Mobile³ MitoLab for Alpine Studies of Hypothermia

Version 2 / E. Gnaiger 2013-02-01

Summary

Mobile³ MitoLab ***Mobile cubed – the mobile mitochondrial laboratory*** – The concept of the Container Laboratory is well established to achive a flexibility for research beyond the range of operations possible in conventional laboratory buildings. The Mobile MitoLab differs from available solutions in terms of internal design, providing the entire and ready-to-use infrastructure for integrated sample recovery, sample preparation, measurement of mitochondrial parameters and data analysis. To increase the economic efficiency of a mobile laboratory, it should be designed as a modular standalone laboratory for field applications, which can also be used as an auxiliary unit connected to conventional core facilities. The mobile laboratory should be independent of a local infrastructure to allow fast implementation of mitochondrial measurements under harsh field conditions (hypothermia). It is suitable for long-distance freight transport (truck, railway, ship) and can be simply displaced as a mobile and fully functional unit within short distances (truck).

1. The *Mobile³ MitoLab* in the hypothermia project

Science

The project on hypothermia provides an excellent model for introducing the Mobile MitoLab and gaining experience in practice, as a basis for optimizing a test version. The mobile laboratory will provide the flexible structure required for the interregional collaboration in the hypothermia project.

Technology

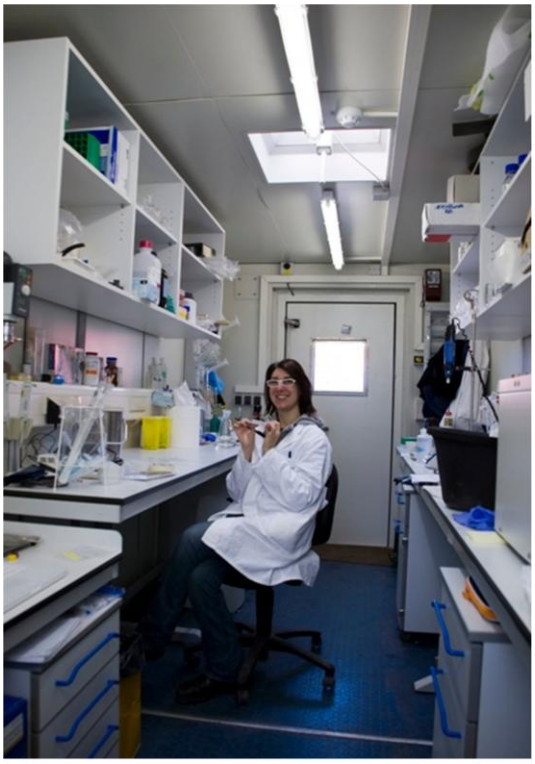
The technical construction of the Mobile MitoLab consists mainly of two parts. (i) The container lab in general, suitable for experimental use as a wet lab, and as a lab for tissue sampling. Further units may be added according to demand (housing, sanitary facility). Autonomic function independent of infrastructure (water, energy) has to be implemented according to demand. (ii) The interior of the Mobile MitoLab must be designed ergonomically to provide an integrated infrastructure for sampling, mitochondrial preparations (microbalance, table centrifuge, binocular with cooling plate for tissue dissection), high-throughput mitochondrial respiration measurements (four Oxygraph-2k units for operating eight respirometric chambers in parallel), automatic washing facilities, data acquisition, analysis and data storage, sample storage and conservation.

2. The *Mobile³ MitoLab* – background information

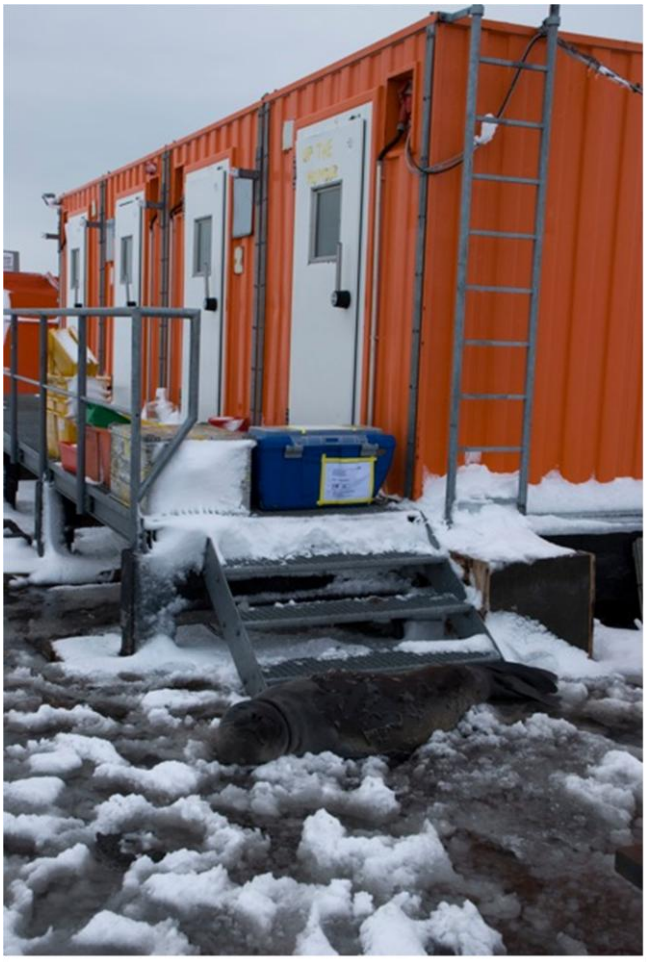
2.1. Mobile Impressions: Container Laboratory in the Antarctic-Station Jubany

Lieber Erich,

Unten angefügt schon einmal ein paar Eindrücke von unseren Laborcontainern, wie sie derzeit auf der Antarktis-Station Jubany von uns genutzt werden.
Die Container wurden seinerzeit allesamt hier in Bremerhaven gebaut, als Sonderanfertigungen, was den Preis natürlich etwas nach oben treibt. Die Kollegen aus der Logistik waren sich aber sicher, dass die so ausgestatteten Container (Laboreinrichtung, Wasser- & Stromanschluss, Abwassertank, Heizung, beheizte Fenster/Türen) für unter 20.000,- € /Stück gekauft wurden.



Laborcontainer Antarktis-Station Jubany



Ende Januar 2010 mit See-Elefantennachwuchs

OROBOROS Oxygraph-2k in Antarctica

Viele Grüße von der Nordseeküste

Felix 2011-02-07

Mark Felix C., Dr.
Integrative Ecophysiology
Alfred Wegener Institute for Polar and Marine Research
Am Handelshafen 12
27570 Bremerhaven, Germany

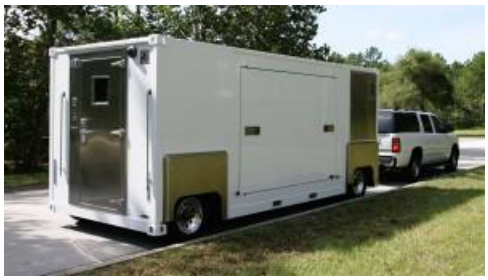
2.2. "Presse" Artikel 30./31. Juli 2011

Karin Schuh: Mehr als nur ein Transportmittel – Leben in der Box. Penthouse, Flagship-Store oder Notunterkunft – Container können zu viel mehr verwendet werden als nur zum schlichten Warentransport. Dass die Formensprache trotz der genormten Maße nicht zu kurz komm, ist der Kreativität von Architekten, Designern und Künstlern zu verdanken. - http://diepresse.com/home/leben/wohnen/682054/Mehr-als-nur-ein-Transportmittel-Leben-in-der-Box

„Er ist exakt 2.44 Meter breit, 8.29 Meter hoch und – je nach Ausführung – 6.06 oder 12.192 Meter lang." Neupreis: ca. 3000 €, gebraucht ab 800 €.
„Das NRW-Forum Düsseldorf widmet sich bis 4. September im Rahmen einer Ausstellung den verschiedenen Zugängen zum Thema Container-Architektur" (Werner Lippert, Leiter des NRW-Forums Düsseldorf).

„Die Baugenehmigung gilt oft nur für ein paar Jahre. Danach werden die Container wieder in ihrer ursprünglichen Funktion eingesetzt."
www.containex.at
www.nrw-forum.de
http://web.stagram.com/tag/containerhouse/

2.3. Mobile Container Laboratories: Germfree's Intermodal ISO Container Labs are easiliy shipped by sea, rail and truck



http://www.germfree.com/product-lines/mobile-laboratories/mobile-container-labs/mobile-container-labs/

2.4. Rocklabs

- http://www.rocklabs.com/container_lab_intro.html

2.5. FLSmidth (Germany): Cements and minerals industry

- http://www.flsmidth.com/en-US/Products/Product+Index/All+Products/Quality+Control/Sample+Prep+for+Container+Lab+Solutions/Nucleus-Cs

2.6. National Oceanography Centre, Southampton

- http://www.noc.soton.ac.uk/nmf/sea_sys_index.php?page=lc

NMFSS have five 20' by 8' container laboratories. All of the container laboratories meet the following specification:

General Specifications

- 20' by 8' shipping containers manufactured to full Lloyds ISO specification.
- Personnel door at either end

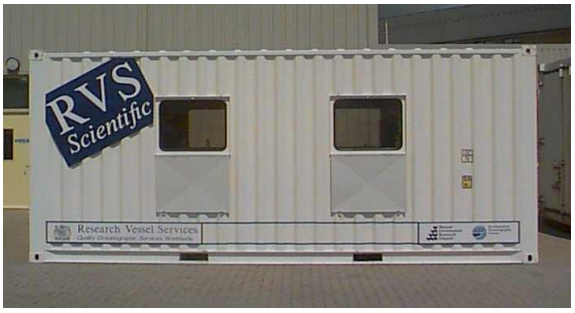
- Service Lobby
- Four Windows
- Fully sealed PVC lining
- Air Conditioning
- Modular PVC topped laboratory work benches
- Stainless steel stauff rails for equipment mounting
- Fitted washbasin with fresh cold water supply
- A non-toxic seawater and fresh cold water supply are available above the laboratory sink for sampling work.
- Fridge and freezer for storage of work and samples
- Internal metal surfaces have been kept to a minimum to allow for trace metal work

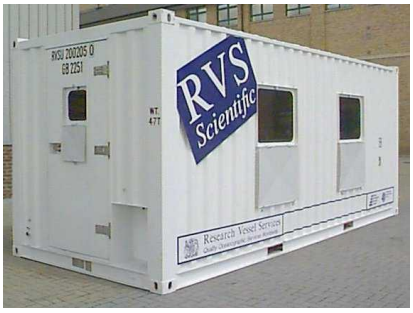
Electrical Services

- 415Vac, 50Hz, three phase supply
- 240Vac, 50Hz, single phase supply
- All electrical services are water resistant to IP65 to allow for high quality cleaning of the containers before and after use.

Safety Provision

- Fire Alarm System
- Fire Extinguisher
- Emergency lighting
- Telephone connection to ships phone system provided
- Connection to ships public address system





Chemistry Containers

Two Ultra clean chemistry containers are available which have been specifically designed to allow for work that requires a high standard of cleanliness.

Ultra Clean Chemistry Container (1)

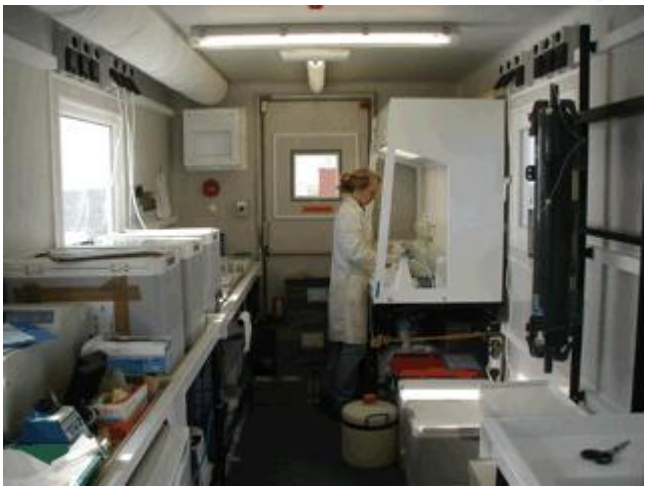
This container is a general purpose chemistry laboratory which has been designed to allow for work that requires a high standard of cleanliness.

- The container is capable of being fitted with a Milli-Pore water purification system.
- The container has a fitted Astec, Laminar flow cabinet.
- The container has provision for compressed air and gasses, and optional racks suitable for CTD water bottles.

Ultra Clean Chemistry Container (2)

This container is a general purpose chemistry laboratory which has been designed to allow for work that requires a high standard of cleanliness.

- The container is capable of being fitted with a Milli-Pore water purification system.
- The container has a fitted Felcon, Laminar flow canopy (with an internal working area of 460x780x955).
- The container has provision for compressed air and gasses, and optional racks suitable for CTD water bottles



Radionuclide Containers

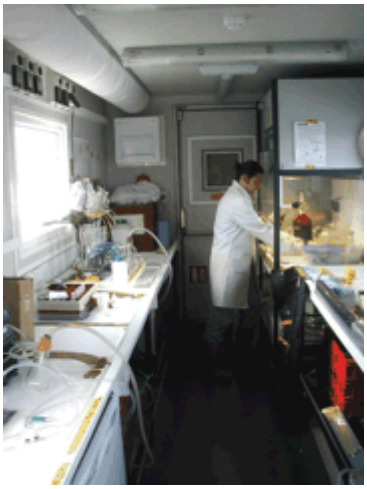
NMFSS have two Radionuclide containers which are designed for general purpose chemistry container. Both these containers conform to the NRPB classification for a medium hazard laboratory.

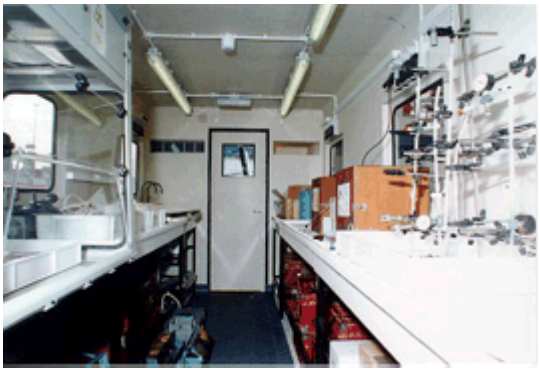
Radionuclide Container (1)

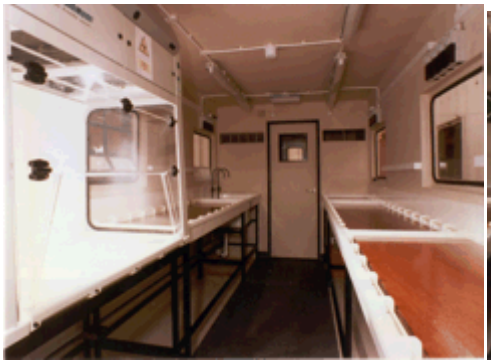
- An ASTEC Sensair 20 Fume cupboard is fitted inside the container which has an internal working area of 1170x700x800 high, all surfaces are manufactured from GRP and are designed to contain any spillages. The fume cupboard unit contains two ten kg carbon filters with two pre-filters. The container has specially designed non absorbent benches to contain any spillages and allow for easy cleaning.

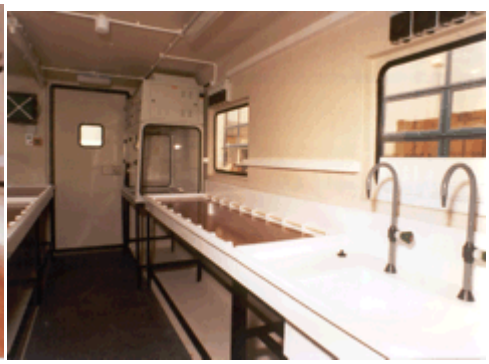
Radionuclide Container(2)

- A Safelab, Airone 1200-GS Fume cupboard is fitted inside the container which has an internal working area of 1150x650x850 high, all surfaces are manufactured from GRP and are designed to contain any spillages.









Portable Containerised Compressor
The Compressor Container comprises of a standard 20' by 8' container manufactured to ISO specifications.
The container is fitted with two double speed Hamworthy 4TH190W70 air compressors which are capable maintaining a constant high pressure air supply. Each of the compressors is capable of supplying 145/290 m(cubed)/hr at 152 bar.
General Purpose Chemistry Laboratory Container
This container is for use as a general purpose chemistry laboratory. The container is air-conditioned and has a sink fitted with a fresh cold water supply and a non-toxic water supply, a fridge and freezer are also fitted for the storage of work samples. This container has a 240V ring main and internal and external 3-phase supply sockets.
Cargo Containers / Flatbed Containers
NMFSS have the following transportation containers:

- 3 x 20' flatbed containers
- 3 x 20' soft top containers
- 2 x 20' hard top containers
- 1 x 10' hard top container

2.7. Various images and links

- http://www.google.com/search?q=Container+laboratory&hl=en&tbo=u&rls=com.microsoft:en-gb:IE-Address&rlz=1I7SUNC_deAT386&tbm=isch&source=univ&sa=X&ei=a38LUeHqJ4zU4QSxy4HQBg&ved=0CE4QsAQ&biw=1152&bih=592
- http://www.modulab.com.au/modulabrelocatable_lab.php
- http://www.impautomation.com/Products/Products-by-Industry/Cement-Industry/Container-laboratory-plant-control.html

3. Requirements (work in progress)

- Highly qualified project manager
- Project partners: …
- Legal boundary conditions (Arbeitsrecht, ..) for a Mobile Lab; …
- Architectural basis
- Raumordnungsgrundlagen
- Funding programs (EU Projekt; regionale Förderungen; …)
- Cooperations

Kontakt

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Mitochondrial Physology Society – http://www.mitophysiology.org

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