

Point of No Return

Arctic Development is Here to Stay



Humans Don't Go Back

Inupiat Endurance 10,000 yrs.

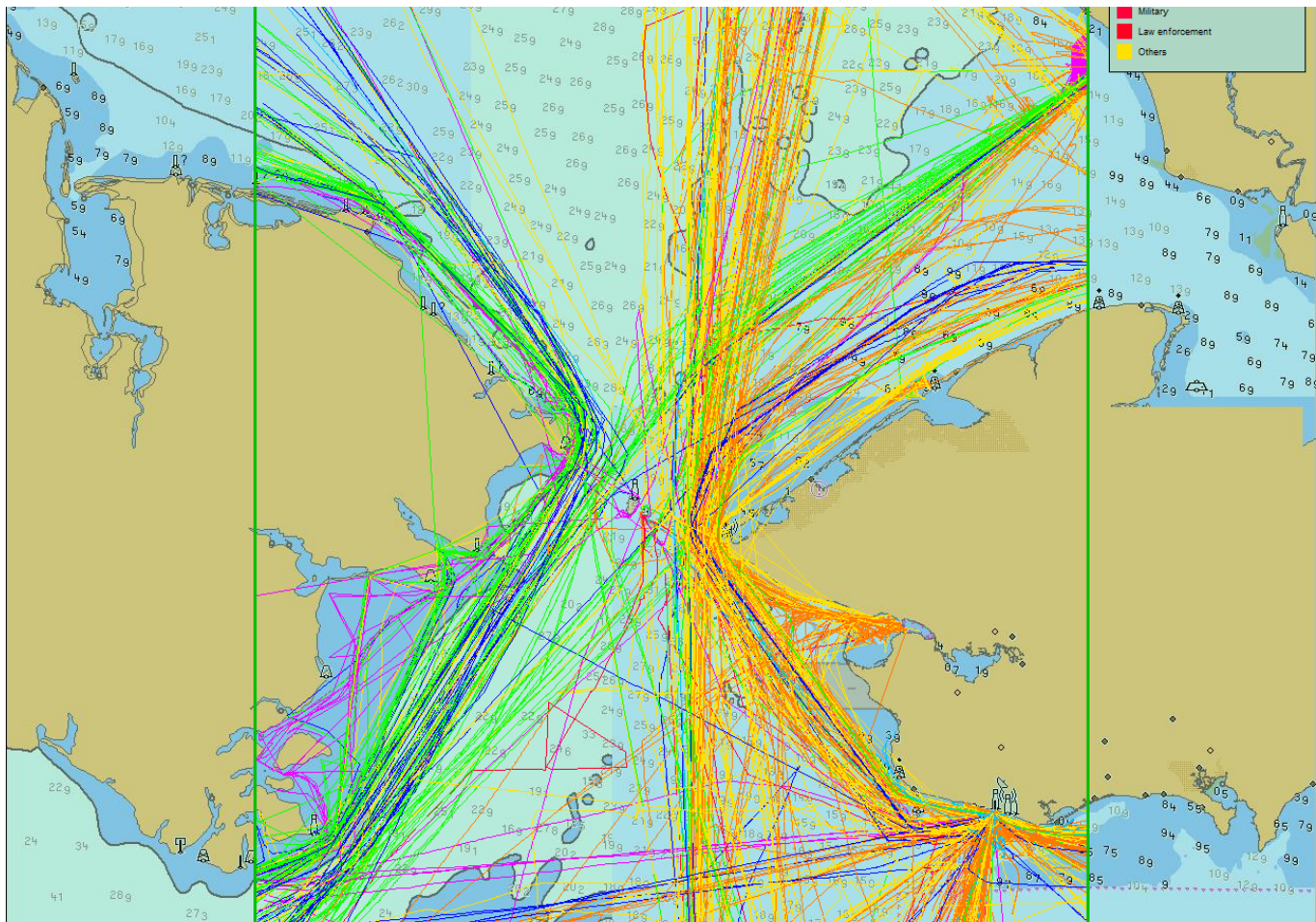


Arctic Shipping Routes

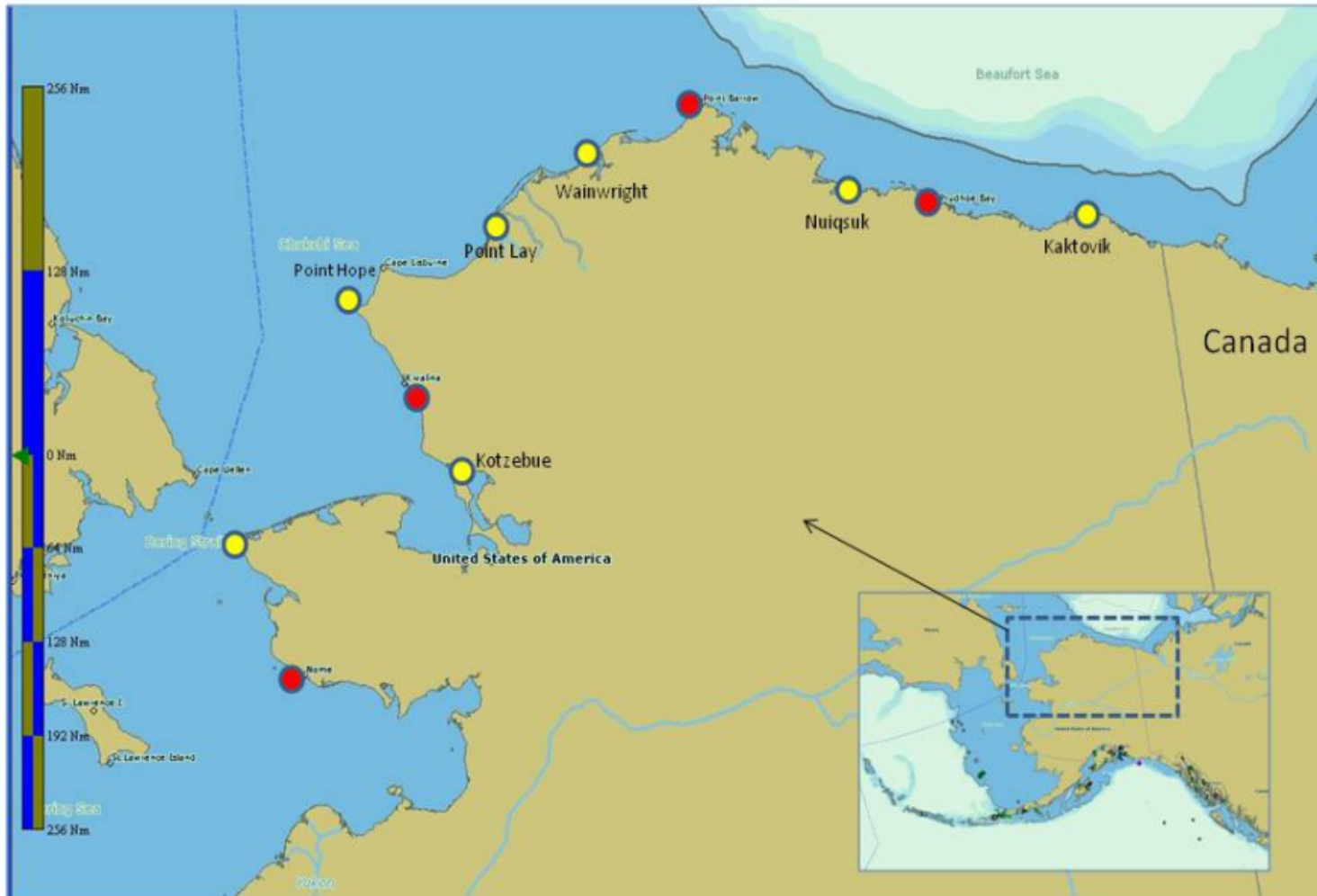


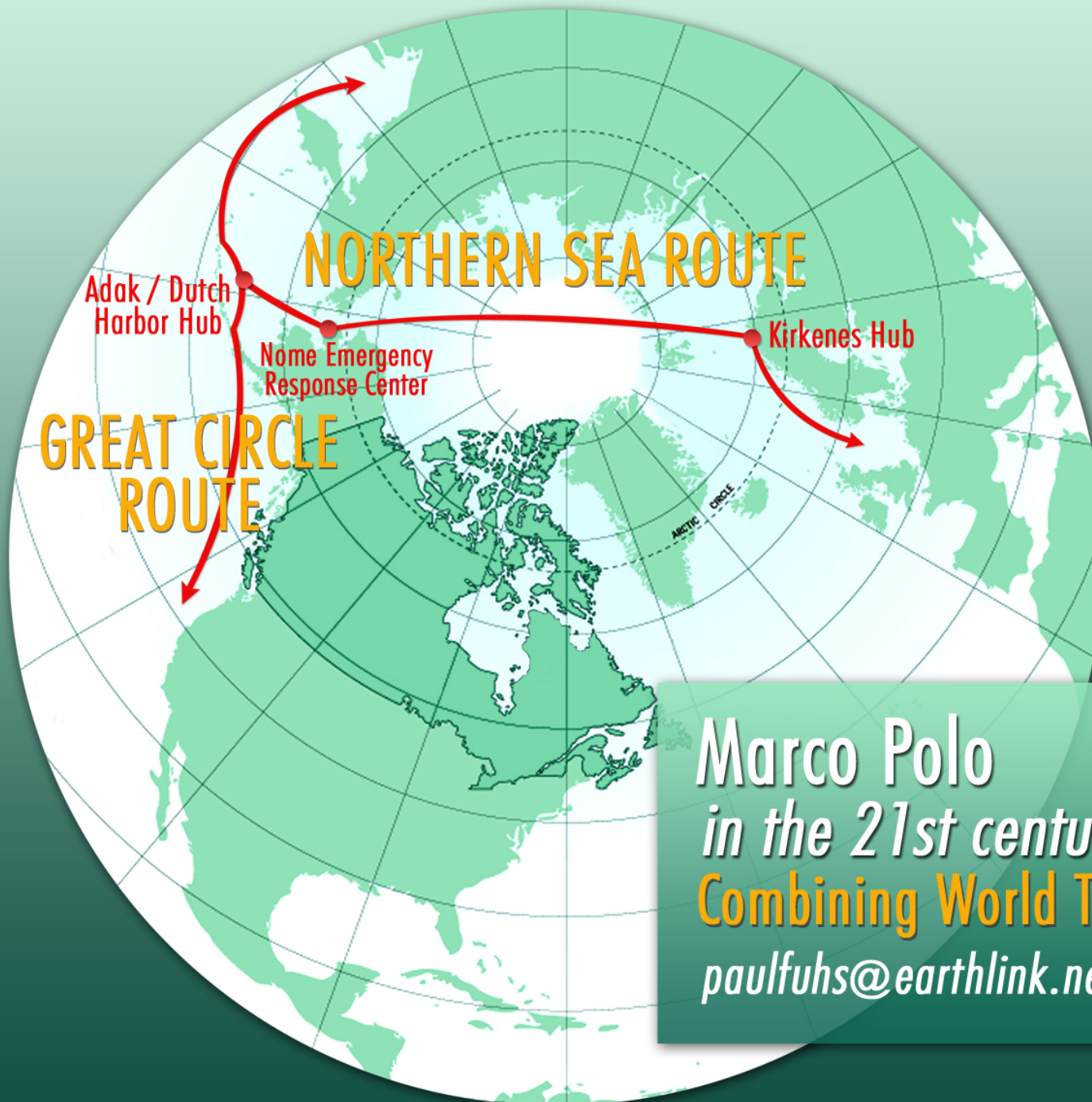
Bering strait

Vessel Traffic 2013



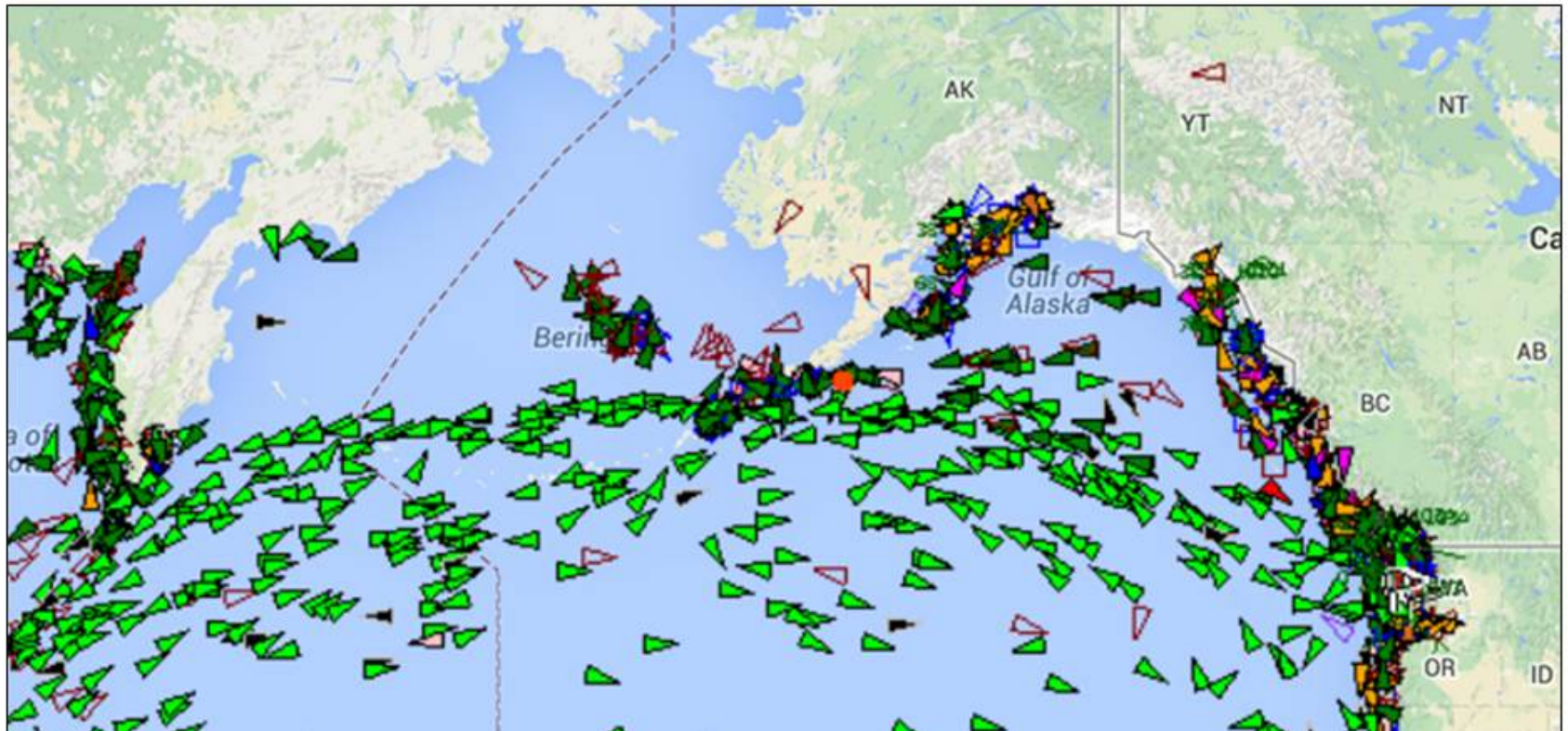
ARCTIC AIS SITES





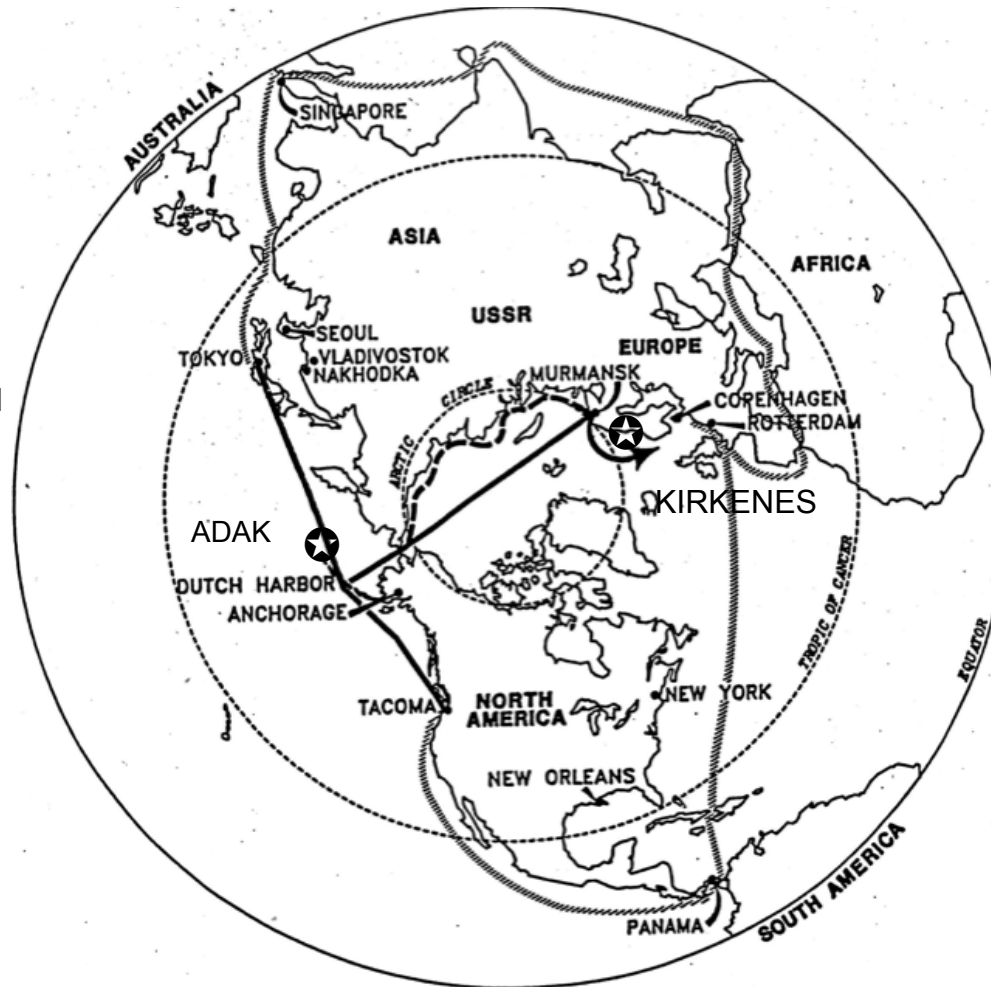
Marco Polo
in the 21st century
Combining World Trade Routes
paulfuhs@earthlink.net

Great Circle Route Vessel Traffic 1/22/14



NSR/Great Circle Route Container Hub Operations

Adak routes
cargo between
Europe, Asia and
US West Coast



Kirkenes routes
cargo between
Asia, the US West
Coast and Europe

Korean Icebreaking Containership

Overview of LNG-Fuelled Ship for NSR

3. DSME Activities

Zero(0) HFO Design



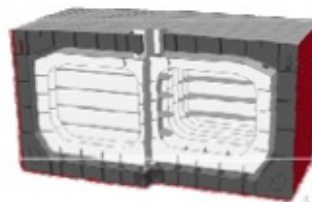
ME-GI Engine



Dual Fuel Diesel Generator Engine



ACTIB LNG Tank

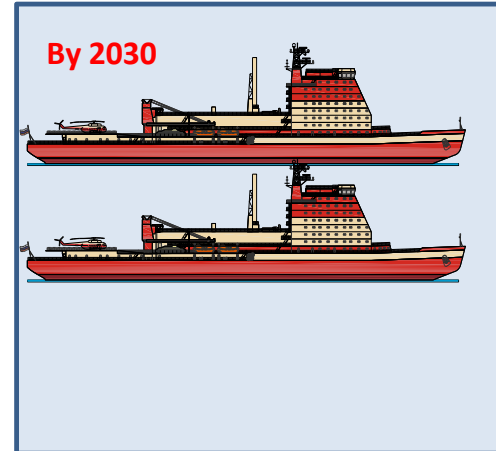
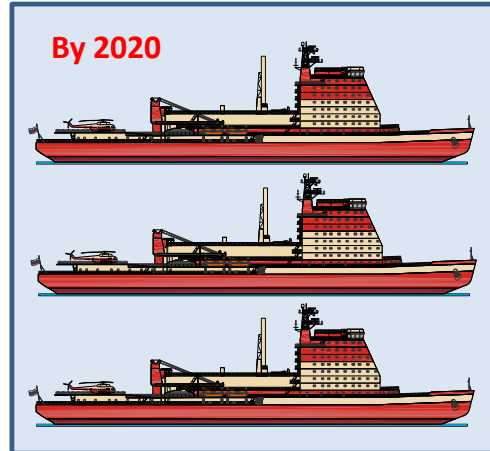


HIVAR Fuel Gas Supply Sys.



Russian Icebreaker Construction Schedule

Shaft power 60 MW



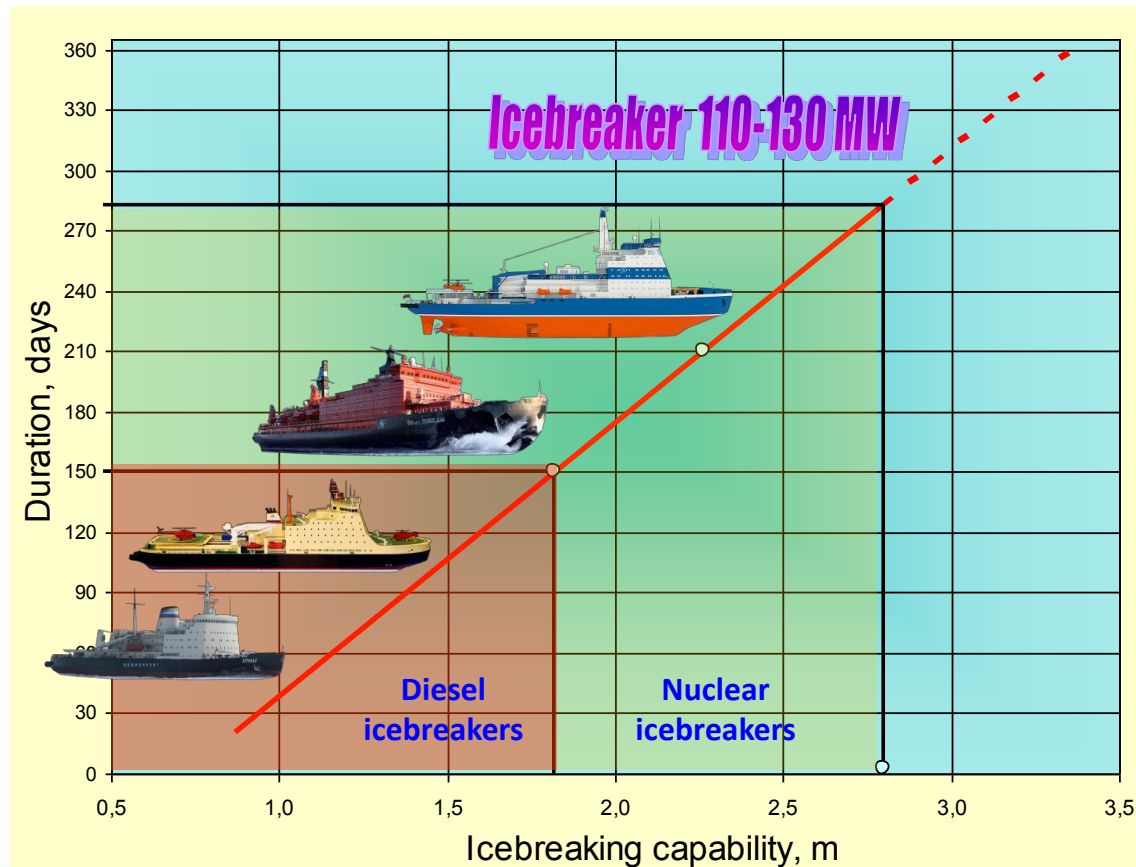
Shaft power 25 MW



Shaft power 18 MW



Icebreaking Capacity



Breaking All Barriers

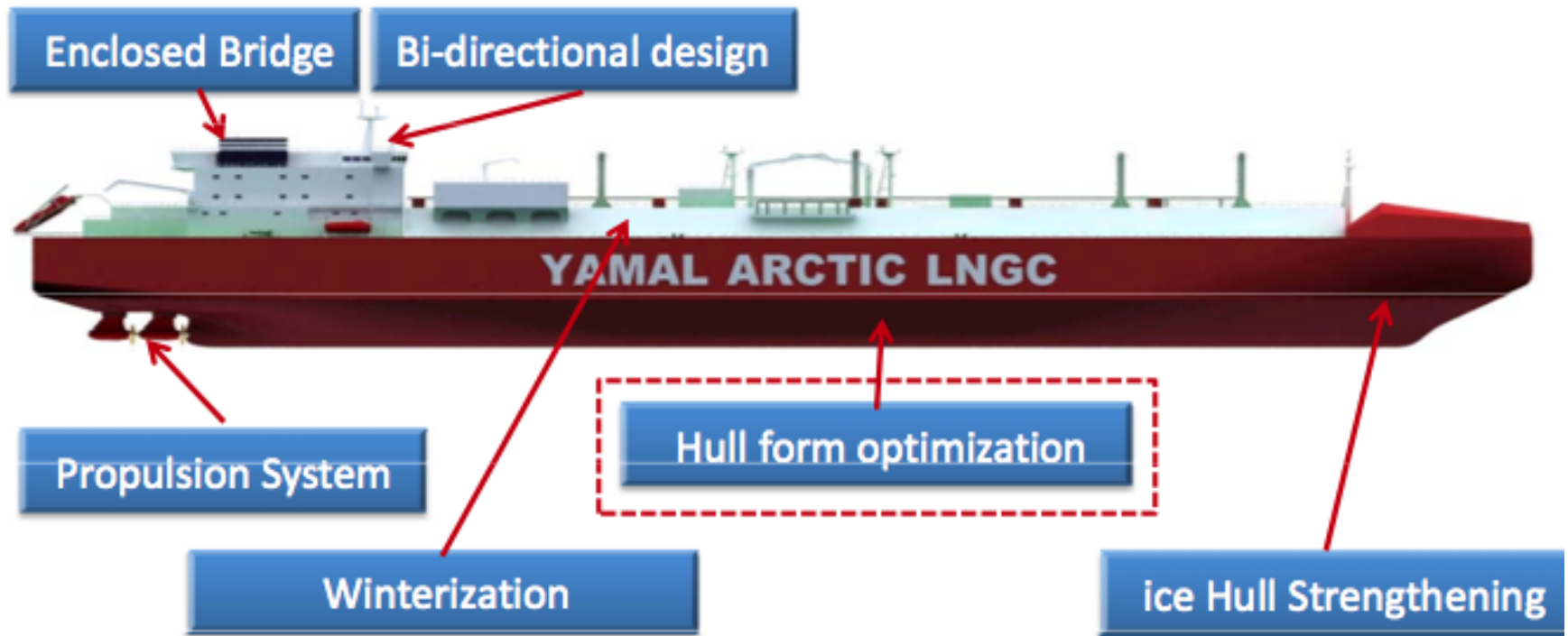


Operational tasks	Parameters	
Escorting of ships on the traditional transportation directions during winter-spring period.	Shaft power	110 MW
Escorting of large capacity ships in the year-round export of raw resources extracted on the arctic seas shelf.	Length	193.6 m
	Breadth	38 m
Servicing of the through transit transportation between Western Europe and Far East	Draft	11-13 m
	Displacement	55600 t
	Icebreaking capability	3.5 m

Korean LNG Vessels

Yamal Peninsula Petroleum Development

Technical features of Arctic Vessel



Maritime Domain Awareness –September 2010



Arctic AIS Sites: Kaktovik, Prudhoe Bay, Barrow, Wainwright, Point Lay, Point Hope, Kivalina, Kotzebue
Subarctic AIS Sites: Wales, Nome, Gambell, Savoonga, Stebbins

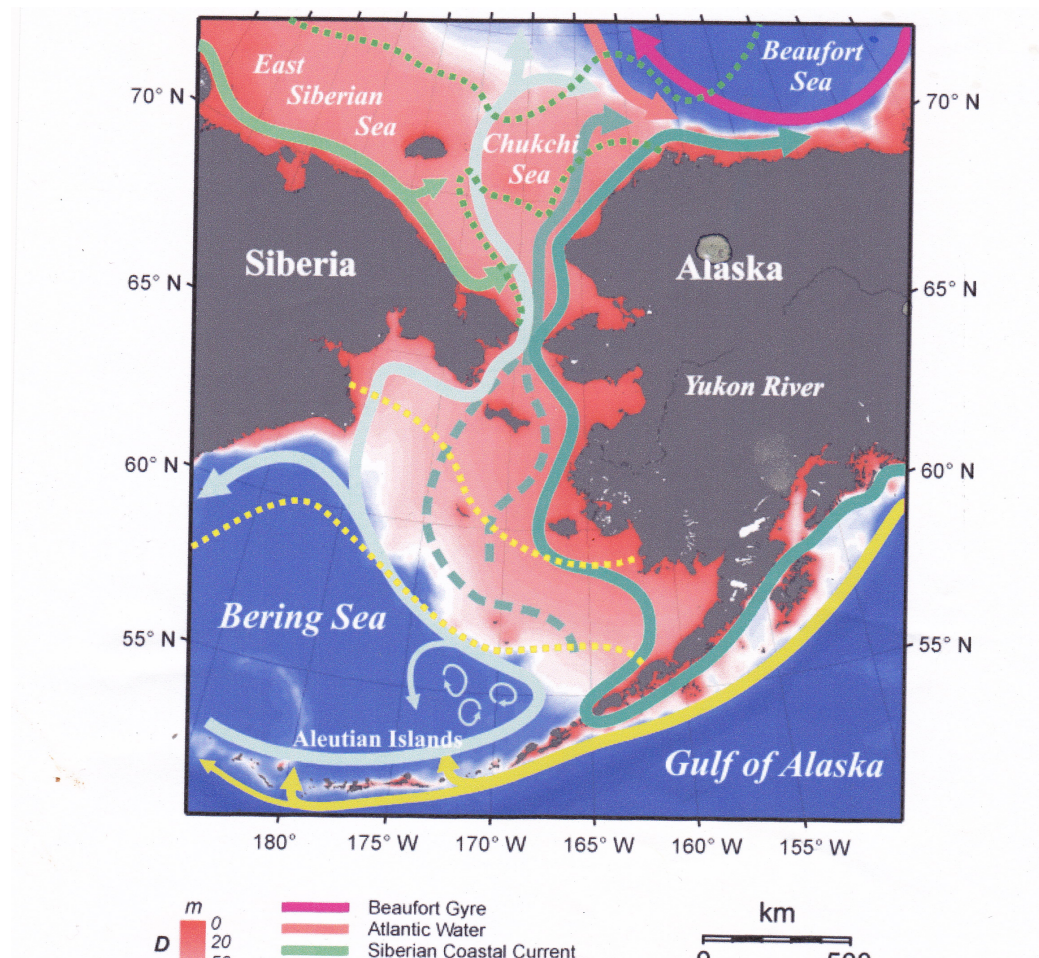
Everyone is Watching



RISK FACTORS: 1.3 million tons cargo 2013
800,000 tons petroleum products



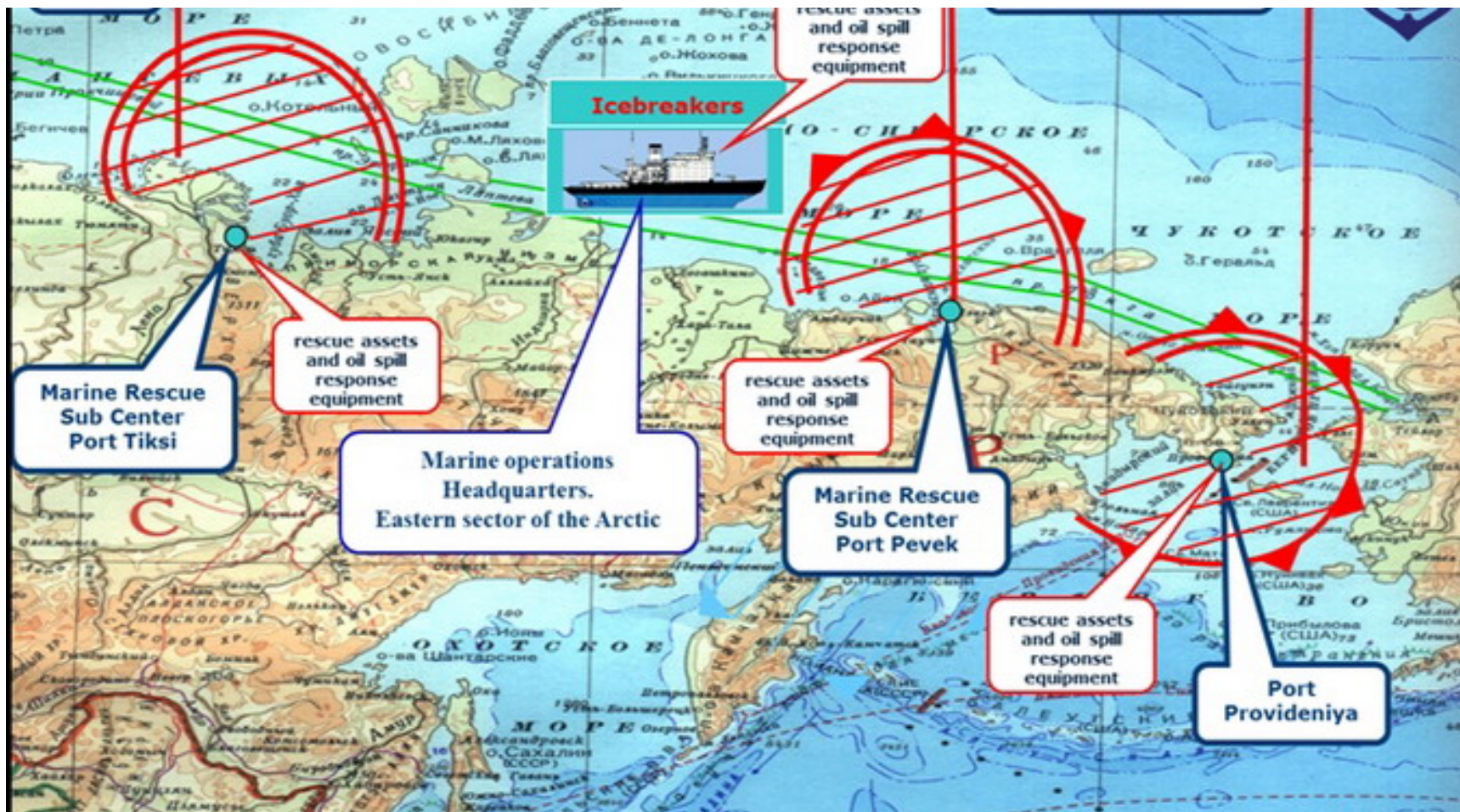
Arctic Circulation Patterns



ARCTIC OIL DEVELOPMENT



Russian Response Centers



Spectators or Actors?



Will we ride the wave
or be rolled over by it?



Don't Forget to Do It Right!



Door to a Brighter Future? It's up to us

