Science Organizations in Alliance to Tackle Common Challenges

The morning of November 4, 2018 witnessed the inauguration of an organization of organizations in Beijing: over 40 national, regional and international scientific and research institutions vowed to act in synergy to deal with common challenges facing "Belt and Road" (B&R) region countries with science, technology and innovation (STI).

Initiated by the Chinese Academy of Sciences (CAS), the newly launched Alliance of International Science Organizations (ANSO) in the B&R Region is expected to play a key role in pooling STI resources from involved nations to propose and implement cooperative programs that target issues of their common concern.

Chinese President XI Jinping sent a congratulatory letter to the launching ceremony of ANSO, saying that promoting cooperation in science and technology among countries constituted an important part in building B&R, and played a positive role in improving people's livelihood, promoting development and coping with common challenges.

He expressed the hope that scientists from different countries can make full use of the alliance as a platform to carry out major science and technology cooperation, foster more talented people in innovation and entrepreneurship and enhance innovative ability in science and technology.

XI also called on scientists to make contributions to promoting people-to-people communication and sustainable economic and social development, the building of a green and innovative path for development and building a community with a shared future for humanity.

In his address to the opening ceremony, BAI Chunli, president of CAS and president of the newly launched organization, emphasized that ANSO aims to address a broad spectrum of issues ranging from environmental and climate change, biodiversity, to epidemics and infectious diseases.

The alliance will help further improve science exchanges and collaboration among B&R countries, BAI said.

According to BAI, CAS has built nine overseas science and education centers and carried out more than 100 scientific collaborative projects conducting research on the environment, resources, biodiversity, health and new drugs with countries and territories along B&R since 2013.

The alliance will publish consulting reports based on joint efforts, so as to provide scientific advice to governments and policymakers of the B&R countries. It will also help train young scientists and grant awards to promote cooperation among scientists and scientific institutions under the B&R Initiative.

The ceremony was also the opening of the second international seminar of B&R science and technology innovation.

CAS Researchers Significantly Contribute to Lunar Exploration Mission

On January 3, 2019, the Chang'e 4 probe sent back photos of the Von Karman crater in the South Pole-Aitken basin, after its successful soft landing, the first ever by a man-made vehicle, on the surface of the far side of the moon. This feat was hailed as opening a new chapter in mankind's lunar exploration.

Joining hands with their collaborators, CAS researchers have made important contributions to the lunar exploration mission. For instance, the research and development of its ground application system was led by the National Astronomical Observatories, Chinese Academy of Sciences (NAOC), which was in charge of deliberating and presenting the system's science objectives, making scientific exploration plans of the payloads aboard the Chang'e 4, monitoring the payloads' operation, receiving, processing and explaining scientific exploration data, managing and releasing the data, and their applied research.

In addition, the payloads carried by the lunar probe were mainly developed by CAS researchers. For instance, the lunar penetrating radar (LPR) and the very low frequency radio spectrometer (VLFRS) were designed by the CAS Aerospace Information Research Institute (AIR). Both of them began their operations successfully after the soft-landing of the lunar probe, making China the first country conducting radio observation on the far side of the moon and filling the scientific gap of radio astronomical observations at the frequencies between 100KHz~10MHz.

Furthermore, the orbit measurement of the lunar probe was conducted by research teams headed by the CAS Shanghai Astronomical Observatory using very long baseline interferometry (VLBI). The VLBI orbit determination system is composed of different CAS telescopes located in various places, including the Tianma 65m Radio Telescope in Shanghai, the Miyun 50m Radio Telescope in Beijing, the Nanshan 25m Radio Telescope in Xinjiang, and Kunming radio telescope in Yunnan.

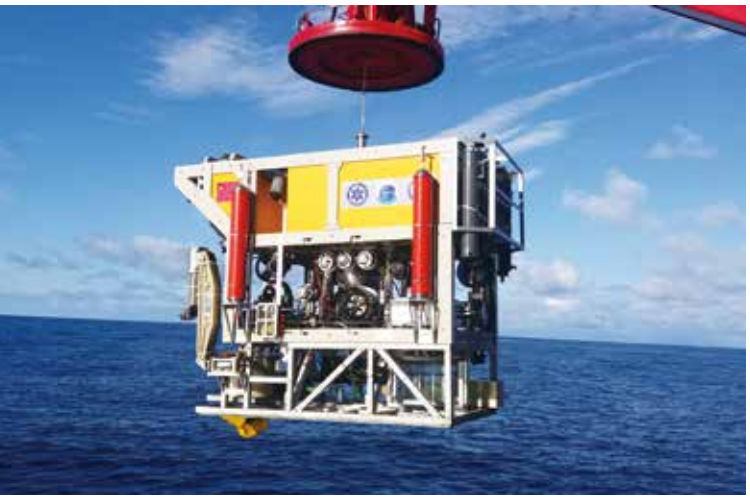
Dark No More: One of the pictures sent back by Chang'e 4, a lunar probe of China, shows a view of the lunar surface from its landing site, the Von Karman crater in the South Pole-Aitken basin of the far side of the moon. Shot by cameras carried by the probe's lander, the pictures mark the first images taken from the far side of the moon. Chang'e 4 started its journey to the moon on Dec 8. (Credit: CLEP/CNSA)

Last but not the least, more than 20 kinds of key materials developed by CAS researchers were employed for the carrier rocket, the inspector and lander of the lunar prober.

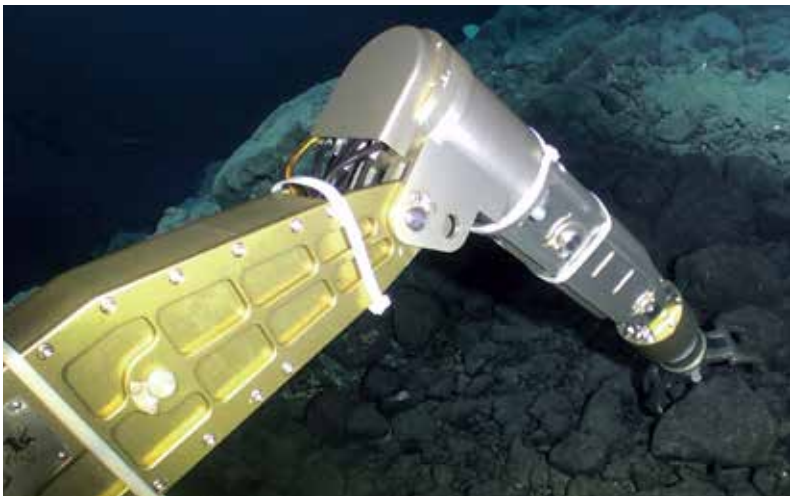
China's ROV Completes a Record 6,000-meter Dive

While performing its maiden mission in a recent scientific survey in the West Pacific, a domestic ROV (remotely operated vehicle) system achieved a national record by diving 6,001 meters underwater.

Named SeaStar 6000, the system was produced



SeaStar 6000 during application (Credit: SIA)



SeaStar 6000 collecting rock samples from sea bottom (Credit: SIA)

by researchers from the CAS Shenyang Institute of Automation (SIA) in cooperation with their colleagues from the CAS Institute of Oceanography.

According to Prof. LI Zhigang, director of the Marine Robotics Department of SIA, over the past two and a half years researchers have overcome many technical challenges such as real-time monitoring and management of over-length armored cables, medium-frequency high-voltage power transfer of adaptive voltage compensation over a long distance, and precision hovering near the seabed.

During the 26-day survey, begun Oct.1, 2018, the SeaStar 6000 completed scientific tasks in cooperation with a deep-sea lander and a Raman spectrometer in a 1,100-meter dive. It also completed three 2,000-meter dives in succession, collecting a total of 400 kilograms of rock samples from the bottom of a West Pacific area, with the largest sample weighing 61 kilograms. In a three-hour 6,000-meter dive, SeaStar 6000 successfully performed a variety of scientific assignments including navigation and observations, biological research, and mud and water sample collection.

The development of SeaStar 6000 is supported by the Western Pacific Ocean System: Structure, Dynamics and Consequences (WPOS), a CAS pilot strategic program. Focused on the Western Pacific Ocean system and its adjacent seas, the program is to carry out a comprehensive and collaborative investigation and research from the perspective of 'ocean system', with the objective of developing a deep understanding on such research issues as the influence mechanism of the Indo-Pacific Warm Pool on the climate system of the East Asia and China, the evolution pattern of coastal ecosystems under the influence of the adjacent oceans, and the environment and the resources distribution of the Western Pacific deep sea. In addition, the program aims to promote the development and application of deep-sea research detection equipment.

A ROV is a tethered underwater mobile device. ROVs are common in deep-water industries such as offshore hydrocarbon extraction. They are also used extensively by the scientific community to study the ocean.

Since the late 1970s when the development of ROVs began in China, SIA has been a key player in the area. Over the years, SIA has created several firsts in the field of underwater robotics in China. Its current research and development are conducted in the following areas: rescue and recovery equipment, maritime survey, deep-water oil and gas engineering, marine scientific instruments, and other applications. Various kinds of marine equipment have been successfully developed, including remotely operated vehicles, autonomous underwater vehicles, autonomous & remotely operated underwater vehicles, and underwater manipulators. Most are maintained in running order and are quickly deployable.