



KONGSBERG

Kongsberg Maritime – Subsea

Hydrography – Integrated Systems and Platforms

**15th MACHC Meeting, Manzanillo, Mexico,
11th to 13th December 2014.**

**Jan Haug Kristensen
Regional Manager Americas
Subsea Sales & Marketing, Kongsberg Maritime AS**



KONGSBERG

Products for any subsea applications

Surveillance

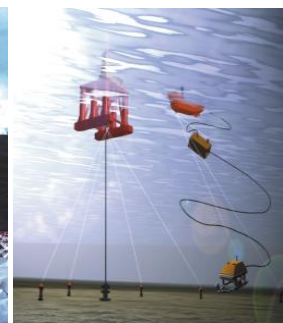
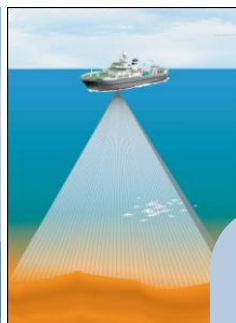
Fishery/ F.
Research/
IEM

AUV

Seabed
mapping

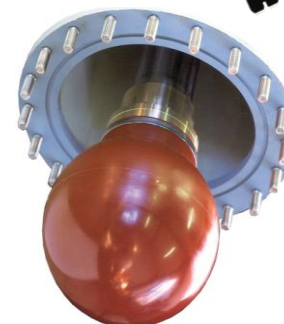
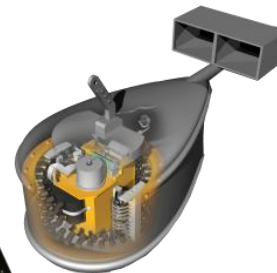
Under water
navigation

Naval
sonars



One third of the world
is covered by land –

The rest is covered by
KONGSBERG

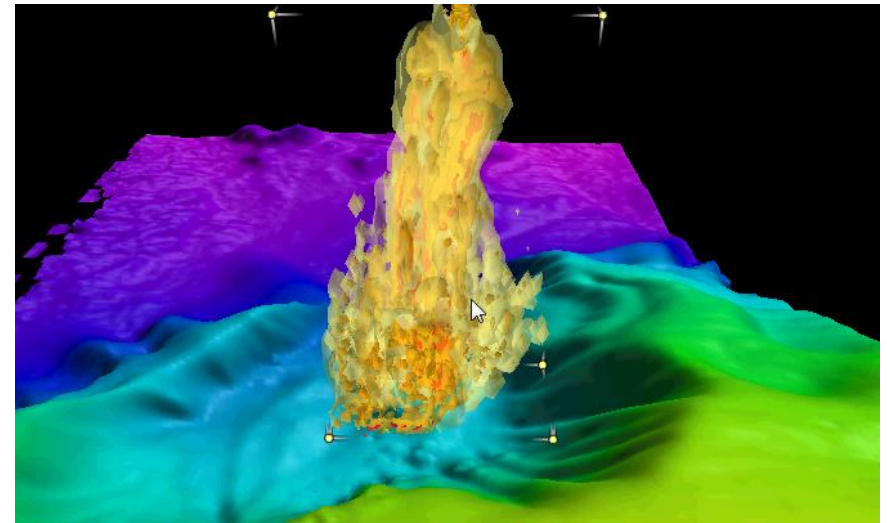
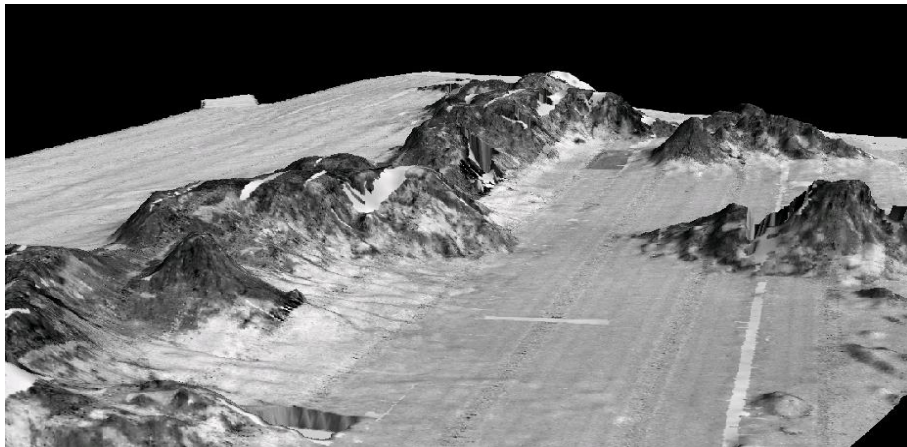
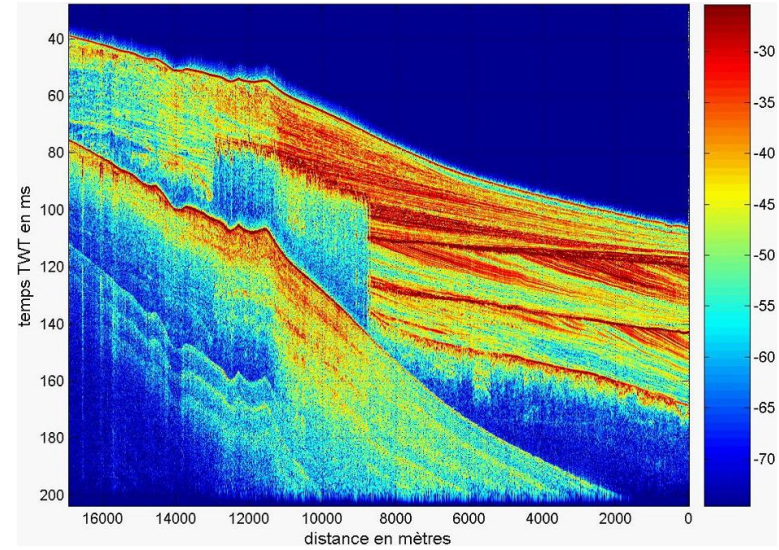
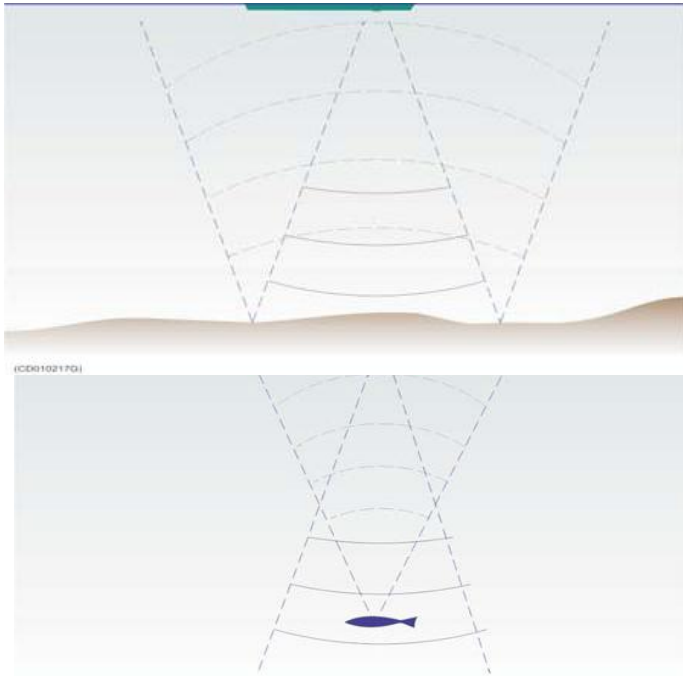


...just a small taste of a variety of products

Underwater acoustics



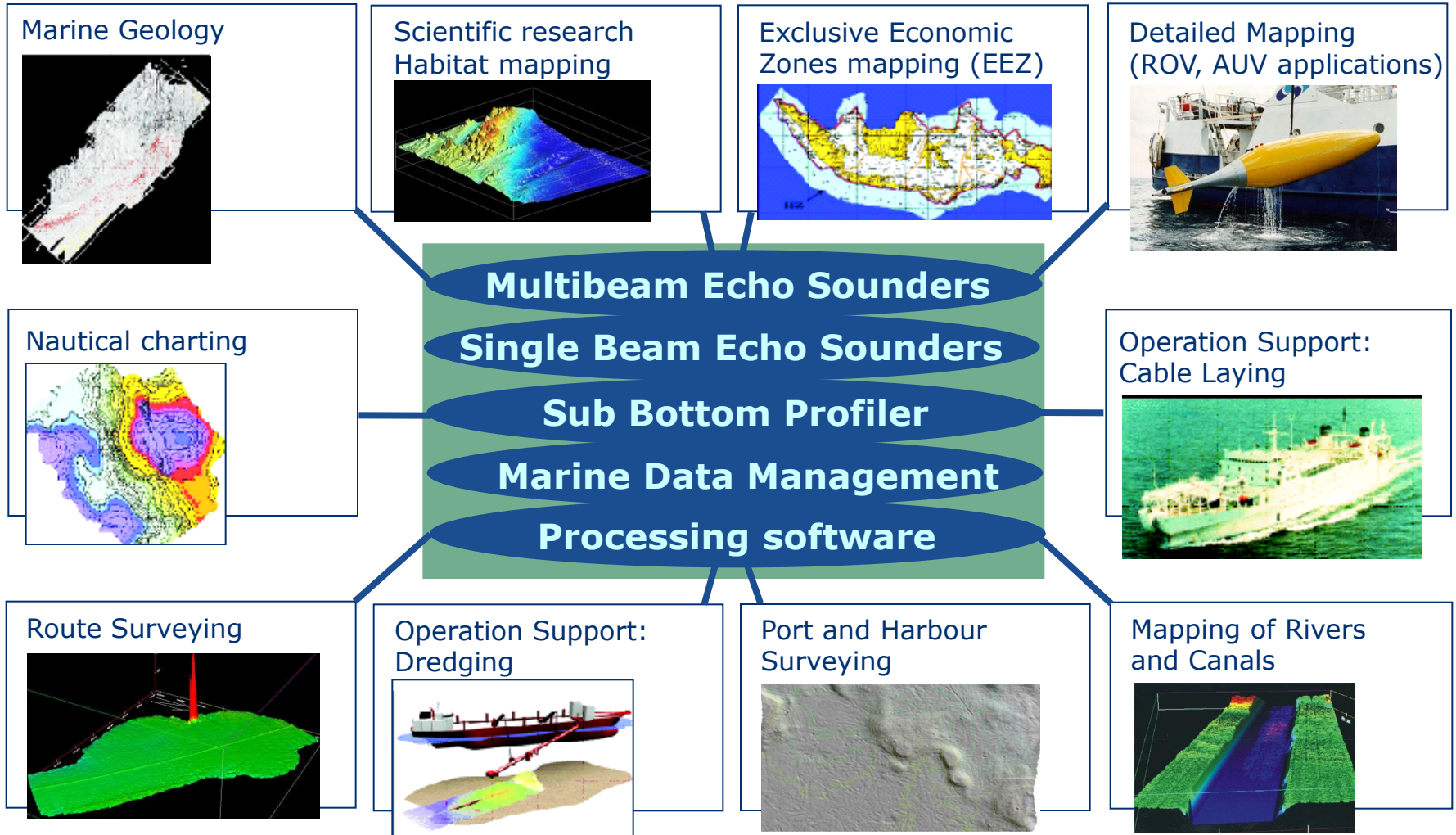
KONGSBERG



Application areas



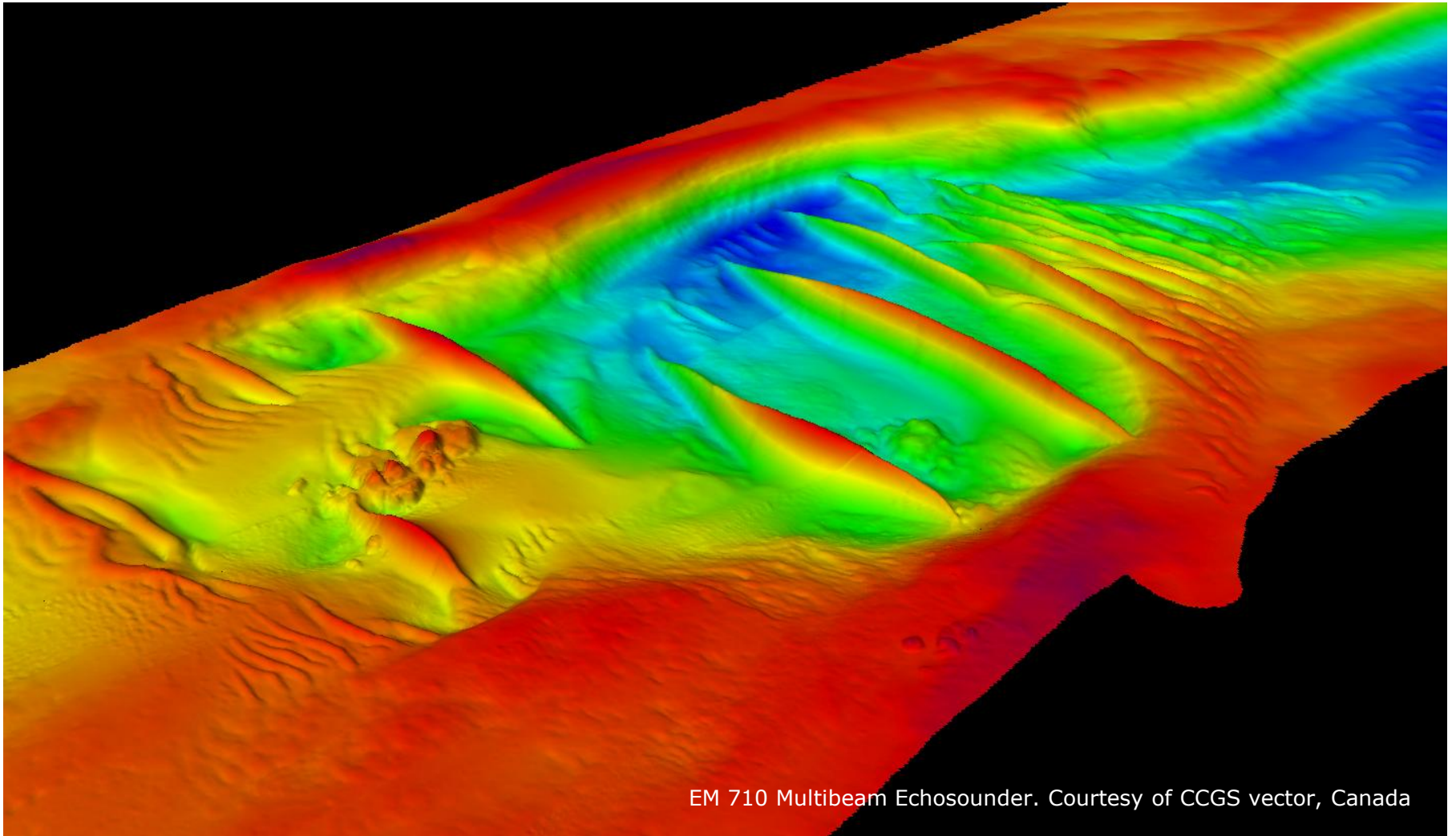
KONGSBERG



Seabed Survey

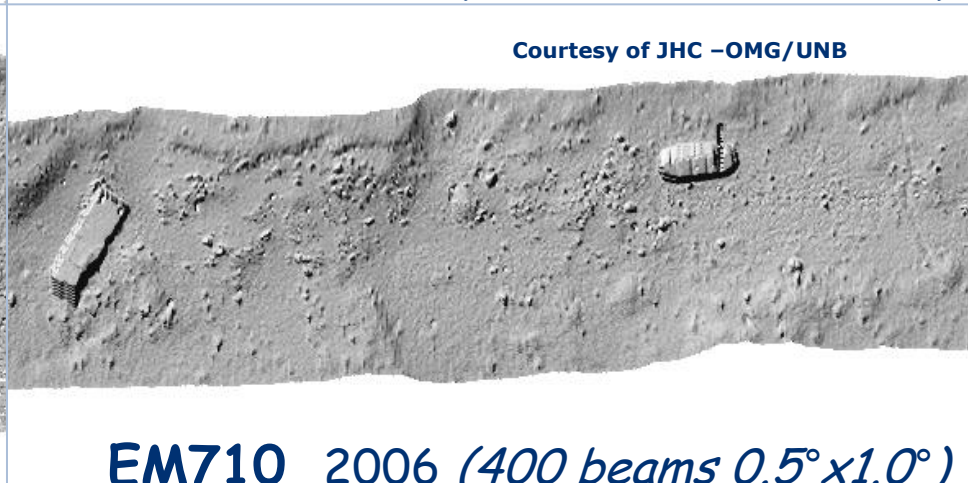
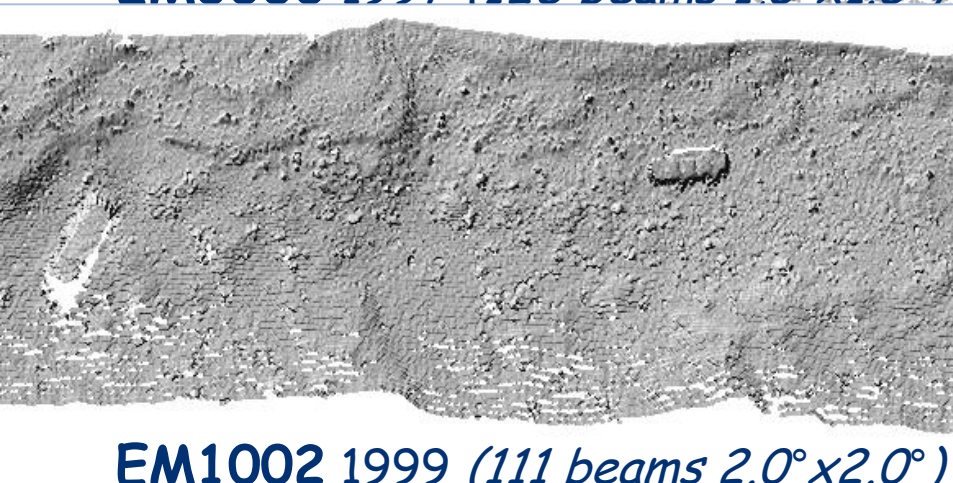
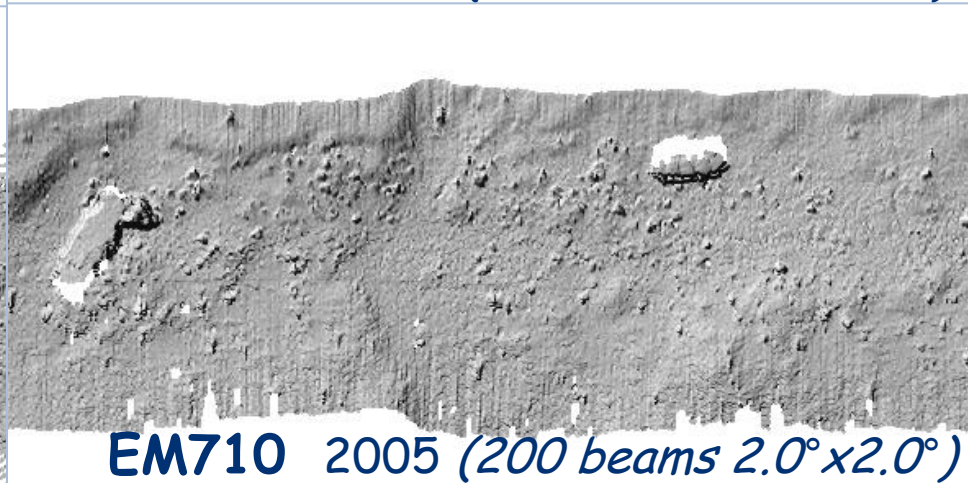
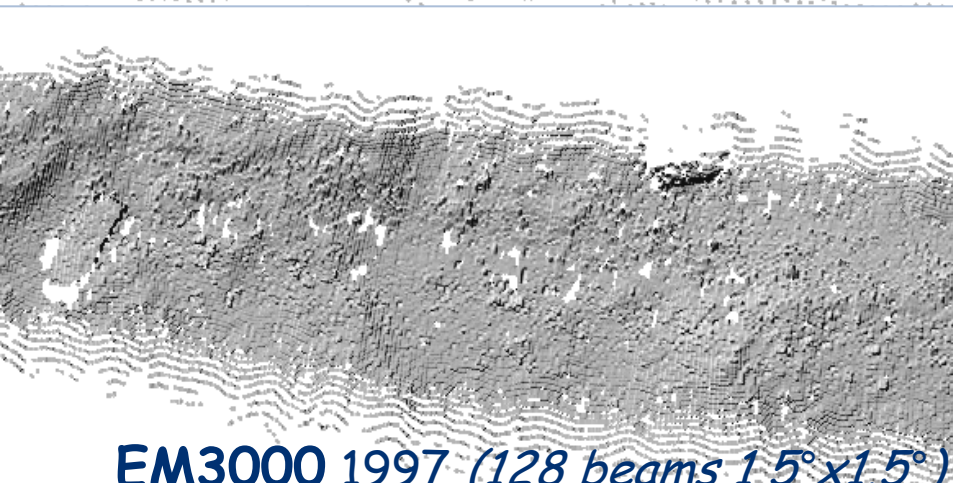
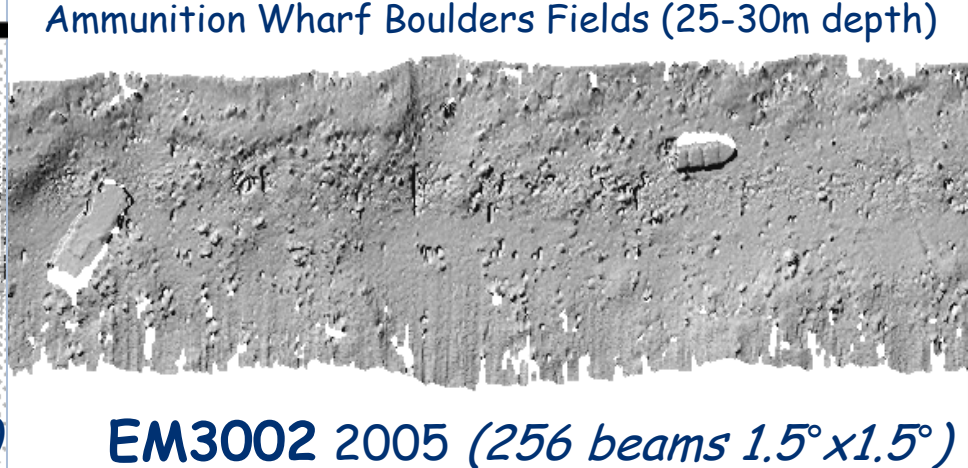
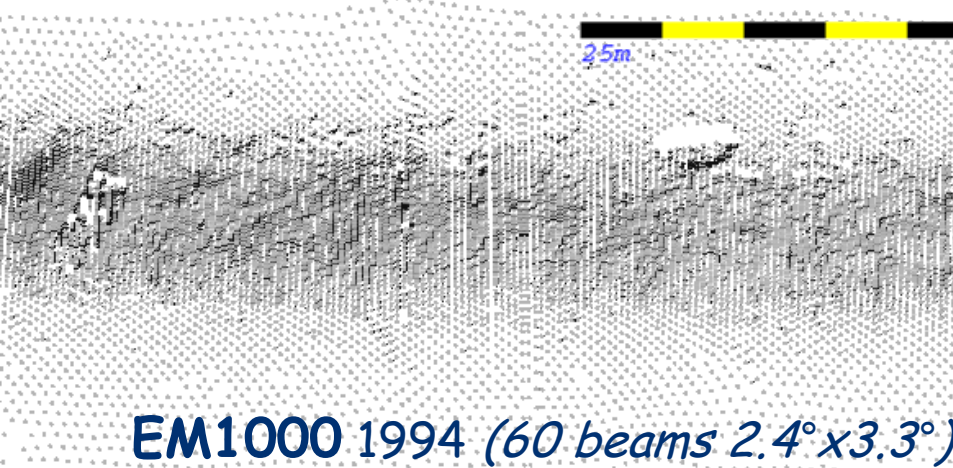


KONGSBERG



EM 710 Multibeam Echosounder. Courtesy of CCGS vector, Canada

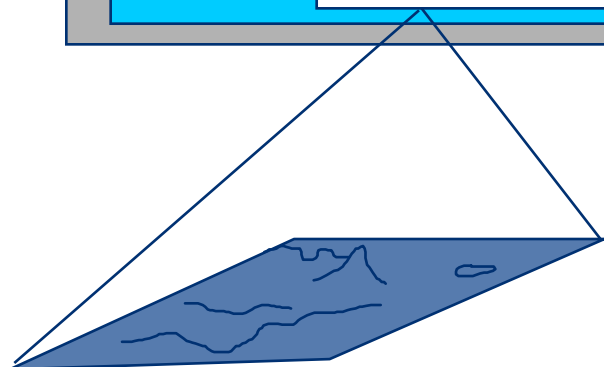
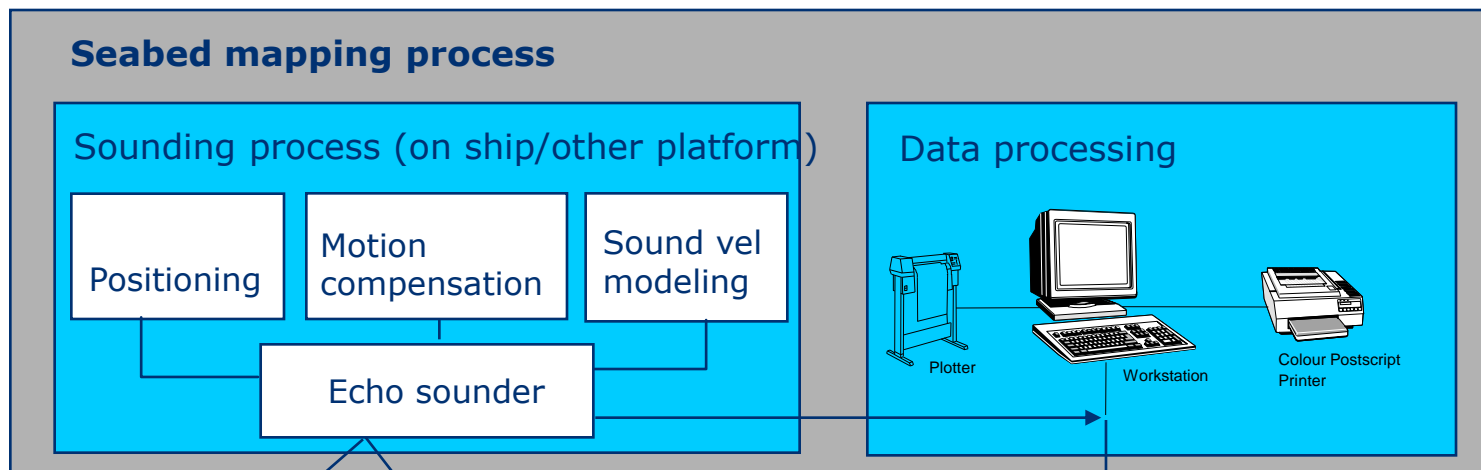
Ammunition Wharf Boulders Fields (25-30m depth)



Courtesy of JHC -OMG/UNB

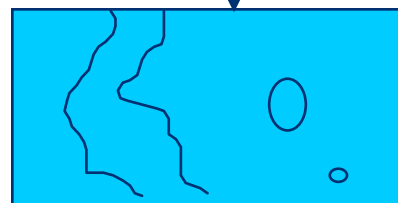


The Quality of a sounding process:



Seabed Terrain

= ? =



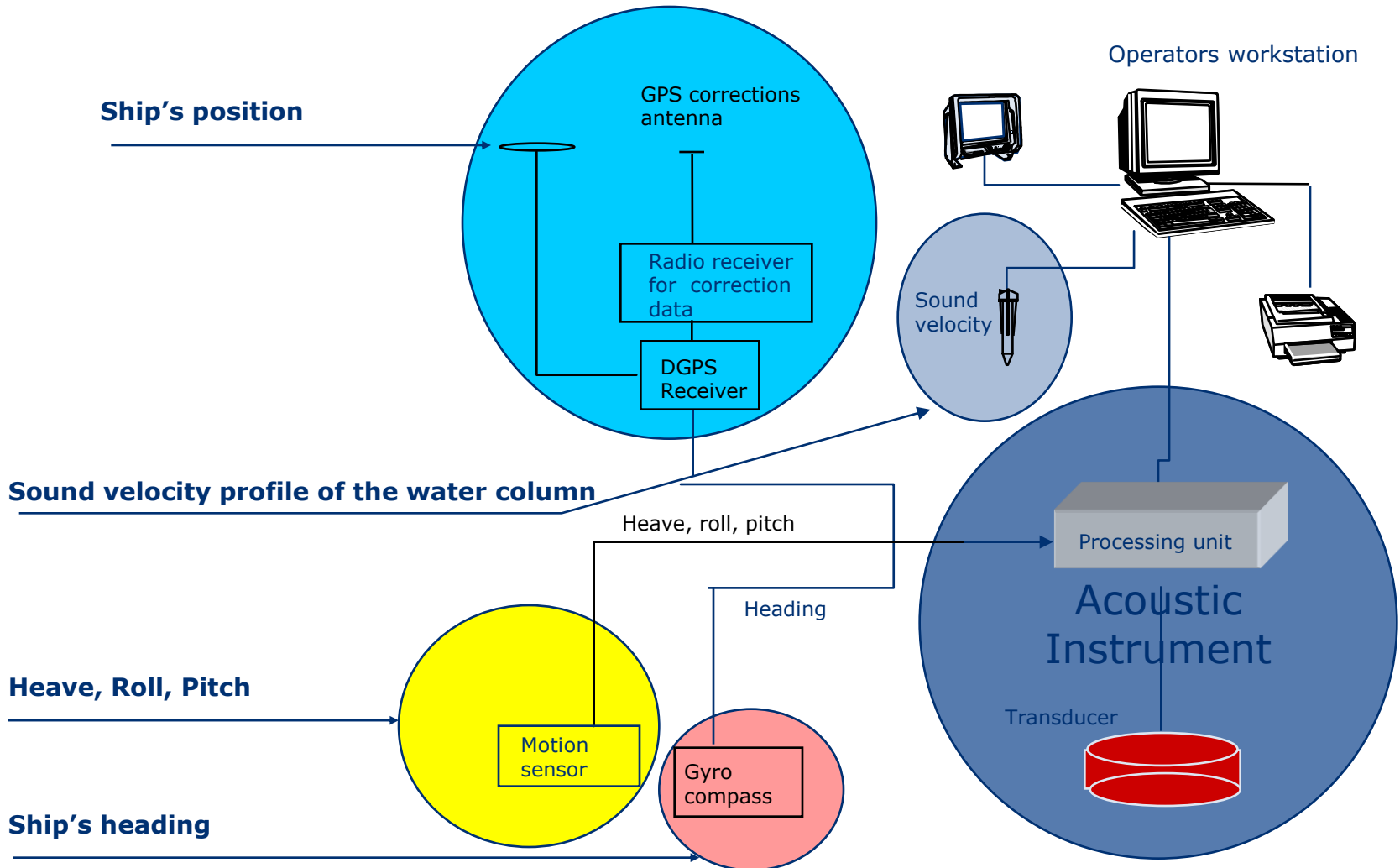
Terrain model

How well does the terrain model represent the seabed terrain?

A Multibeam system is more than an acoustic device



KONGSBERG

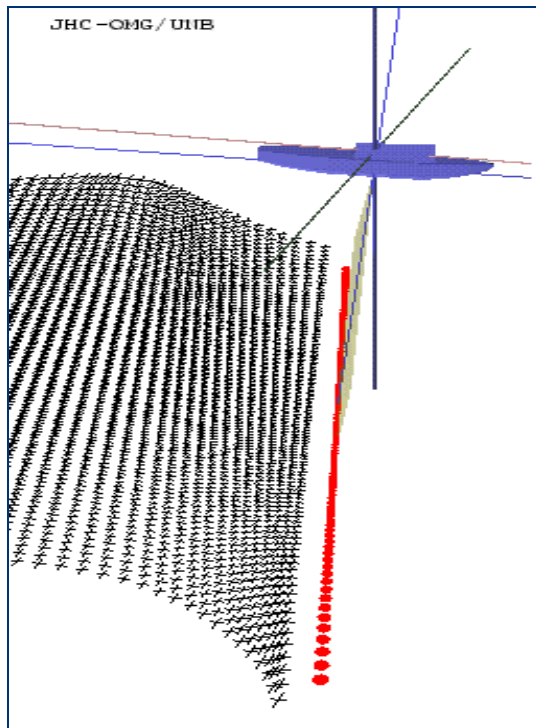


Beam forming - stabilization



KONGSBERG

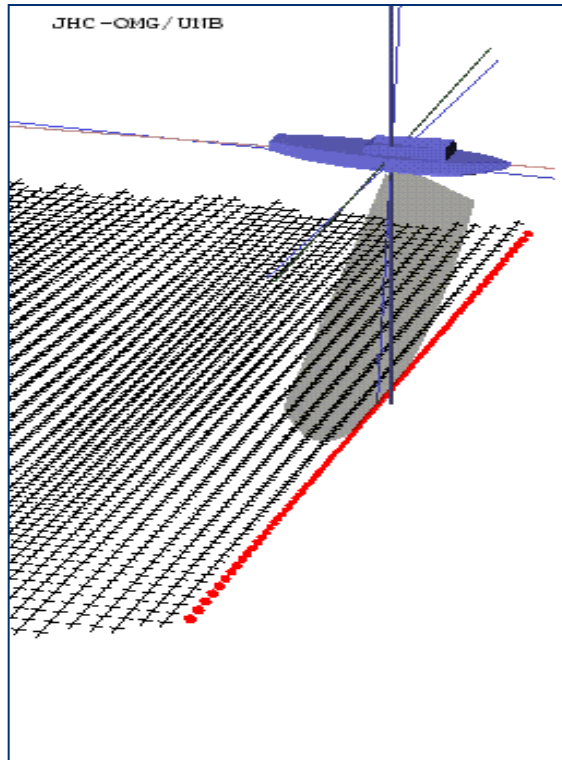
*No
Stabilisation*



Courtesy of JHC -OMG/UNB

Beam forming - stabilization

Roll Stabilisation

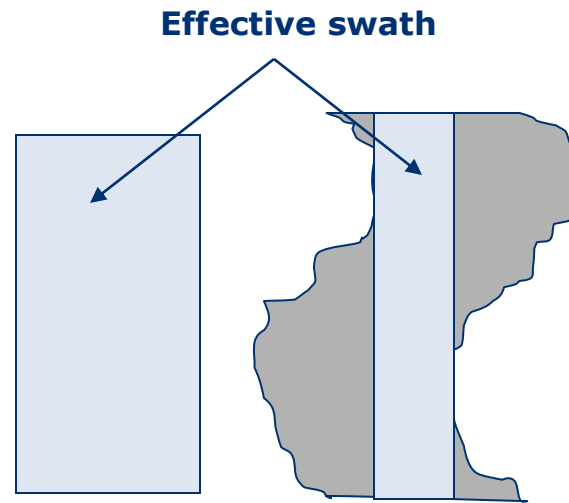


Courtesy of JHC -OMG/UNB

Each Receive Beam is stabilized for roll by the Beamformer (electronic beam steering).

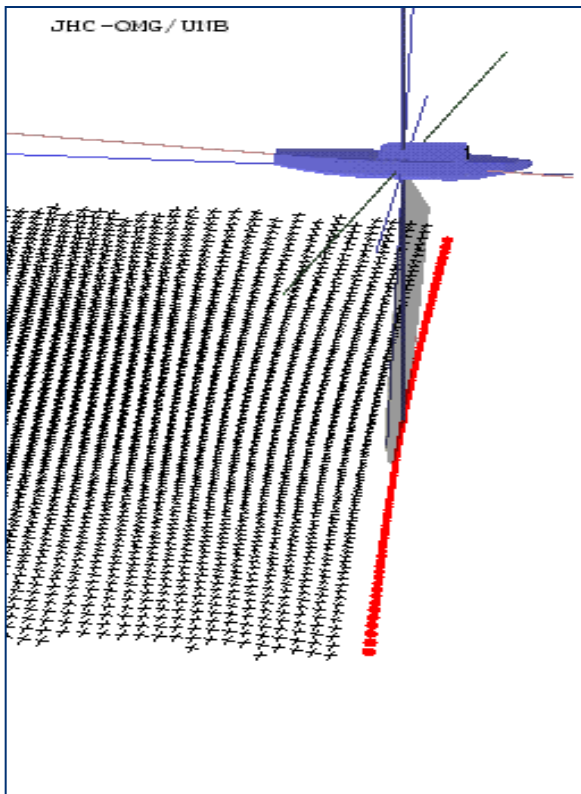
Input in real time from the Motion Sensor.

All beam pointing angles are constant (related to the vertical axis).



Beam forming - stabilization

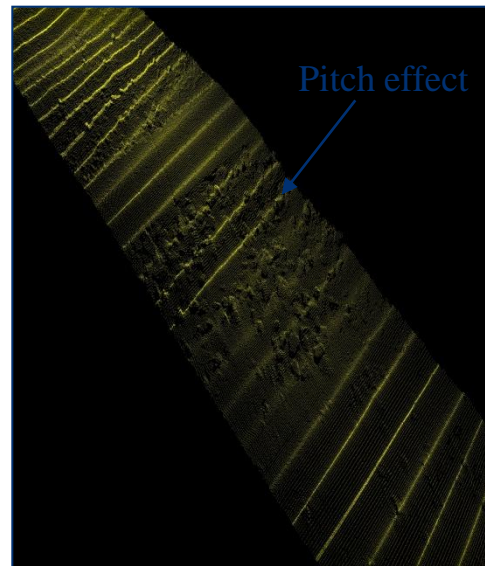
Roll and Pitch Stabilisation



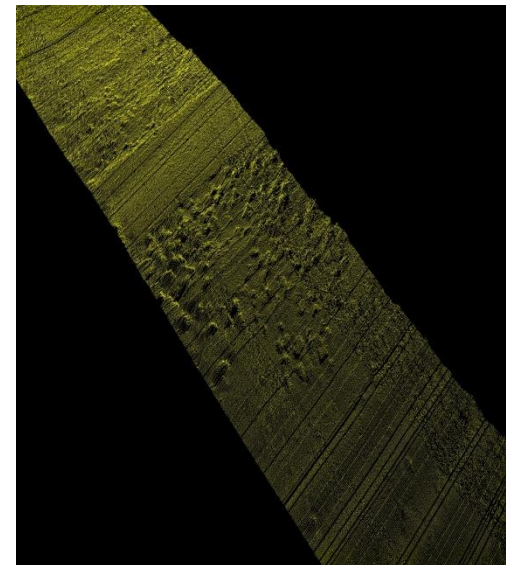
Courtesy of JHC -OMG/UNB

Stabilization for pitching is obtained by steering the transmit beam electronically forward or aft at the time of transmission, based upon input from the motion sensor.

No pitch stabilization



Pitch stabilization on



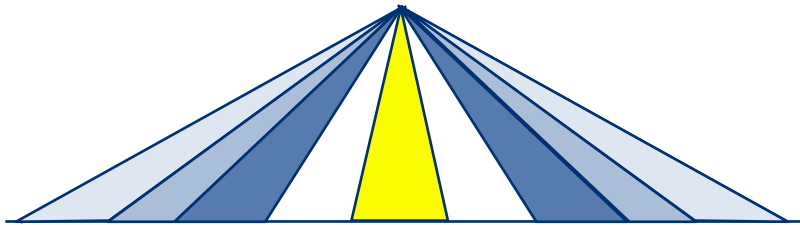
Courtesy of QPS



Beam forming - stabilization

The system is full stabilized for yaw by using sector transmission.

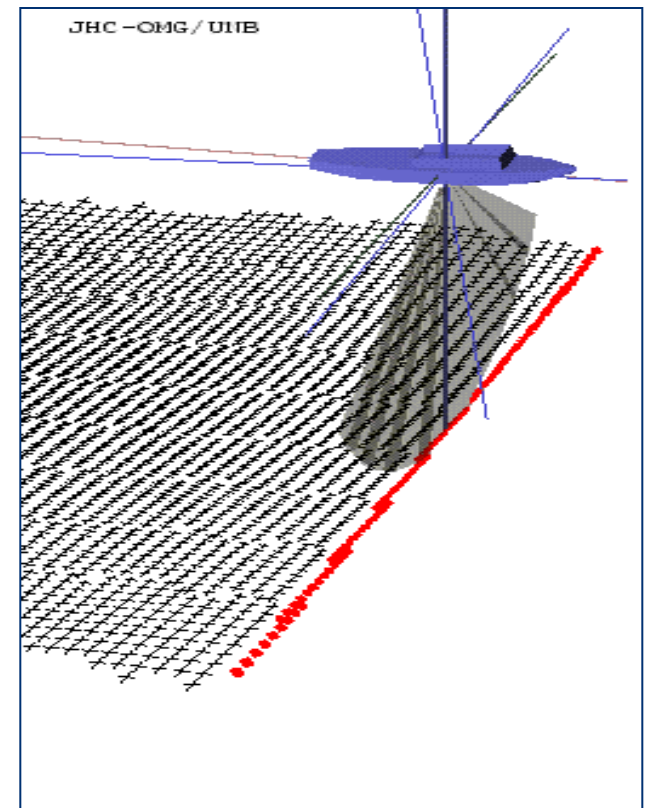
Sector transmission with frequency coding and individual tilt control.
Simultaneous transmission on all sectors.



Frequency coding of transmit beams

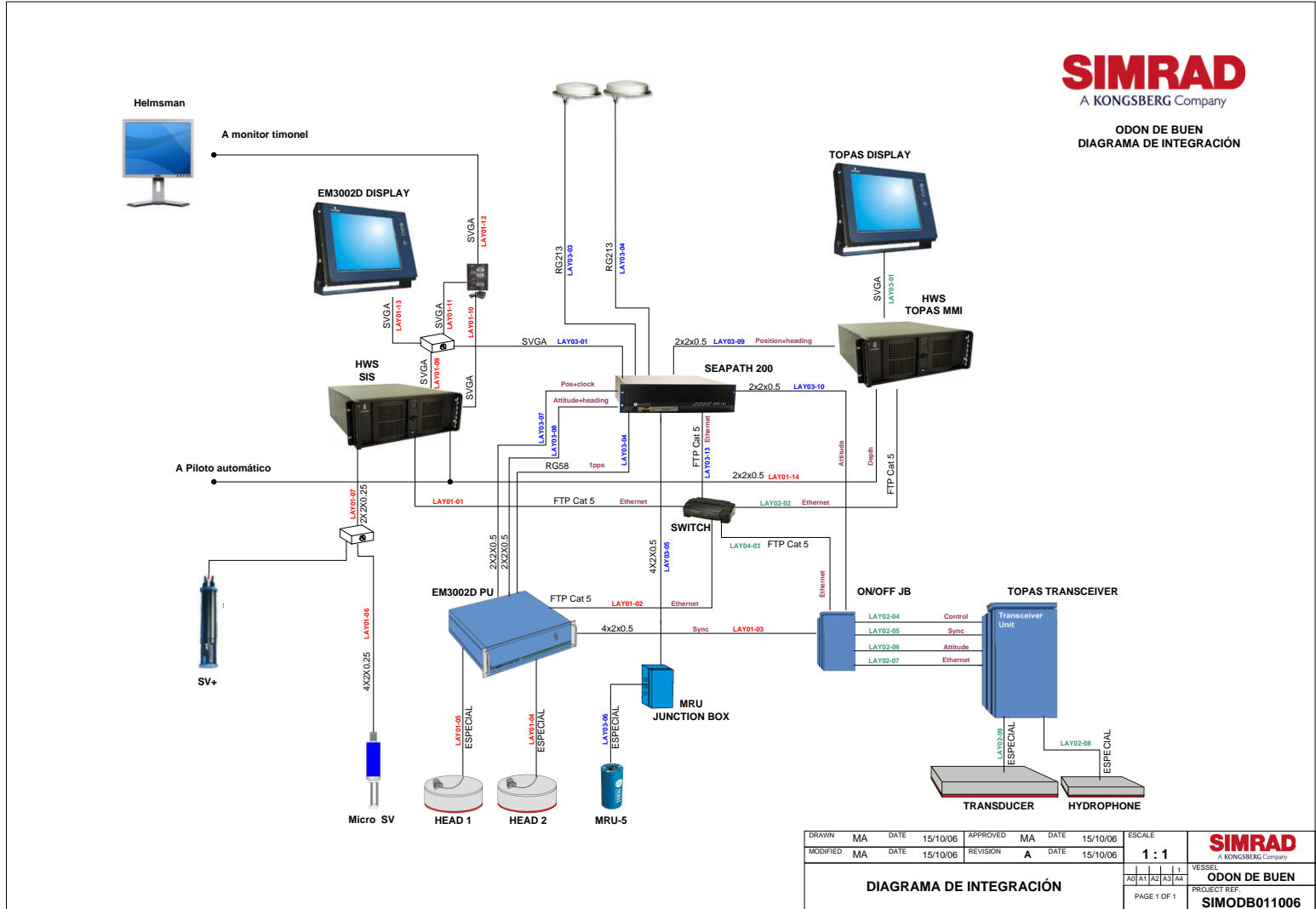
9 sectors in deep water

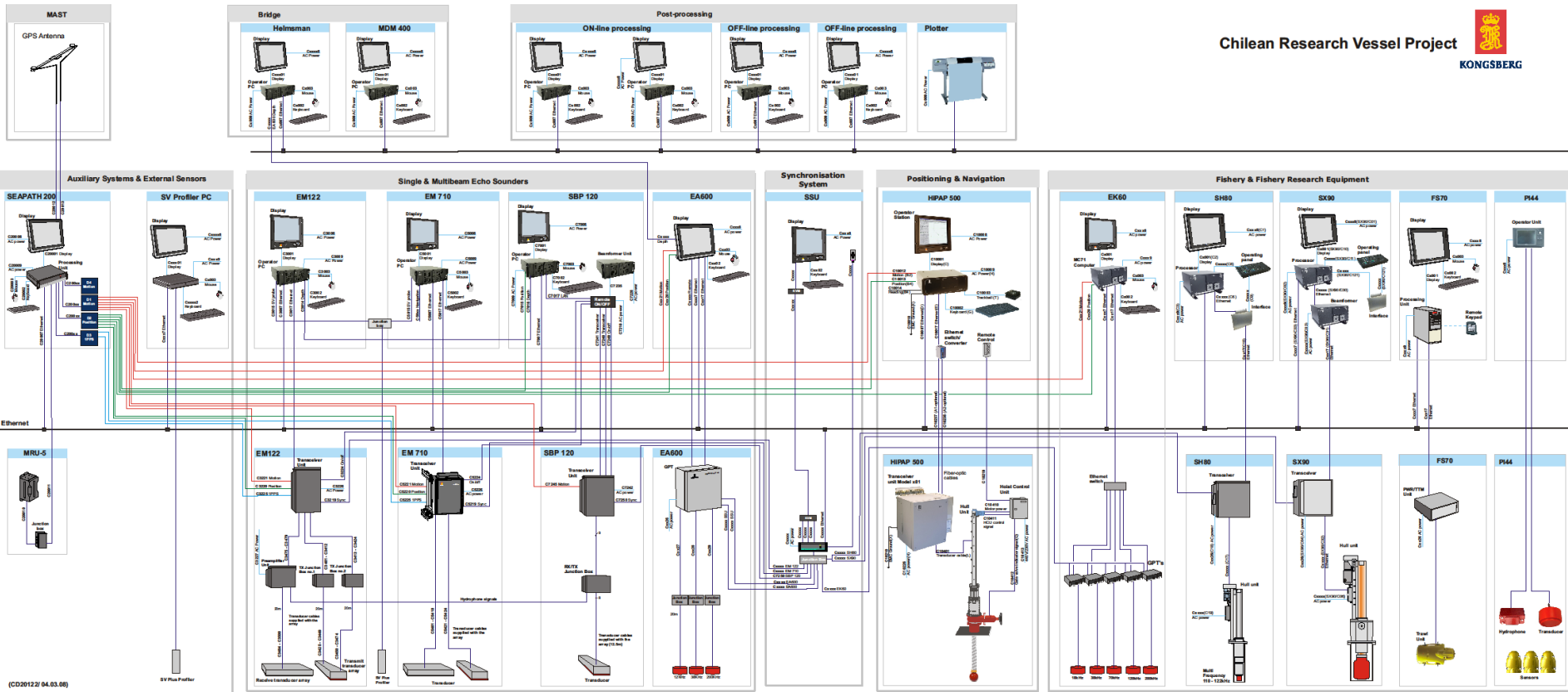
Roll, Pitch and Yaw Stabilisation



Courtesy of JHC -OMG/UNB

Integrated Systems

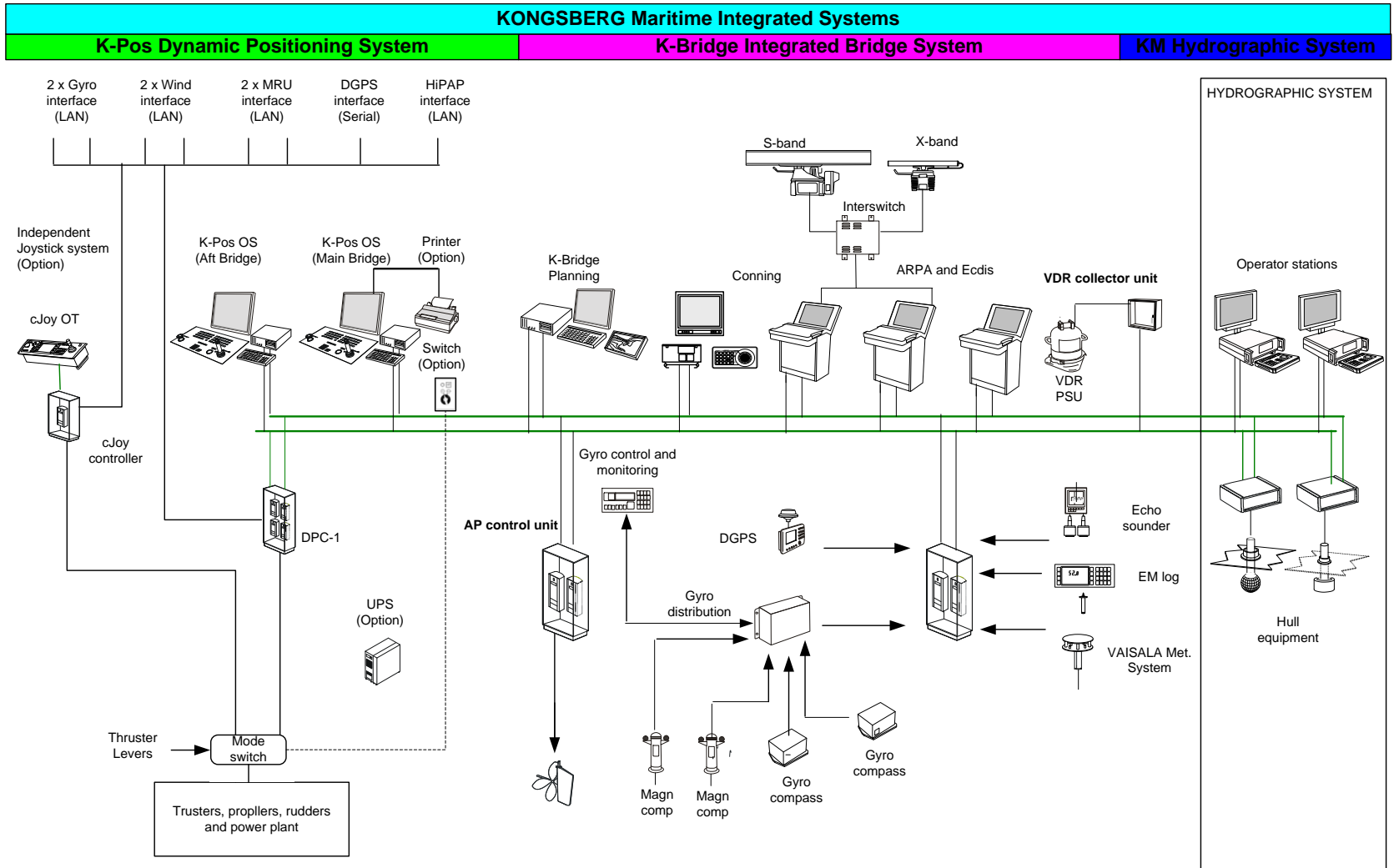




Integrated Systems



KONGSBERG



Integrated Systems



KONGSBERG



Integrated Systems



KONGSBERG



Integrated Systems



KONGSBERG



Integrated Systems



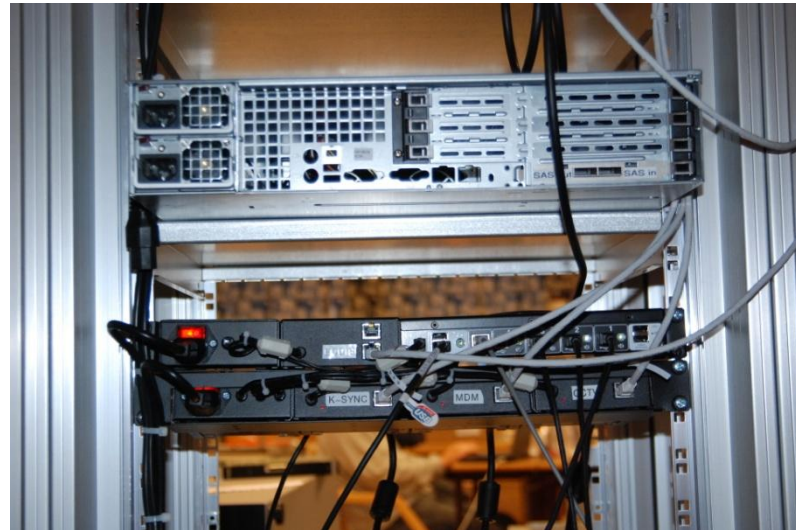
KONGSBERG



Integrated Systems



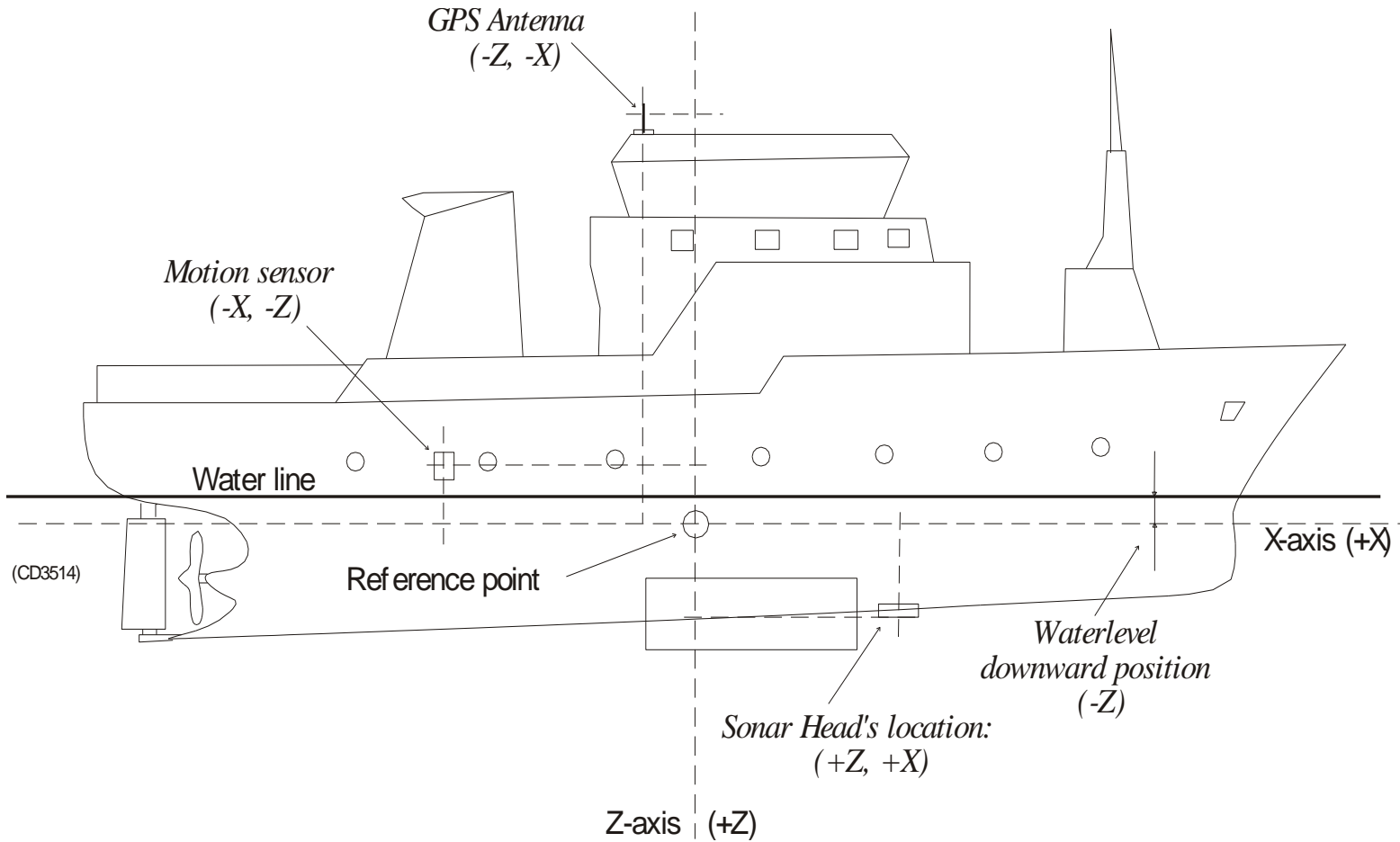
KONGSBERG



Sensor Locations on a Ship



KONGSBERG

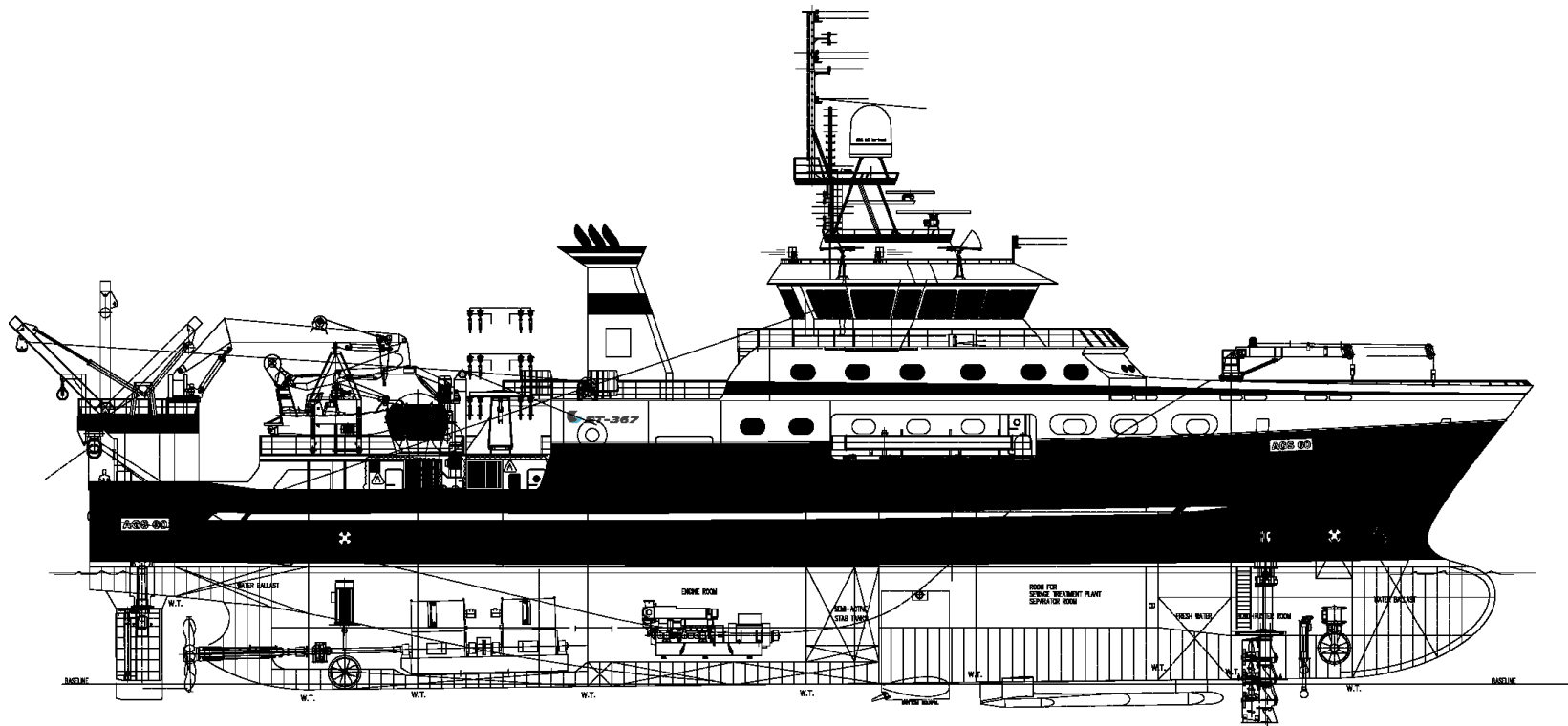


All sensor locations and mounting angles are inserted and compensated for

Integrated Systems



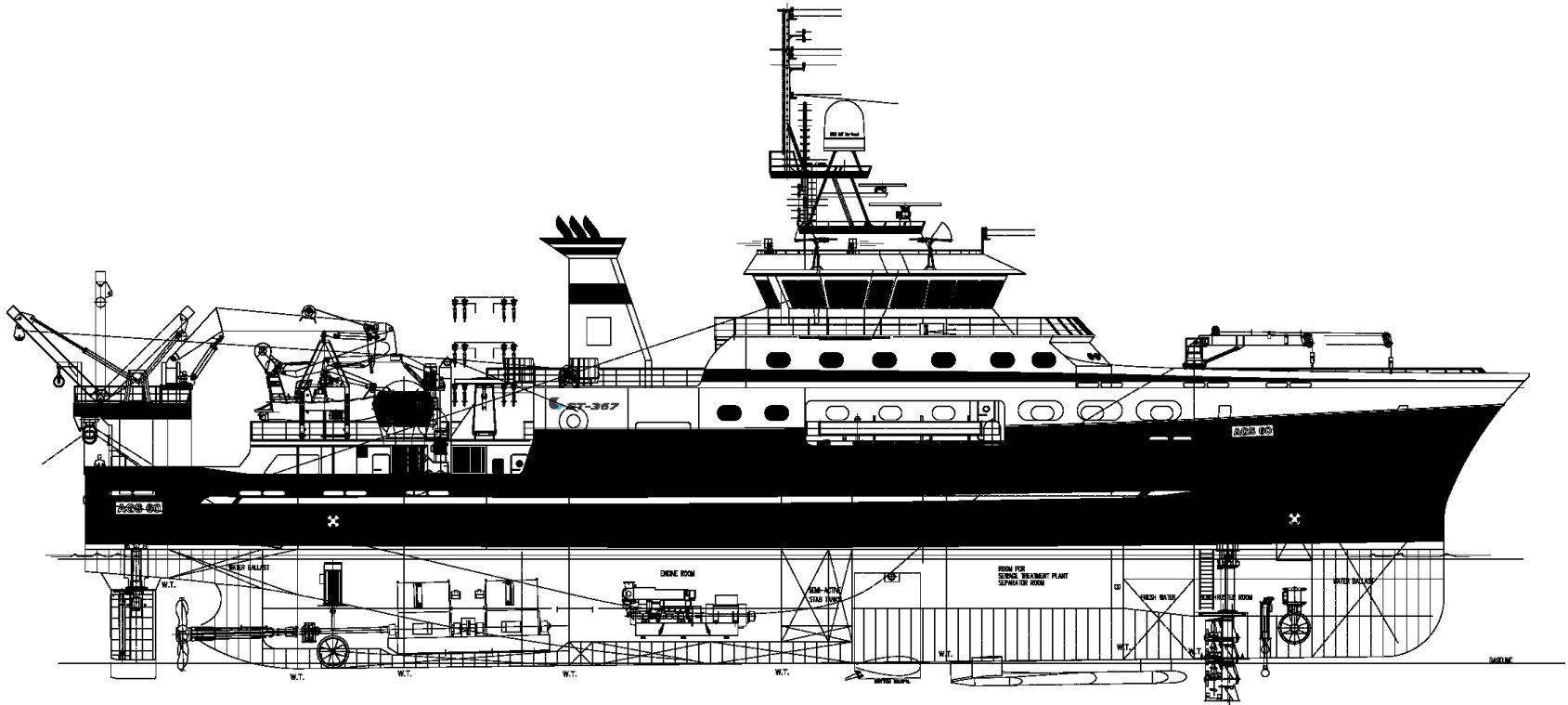
KONGSBERG



Integrated Systems



KONGSBERG



Integrated Systems



KONGSBERG

ST-design™



Skipsteknisk 

Integrated Systems



KONGSBERG

ST-design™



Skipsteknisk 

Integrated Systems



KONGSBERG



B I O Hesperides, Spain
Constructed 1990 to 1992



KONGSBERG

Antarctic and Arctic operations



**Future –
New Norwegian Polar RV
RV “Kronprins Haakon”
LOA: 100m, LPP: 84.8m
Beam: 20.0m
Draught: 7.6m
To be constructed by
Fincantieri, Italy**



KM Quality Assurance - In-door test tank



KONGSBERG



Testing of

- impedance
- directivity/sidelobes
- sensitivity
- efficiency

Every KONGSBERG transducer is tested individually in a test tank

Important to take into consideration in the early stage of an Integrated Project

To prevent errors in the data:

- Invest in high quality sensors
- Invest in vessel and installation design
- Invest in supervision by KM during installation
- Invest in time spent on alignment
- Invest in time spent on calibration
- Invest in operator training

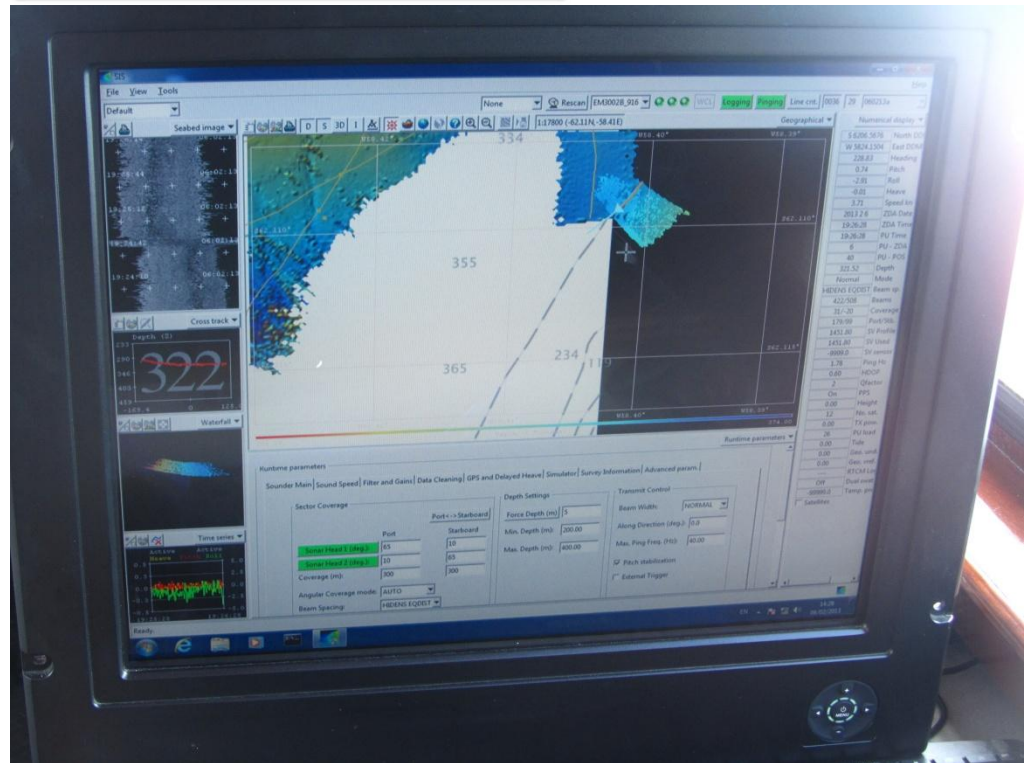
Do you want to lend your brand new bike to a driver without a license ?



Nice picture from Antarctica



KONGSBERG



Courtesy of DHN, Peru

THE GLOBE

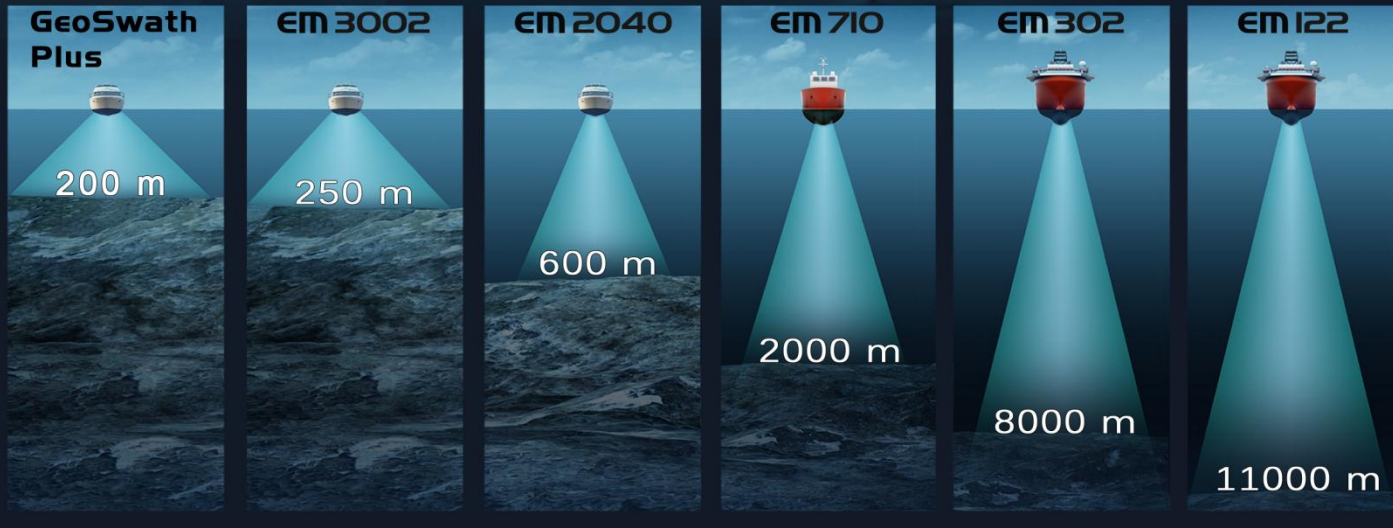


KONGSBERG

1/3 COVERED BY LAND
THE REST IS COVERED BY KONGSBERG

The complete multibeam echo sounder product range

MASTERS IN SOUNDING YOUR WATERS



Obrigado
Para
Su
Atencion



[kongsberg.com](https://www.kongsberg.com)



KONSGBERG