

Greening the European research vessel fleet

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Eurofleets

- EC funded Research Infrastructure project (www.eurofleets.eu)
- Enhance coordination and promote the cost effective use
- Consortium of 24 partners, 15 countries
- 3 'domains'
 - Networking
 - Transnational access
 - Research (software facilitating transnational access, interoperability)



Eco-Responsability & Eco-Design

Design guidelines for regional research vessels

- Description of current performance
- Available techniques
- Guidelines

Environmental Management

- LCA
- RV-EM Plan
- RV-EM System



Current Performance

Questionnaire to 100 RV operators
>150 regional vessels (20-60m LOA)

- MARPOL annexes I, IV, V & VI
- EC regulation on engine exhausts
- IMO convention on antifouling paints & ballast water
- Use of hazardous materials
- Underwater radiated noise
- Conduct of marine science
- Administrative tools

Green = being better than conventions/legislation



Current Performance

Operators generally follow international conventions

Older MARPOL annexes (I, IV & V) efforts to green operations and vessels

Disposal of oil, sewage and garbage accustomed to practice costs involved have become standard or costs have evolved to acceptable levels

Recent conventions simple compliance

In time rules become simpler, older ships are being decommissioned. Community adapts, maybe slowly, but surely to an environmentally more friendly activity

Greening occurs equally for smaller and larger vessels (<>400GRT)

'Margin for growth'

All operators consider the environment important enough to consolidate an environmental policy into a management systems that are even often certified, the overall tendency seems to adopt what is legally asked for

Some operators indicate absence of compliance with international regulations



Green/Clean Ship

Fashionable term

The green ship does not exist

Continuous development of technologies/legal demands narrows the concept

Greener/Cleaner ship

Environmental awareness :
crew & shore staff training
environmental management system
certification

Clear definition of the greener ship concept & auditing



Greener Ship Designs

Green Ship Technology Book (European Marine Equipment Council 2010)
<http://www.emec.eu/green/>

Reduction of air emissions
Ship waste disposal
Bilge water treatment
Black water treatment
Grey water treatment
Ballast water treatment
Anti-fouling systems

Integration of existing technologies : 15-20% improvement
Further development of technologies : 30% more eco-friendly ships



Greener Technologies

MARPOL I Oil

Dispose off at shore

High speed centrifuges

Biodegradable fuels & oils

Green ship initiative NOAA-GLERL since 2006

Water lubed stern tube

MARPOL IV Sewage (no discharge anticipated)

Dispose off at shore

Sewage treatment system

Membrane bioreactors

Vacuum toilets

MARPOL V Garbage (recent MEPC62 results)

Dispose off at shore

Waste compressors

Incinerators (heat recovery)



Greener Technologies

MARPOL VI Air Pollution

- Slow steaming
- Low sulphur fuels
- Cold Ironing
- Improved hull, propeller & rudder design
- Engine performance monitoring
- Waste heat recovery
- LNG as fuel
- Exhaust cleaning – NO_x, Soot & SO_x
- Hybrid power generation fuel cells, solar, wind
- Air lubrication

Anti-Fouling Systems

- Biocide free systems (Natural biocides under development)
- Surface treated coatings
- Non-stick coatings
- Photoactive paints
- Active anti-biofouling
(Slime producing coatings)



Greener Technologies

Balast Water Convention

Balast water treatment systems
Balast water free hull design

Harmfull substances

Assured through EMP/EMS

Underwater Radiated Noise

All electric propulsion; cleaner exhausts & lower fuel consumption
Silent Class notations (DNV, BV)

Conduct of Marine Science

Adopted by IRSO & ERVO
Assured through EMP&EMS

Administrative tools

Green Class notations (DNV, GL), Green Passport (ABS)
ISM
ISO9001, ISO 14001
Blaue Engel (ship & operations)



Greener Ship Designs



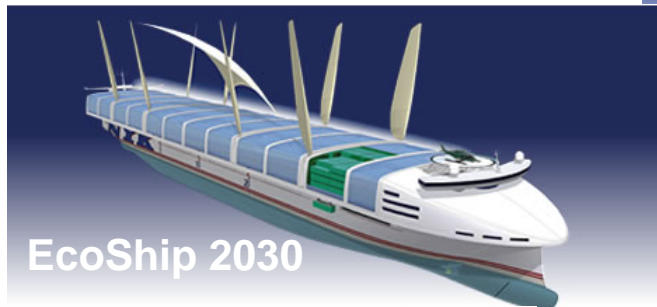
0-emissions container feeder



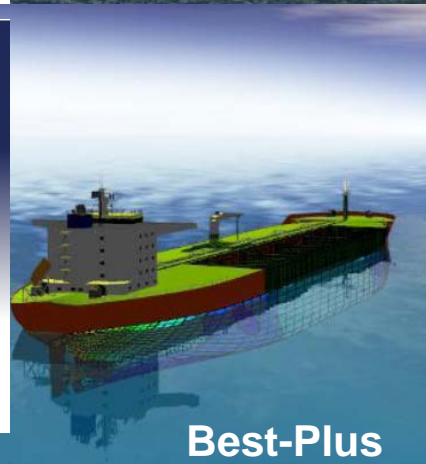
Ecore Bulker



Momentum RoRo



EcoShip 2030



Best-Plus



Quantum Container



Wallenius E/S Orcele



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Greener Ship Designs



Greener Ship Designs

Tsekoa II



Greener Ship Designs

Princess Royal



Greener Ship Designs



Greener Ship Designs




Derek M. Baylis



Oceania





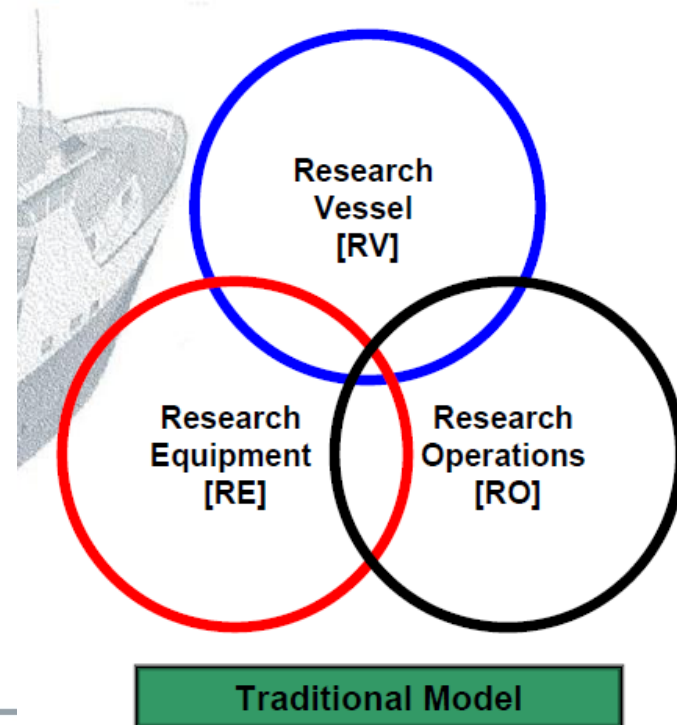
Is “Greening the Research Fleet” all that we as research ship operators need to do to manage the impact of our marine scientific research activities on the ocean environment ?

Delivering a ‘Green and Sustainable’ capability that can be adopted by the RV operators within the European Community



Life Cycle Analysis

In the proposed Research Vessel Life Cycle Analysis [RVLCA] the approach adopted for the delivery of a 'Green' Eurofleets capability was to develop a three facet inter-related research delivery capability model. It is argued that the proposed model allows for the capture of all of environmental aspects of the delivery of a marine scientific research capability.



Three Research Vessel Life Cycle Analysis Inventory Types

[RVLCA][RV] – LCA Inventory Table		
Life Cycle Stage	Environmental Aspect	Environmental Impact
Requirements		
Design		
Build & Mid Life Update		
Operation Normal		
Operation Laid Up		
Operation Refit, Recertification & Upgrade		
Disposal / End of Life		

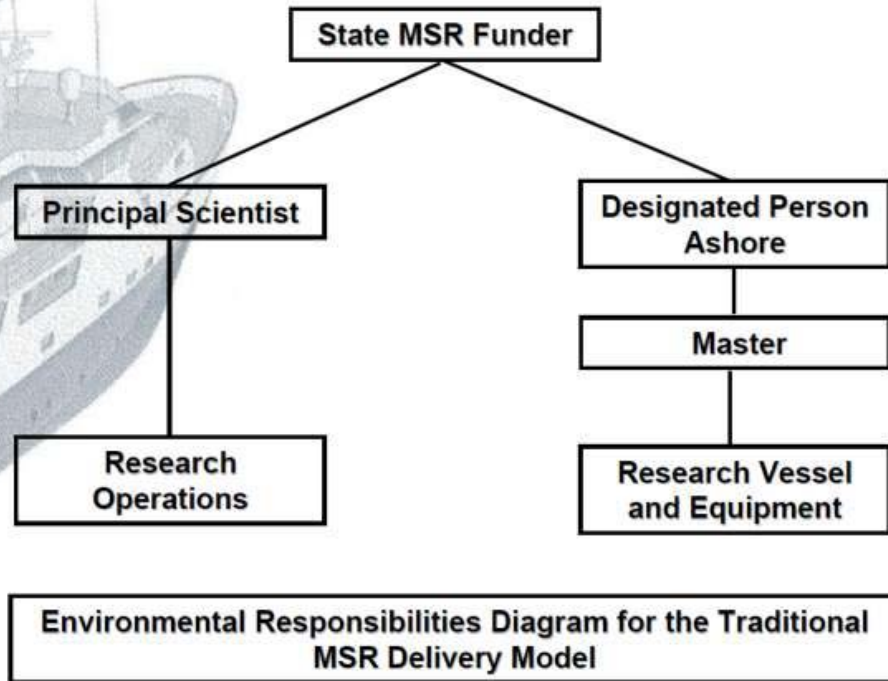
It is possible to have a fully environmentally compliant Research Vessel with respect to the ISM code or ISO 140001 standards but still not be able to undertake certain types of scientific experiment.

[RVLCA] [RE] – LCA Inventory Table		
Life Cycle Stage	Environmental Aspect	Environmental Impact
Requirements		
Build / Procure		
Operation Normal		
Operation Modification		
Operation Autonomous		
Operation Loss		
Operation Non Recoverable		
Operation Logistics		
Disposal / End of Life		

For example the use of acoustic scientific equipment in designated marine mammal protection areas.

[RVLCA][RO] – LCA Inventory Table		
Life Cycle Stage	Environmental Aspect	Environmental Impact
Science Proposal		
Peer Review		
Cruise Planning		
Cruise Passage		
Cruise On Station		
Post Cruise Disposal of Scientific Sample		
Post Cruise Disposal of Scientific Waste		





The 'traditional model' based on a principal scientist & marine scientific research being delivered from a Research Ship the environmental responsibilities are less well defined under the maritime ISM code or ISO 14001.

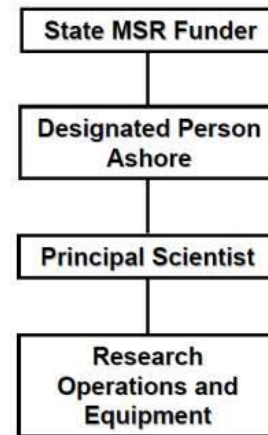
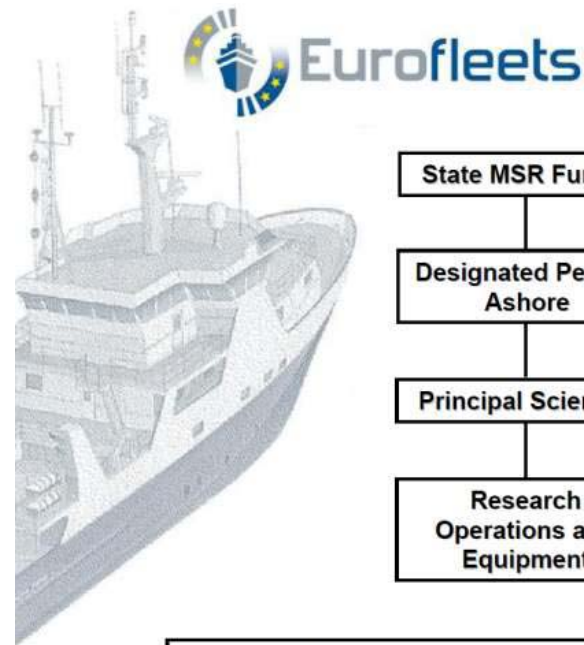
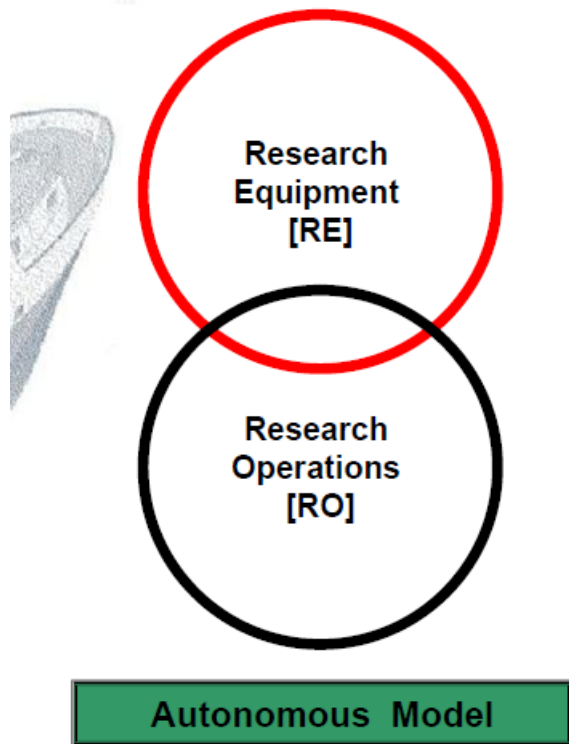
Research Vessel Environmental Management Plan [RVEMP]

Consideration of the environmental issues arising from the growing use of autonomous capabilities such as profiling floats, gliders and powered autonomous vehicles [AUV, UAV etc...].

In the 'Autonomous' case a growing number of Principal Scientists fly their gliders in support of their marine scientific research operations from ashore. This can and will give rise to both safety and environmental compliance issues.



The 'autonomous model' based on the principle that marine scientific research being delivered by an AUV capability, not deployed and operated from Research Ship, the environmental responsibilities are not so well defined under the maritime ISM code or ISO 14001.



Proposed Environmental Responsibilities Diagram for the Autonomous MSR Delivery Model



Thank You

**If you wish to discuss these ideas further then
please contact**

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