and developing capabilities in space technology is to continue building satellites. But there is no need to build a satellite for each country, and have every country working on everything. We can achieve the same objectives, and much more efficiently, if all these countries join into building one satellite, and every country contributes in whatever area it wants to contribute.

Question: Can you give an example?

If a certain country has a particular interest, or a particular development in the communication area, they can design the communications system and build it. If some other country is in materials, they can work on the structure. So each country chooses that, and they get the benefit of the choice they make.



An illustration from Dr. Argoun's presentation to the Space Presentation Environment Conference in Cairo, May 2008.

This is similar to what happened in Europe, where the countries of the European Space Agency concentrate on the area they like, and everybody builds infrastructure in the area they want to develop inside their country, but they all participate in the global project. It's similar to that in Africa. And space by its nature is a collaborative effort. Even the satellite itself does not see borders, and new information flows freely in this area. Even in building satellites, it's much more efficient and much more economical if you do it as a collaborative effort.

So, what we are suggesting is that the project be under the United Nations umbrella, because the United Nations was the one that initiated the UNISPACE-III Conference, which was held in 1999, and really supported this. They encouraged advanced countries to transfer technology for space for peaceful purposes to underdeveloped countries. They encouraged underdeveloped countries and governments to get into this. And actually they are still organizing all these workshops to support these types of endeavors.

So, we are suggesting that under the umbrella of the U.N., there be formed a consortium, or a group of willing countries and willing entities, that together will help build a satellite, over the long run, for Africa. And of course, it will be directed at the benefit of the African countries, not only in terms of technology, but also images and applications and the like. And eventually, two things will happen. The countries will have the knowledge and the know-how, and they will have a system that brings these countries together for major projects.

One of the problems in countries in Africa is that they do not cooperate effectively and there's no system for flow of management and information and working together. So, if you do a project like this and succeed in making it happen, then you unclog a lot of things.

Question: How do you take this technology, perhaps relating to the Egyptian experience, in order to create a technical cadre which might have a more general benefit for the nation economically?

This was one of the regional objectives for the space program when we proposed it. And that is, if you accept and succeed in implementing this program, it gives you a certificate of quality for your products and your processes that is valid everywhere in the world. In a way, space technology has certain features, that if it infiltrates into the local industry, it raises the quality level significantly.

NARSS

EgyptSat-1 being assembled in the nose cone of the Dnepr launcher, along with other payloads.

Things like deadlines. The planning of space takes a lot of planning: Every move is carefully planned and timed very accurately. The quality of the materials, the inadmissibility of error in processes. If you bring these concepts, and do these projects with the local industry, then you raise the standard of that industry significantly. And if you succeed in the final product, then, as I said, you get the certificate of quality to expand. If Egypt makes satellites with their own people, then nobody will be worried about importing from them.

So to do this, we should realize that satellite-making is in a narrow strip of the industry. We are talking about a sector in Egypt that has 100 or 150 people working in it, and perhaps will become several thousand. It's not like a major industry. But, in certain areas of the industry, in electronics, in consumer products of a higher level, it's instrumental. It can change things.

So, what we tried to do is get the components and the parts of the satellites to be manufactured in Egypt under license. We succeeded in making a few, not many, components. We planned originally in the EgyptSat program to build eight components, and we succeeded in three. So there is a degree of success. It's just a general concept, to bring in the benefits of space technology to industry, to scientific research institutions, to universities, and to the common people. We realize that this is not a great number of people involved, but it is important.

iinitiative.wordpress.com/category/satellites/

Government representatives signing a memorandum of understanding, during the Third African Leadership Conference on Space Science and Technology for Sustainable Development, in Algiers, in December 2009. The African Resource Management Constellation involves an initial collaboration of Nigeria, South Africa, Kenya, and Algeria around sharing of satellite data.

DesertSat

Question: Now you have developed EgyptSat-1 and are working on EgyptSat-2, and then you will begin on DesertSat. Tell me about DesertSat and how you intend to utilize this. Obviously, this would be of service in dealing with that other major problem for Africa, which is water.

What we have in the Egyptian space program is the third satellite. We have had one every five years, but with a higher degree, an increasing degree, of local participation in each one. So we had 50 percent in the first one, where we were learning and getting the training, and so on; 60 percent in the second one; and we will have 85 percent and higher in DesertSat. EgyptSat-1 was launched in 2007, EgyptSat-2 was supposed to be ready in 2012, and 2017 for DesertSat.

Now the idea of DesertSat, is that Egypt, and Africa actually, have certain characteristics of its land—of course, it is desert. So what you need in a satellite to explore the desert is different from what you need in an education-type satellite or in an eyesight satellite, as in Canada. The sensors, or the scanners, which are the exploring vehicles of the satellite, will have different features, will look for different things.

What you look for in the desert is, as you mentioned, basically the water, traces of water, and possibly oil. And formations of minerals, and that kind of wealth. So we are looking at the spectral stamp of these phenomena and trying to make the sensor more sensitive to these than it is, for example, to ocean water.

One thing, for example, in looking for water: You would look for temperature, because if there is water in an area inside the desert, in a pool somewhere, but underground, what happens, is that the sand in that area might be slightly wetter, slightly cooler than the other sand. So you have to have a sensitivity to this differential in the temperature. This is what we're hoping—to get the sensor designed and built by that

Courtesy of Dr. Mohamed Argoun

The Aswan receiving station for EgyptSat.

NARSS

EgyptSat image of Cairo.

time and fly it on DesertSat, and use that to map the desert in a different way. That was our objective with DesertSat.

We are now are also working to try to design sensors at Cairo University, where I am now doing some research work, in that direction, and also trying to get international cooperation on these kind of operations.

It's interesting. We see this wealth of the desert, if you look at it in one way; and it is a big problem, if you look at it differently. And we have to utilize that in some way and this is one of the ways we can do that.

Question: Tell me about the development of your space technicians. Initially, with EgyptSat-1, you sent out your people to Ukraine for training. How many were there at that time?

There were 64. And there are another 60 or so who have entered the program.

Question: Can you see the point where you would have the internal resources to build your own cadre independently?

Certainly, I should think 64 is a large number for this type of work. When we first envisioned the project, and talked with many of the companies in the country, we talked about 20 or so. But our objective was different. It was to get a larger number and to use them, as I said, as a fertilization for other groups.

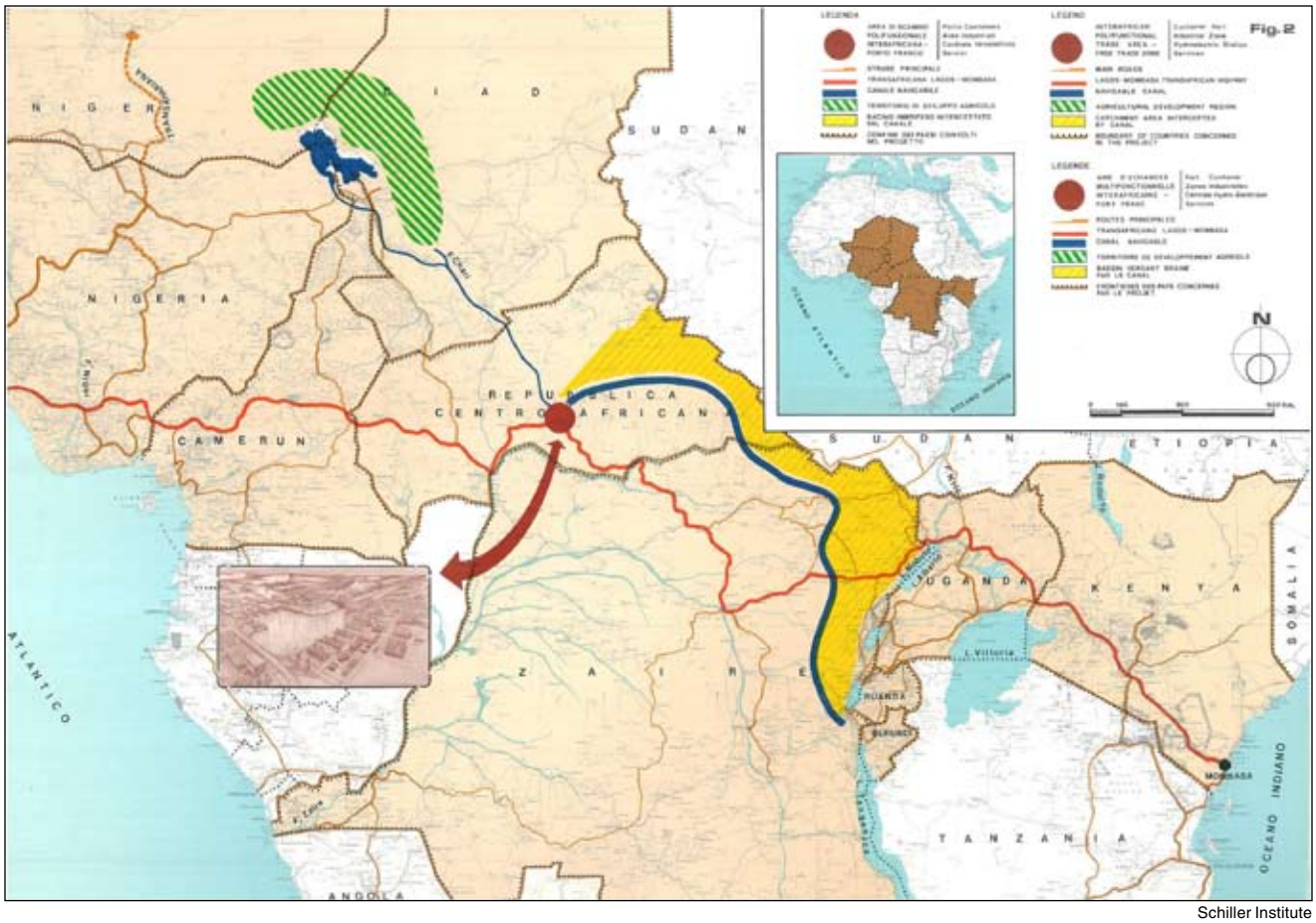
So for EgyptSat-2, a number like 300, or maybe around 240 specialists, would not be a large number. It's about what is needed. Because the 60 were just learners, but behind them was all of Ukraine's space industry. You can't transfer all of that with 60 people. So we need to increase the Egyptian team for EgyptSat-2 to the range of 200 or 240. And that's happening slowly but surely.

Question: Is the proposal for AfricaSat coming from the Egyptian government?

No, it is actually coming from industry people, from people like myself who are interested in space. And we would like to get government and non-government organizations, research centers, and companies to participate in building this, but under the auspices of the United Nations, so as not to lose the initial effort that was done in building the first satellites in all

GFSC/NASA

A 2004 NASA image of a dust storm and Lake Chad (the olive green area). Egypt's DesertSat will be designed to specialize in viewing desert terrain, in particular searching for underground water.



Schiller Institute

The development of the Lake Chad basin is one part of the huge Transaqua project, which would bring water from the Congo to replenish Lake Chad and reverse the desertification of the area. Lake Chad is in the upper left of the map, straddling the borders of Niger, Chad, the Central African Republic, and Nigeria.

these countries. Because, as I said, the states need much more of a push than was needed at first. And collaboration can ease the burden on each country.

Question: And what is the level of cooperation between the African countries in this field today?

It does not exist.

Question: Then perhaps the International Astronautical Congress, which will be held in Capetown, South Africa next year, may be an occasion to push forward this proposal?

We should start talking about it and getting some support for the idea, and hopefully it will eventually have enough support to form some active groups to start the planning process.

The Transaqua Project

Question: The LaRouche Political Action Committee, and *EIR* magazine, have recently relaunched the Transaqua project, to divert water from the Congo River to revive Lake Chad as the source of water for the Sahara region, and to use this project to begin to win back much of the area that has been lost to desertification. This is part of the global extension of the North American Power and Water Alliance [NAWAPA] project, being organized in the United States.

About creating a new basis of water in the African desert: The problem is evaporation. The heat in that area is absolutely the highest temperature in the world. Actually, there is an environmental model that was built at Cairo University, and it shows that the heat, the temperature—this is the hottest spot on the planet, in the area near Aswan.

The rates of evaporation are very high, to the extent that you cannot use water spray efficiently, because while you are spraying, a lot of the water simply evaporates. The surface of the particles in small balls of water atoms are flying around, and then, the temperature affects the atoms. So the temperature effect is very serious.

The projects for transporting the water are still viable, but they have to be in closed canals, in closed pipes, basically underground. There is only a limited amount of water that arrives in this area, basically coming from Nile sources, and a lot of it is lost with that vapor. Therefore, the investment really becomes putting this in closed pipes. And pipes are the way of doing it. If you do that, and you put that into deep lakes, rather than shallow lakes, then you can reduce the evaporation. So this is different engineering in looking at the problem. But still it can be done.

Definitely, you can bring these areas to life with water.