

# The Challenges of New Territories: Space, the Arctic, and the World Ocean

## KEY CONCLUSIONS

### **The development of new territories makes it possible to find unique technological solutions and create fundamentally new products**

“We are gaining truly amazing new knowledge about what is at the ocean’s depths. It is a storehouse of mineral resources, huge reserves of hydrocarbons, and huge reserves of biological resources that exceed those on land by several times”, Russian Academy of Sciences Vice-President Andrey Adrianov said.

“Ocean resources are a strategic reserve and strategic resource for future generations”, Adrianov said.

“By the 2030s, we will start to develop asteroids. There are a number of interesting technologies – robots, space drones, CubeSats”, Technology Transfer Center General Director Sergey Zhukov said.

“We need to build new research vessels and conduct complex expeditions, when geologists, climatologists, oceanologists, biologists, chemical hydrologists, etc. all work together [...] The world ocean is a living space with which the future of mankind is connected. No matter how seemingly endless this resource seems to us, we need to develop a strategy for a careful approach to and the careful future of its exploitation”, Adrianov said.

## PROBLEMS

### **The lack of the necessary infrastructure to develop hard-to-reach sites**

“We still don’t have high-speed Internet in the north and there is no reliable connection that would allow us to manage air transport and mobile transport from space”, Zhukov said.

“Almost 400 mineral deposits have already been discovered in the Arctic territory of Yakutia. Of this amount, almost 300 deposits are located in the unallocated subsoil fund, and the main reason they aren’t being developed is the lack of sufficient infrastructure to start developing these deposits”, First Deputy Prime Minister of the Republic of Sakha (Yakutia) Aleksey Struchkov said.

“Today, the quality of the Internet in the Arctic and northern regions does not meet the requirements of our times. When we talk about the digitalization of the economy and launching projects related to the digital economy, we must first talk about infrastructure and the infrastructure of the Internet as well. And the cost of traffic is the determining or main factor in this regard. For the most part, all our servers work through satellites, which are very expensive. In this regard, the use of new technologies and new satellites [...] would allow us to further step up our actions in the application of the Internet and transition to a digital economy”, Struchkov said.

### **Disruptions in natural ecosystems due to the unsustainable use of resources**

“Even technologically advanced countries are not ready to carry out the large-scale development of, say, minerals in a manner that is optimal and cautious with respect to the ocean’s ecosystems [...] Ecosystem research is needed above all else. It is essential to understanding how, for example, deep-water ecosystems function so that we can make an informed choice [...] We need to develop modern technical means, specifically underwater robotics, and there has been very good progress here [...] The Institute of Marine Technology Problems, which faces these tasks, is able to design effective underwater robotics that are already producing the new knowledge we need about deep-sea ecosystems and resources,” Adrianov said.

“For now we aren’t even able to meet the most primitive challenges, such as the plastic pollution of the world’s oceans, for example. We see how phenomena are appearing that had been absolutely impossible in the past, such as the Great Pacific garbage patch [...] We have already had a shortage of places for accommodation in a number of orbits”, said Dmitry Peskov, Special Representative of the President of the Russian Federation on Digital and Technological Development and Director of the Young Professionals section at the Agency for Strategic Initiatives

### **Insufficient level of technological development**

“We still don’t have sufficiently advanced machines, for example, to extract mineral resources from the ocean’s depths. Underwater engineering is a completely new industry that is just now emerging in certain countries that are experiencing a shortage of commodities and are trying to find these resources in the depths of the world ocean”, Adrianov said.

“At present, the level of technological development does not allow us to reliably and safely explore the Arctic zone or explore the oceans and space”, Peskov said.

## SOLUTIONS

### **Sustainable use of resources and preventing the pollution of the ecosystem**

“We need breakthrough studies, bridgeheads, and competent pilots. The spatial challenge is directly related, for example, to the climatic challenge, but I think it would be a good idea to stop and think about where we are going [...] Economic logic can’t be the only kind of logic for the appropriate development”, Peskov said.

### **Development of human capital**

“The university is the place where everything that is new in the world is concentrated. FEFU has three priority challenges. We are moving in all directions – with the Academy of Sciences and we have independent initiative projects. Because a new market and a new challenge means new problems, but these are also new opportunities”, Far Eastern Federal University (FEFU) Vice Rector for Research Kirill Golokhvast said.

“I firmly believe that the future of Russian cosmonautics is not only connected with the Vostochny launch site, but also with the potential design capacities and minds of FEFU, Pacific National University, and others, and with the production of missile carriers in Komsomolsk”, Zhukov said.

“We have to learn how to create teams that are not bound by spatial barriers. In order to get a proper grasp of space, we need to learn how to reject space, and we need to understand where the person is who will bring about the greatest benefit in your project or on your team when implementing the corresponding project”, Peskov said.

### **Development of modern technologies**

“We already have several regions where we are working – to varying degrees with state support or not always with state support – on the challenges of a digital model of the territory [...] We are ready to come to the Far East and make a digital model with 3D coordinates of the territory”, Zhukov said.

“We need to utilize the opportunities of the Far East and its engineering potential in order to create unmanned systems here”, Zhukov said.

“As for the Arctic, we need robotic means above all else because it’s an extreme habitat for humans [...] We need technical means here that can replace a person”, Adrianov said.