



*DESSC Meeting – Dec.2004. San Francisco*

# COMRA's Recent Scientific Programs and Technology Developments

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## Topics

- 1.COMRA and its Visions
- 2.COMRA's Recent Programs
- 3.COMRA's Technology Development
- 4.Future Cooperation



# 1.COMRA and its Visions

**COMRA:** China Ocean Mineral Resources R & D Association

- **Established in 1990**
- **Registered in UN on March 5, 1991, as an international pioneer investor of deep-sea bed exploration and exploitation, was allocated 150,000Km<sup>2</sup>**
- **A governmental organization to coordinate the activities of deep-sea bed exploration and exploitation in China.**
- **Directly funded by the central government**



# COMRA's Visions:

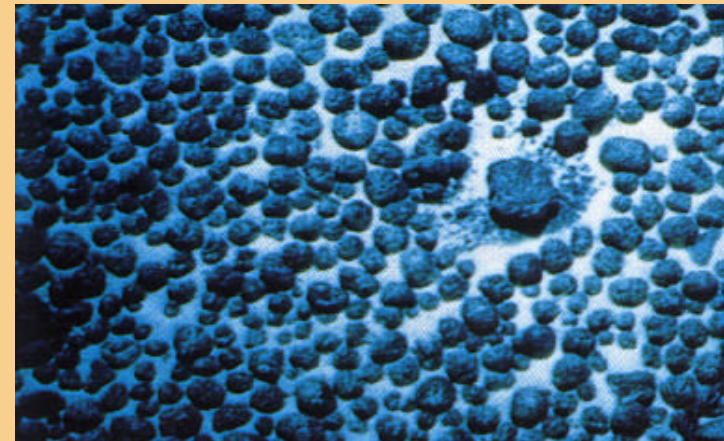
- To explore new mineral resources for China's economic development;
- To promote the development of high and new technology industry;
- To assure the rights of China to exploit the resources in the international seabed;
- To contribute to the exploitation and utilization of the resources for the whole mankind.



## 2.COMRA's Recent Programs

### A. For Resources:

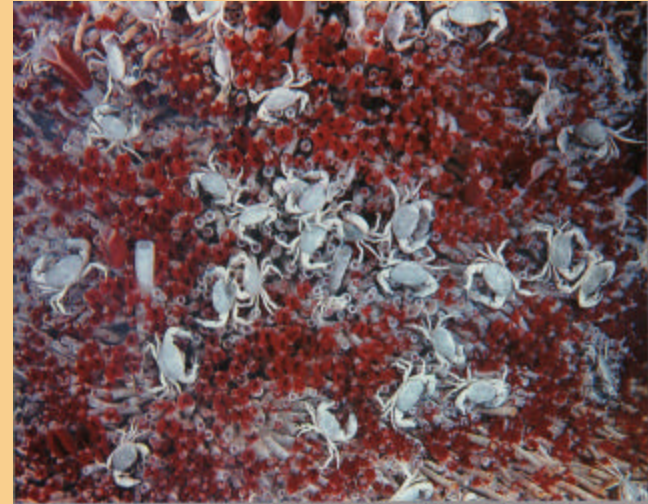
- Mineral resources
  - Cobalt-rich Crusts
  - Manganese Nodules
  - Thermal Sulfide Deposits
- Deep Sea Genetic resources
  - Thermal Genetic Resources
  - Cold Genetic Resources
- Gas Hydrate in the Deep Seas





COMRA has two vessels at sea this year in the Pacific conducting exploration work. The total length of the two cruises will be about 450 days.

- 1 leg for Thermal Sulfide Deposits
- 2 legs for Manganese Nodules
- 7 legs for Cobalt-rich Crusts
- 1 leg for Environmental Program





## B. For Environmental Study

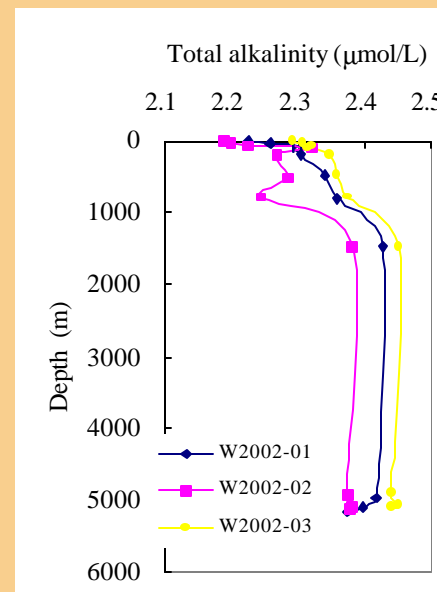
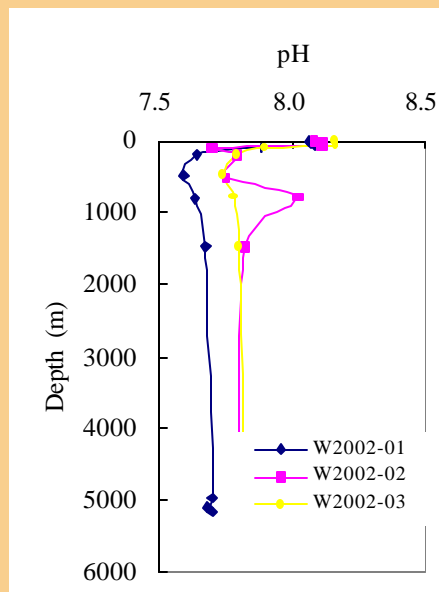
- **NaVaBa program** (**Natural Variability of Baseline Study**)

### Basic considerations:

- 1). Environmental baseline is NOT stable, one or two times investigation is not enough.
- 2). Mining technology is still under development, no one knows exactly how the mining system will look like. Difficulties to simulate the disturbances.
- 3). More attention should be paid to the Natural Variability of Baseline study--- NaVaBa



- NaVaBa program (Natural Variability of Baseline Study)
- Good results have been achieved.







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## 2. COMRA's Tech. Development

### ➤ A. Mining Tech. for Manganese

We have developed a prototype for lake test and are going to do 1000m sea trial in near future



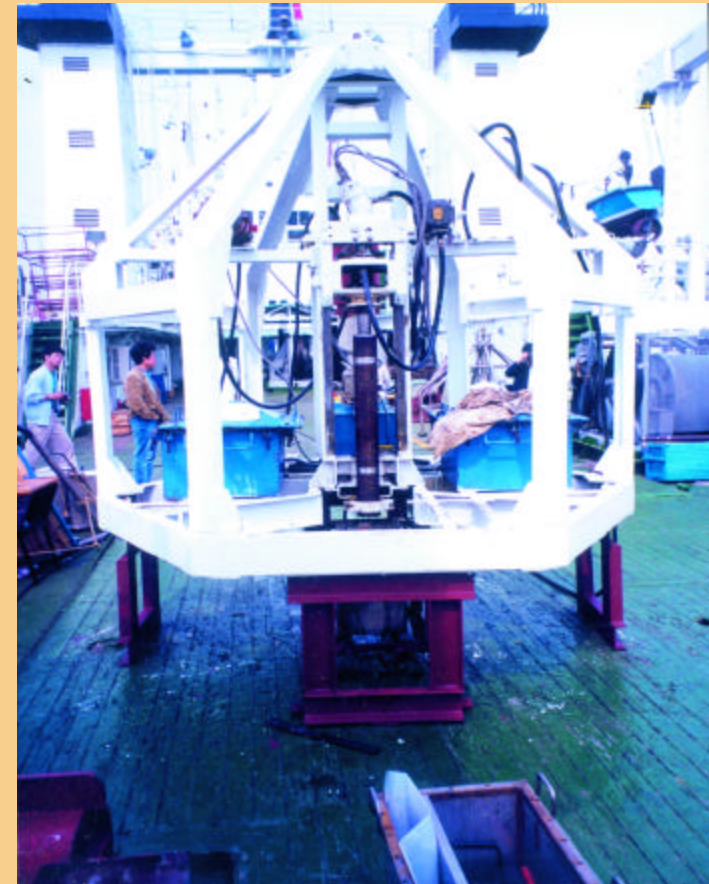
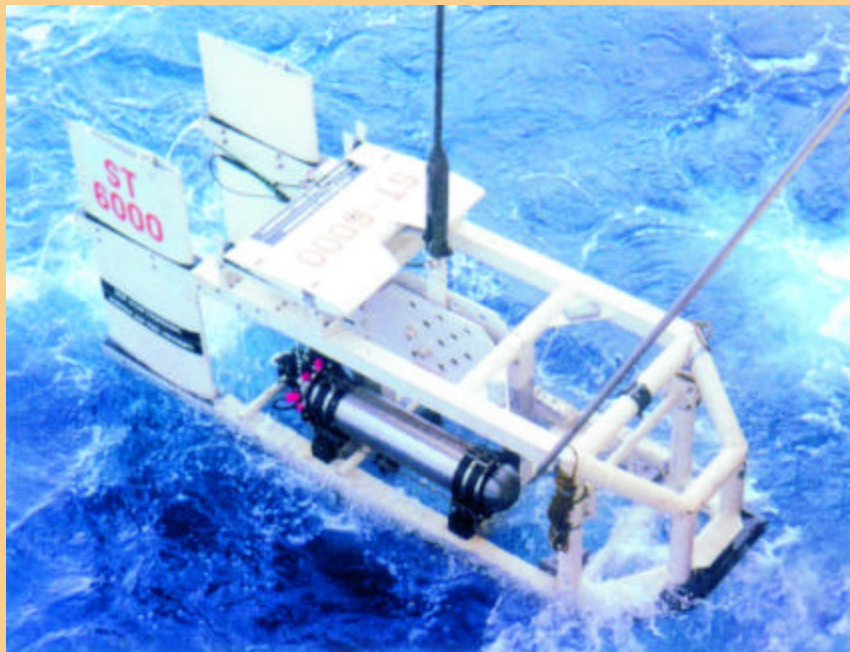
### ➤ B. Metallurgical Tech.





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➤ **C.** Exploration  
Tech.





## D. Submersibles

- AUV (Autonomous Underwater Vehicle)
  - CR-01
  - CR-02

1. Rated to 6000m water depth
2. With Video, Camera and acoustic equipment





➤ ROV (Remote Operated Vehicle)

1. Rated to 3500m water depth
2. Finish construction and at sea trial at the moment





➤ HOV (Human Occupied Vehicle)

1. Rated to 7000m water depth
2. Under construction will be ready for sea trial at 2006
3. With two manipulators, Video, Camera and acoustic equipment





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# COMRA's R/V “Dayang Yihao”





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## General Information of “Dayang YiHao”

|                            |                                |
|----------------------------|--------------------------------|
| Length overall             | 104.5 Meter                    |
| Beam extreme               | 16.0 Meter                     |
| Depth                      | 5.60 Meter                     |
| Tonnage                    | 5500 Tons                      |
| Full Speed                 | 16 knots (29.5 km/h)           |
| Cruise Speed               | 12 knots (22.1 km/h)           |
| Self-Support Capacity      | 60 days                        |
| Dynamic Positioning System | SDP-11GDP                      |
| Crew                       | 75 (25 sailors, 50 scientists) |





## Investigation system

|  |
|--|
| <b>10/25 tons A-frame hydraulic lift (end of ship)</b>                     |
| <b>1.5 tons A-frame hydraulic lift (right side of ship)</b>                |
| <b>13 meters 4 tons constant tension folded telescopic hydraulic crane</b> |
| <b>14 meters 4 tons folded telescopic hydraulic crane</b>                  |
| <b>10 meters 1 tons folded telescopic hydraulic crane</b>                  |
| <b>9 tons tension towing hydraulic winch</b>                               |
| <b>10000 meters fiber-cable hydraulic winch</b>                            |
| <b>10000 meters coaxial-cable hydraulic winch</b>                          |
| <b>10000 meters steel-cable hydraulic winch</b>                            |
| <b>10000 meters CTD hydraulic winch</b>                                    |
| <b>6000 meters electric magnetometer winch</b>                             |







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## Main investigation equipment

|   |                                 |
|---|---------------------------------|
| <b>Multi-beam system</b>                                    | <b>SeaBeam2112. 360</b>         |
| <b>Shallow stratum Profiles system</b>                      | <b>Simrad Topas-018</b>         |
| <b>6000 meters deep-towing acoustic system</b>              | <b>Benthos</b>                  |
| <b>6000 meters deep-towing optical system</b>               | <b>Simrad and SJTU ST-6000</b>  |
| <b>6000 meters super-short base line positioning system</b> | <b>Posidonia6000</b>            |
| <b>6000 meters underwater autonomic robot system</b>        | <b>AUV</b>                      |
| <b>ADCP</b>   | <b>RDI38kHz and150kHz</b>       |
| <b>CTD</b>  | <b>Seabird and FalmoutI CDT</b> |
| <b>Cesium light pump ocean grads magnetometer</b>           | <b>G880</b>                     |
| <b>Ocean gravimeter</b>                                     | <b>Lacost and KSS2-2</b>        |
| <b>6000 meters deep-ocean anchor system</b>                 |                                 |
| <b>Deep-ocean camera system</b>                             | <b>Benthos3000 and 800</b>      |





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## Main investigation equipment



. Network information integration system



Multi-beam system



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# Main investigation equipment

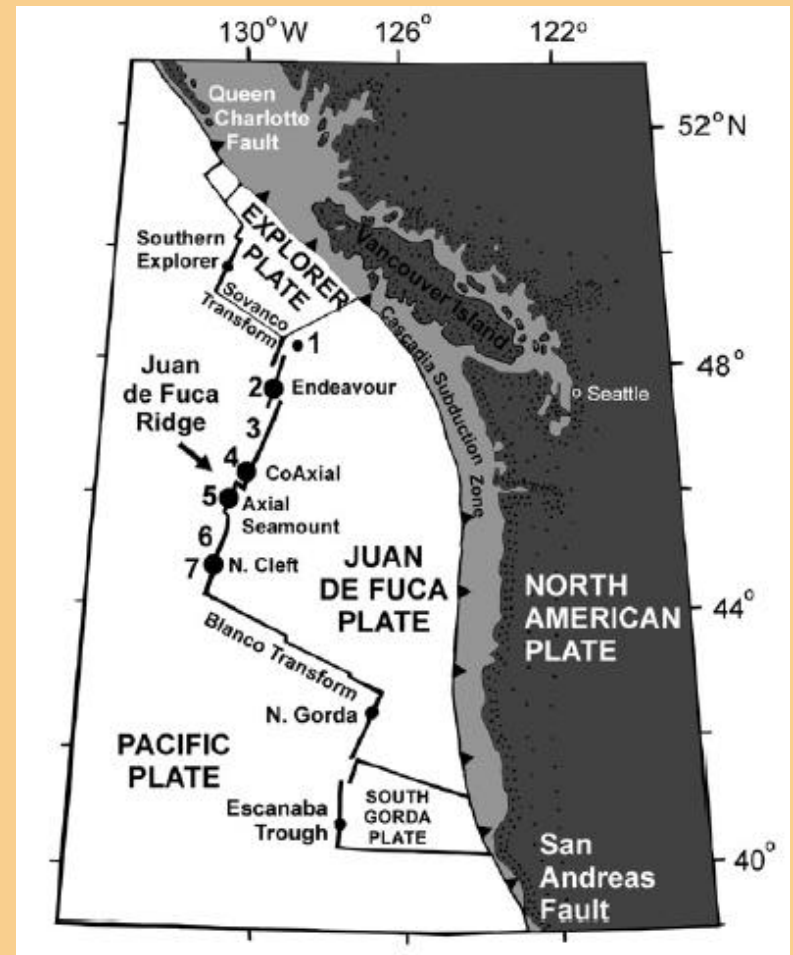


ADCP Laboratory



# 4.Future Cooperation

- 1). Purchase Alvin dives in 2005 at the Juan De Fuca Ridge
- 2) Joint Cruise with WHOI for thermal sulfide vent in 2005 with Dayang Yihao in Indian Ocean





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**The End**

**Thanks All!!**