

Joint session on:

- **Architecture**
- **Mechanics and materials**
- **Sea operations**
- **Power systems**

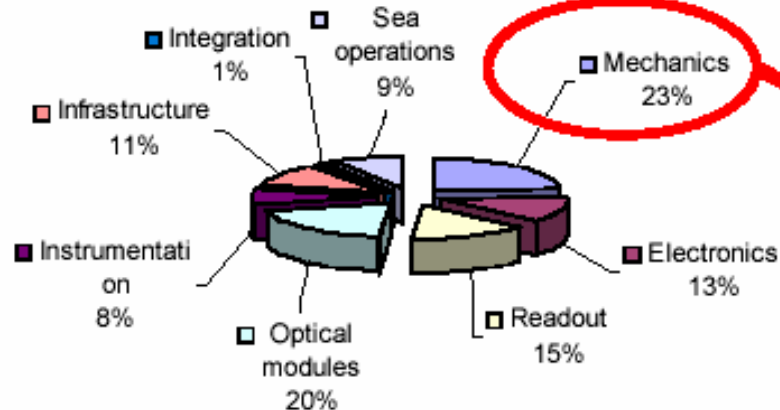
Architecture and cost effectiveness of the km³

Lessons from ANTARES:

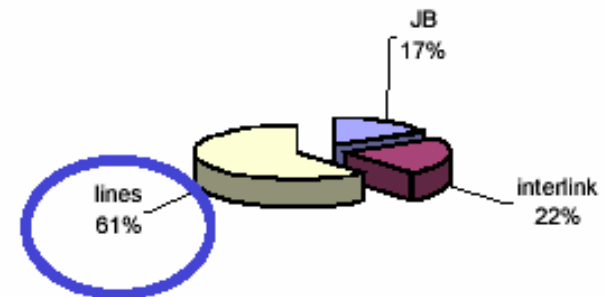
- Mechanics is a large fraction of the total detector cost
- Connections are expensive (wet mateable connectors and operations)
- Reduce number of connections
- Reduce number of electronics containers

ANTARES: costs of the mechanics

DETECTOR BUDGET COST BREAKDOWN



DETECTOR MECHANICS FINAL BALANCE COST BREAKDOWN



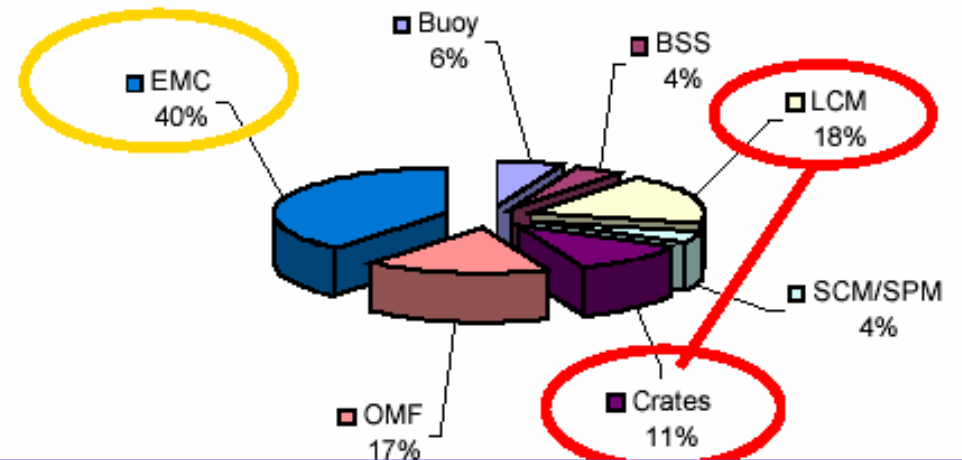
MECHANICS ENGAGE A SIGNIFICANT AMOUNT OF THE DETECTOR BUDGET

THUS, EN AFFORT ON THAT FIELD IS WORTH TO REDUCE DETECTOR OVERALL COSTS

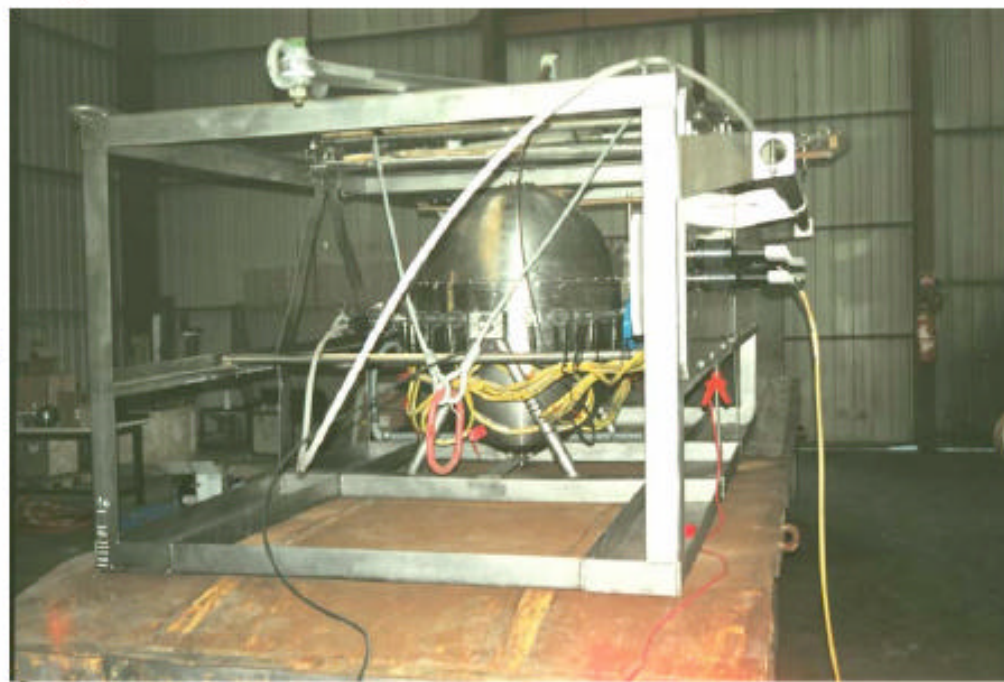
SOME GENERAL SUGGESTIONS:

- USE OF STD COMPONENTS/SIZES
- ALTERNATIVE MATERIALS (FIBREGLASS vs TITANIUM)
- STRONG PROJECT MANAGEMENT / COMMERCIAL ATTITUDE
- TAKE ADVANTAGE OF LARGE SERIES PRODUCTION COST SCALEFACTOR
- SIMPLIFY THE DESIGN

LINE MECHANICS FINAL BALANCE BREAKDOWN



ANTARES: junction box

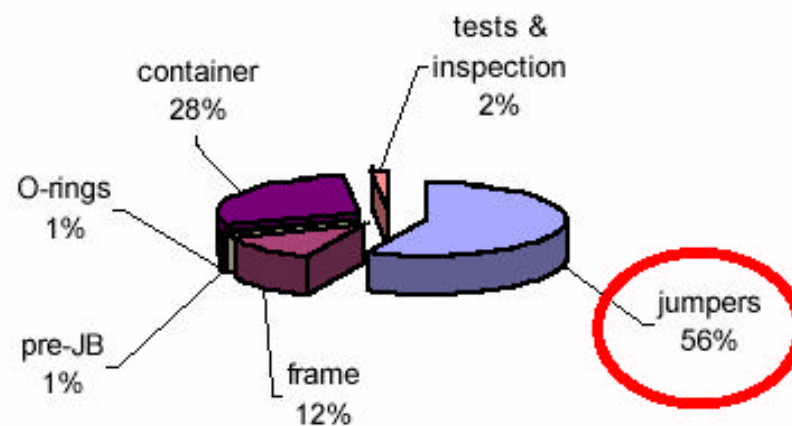


JUNCTION BOXES ARE “MINOR” ITEMS ON THE OVERALL DETECTOR BUDGET (**LESS THAN 4%**)

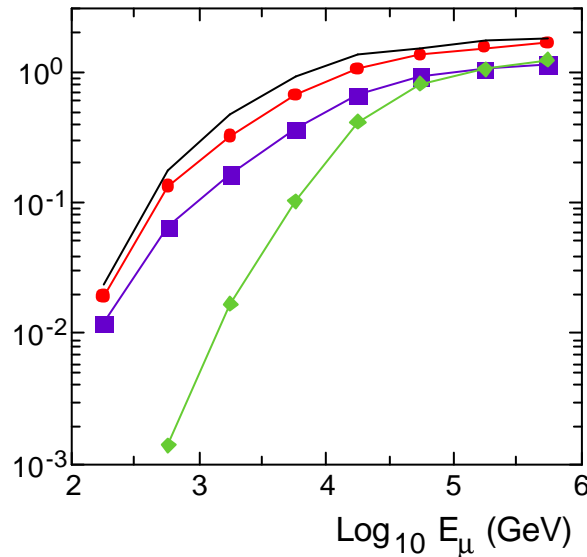
THE STRONGEST ACTION SHOULD BE MADE ON JUMPERS (SEARCH FOR COMPETITORS, COMMERCIAL AGREEMENTS AND SO ON)

ANY IMPROVEMENT ON THE CONTAINER IS WELCOME, BUT CAN HAVE A VERY LIMITED EFFECT ON THE OVERALL DETECTOR BUDGET (**LESS THAN 1%**) AND SHOULD BE CAREFULLY EVALUATED - COMPLEXITY CAN AFFECT RELIABILITY

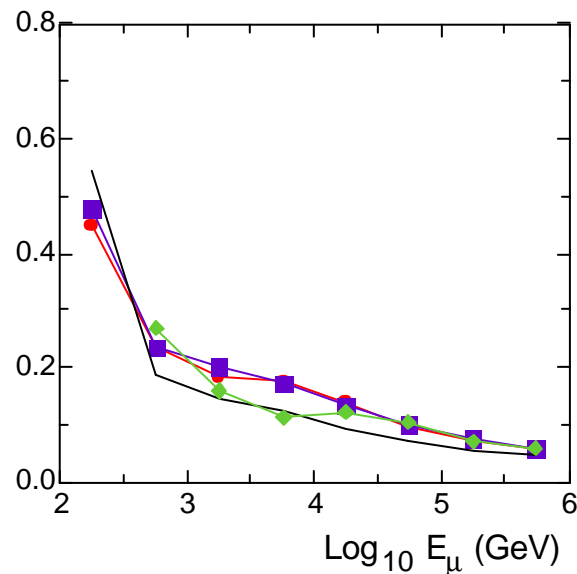
JB FINAL BALANCE COST BREAKDOWN



Comparison of different detector architectures



— Homogeneous lattice detector	5600 PMTs	20 kHz
● NEMO Tower detector	5832 PMTs	20 kHz
■ NEMO Tower detector	5832 PMTs	60 kHz
◆ NEMO Tower detector	5832 PMTs	120 kHz



Effective areas and median angles for two different detector architectures and different optical background rates

Simulations performed with the ANTARES simulation package

See talk by P. Sapienza



Alternative approaches

New ideas

How to install and maintain moored structures in the instrumentation field

- **Using a special vessel equipped with Dynamic Positioning System and a ROV with robotic manipulator driven by the umbilical**
- **Use a bottom mounted ROV supplied by the underwater power and signal cables**

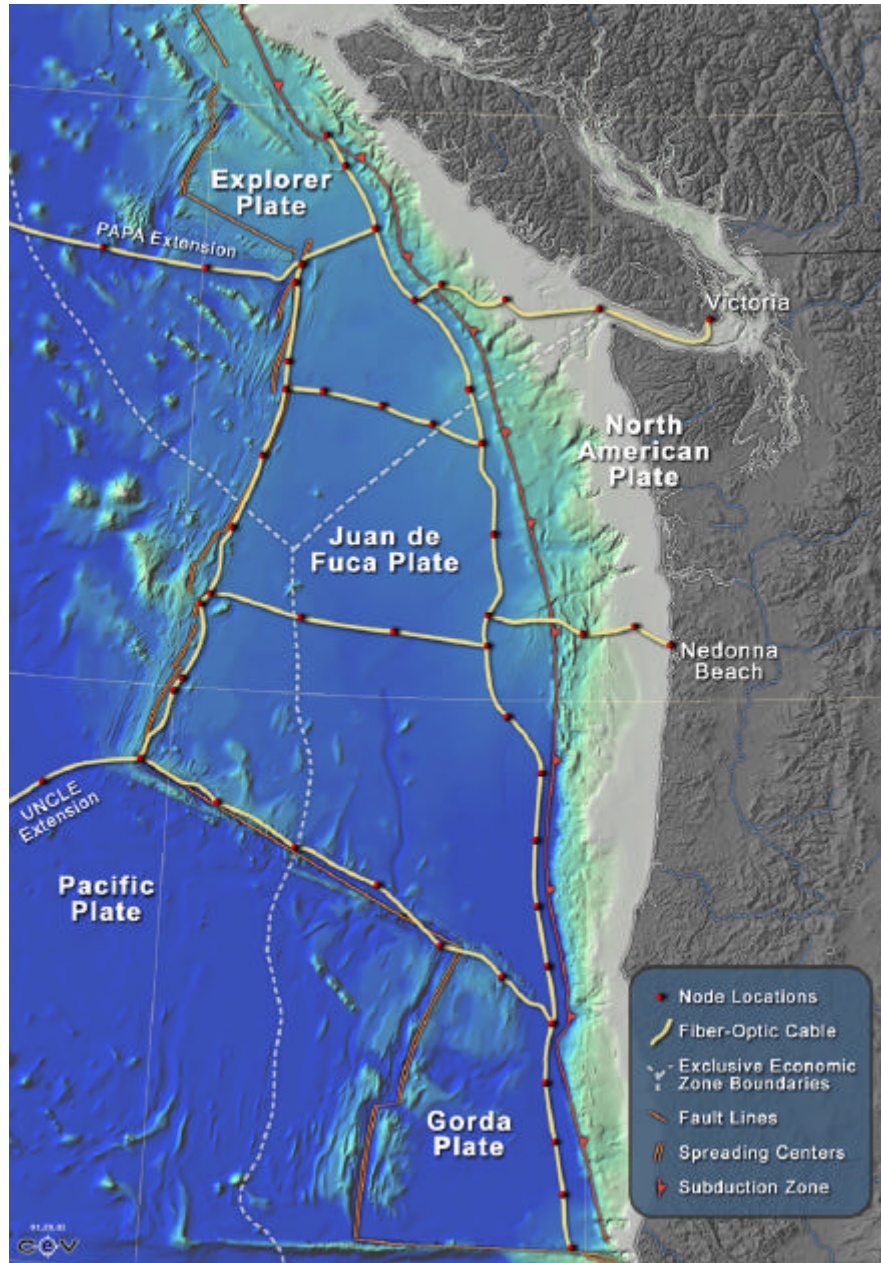
Autonomous Underwater Robot on a bottom rail

- The concept is to relay in a bottom referenced fixed path for an Autonomous Underwater Vehicle also fitted with robot to operate the string connectors and with self propulsion to move them in the field of installation and maintenance
- The fixed path is obtained with a rail network to reach the individual string location
- Rail deployment must be done by DP vessel and ROV

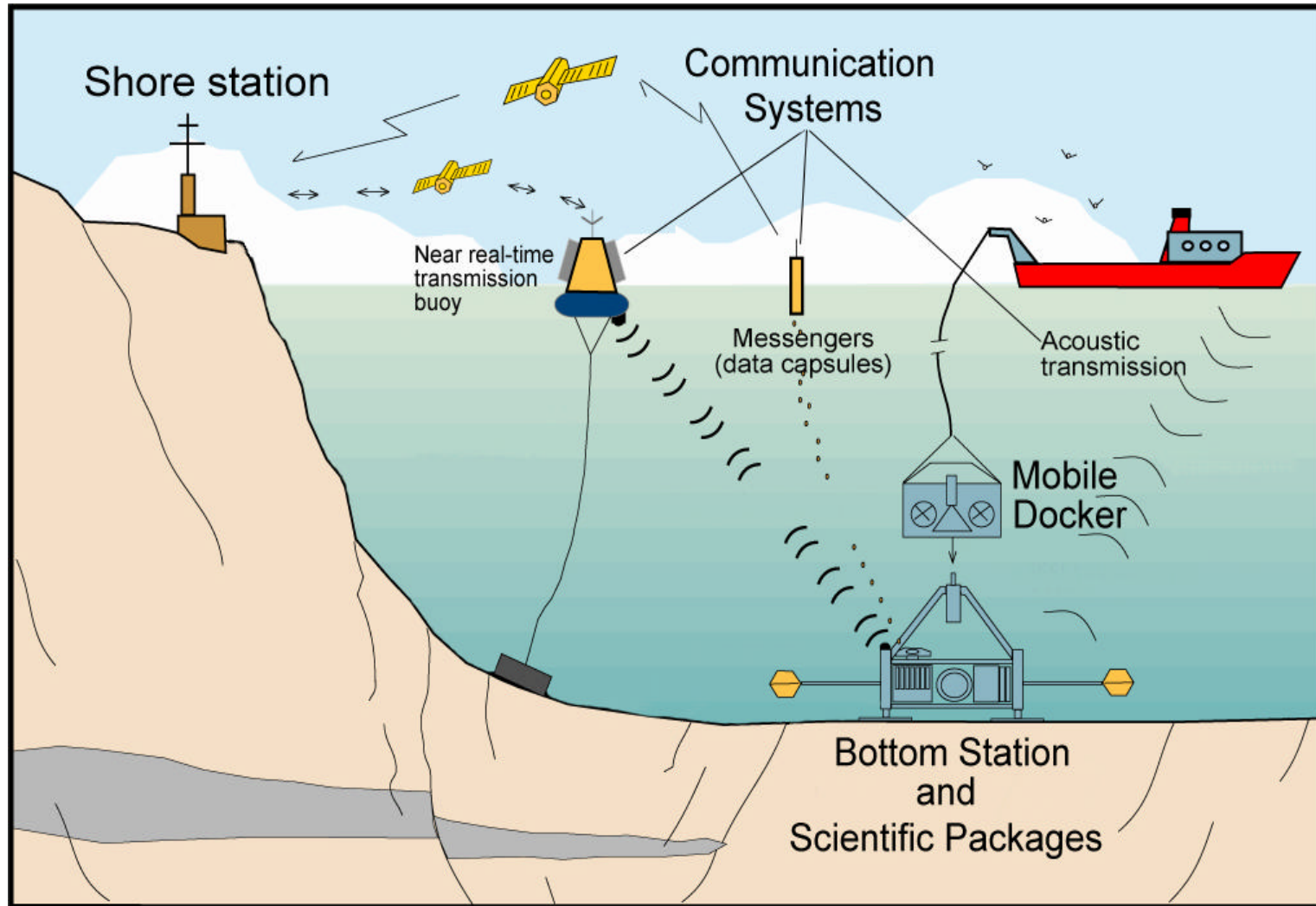


What is NEPTUNE?

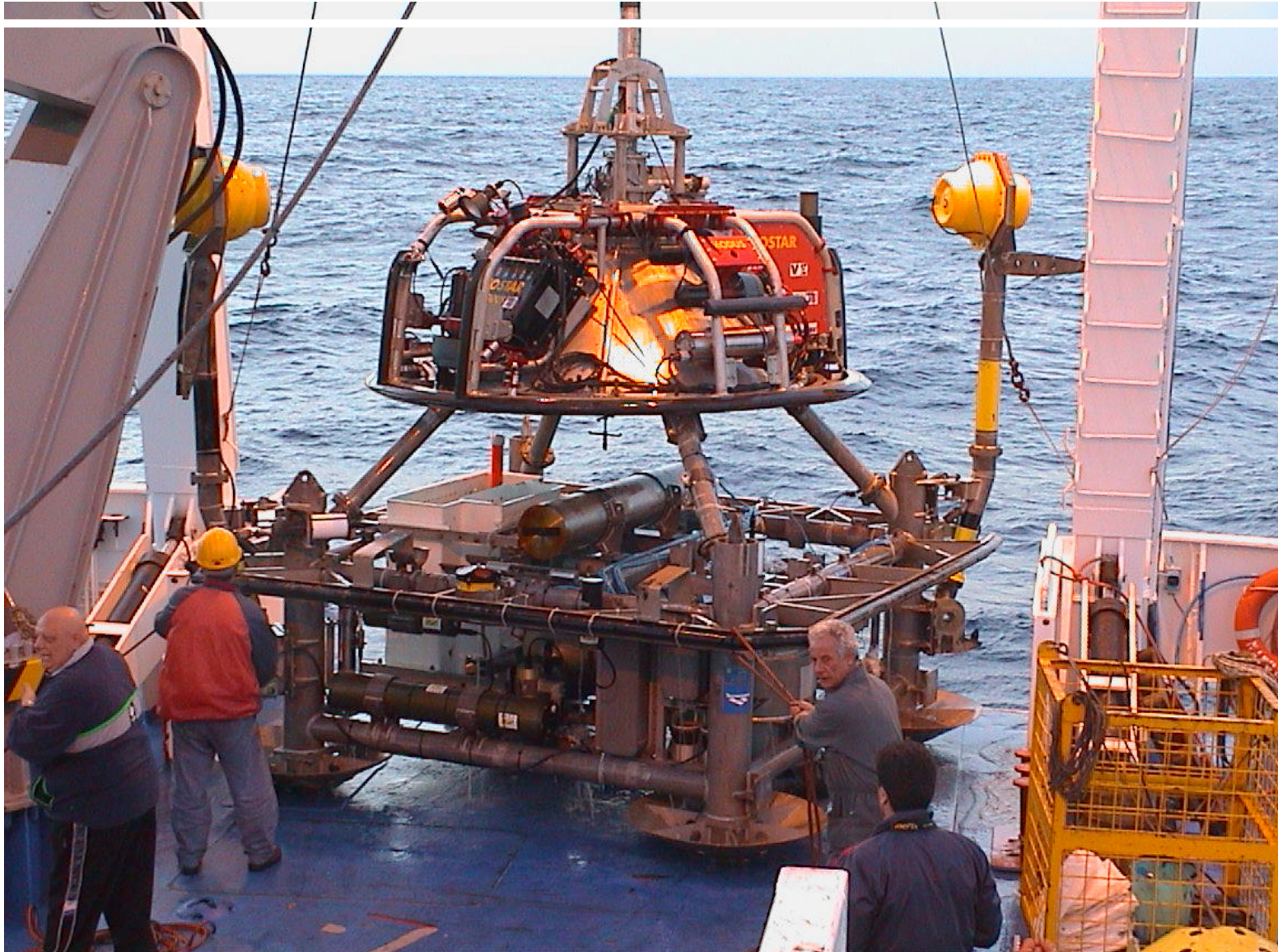
- 1000 x 500km network, from shore to 4 km depth
- 2 shore landings
- About 35 nodes
- Standardized science interface
- Up to 8 kW and 100 Mb/s



The GEOSTAR concept



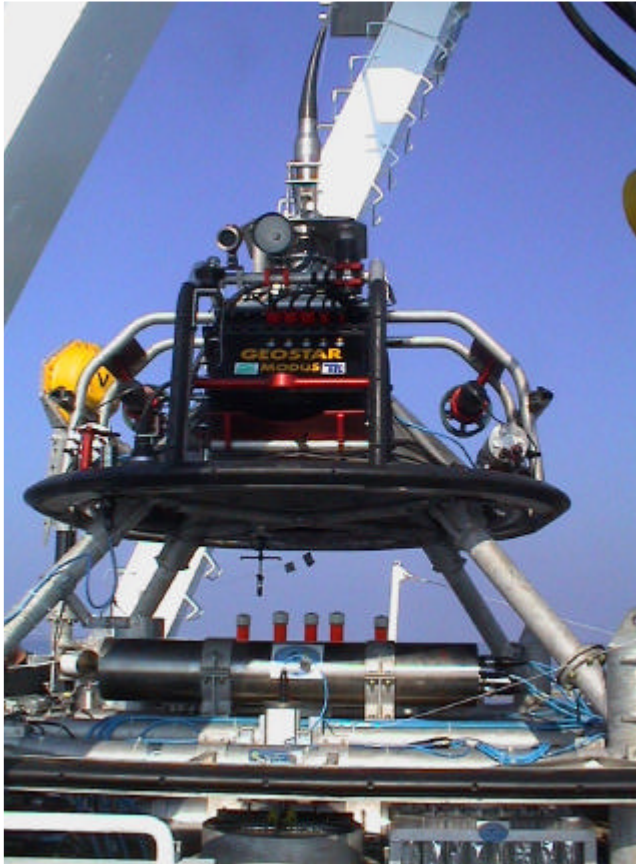
GEOSTAR system



VLV ?T Workshop "Technical Aspects of a Very Large Volume Neutrino Telescope in the Mediterranean Sea" October 5-8, 2003 NIKHEF, Amsterdam

MODUS

submarine vehicle for GEOSTAR
deployment/recovery



A possible self connecting system

