# New German Deep-Sea Research Vessel
## (replacement SONNE)

### scientific-technical requirements


Klaus von Bröckel, ERVO, May 2009
IFM-GEOMAR

**Introductive remarks:**

Right now we are about to end the discussion for the scientific requirements of a new Deep-Sea Research Vessel, which will replace the RV SONNE.

The Federal Waterways Engineering and Research Institute (Bundesanstalt für Wasserbau - BAW) is in the final stage of the preparation of the technical design specification and the general arrangement, which will be the base for the tender in July 2009.

For the first time the tender will be for the construction as well as for the operation of the ship for about 10 years. That is for a consortium of a shipyard and a shipping company

Thus, the shipping company, which will run the ship for about 10 years, is incorporated into the construction process. From this consortium we expect a ship with no big modifications after delivery due to disapproval of the shipping company.

The final objective is a replacement of RV SONNE with a highly sophisticated Deep-Sea Research Vessel, which fulfils optimal all requirements of the whole multidisciplinary marine community during the next decades.

The Federal Government as well as the five German coastal states have allocated a sum of up to 110 Mio €.

# DeepSea RV – scientific-technical requirements SONNE I

**short history:**

| | |
|---|---|
| 1969 | built as stern-trawler |
| 1977 | conversion to global multidisciplinary research vessel |
| 1991 | extension and modernisation |
| work area: | mainly Pacific und Indic Ocean |
| field of work: | mainly geophysics and multidisciplinary oceanography |
| owner: | RF-GmbH, Bremen |

http://www.rf-gmbh.de/galerie.php

# DeepSea RV – scientific-technical requirements

## SONNE II

| | |
|---|---|
| length: | 87,00 m |
| width: | 14,20 m |
| draught: | 6,80 m |
| displacement: | 4734 t |
| speed: | 12,5 kn |
| crew: | 25 pers. |
| scientists: | 25 Pers. |
| engine: | diesel-electric |
| endurance: | 50 days |
| cables + wires: | max. 8000 m |
| scientific rooms: | 450 m² |
| working deck area: | 260 m² |
| 20'-container: | 7,5 (2 inside) |
| scientific store room: | 50 m² |

http://www.rf-gmbh.de/galerie.php

**Requirements for the ship:**

(sea-worthy, energy-efficient, environment friendly, superb manoeuvrability)

- general data for a 'bigger' MARIA S. MERIAN
  - cruising speed 12 kn (max. speed 15 kn)
  - cruising range 7500 sm
  - endurance 50 days
  - engines (diesel-electric)
  - POD-propulsion
  - redundant machinery rooms for optimal safety
  - low noise level (ICES 209 preferable)
  - stabilisation during cruising and on station
  - dynamic positioning
  - stern ramp or flap

## DeepSea RV – scientific-technical requirements

**requirements II**

- hydro-acoustic system
  - -multibeam echo sounder for deep and shallow waters
  - - sub-bottom profiler
  - - ADCP (2 different frequencies)
  - - USBL (e.g. Posidonia) for tracking of underwater vehicles
- laboratories and scientific rooms (about 500 $m^2$)
  - - several wet- and dry-labs of about 20 $m^2$ each
  - - cold rooms (temperature stable) on main deck
  - - 2 hangar with attached lab container space
  - - store room for lab containers
- working deck (about 600 $m^2$)
  - - for ROV and AUV simultaneously
  - - laboratory and other containers
  - - lifting devices (A-frame; 2 sliding beams; 4 cranes)
  - - winches for 6,000 to 12,000 m of cables and wires

- seismic sompressor
- data distribution system
- permanent internet access
- 2 hydrographic wells
- 2 airgun arrays
- coring device
- 2 working boats (fast-rescue + rubber)
- total of 72 persons (32 crew + 40 scientists)
- single cabins for crew
- 28 single and 6 double cabins for scientists
- all cabins with internet access
- social rooms with large windows (mess, library, bar + sitting room, conference room, smoking room, sauna + fitness room)

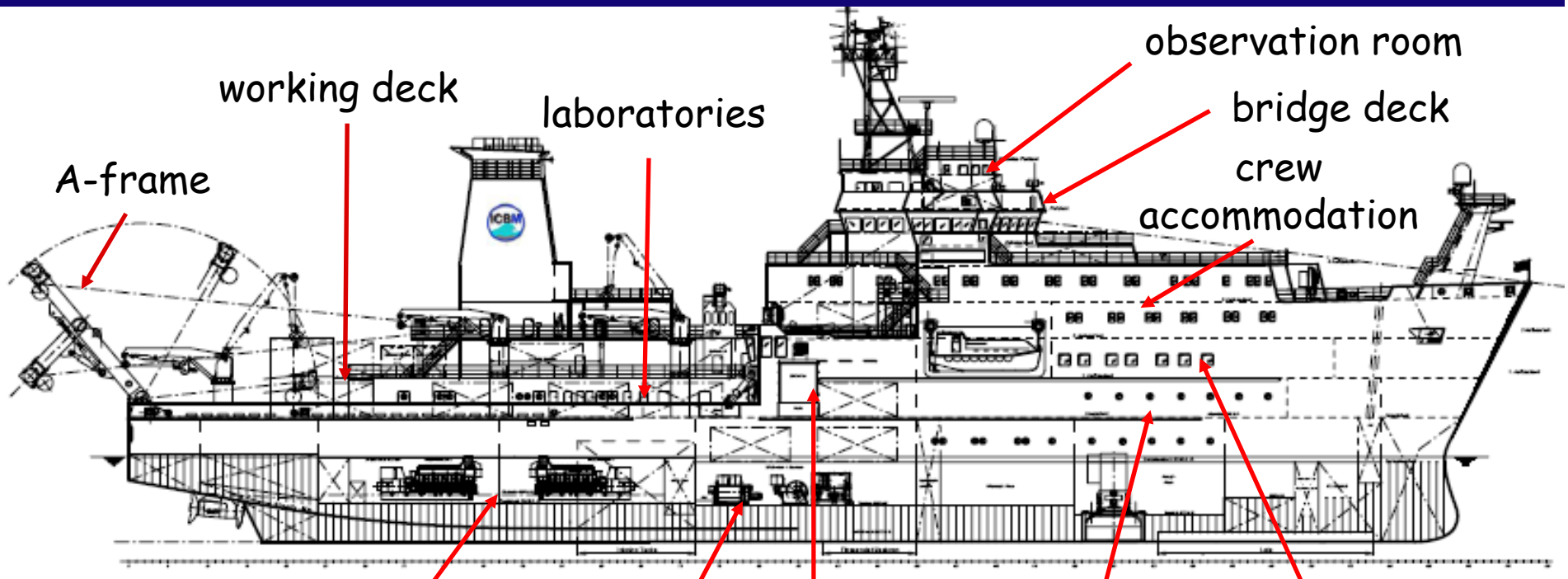
**Requirements for the shipping company:**

- bridge
  - 3-watch-ship
- scientific-technical support (WTD)
  - 4 persons for
    - maintaining all sensors
    - e-mail
    - data distribution and collection
    - hydro-acoustic systems
    - weather station
    - all installed electronic systems (e.g. winches)
    - general support for scientists

- on deck
  - 2 to 4 persons over 24 hours (depending on scientific requirements)
  - handling of all winches and lifting devices
  - general support for scientists
- machinery
  - maintaining of all installed laboratory equipment
  - general support for scientists
- 'catering'
  - one mess room with 'overall area'
  - self-service (60 min per meal)
  - regular cabin cleaning
  - bar with self-service

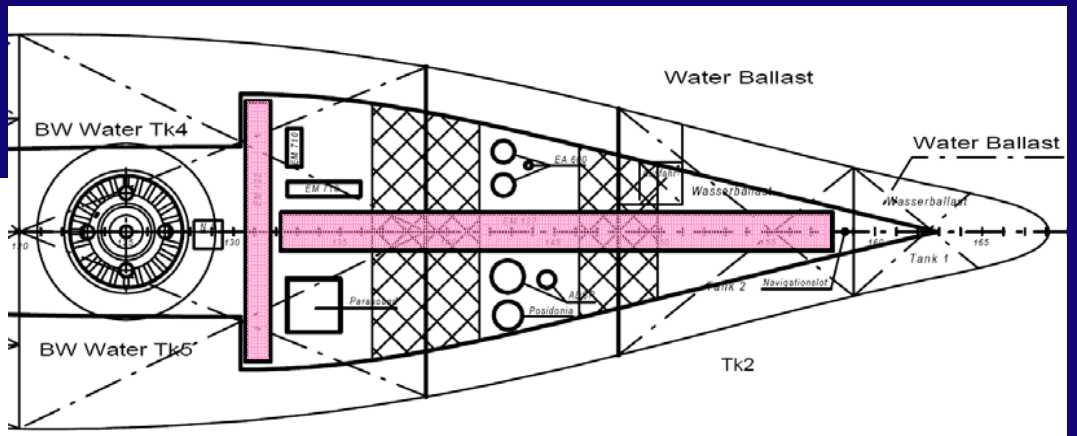
# DeepSea RV - scientific-technical requirements

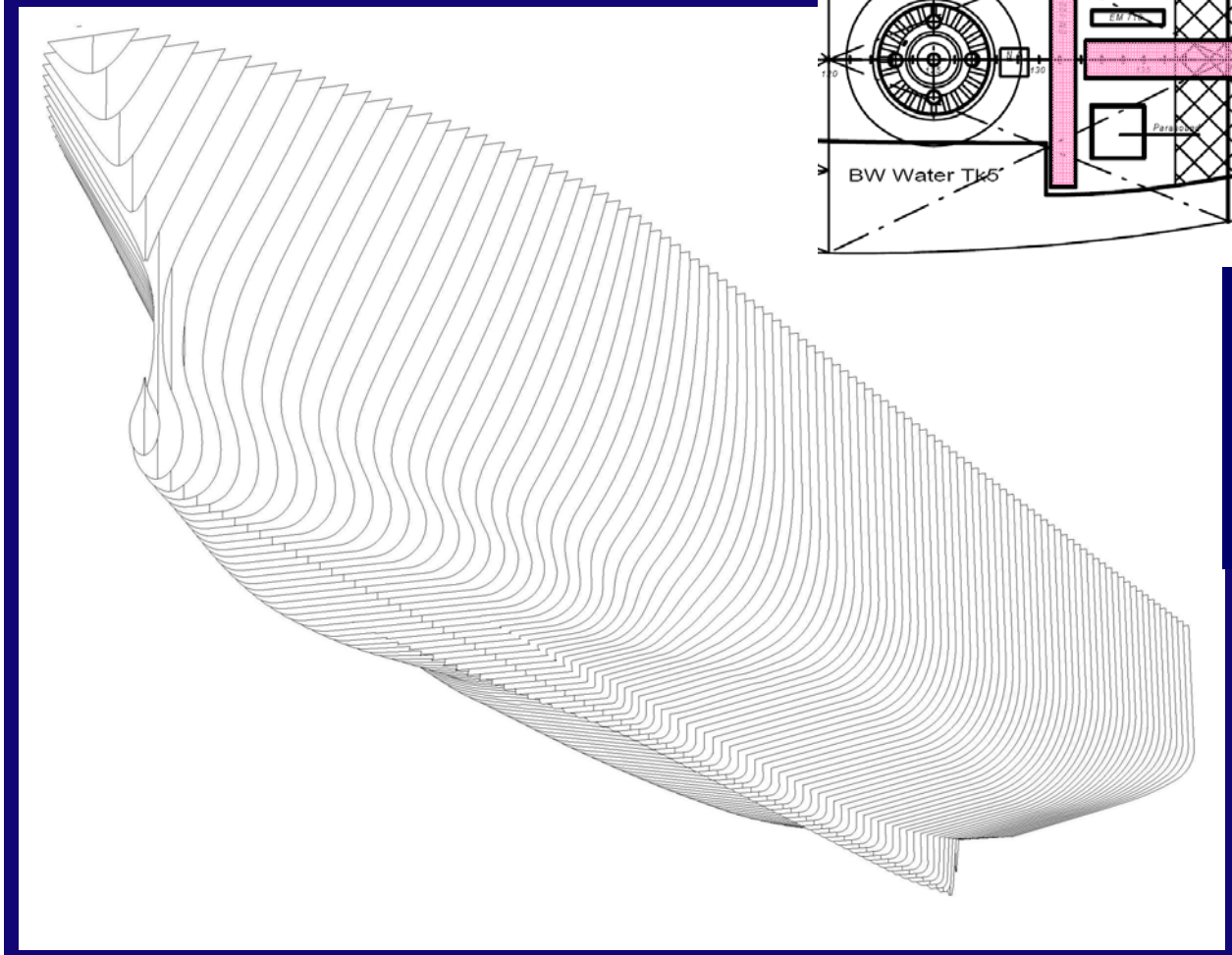
## general arrangement



# DeepSea RV – scientific-technical requirements

## echo-sounders

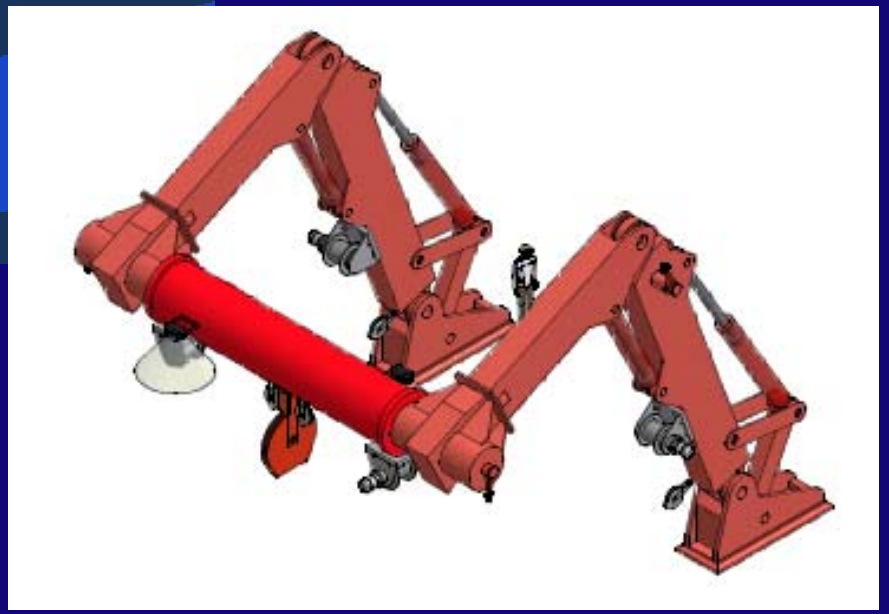


huge transducers for deep-sea multibeam echo-sounder (0.5° x 1° beam-opening - 16 x 8 m)

first drawing (integrated gondola)

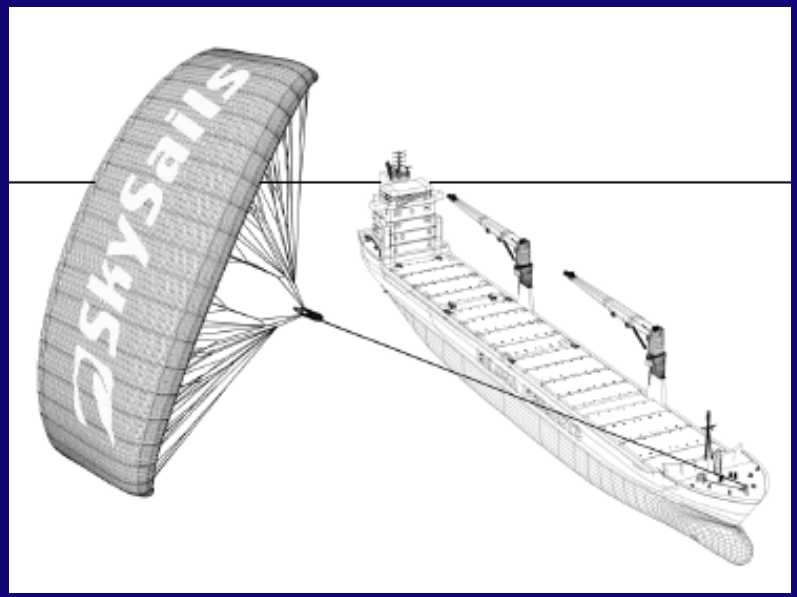
folding A-frame



multifunction cranes:

- offshore (SWL 5 t)
- harbour (SWL 10 t)

SkySails




**energy-efficiency:**

- use of waste heat
- SkySails
- fuel-cells
  - within harbours
  - very clean ship during specific sampling periods
  - but still very expensive and not proved
  - with participation of Hamburg University of Applied Sciences

**thanks for your attention**

# DeepSea RV – scientific-technical requirements

end

# GERMAN RESEARCH VESSELS*

* except RVs from the Ministries of Defence (1 RV), Agriculture (3 RV), Traffic (6 RV)




## 11. ERVO – 2009 – Kopenhagen, DK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# GERMAN RESEARCH VESSELS

## ship data

| RV | owner | length (m) | BRT/ BRZ | type | scientists | crew | company | duration (d) | year of construc. |
|---|---|---|---|---|---|---|---|---|---|
| **POLARSTERN** | AWI | 118,0 | 17.300 | global (polar) | 50 | 44 | Laeisz | (100) | 1982 |
| **METEOR** | BMBF | 97,5 | 4.280 | global | 28 | 32 | Laeisz | 50 | 1986 |
| **SONNE** | RF | 97,9 | 3.557 | global | 25 | 30 | RF | 50 | 1977/ 1991 |
| **MARIA S. MERIAN** | IOW | 94,8 | 5.573 | oceanic | 23 | 23 | Briese | 35 | 2006 |
| **POSEIDON** | IFM-GEOMAR | 60,8 | 1.509 | oceanic | 12 | 18 | Briese | 28 | 1976 |
| **ALKOR** | IFM-GEOMAR | 55,2 | 1.322 | regional | 12 | 11 | Briese | 28 | 1990 |
| **HEINCKE** | AWI | 55,2 | 1.322 | regional | 12 | 11 | Briese | 28 | 1990 |

All above vessels (POLARSTERN only for joint cruises) are available within the Barter agreement of now United Kingdom, France, The Netherlands, Norway, Spain and Germany

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **PROF. A. PENCK** | IOW | 38,6 | 307 | regional | 9 (11) | 10 | Briese | 14 | 1951 |
| **SENCKENBERG** | Senckenberg | 29,5 | 168 | regional | 4 - 5 | 5 | Senckenberg | 5 | 1976 |
| **LUDWIG PRANDTL** | GKSS | 32,5 | 171 | regional | 6 - 10 | 2 | RF | 1 | 1983/2003 |
| **LITTORINA** | IFM-GEOMAR | 29,8 | 168 | regional | 6 (12) | 5 | IFM-GEOMAR | 7 | 1975 |
| **UTHÖRN** | AWI | 30,5 | 254 | regional | 2 | 5 | Laeisz | 2 | 1982 |

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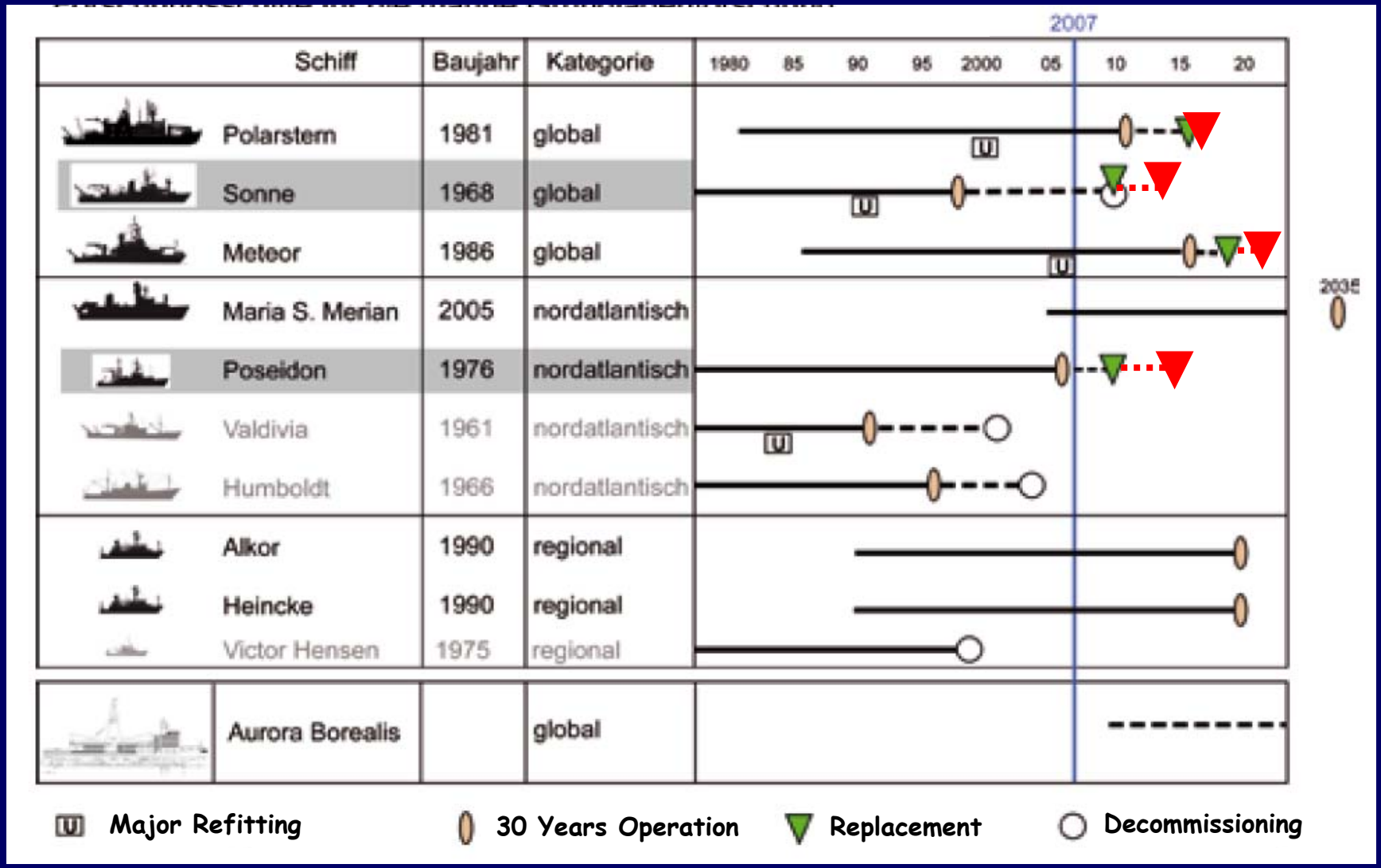
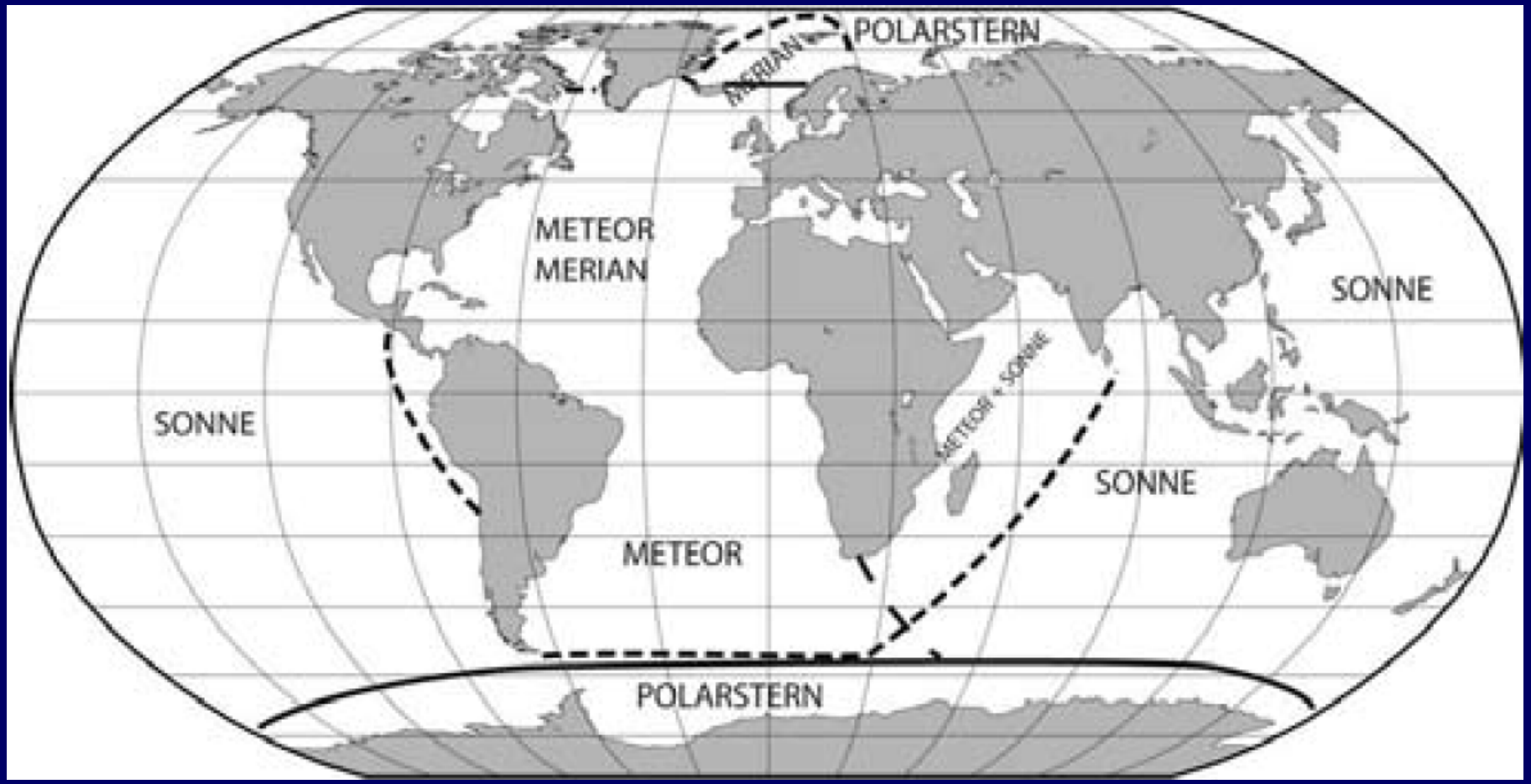
# GERMAN RESEARCH VESSELS

## state of fleet



# GERMAN RESEARCH VESSELS

## main research areas

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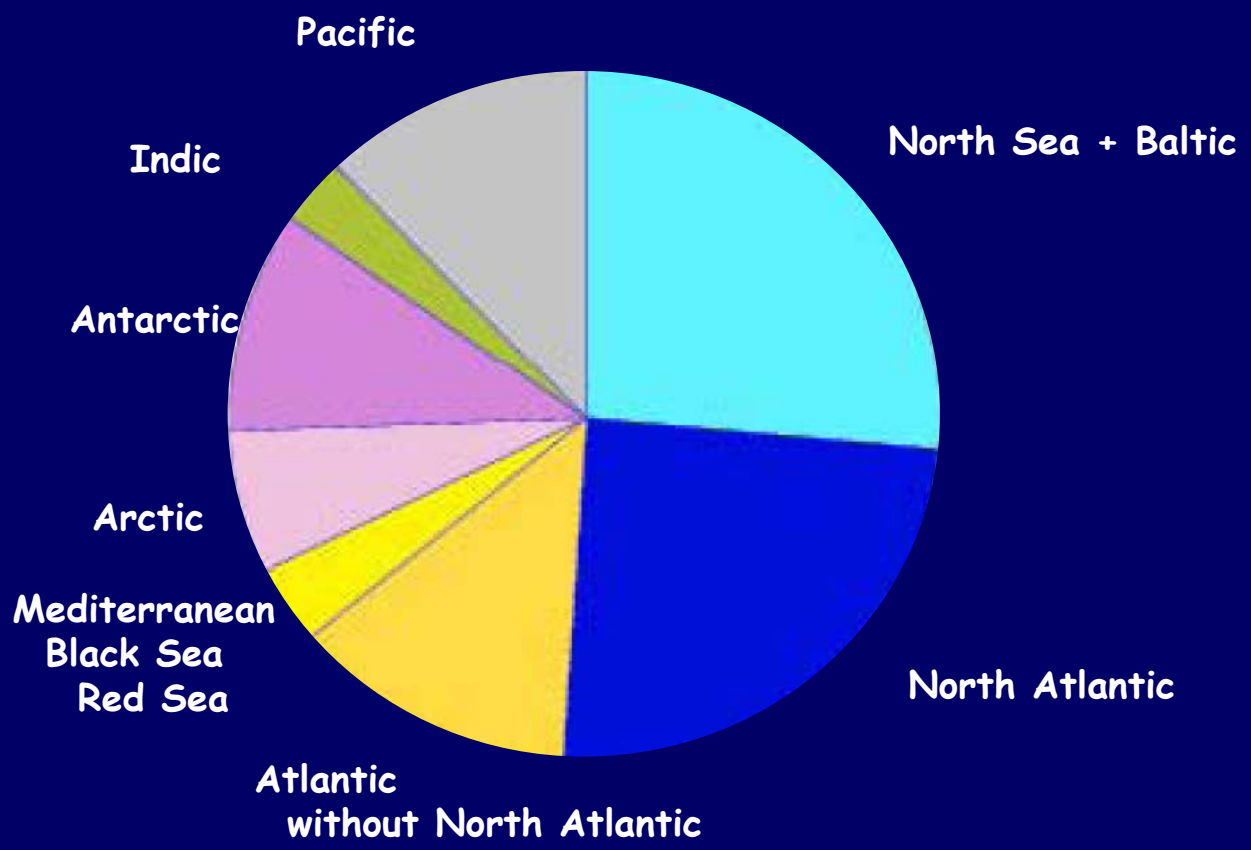
# GERMAN RESEARCH VESSELS

## research areas II



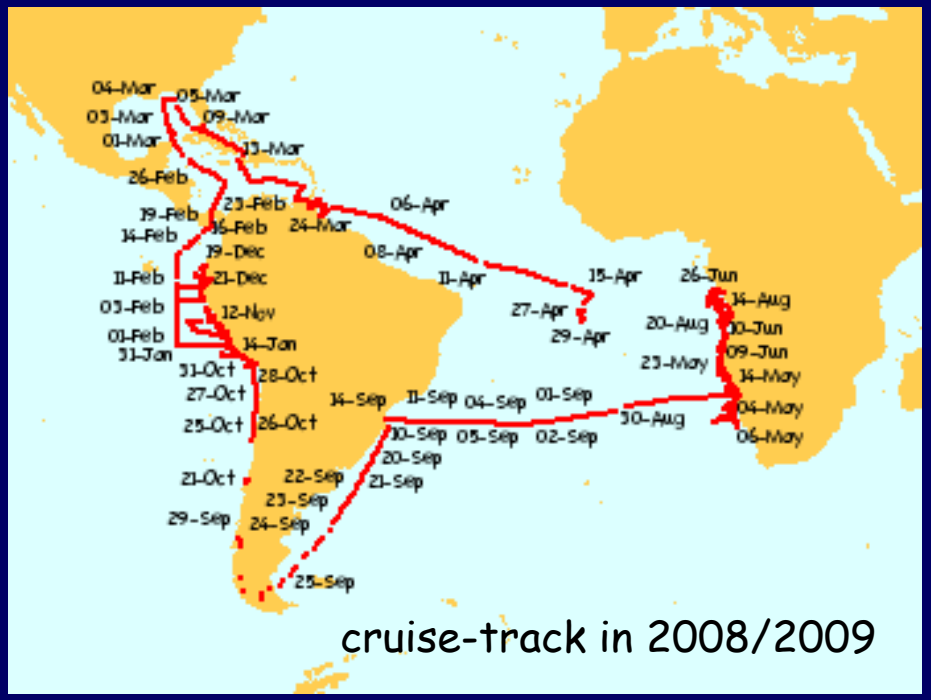

Research in different Areas in 2000 – 2005
total working time: 9,543 days

# GERMAN RESEARCH VESSELS

# METEOR

- relative good experiences with retractable bow-thruster and new DP during station keeping

since 22 years 'flagship'
- now fulfilling its 77. expeditions
- about 320 days per year at sea



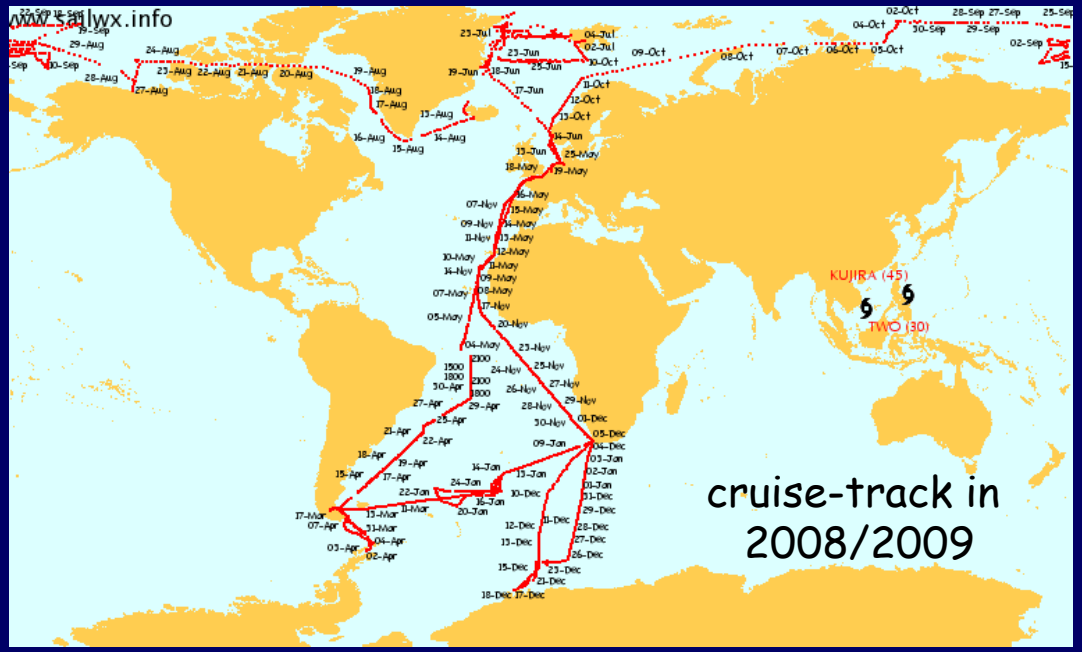
# GERMAN RESEARCH VESSELS

# POLARSTERN


since 26 years

- more than 30 expeditions
- nearly 320 days per year
- November – March in Antarctic waters
- summer months in Arctic waters

- severe accident with helicopter (2 deaths, 3 injured)
- due to high fuel costs the cruising speed was reduced to about 9 kn
- less working days for science
- the board of trustees decided to prepare a study for a replacement of RV POLARSTERN

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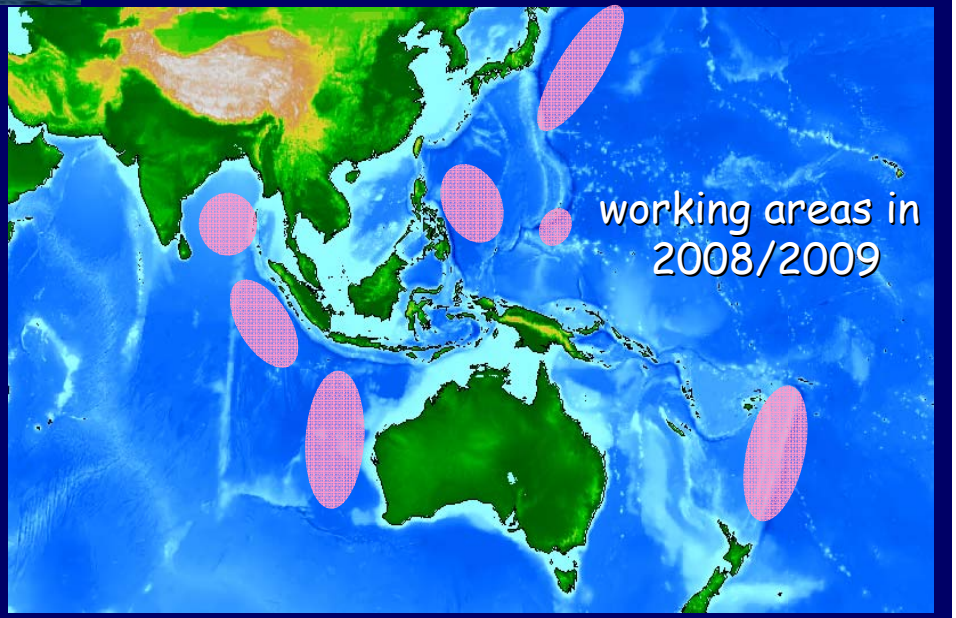
# GERMAN RESEARCH VESSELS

## SONNE

only privately owned ship in German fleet
chartered by Federal Ministry of Education and Research for 250 days per year

- ship operates mainly in the Pacific and Indic and can be chartered (as it was done by India and Australia during 2008)

- mainly due to age (1969) it will be replaced by public owned ship in 2013



# GERMAN RESEARCH VESSELS

# MARIA S. MERIAN


newest ship of the fleet (2006) -
slowly getting rid of 'teething problems'

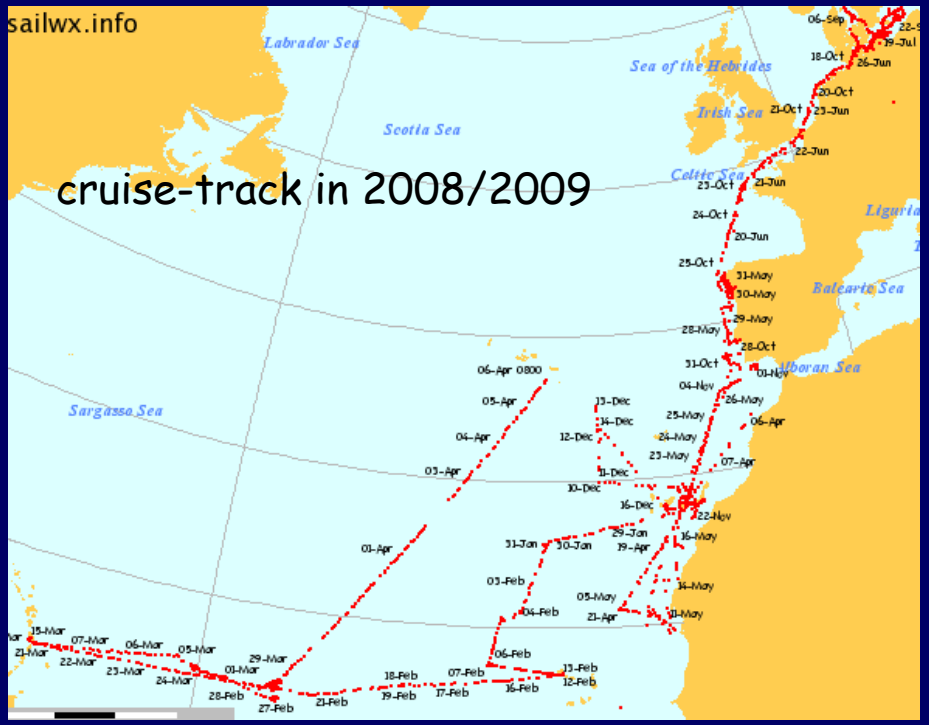
- excellent manoeuvrability and station keeping with pods and DP
- another unscheduled docking due to sealing problems between one pod and hull in November

cruise-track in 2008/2009

# GERMAN RESEARCH VESSELS

# POSEIDON

- the 'old lady' of IFM-GEOMAR
- since 1976 nearly 380 expeditions



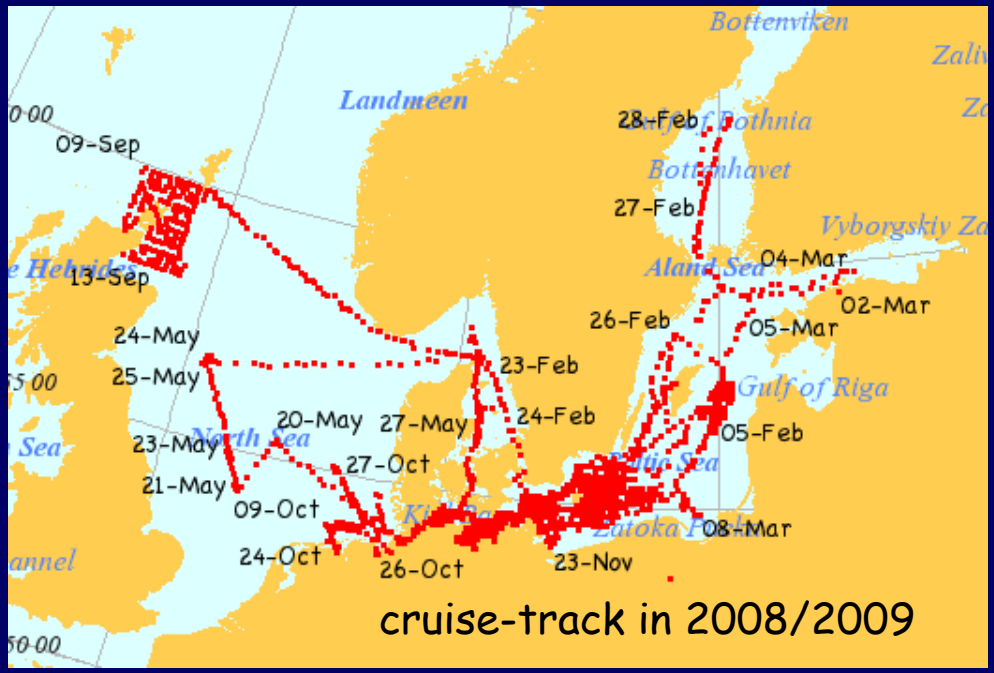

- some winch trouble due to age
- will be replaced within the next five years
- first planning discussions will start this summer

# GERMAN RESEARCH VESSELS

## ALKOR

- lot of student practicals besides 'normal' research cruises

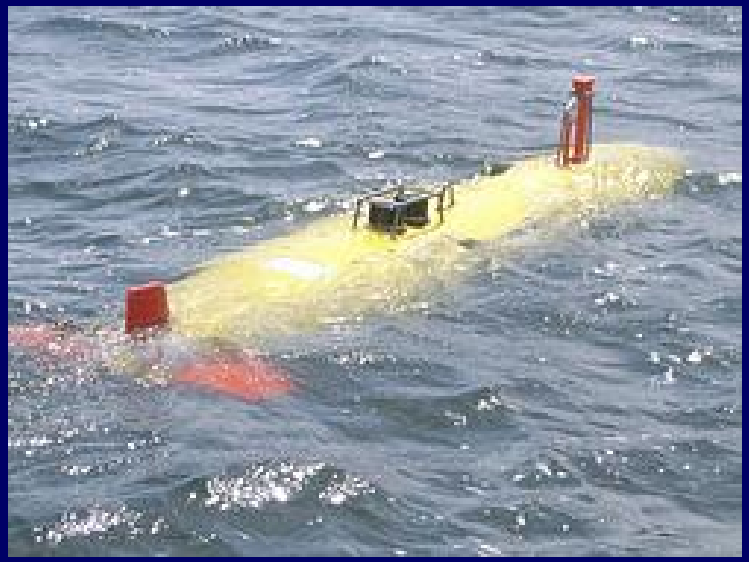
- within the next two years major refit planned



cruise-track in 2008/2009

# GERMAN RESEARCH VESSELS

## new equipment



**AUV "ABYSS"**

| | |
|---|---|
| - length | 3,98 m |
| - weight | 885 kg |
| - diving depth | 6.000 m |
| - speed | 4 kn |
| - endurance | 24 hrs |
| - sensors | temp + Sal |
| | turbidity |
| | side-scan sonar |
| | camera |
| - price | 2.3 Mio € |

# GERMAN RESEARCH VESSELS

new equipment



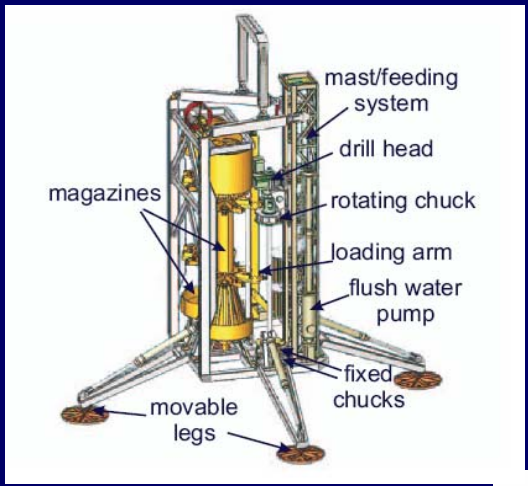
## ROV "Kiel 6000"

- length 3.5m, width 1.9m, heigth 2.4m
- weight in air: 3500kg, in water: neutral
- speed: 3 kn ahead/aback
- propulsion: 7 electric motors
- station-keep capability (DP): ±0.3m
- electric power: 3800 - 4160VAC/460Hz
- deep-sea cable: LWL 6500m at 19mm Ø
- multibeam depth sounder
- scientific payload: up to 100kg
- transport of entire system in five 20' ISO containers (total weight: 65t)
- certification: Germanischer Lloyd

# GERMAN RESEARCH VESSELS

## new equipment

thinking about acquiring




**WINDER**

for very heavy instruments
(it 'winds' cables for
energy and communication
around a synthetic rope)

e.g. for portable
sea-floor drill rig
**MeBo**
deployment depth
retricted due to
weight of cable

# GERMAN RESEARCH VESSELS

end


a rare event: meeting of POLARSTERN and MARIA S. MERIAN in the North Atlantic

## THANKS FOR YOUR ATTENTION