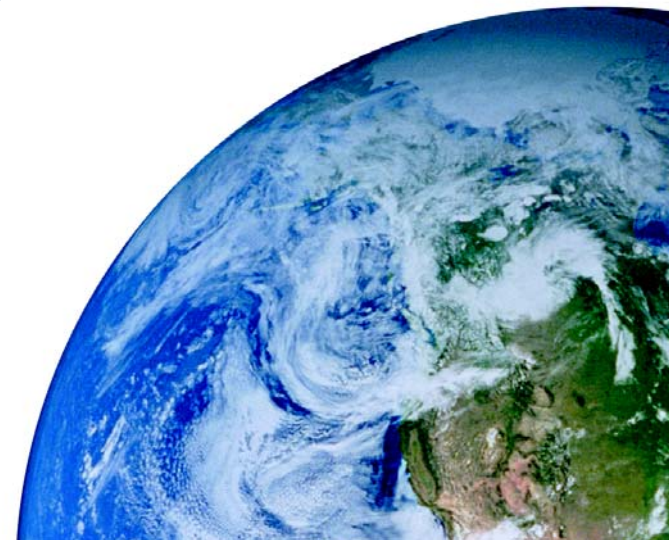


MARITIME SHIPMENTS OF RADIOACTIVE MATERIAL

Presented by Stefan Hoefft
World Nuclear Transport Institute
London, October 06, 2010

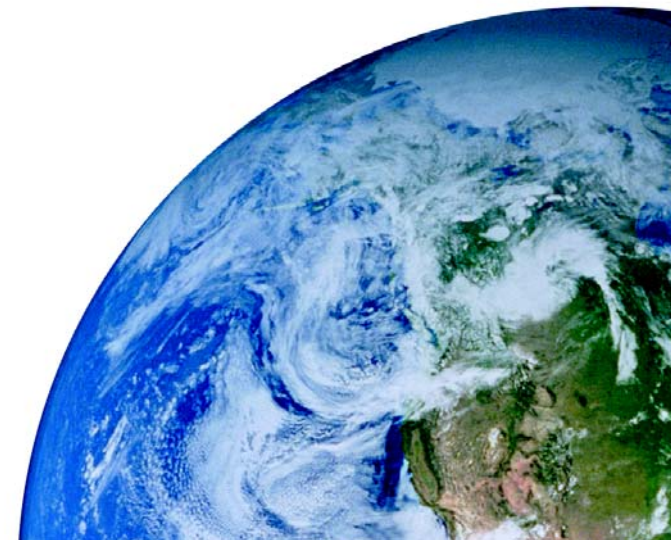


Limited carriers available worldwide accepting radioactive material



Special remark:

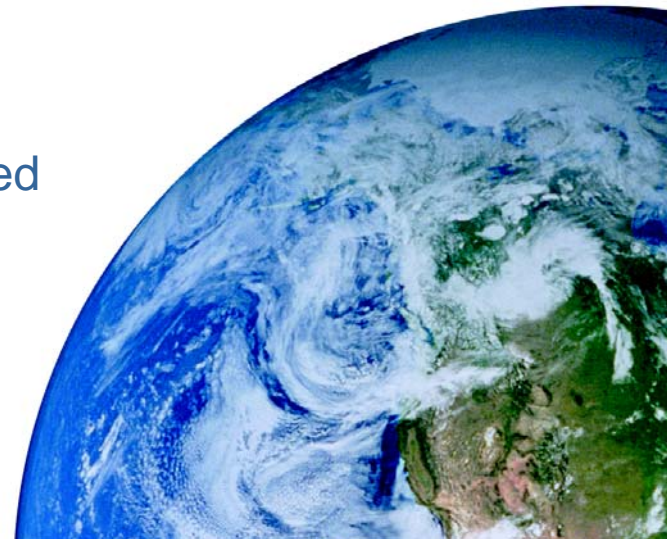
The majority of those carriers only accept non-fissile material on board of their vessels



Types of Services

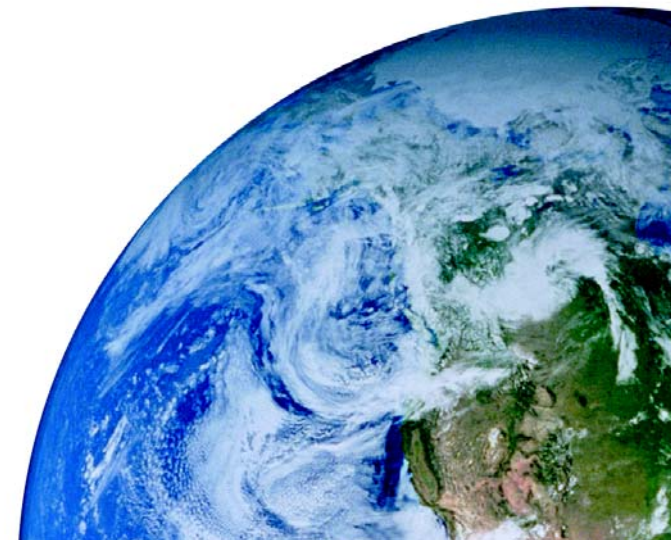
Generally, there are 3 main types of services available to arrange for a maritime transport of radioactive material:

- **Liner**
fixed routes with fixed port rotations and published schedules
- **Charter**
flexible routes with direct service on demand
- **Tramp**
flexible routes and schedule in shipping line's preferred area depending on cargo volume and agreements with charterers



Modes of transport

- **ISO Containers** (20', 40' containers, flats, platforms)
- **Break-bulk** (lash barges, vessel holds)
- **Ro/Ro** (Mafi-trailers)



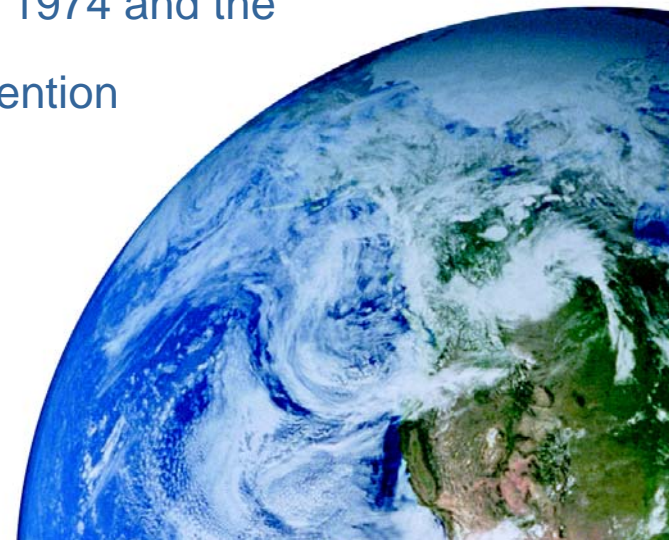
Basic regulatory framework (I)

IMDG code (International **M**aritime code for **D**angerous **G**oods),
published by **IMO** (International **M**aritime **O**rganization)

The IMDG code, a mandatory requirement for international sea transport, supplements the International Convention for the



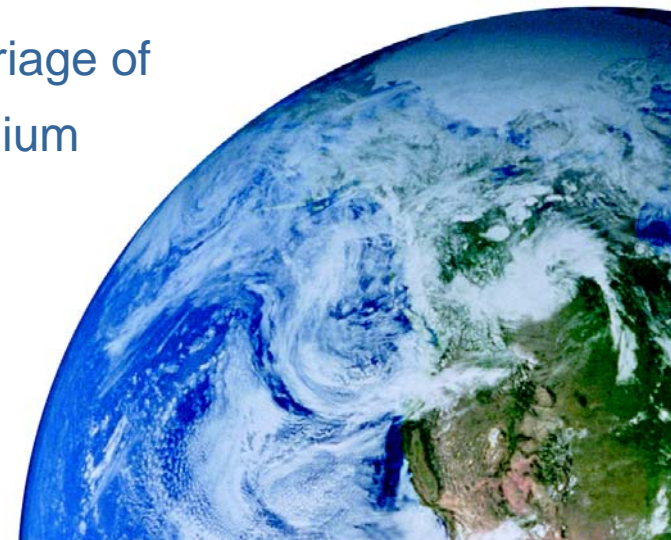
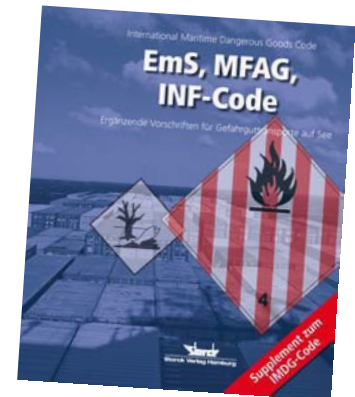
- **SOLAS** (**S**afety **o**f **L**ife **a**t **S**ea), adopted in 1974 and the
- **MARPOL** (International Convention for Prevention of **M**arine **P**ollution from Ships), adopted in 1973 and 1978.



Basic regulatory framework (II)

and IMDG's supplement codes:

- **EmS** (**Em**ergency **M**edical **S**ervices)
- **MFAG** (**M**edical **F**irst **A**id **G**uide)
- **INF** (**I**nternational Code for the Safe Carriage of Packaged Irradiated **N**uclear **F**uel, Plutonium and High-Level Radioactive Wastes on Board Ships)



National laws and requirements also become applicable for the vessel having radioactive material on board and the ports in transit or handling such cargo !!!

Key subject:

- Transport licenses
- Handling permits
- Package approvals / validations
- Insurance needs



Local requirements in ports

- **port operators**

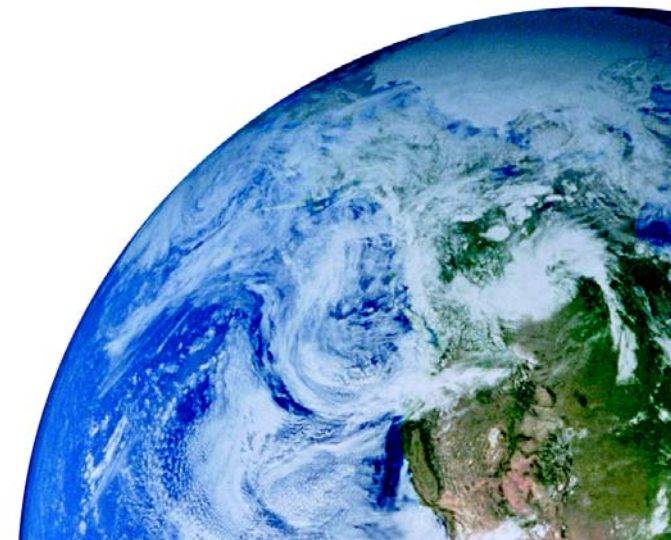
- handling of radioactive cargo
 - permits for handling such cargo
 - direct transfer (intermodal traffic)

.....

- **port authorities / water police**

- marine surveying / radiation protection officer
 - rejection of cargo

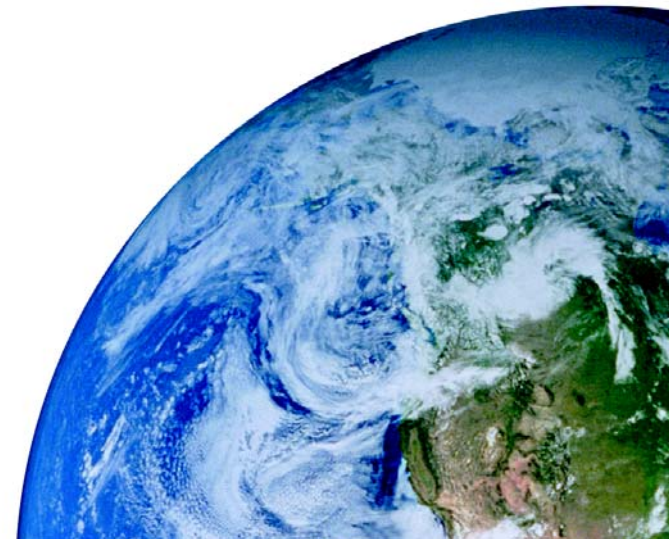
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The impact of the given infrastructure inside a port

Challenges which may be faced:

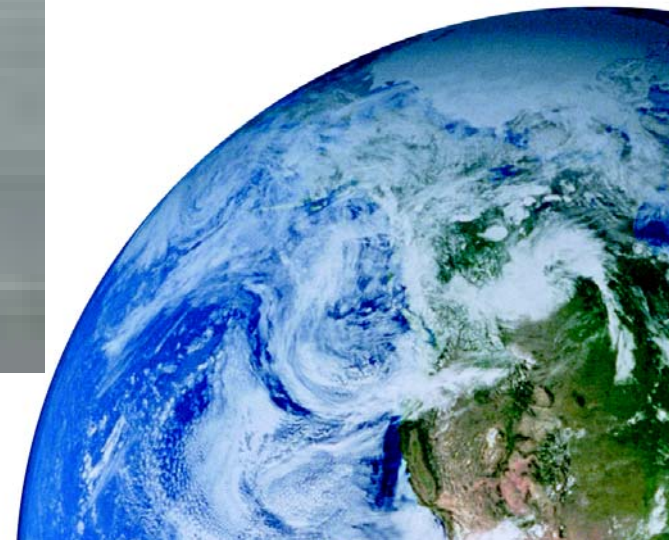
- **absence of suitable cranes**
- **absence of hazmat yards**
- **bad infrastructure** (terminal, berth, ramps, etc.)
- **tidal range**
- **weather conditions** (winter/summer)



Routes for shipments of radioactive materials on sea

Examples for main routes of shipments of radioactive material:

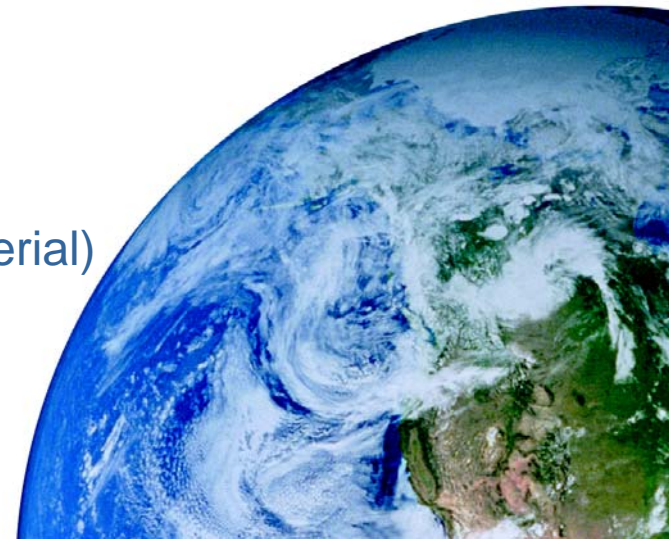
- **Europe - North America (westbound/eastbound)**
- **Europe - Russia (westbound/eastbound)**
- **Europe - Far East**
- **Europe - South America**
- **Australia - Europe - North America**
- **Australia - Far East**
- **Africa - Europe**
- **Africa - North America**
- **North America - Far East**
- **South America - North America**



Radioactive materials shipped on sea

Examples:

- **Enriched UF₆** (max. 5% Uranium-235)
- **Natural UF₆**
- **Uranium Ore concentrates** (U₃O₈)
- **Uranium Oxide** (pellets, powder)
- **Fuel Assemblies**
- **Various sources** (e.g. Co₆₀)
- **Equipment**
(cylinders- empty, heeled state; SCO-material)

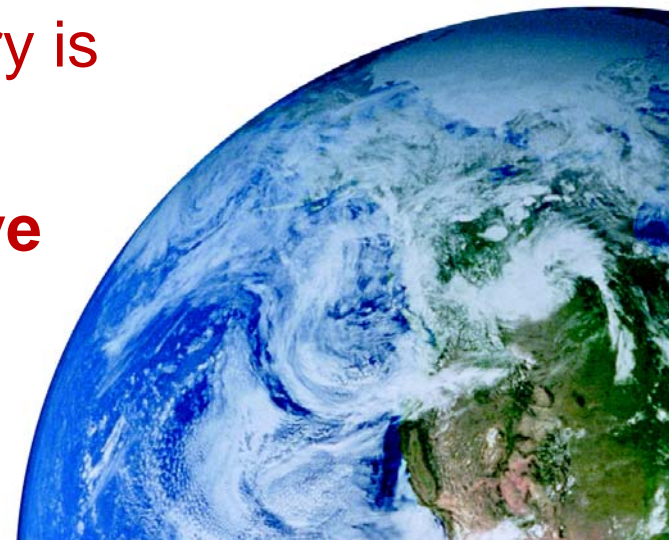


Conclusion 1

Summary of basic aspects:

- **Only limited carriers** available offering not every service on their various shipping rotations
- A large number of **laws and regulations**
- as well as **local requirements** apply

Despite these challenges, the industry is making the **best possible efforts** to ensure **safe deliveries of radioactive products on sea worldwide !!!**



Conclusion 2:

Example:

Availability of transatlantic carriers for fissile material

Taking into account that in the past few years only **one major liner service** accepted fissile material on board of their vessels **for the industry's main route between Europe and North America**, it is in the interest of **all resp. parties involved** in the logistic chain to continue with **efforts to support & maintain** such **routes and options** for the continuity of service !!!



Keeping all the aforesaid in mind sometimes does not protect you against unexpected things...



Thank you very much
for your attention!!!

