

Memorabilia

2017

On October 23, 2017, R/V TTK became China's first research vessel that obtained the DNV SILENT certificate.



2018

From April 2 to 10, 2018, French research schooner Tara called at Xiamen on its first-ever mainland China tour. A joint open house was organized onboard Tara and R/V TTK.



On May 16, 2018, the 30-day SCS DEEP exploration was successfully accomplished, which was also the first ROV cruise onboard R/V TTK.

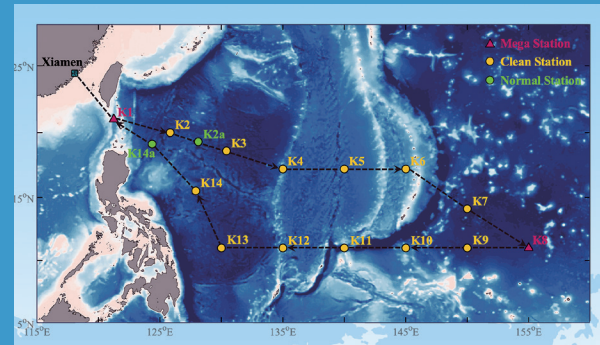


In July 2018, the first "XMU at Sea" undergraduate training cruise was implemented onboard R/V TTK.



2019

On June 13, 2019, the first GEOTRACES-China expedition to the western North Pacific (KK1903) was successfully accomplished. Thirty-six scientists from 6 domestic and 4 international research institutes participated in the cruise.



On June 15, 2019, the premiere of documentary film "Research Vessel TAN KAH KEE" was held at XMU Xiang'an campus.



On August 15, 2019, R/V TTK paid her first foreign port visit during the second leg of "XMU at Sea" undergraduate training cruise. The open-house to Malaysian public was held with big success during the port call.

2020

In June 2020, "Teacher at Sea onboard R/V TTK" program was officially launched during the KK2002 cruise.

In Honor of Tan Kah Kee

Construction began in March 2015, launched and named in May 2016, officially delivered and put into service in April 2017, research vessel Tan Kah Kee (R/V TTK) is one of the most advanced and versatile research vessels in China. The new vessel was named in memory of our great founding father, the renowned patriotic overseas Chinese leader Mr. Tan Kah Kee, who established XMU in 1921. Since then, having a modern, highly capable research ship has been a century-long dream for generations of XMU's oceanographic community.



Mission

R/V TTK's mission is to provide the best possible facility, technical and operational assets to meet seagoing scientific and educational mission requirements of academic community.

Vision

S AFETY

E FFICIENCY

A DVANCEMENT



Channel

<https://ships.xmu.edu.cn/>



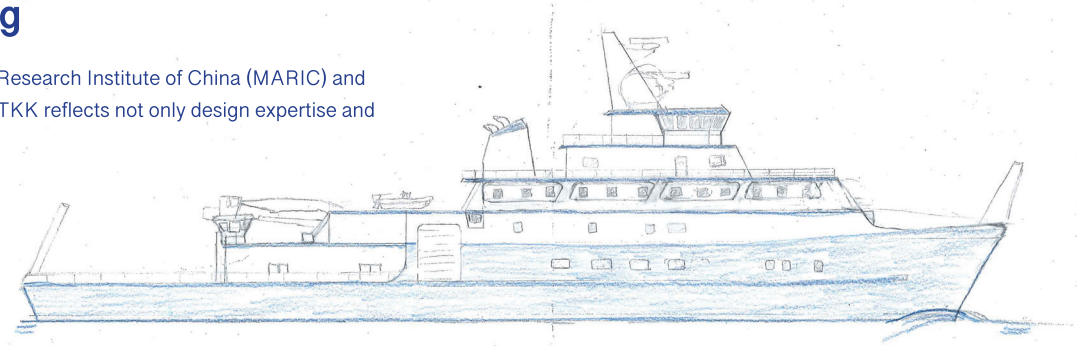
Research Vessel Tan Kah Kee



THIS BROCHURE WAS PRINTED ON 100% RECYCLED PAPER

Timeline of Shipbuilding

With joint efforts of Glosten, Marine Design & Research Institute of China (MARIC) and Guangzhou Shipyard International (GSI), R/V TTK reflects not only design expertise and customized facilities, but also a successful, international, and integrated collaboration.



2012

May 10, 2012: Signed preliminary design contract with Glosten.

November 2, 2012: Signed detailed design contract with MARIC.



2015

March 31, 2015: Plate-cutting ceremony at GSI shipyard.

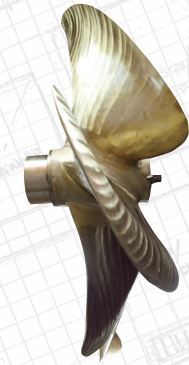


November 26, 2015: Keel-laying ceremony (Hull No.: 13130076).



2016

May 8, 2016: Launching and naming ceremony.



2017

April 15, 2017: Delivery ceremony in Xiamen Port.



Outreach

R/V TTK has been proactively utilized as an ideal platform to fulfill her responsibility of extending the scope for ocean sciences, and to increase public awareness of ocean protection.

Since the delivery, all previous open houses onboard R/V TTK have attracted extensive public participation. In 2018, French research schooner Tara called at Xiamen on its first-ever mainland China tour. During the visit, a series of outreach activities were jointly implemented, such as "a live broadcast of Tara's arrival", cultural lectures, marine science exhibitions as well as public open house.



In 2019, during R/V TTK's first call at Port Klang, Malaysia, a two-day public open house was held, which played a unique role in deepening academic cooperation and exchanges between China and countries in South-East Asia. This was the first time that a Chinese scientific research vessel was opened to Malaysian public.



On June 15, 2020, the first online lecture of "Teacher at Sea onboard R/V TTK" initiative was officially launched, and its total coverage on the Internet exceeded five million hits.

By offering seagoing opportunities to teachers, this program provides first-hand ocean science knowledge to K-12 students through this unique at-sea classroom. Beginning in 2020, one or two teachers from all over the country will be selected to attend the "Teacher at Sea" program. They will take an expedition at sea onboard R/V TTK and offer live online courses about ocean science and technology. This is also an exercise to echo the pioneering contributions made by Mr. Tan Kah Kee, the founding father of XMU, who devoted himself to China's education over a century ago.





Scientific Working Areas

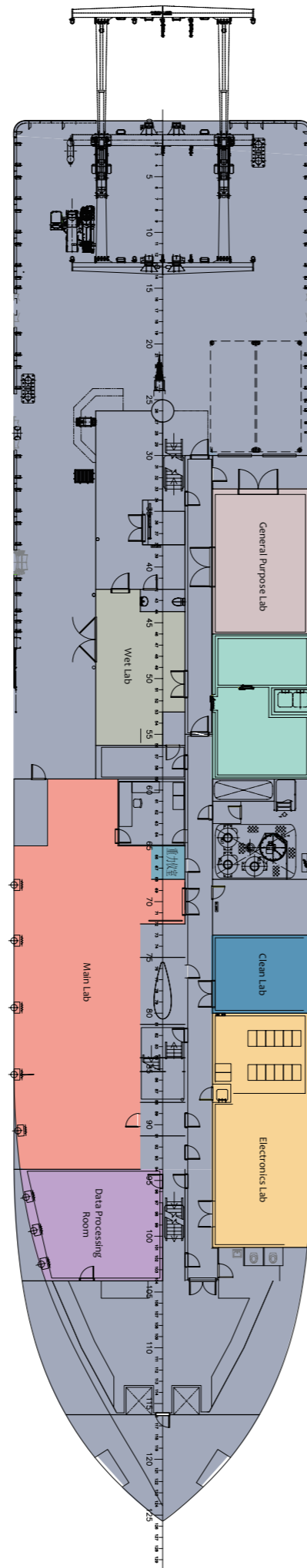
There are a suite of laboratories and facilities onboard R/V TTK to meet the various scientific requirements. The total area of labs is 407 m², and that of all working deck is up to 432 m².

1) Laboratories

- Main Lab - 126 m²
- Electronics Lab - 55 m²
- Clean Lab - 19 m²
- Wet Lab - 32 m²
- General Purpose Lab - 35 m²
- Atmospheric Lab - 14.5 m²
- Data Processing Room - 36 m²
- Underway System Lab - 10 m²

2) Facilities

- -80 °C, -20 °C, +4 °C freezers and refrigerated storage rooms
- Illuminated incubator
- Ice generator
- Water purification systems
- Fume hoods
- Taps (freshwater, distilled water and un-contaminated seawater), power outlets, compressed air outlets and network interfaces are available in all work areas.



Shipboard Equipment and Facilities

Launch and Recovery Systems

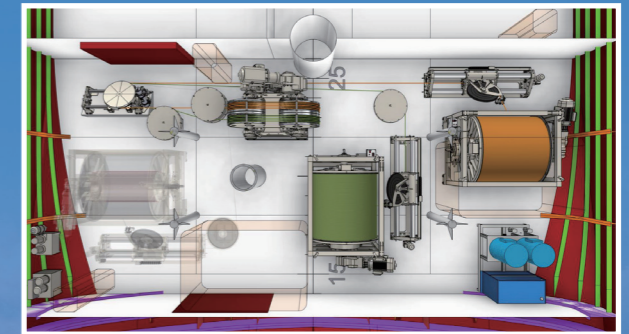
R/V TTK has outstanding science handling abilities. The LARS are able to cover the entire scientific working area, and can be operated from the aft control station or via the remote control console. Winch parameters (line speed and tension etc.) are displayed at the control station and on the LED screens at main deck.

Winches

- CTD winch - 10,000 m of 8.18 mm coaxial cable
- Hydrographical winch - 8,000 m of 8.18 mm coaxial cable
- Traction winch system - two storage drums, one carries 15,000 m of 14.3 mm steel cable, and the other carries 10,000 m of 17.3 mm electro-optic cable

Two portable clean winches are available in complement to the permanently installed systems:

- TEISS winch - 8,000 m of 15.25 mm Kevlar cable, for ultra-clean seawater sampling
- Clean winch - 4,000 m of 9.525 mm Kevlar cable, for deployment of in-situ pumps collecting TEIs particle samples



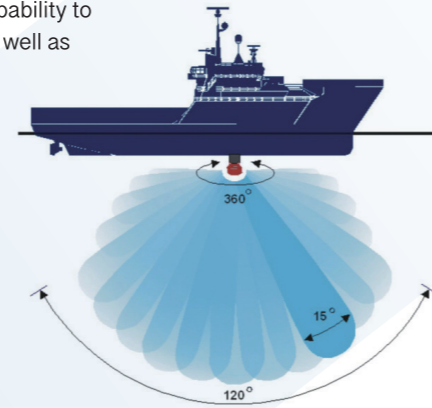
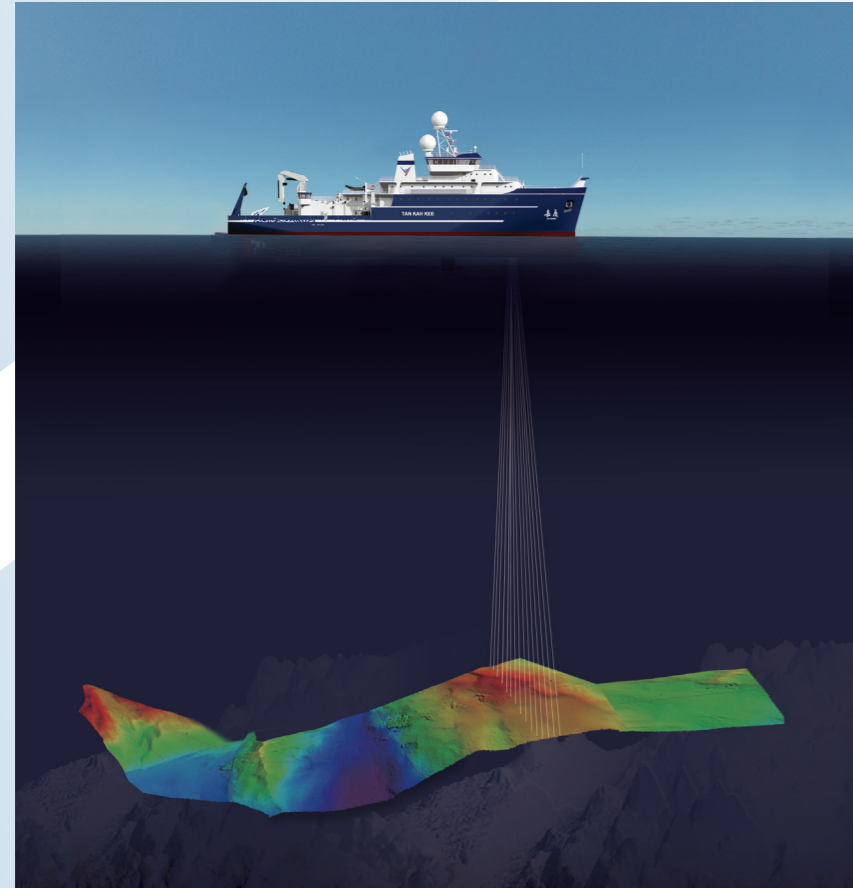
Cranes

1. Stern A-frame - SWL 15T
2. Main Crane - 20T@10m, 13T@15m
3. Telescopic Hydro Boom - 15T@0m, 6T@5m
4. CTD Davit - SWL 2.5T
5. Aft Auxiliary Crane - 4.5T@11.3m
6. Forward Crane - 1T@7m
7. Auxiliary rail for deck operation



Equipment for Marine Geophysics

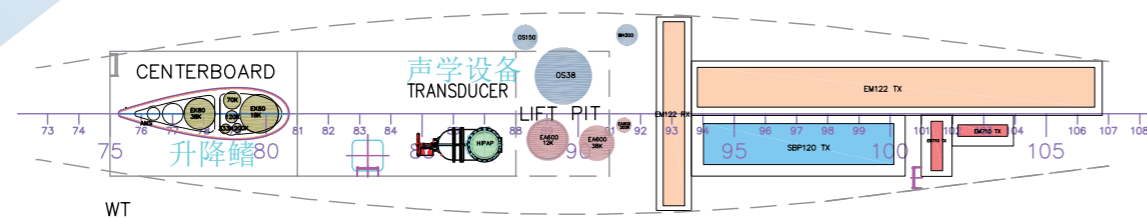
R/V TKK, embedded with a suite of Kongsberg sonars on the hull, has an impressive capability to conduct geophysical research, which enables scientists to explore the water column, as well as mapping the seafloor.



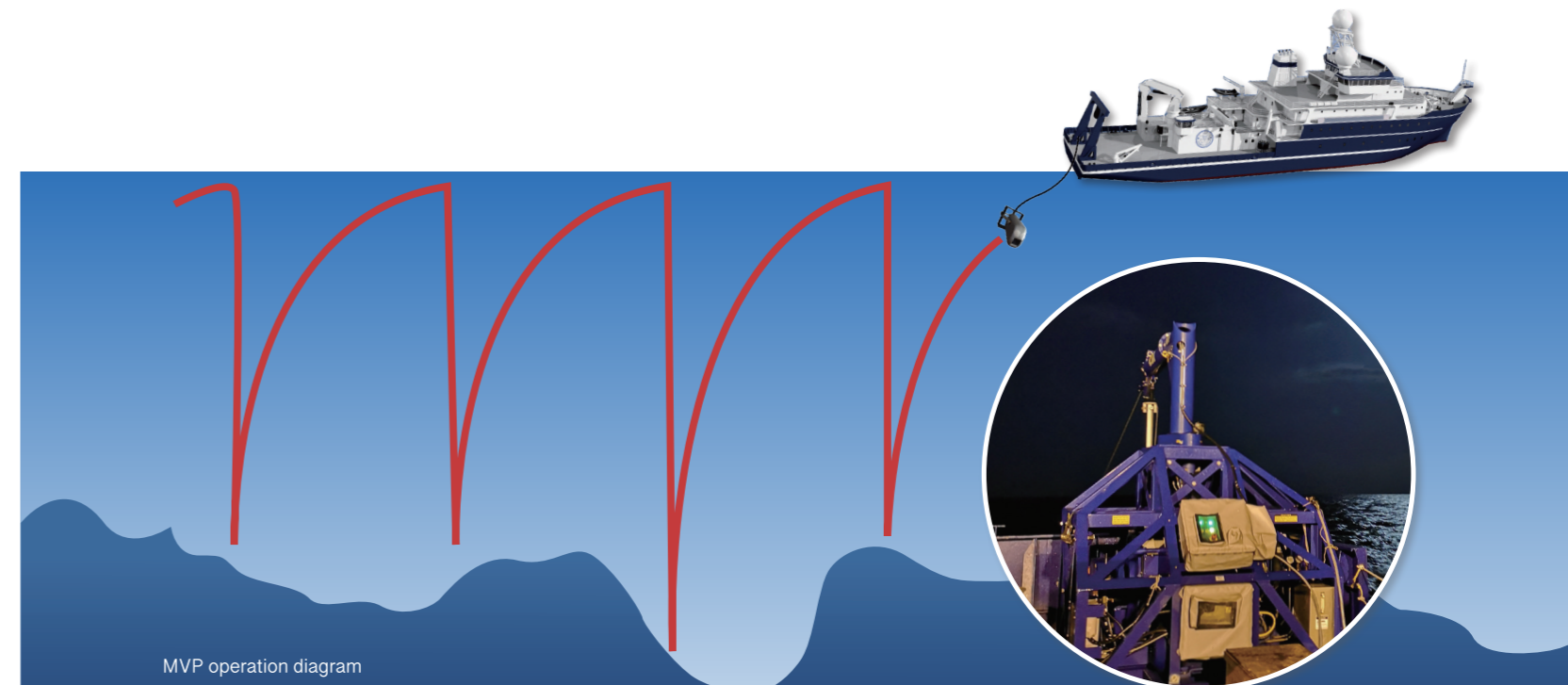
Oceanographic and Meteorological Instruments

R/V TKK is equipped with various instruments to collect oceanographic and meteorological data in atmosphere, air-sea interface and seawater.

- CTD - Seabird 911 Plus with dual C-T sensors (24-bottle and 36-bottle rosette each)
- Moving Vessel Profiler - AML MVP300
- Thermosalinograph - Seabird SBE21
- Acoustic Doppler Current Profiler - TRDI OS38, OS150, WHMariner300
- Automatic Weather Station - Vaisala AWS430
- Air-sea Flux System - Campbell EC3000
- Doppler Weather Radar - SCR-CPD



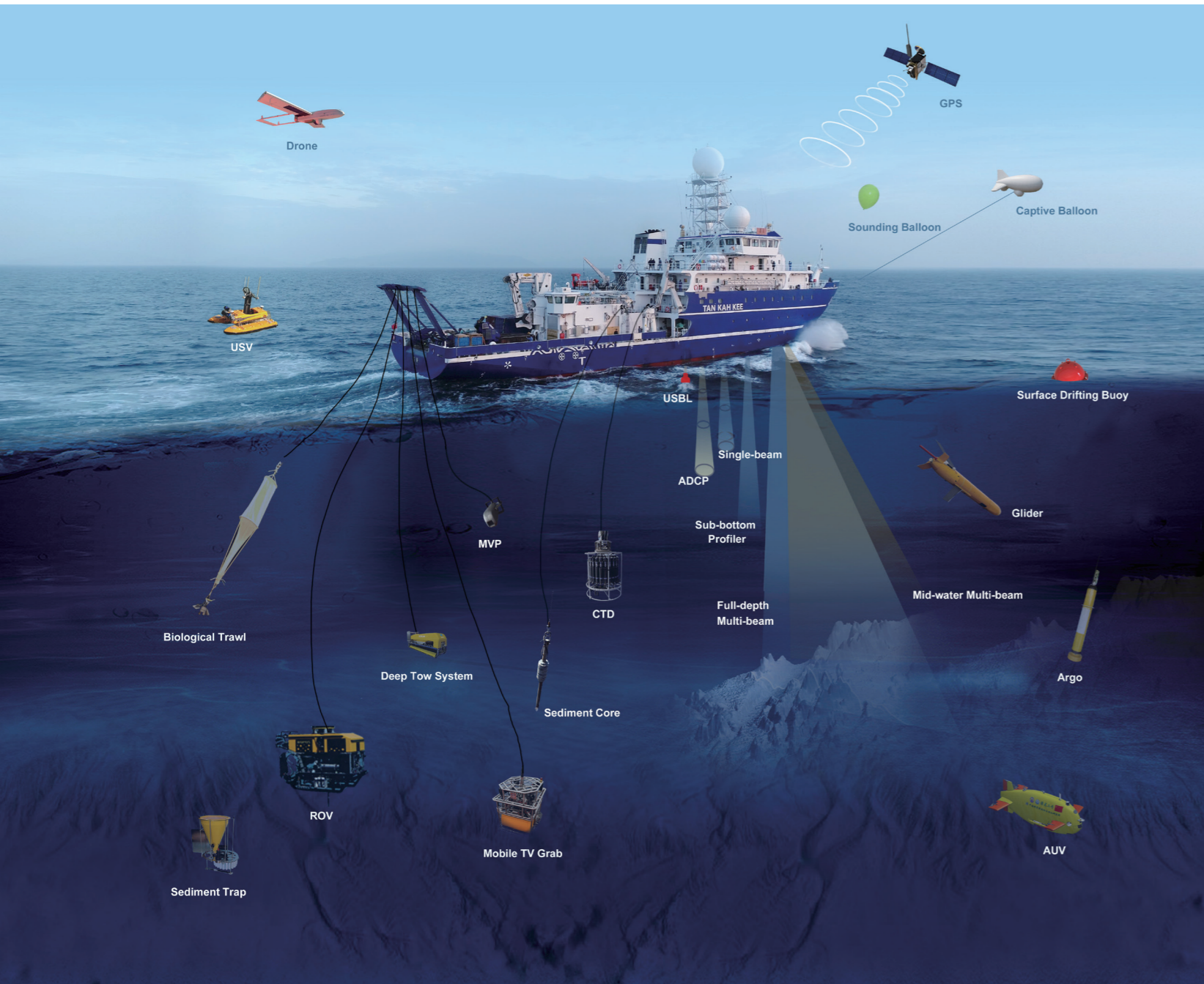
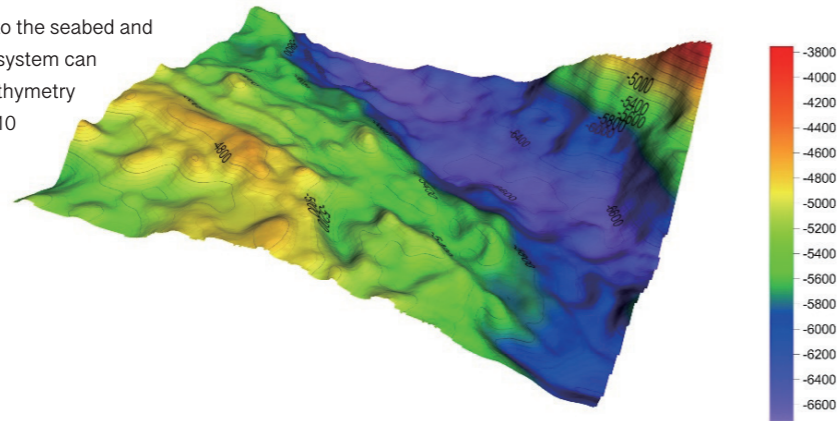
- Full Ocean Depth Multibeam Echosounder - Kongsberg EM 122 ($1^\circ \times 2^\circ$)
- Medium water Multibeam Echosounder - Kongsberg EM 710 ($1^\circ \times 1^\circ$)
- Sub-bottom Profiler - Kongsberg SBP 120 (6°)
- Single-beam Echosounder - Kongsberg EA 600 (12/38/200 kHz)
- Fishery Research Echosounder - Simrad EK80 (18/38/70/120/200/333 kHz)
- Marine Gravimeter - DGS AT1M
- Navigation System - SeaPath330+
- USBL - Kongsberg HiPAP 101



MVP operation diagram

Ocean Bathymetry Survey

When the ship is underway, by transmitting acoustic signals to the seabed and receiving weak echoes, the ship-borne multibeam sounding system can obtain hundreds of water depth values, then mapping the bathymetry of the deep ocean. Two multibeam sounding systems (EM 710 and EM 122) installed onboard R/V TTK can precisely map the bathymetry in both shallow and deep waters with high accuracy.



Seagoing Oceanographic Research

Each year R/V TTK has an average of 270 days in operation at sea. All state-of-the-art observational instruments and experimental systems enable our professional shipborne technical support (STS) team to carry out ocean bathymetry surveys, at station and underway marine environmental, meteorological and air-sea interface flux studies, as well as biological, chemical and geological samplings.

Synergetic Operation of ROV

To explore the dark deep ocean, scientists need to use deep submersibles (underwater robots) equipped with illumination and imaging systems.

In April to June 2018, R/V TTK participated the Deep ROV cruise in the South China Sea (KK1803) funded by the NSFC. The ROPOS ROV carried out 33 scientific dives for in-situ observations, experiments and sampling of the seabed from 1,000 to 4,000 meters. It was operated 320 hours in total, with the longest single dive of up to 33 hours.

After launched by A frame and the electro-optical winch into the targeted area, the ROV was operated by scientists in the control van on-deck to explore the seabed, and to carry out deep ocean research through manipulators and various sensors and samplers. Meanwhile advanced scientific instrument onboard R/V TTK, such as the Dynamic positioning system (DP), the acoustic positioning system (HiPAP 101) and the multibeam seabed mapping system (EM 122), ensured precise positioning of ROV in the deep ocean.





Collection of Trace Elements in Seawater

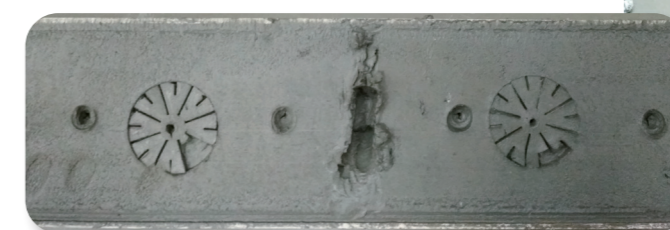
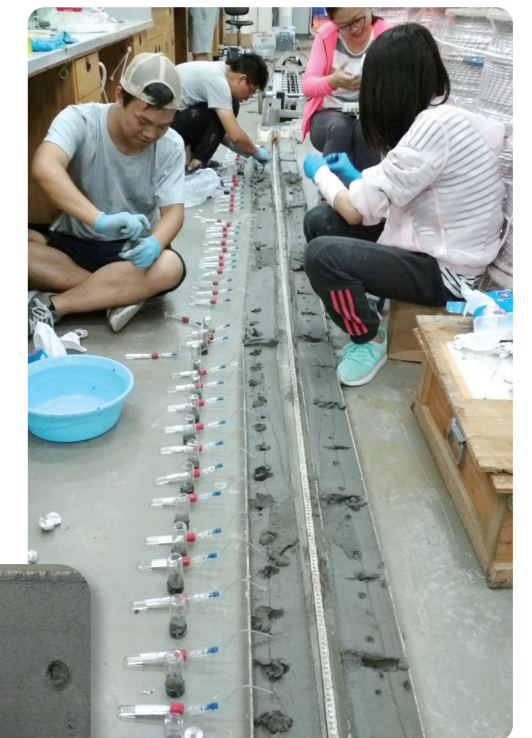
In the spring of 2019, the GEOTRACE-China West Pacific cruise was successfully accomplished onboard R/V TTK, the only research ship that equipped with the very first set of Trace Elements and Isotopes Sampling System (TEISS) in China. Thirty-six scientists were from 10 domestic and international universities and research institutes. This is the first large-scale comprehensive study of trace elements in seawater independently carried out on a Chinese scientific research vessel in accordance with the scientific goals and technical standards of the GEOTRACES program.



Collection of Seabed Sediments

The gravity corer is one of the major geological samplers. By analyzing and studying sediment samples, marine geologists can understand the history, sedimentary features and the vertical distribution and variations of sediments of the seabed.

A special rail system is bolted on the main deck of R/V TTK to assist the launch and recovery of large equipment such as gravity corer. During the operation, the stern auxiliary crane is used to transfer the corer to this rail, then the corer is lowered into the seawater by stern A frame and the winch. Scientists on deck can monitor the status of the corer by the wire tension reading of the winch.





Bolt-down System for Easy Mounting

R/V TTK is the first research ship in China that installs versatile bolt-down system in all scientific working areas, both outdoor and indoor. The 2'x2' bolt-down grids allow equipment be easily mounted on the working deck, which greatly enhances the efficiency and flexibility of the sea-going operations onboard.

Labs in standard 20' containers, such as trace-metal clean van, radio-isotope van, can be easily loaded onto the deck. The bulwarks on both sides of the deck can be disassembled according to operational requirements, effectively improving the efficiency and safety of over-the-side operations. R/V TTK is also equipped with fully flush watertight hatches and removable door sills, which meets the watertight requirements, as well as provides an unimpeded access between working deck and indoor labs.



All labs onboard are equipped with cable trays and entry seals which meets the temporary need of wire routing between different labs. The bench, wall and ceiling of the labs are equipped with mounting sockets with an interval of 610 mm.



R/V *Tan Kah Kee*

Commissioned with tailor-design low-noise electric propulsion system, R/V TTK can mitigate underwater radiated noise (URN). The vessel has outstanding science handling abilities, equipped with state-of-the-art acoustic transducers, with highly precise dynamic positioning performance, Trace Elements and Isotopes Sampling System (TEISS), and broad-band data transmission capability, enabling it to carry out multi-disciplinary field observations in global ice-free waters.



General Specifications

Overall Length	77.70 meters
Beam	16.24 meters
Draft	5.00 meters
Gross Tonnage	3611
Operational Speed	11 knots
Maximum Speed	> 15 knots
Range	> 12,000 nautical miles
Endurance	> 50 days
Capacity	54 (18 crew, 36 scientists)
Area of Working Deck	432 square meters
Area of Laboratories	407 square meters

Quite Ship

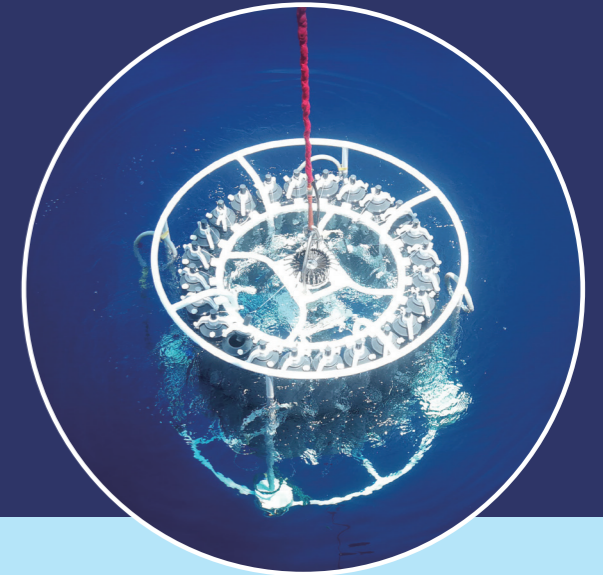
To ensure the optimal performance of acoustic transducers for the acquisition of high-quality research data, the underwater noise emission must be strictly controlled. R/V TKK is installed with customized low-noise electric propulsion system, highly skewed fixed pitch propellers and thrusters. Damping techniques for noise and vibration control are also applied to the main equipment and cabins onboard.

In October 2017, DNV GL awarded the very first SILENT Certificate in China to R/V TKK, which fully complies with the Silent R and F (light search) notations.

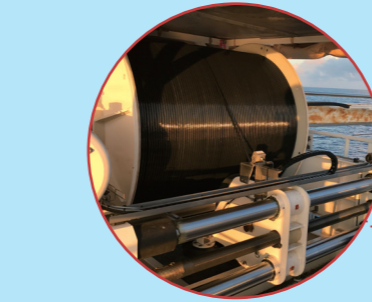
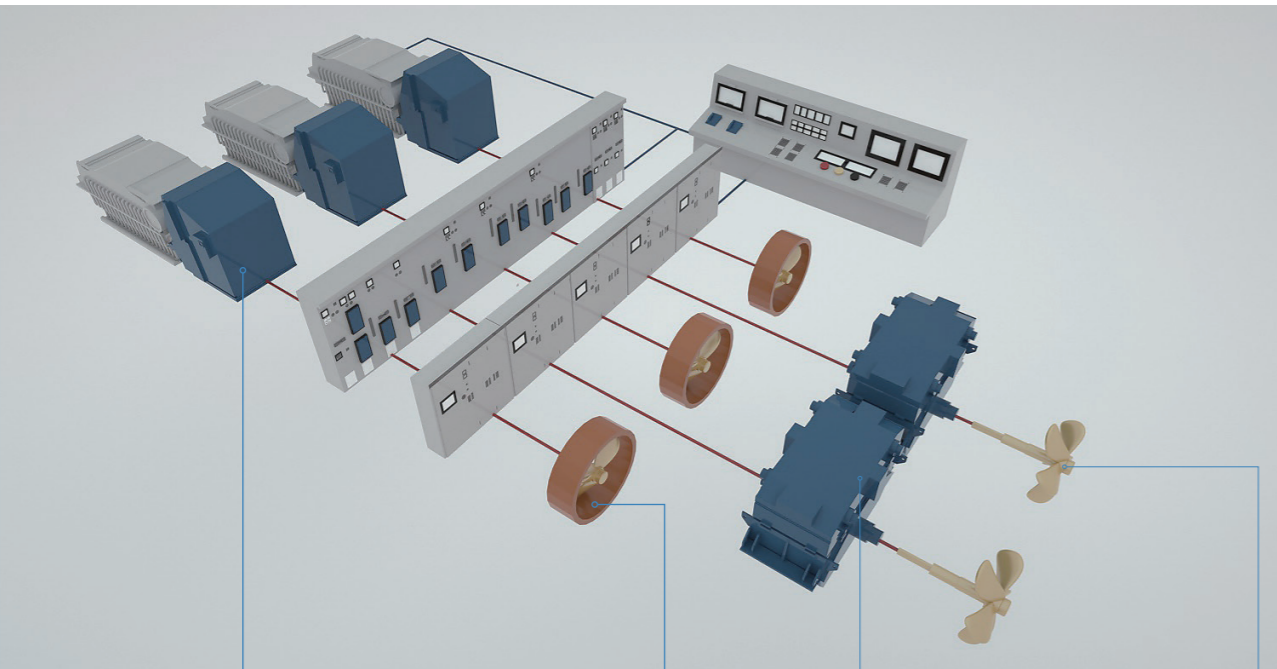


Trace-metal Clean Sampling

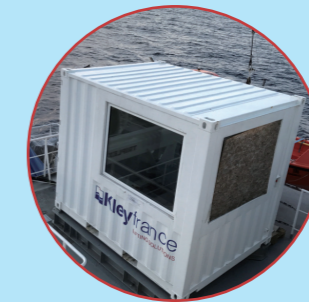
Elements having a concentration of $50 \text{ nmol}\cdot\text{L}^{-1}$ or less in seawater are called trace elements, which play important roles as regulators of key biogeochemical processes in the ocean, e.g. carbon cycling. In order to study trace elements in seawater, scientists must collect and analyze seawater samples under an ultra-clean environment. R/V TKK is China's first and only research vessel equipped with Trace Elements and Isotopes Sampling System (TEISS), which complies with GEOTRACES criteria.



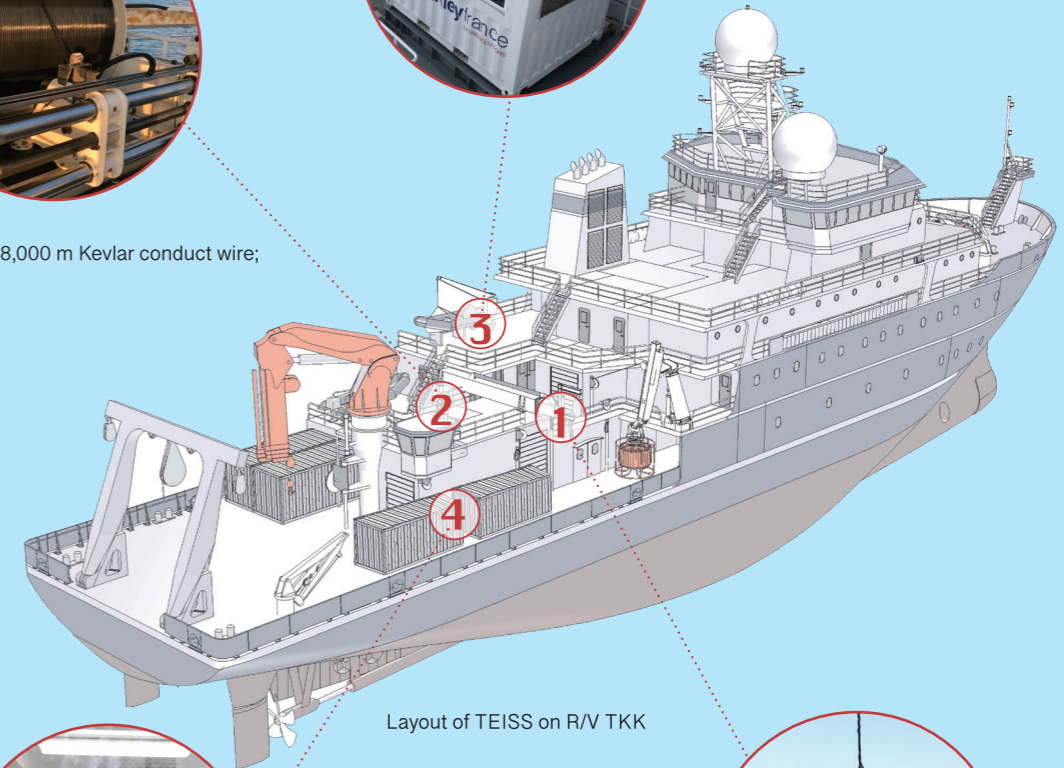
System Components



Clean winch with 8,000 m Kevlar conduct wire;



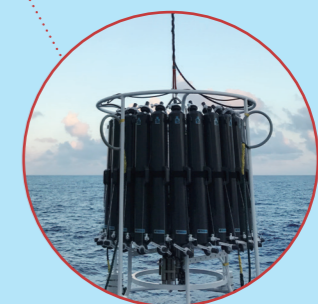
10-foot container for housing the power and control system;



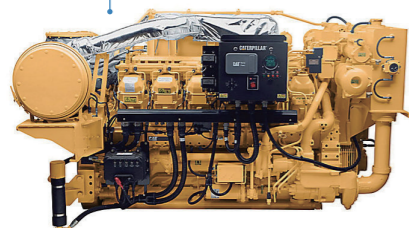
Layout of TEISS on R/V TKK



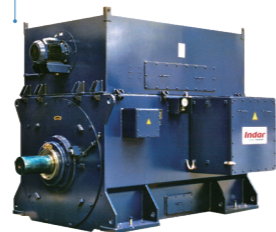
Trace elements clean sampling lab van and analysis lab van, one each (1,000 grade clean room);



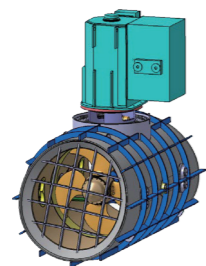
TraceMetal-Clean (TMC) CTD with GEOTRACES compatible water sampler (24*12 L);



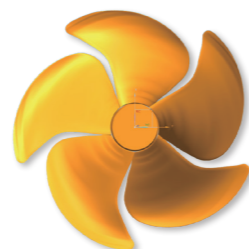
Double resiliently mounted diesel generator sets (3)



Silent low-speed variable frequency propulsion motors (2 sets)



Bow and stern thrusters with resilient tunnels (3 sets)



High-efficiency and highly skewed fixed pitch propellers