

# 面向深海资源勘查的“潜龙”系列自主水下机器人研发与应用

## 成果简介:

深海资源勘查是建设海洋强国的核心任务，是实现国家可持续发展的重要保障，亟需研发能在深海自主勘查的水下机器人(AUV)新装备。团队立足自主研发，突破了适于复杂地形的高机动航行控制方法、高质量多元数据处理与融合、新型半自动化布放回收等关键技术，成功研制了具有自主知识产权的“潜龙”系列深海AUV，填补了深海资源自主调查装备的空白，并广泛应用于多金属结核、多金属硫化物、富钴结壳、可燃冰等多种深海矿产资源的大范围精细勘查，是我国深海资源自主勘查技术引领者和装备唯一提供者，在推动深海资源勘查中发挥了不可替代的作用。

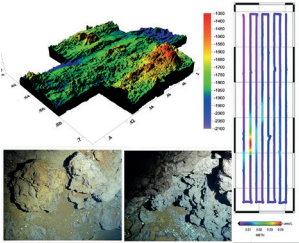
## Introduction:

Deep-sea resource exploration is the core task of building a strong ocean state and an important guarantee for the sustainable development of the country, and there is an urgent need to develop new equipment of autonomous underwater vehicles (AUV) that can conduct autonomous exploration in the deep sea. Based on independent research and development, the team has broken through the key technologies such as high mobility navigation control method suitable for complex terrain, high quality multi-data processing and fusion, new semi-automatic launch and recovery, and successfully developed the Qianlong AUV of deep-sea with independent intellectual property rights, which has filled the gap of deep-sea resources autonomous survey equipment and is widely used in the large-scale fine exploration of polymetallic nodules, polymetallic sulphides, cobalt-rich crusts, combustible ice and other deep-sea mineral resources, and is the leader of China's independent deep-sea resource exploration technology and the only provider of equipment, playing an irreplaceable role in promoting the exploration of deep-sea resources.



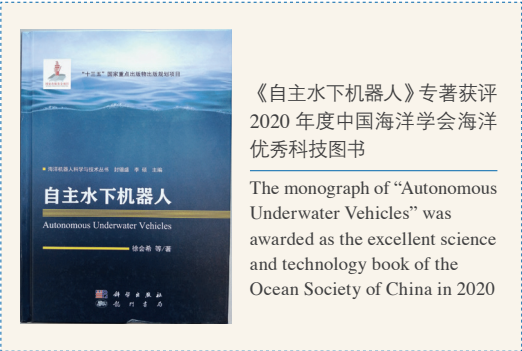
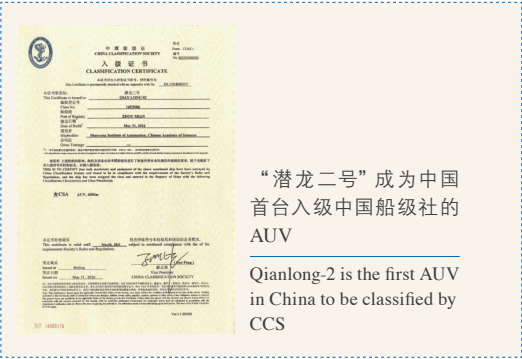
《开讲啦》，“潜龙二号”总设计师刘健开讲：我们为什么探索海洋

“VOICE”, Liu Jian, the general designer of Qianlong-2, talked about why should we explore the ocean



“潜龙”AUV 近海底地形、水体、拍照成果

Qianlong AUV exploration results, include the near the sea floor topography, water bodies, photos



2014 年，“潜龙一号”项目组获中国自动化领域年度团队奖  
In 2014, Qianlong-1 project team won the annual team award in the field of automation in China



2018 年，“潜龙”AUV 成果获得海洋工程科学技术奖一等奖  
In 2018, Qianlong AUV won the first prize of Ocean Engineering Science and Technology Award

## Development and application of “Qianlong” AUV for deep-sea resource exploration

### 推荐单位 / Recommended Unit

中国科学院沈阳自动化研究所  
Shenyang Institute of Automation, Chinese Academy of Sciences

### 完成单位 / Accomplished Unit

中国科学院沈阳自动化研究所  
Shenyang Institute of Automation, Chinese Academy of Sciences

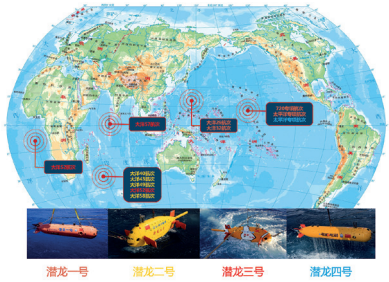
### 合作单位 / The Main Cooperation Unit

中国科学院声学研究所  
Institute of Acoustics, Chinese Academy of Sciences



2016 年，“潜龙一号”参加第二届军民融合展，受到习近平总书记高度关注

In 2016, Qianlong-1 participated in the Second Military-Civilian Integration Exhibition and received high attention from Secretary-General Xi Jinping



“潜龙”AUV 执行大洋航次遍及太平洋、印度洋、大西洋

Qianlong AUV performed cruise in the Pacific Ocean, Indian Ocean and Atlantic Ocean



2016 年，“潜龙二号”参加国家“十二五”科技创新成就展

In 2016, Qianlong-2 participated in the National 12th Five-Year Plan Science and Technology Innovation Achievement Exhibition



“潜龙二号”在西南印度洋执行大洋 49 航次任务期间，成功完成第 50 次深海下潜

Qianlong-2 successfully completed its 50th deep-sea dive during COMRA 49th cruise in the southwest Indian Ocean



团队成员 / Team Members:



刘 健  
Liu Jian

中国科学院沈阳自动化研究所  
主要贡献：“潜龙二号”、“潜龙三号”总设计师，系统集成、关键技术研发。

Shenyang Institute of Automation, Chinese Academy of Sciences  
Main contributions: General designer of “Qianlong-2” and “Qianlong-3”, system integration, key technology research and development.



徐会希  
Xu Huixi

中国科学院沈阳自动化研究所  
主要贡献：“潜龙一号”、“潜龙四号”总设计师，“潜龙二号”副总师，系统集成、关键技术研发。

Shenyang Institute of Automation, Chinese Academy of Sciences  
Main contributions: General designer of “Qianlong-1” and “Qianlong-4”, deputy general designer of “Qianlong-2”, system integration, key technology research and development.



李 硕  
Li Shuo

中国科学院沈阳自动化研究所  
主要贡献：构建研发技术体系，总体技术方案的设计与指导，策划航次应用。

Shenyang Institute of Automation, Chinese Academy of Sciences  
Main contributions: Build the R&D technology system, design and guide the overall technical scheme, and plan the cruise application.



赵宏宇  
Zhao Hongyu

中国科学院沈阳自动化研究所  
主要贡献：“潜龙二号”副总师，总体设计、试验和应用。

Shenyang Institute of Automation, Chinese Academy of Sciences  
Main contributions: Deputy general designer of “Qianlong-2”, overall design, test and application.



张东升  
Zhang Dongsheng

中国科学院声学研究所  
主要贡献：声学系统负责人，声学系统集成及工程应用。

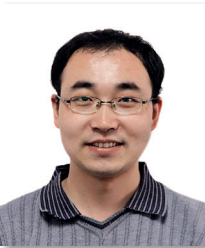
Institute of Acoustics, Chinese Academy of Sciences  
Main contributions: Head of acoustic system , acoustic system integration and engineering application.



许以军  
Xu Yijun

中国科学院沈阳自动化研究所  
主要贡献：控制系统硬件负责人，关键技术研究，工程开发与应用。

Shenyang Institute of Automation, Chinese Academy of Sciences  
Main contributions: Head of control system hardware , key technology research, engineering development and application.



徐春晖  
Xu Chunhui

中国科学院沈阳自动化研究所  
主要贡献：控制系统软件负责人，关键技术研究，软件开发与航次应用。

Shenyang Institute of Automation, Chinese Academy of Sciences  
Main contributions: Head of control system software , key technology research, software development and cruise application.



王轶群  
Wang Yiqun

中国科学院沈阳自动化研究所  
主要贡献：软件设计，控制与导航技术研发。

Shenyang Institute of Automation, Chinese Academy of Sciences  
Main contributions: Software design, control and navigation technology development.



石 凯  
Shi Kai

中国科学院沈阳自动化研究所  
主要贡献：硬件设计，关键技术研发，试验与应用。

Shenyang Institute of Automation, Chinese Academy of Sciences  
Main contributions: Hardware design, key technology R & D, test and application.



王晓飞  
Wang Xiaofei

中国科学院沈阳自动化研究所  
主要贡献：载体系统负责人，关键技术研究，工程设计，航次应用。

Shenyang Institute of Automation, Chinese Academy of Sciences  
Main contributions: Head of carrier system, key technology research, engineering design, cruise application.