

Offshore exploration in the arctic

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GustoMSC



KIVI NIRIA

170

34^e lustrum
170 jaar TU Delft

Arctic Battle

Symposium - 8 March 2012

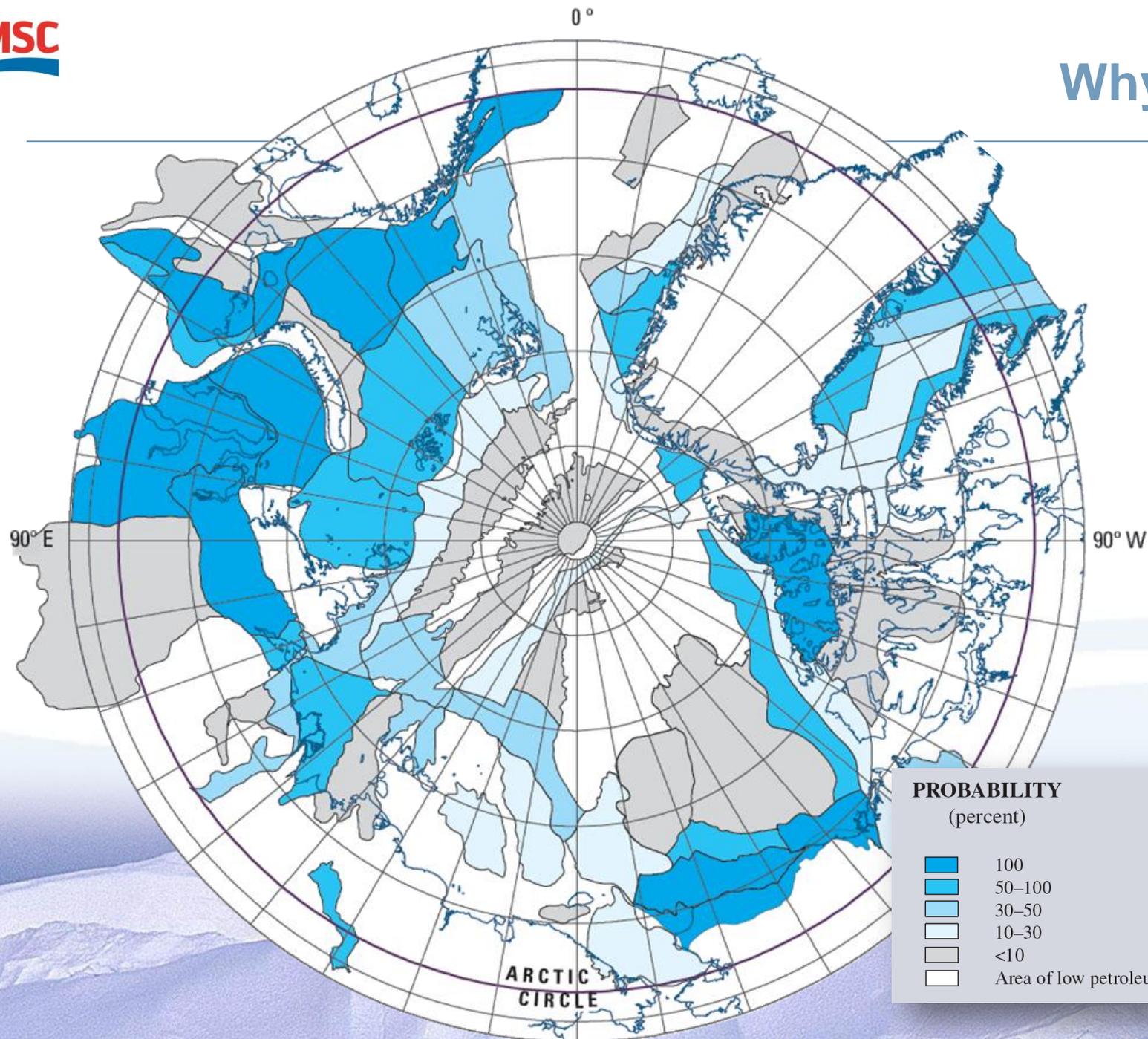
Why?

*Challenges? What
challenges?*

The heart of the matter:

Principles

Solutions



Offshore exploration in the arctic

CHALLENGES?

WHAT CHALLENGES?

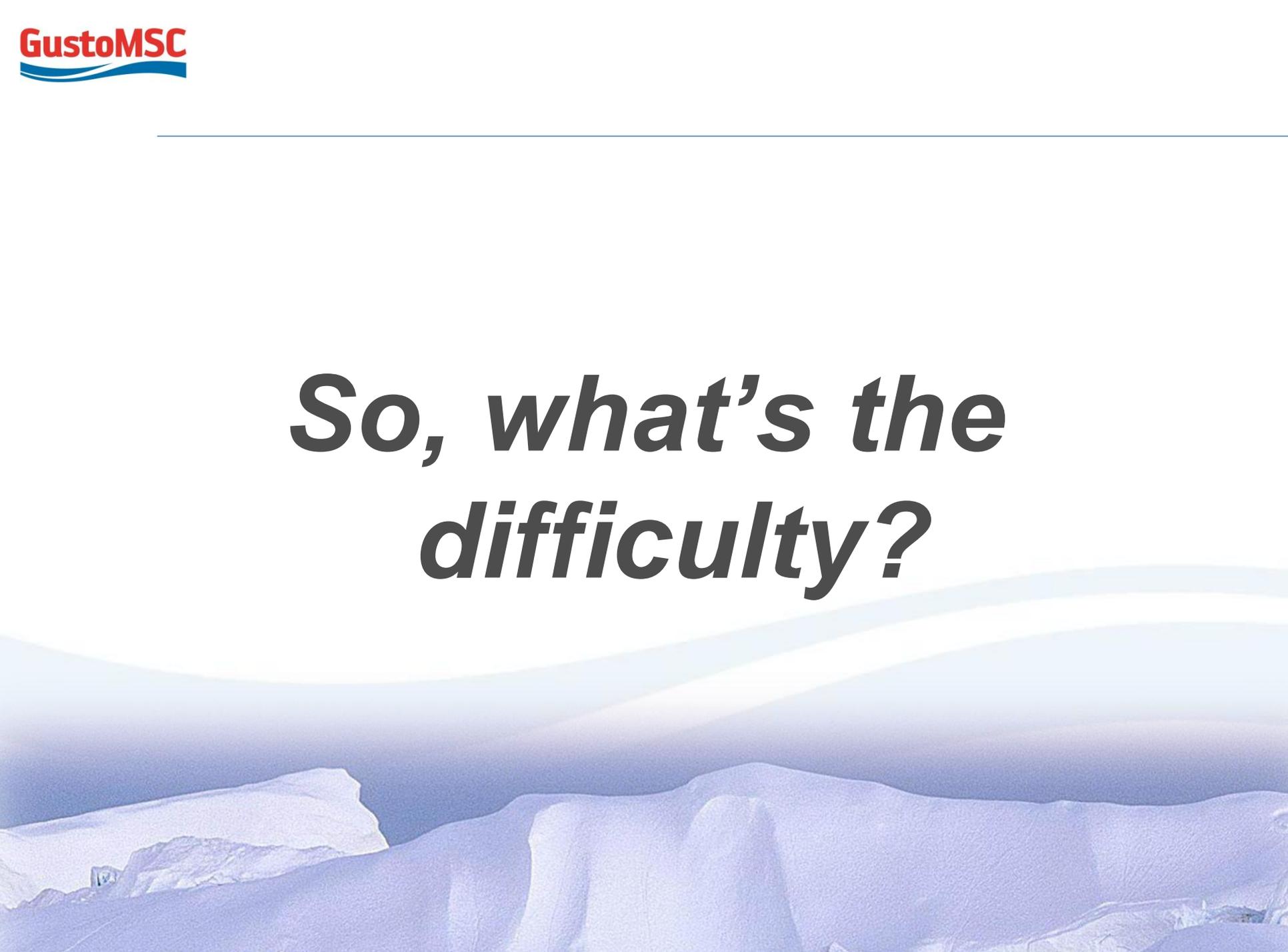
Been there, done that...

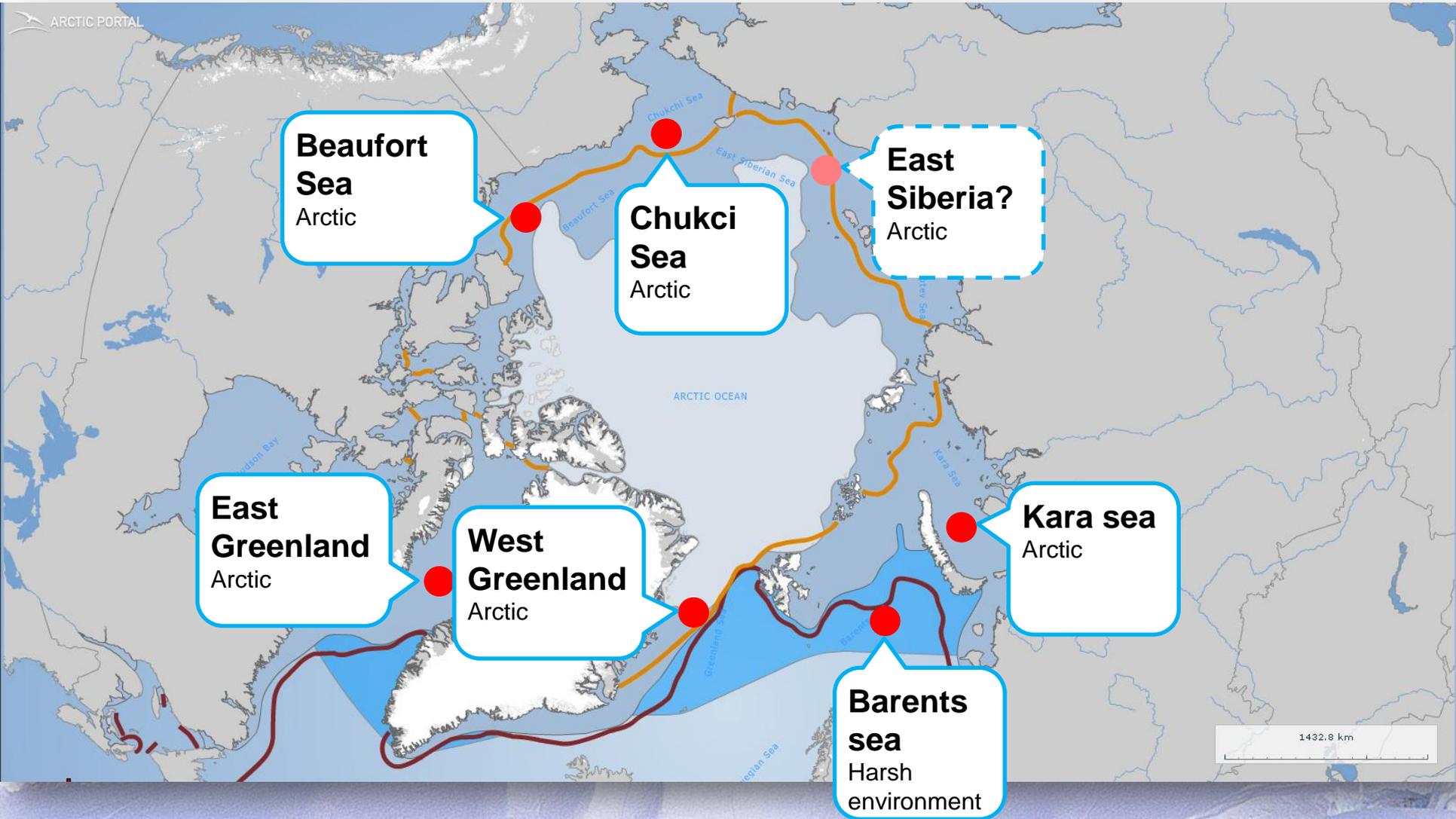


...Or, not quite?

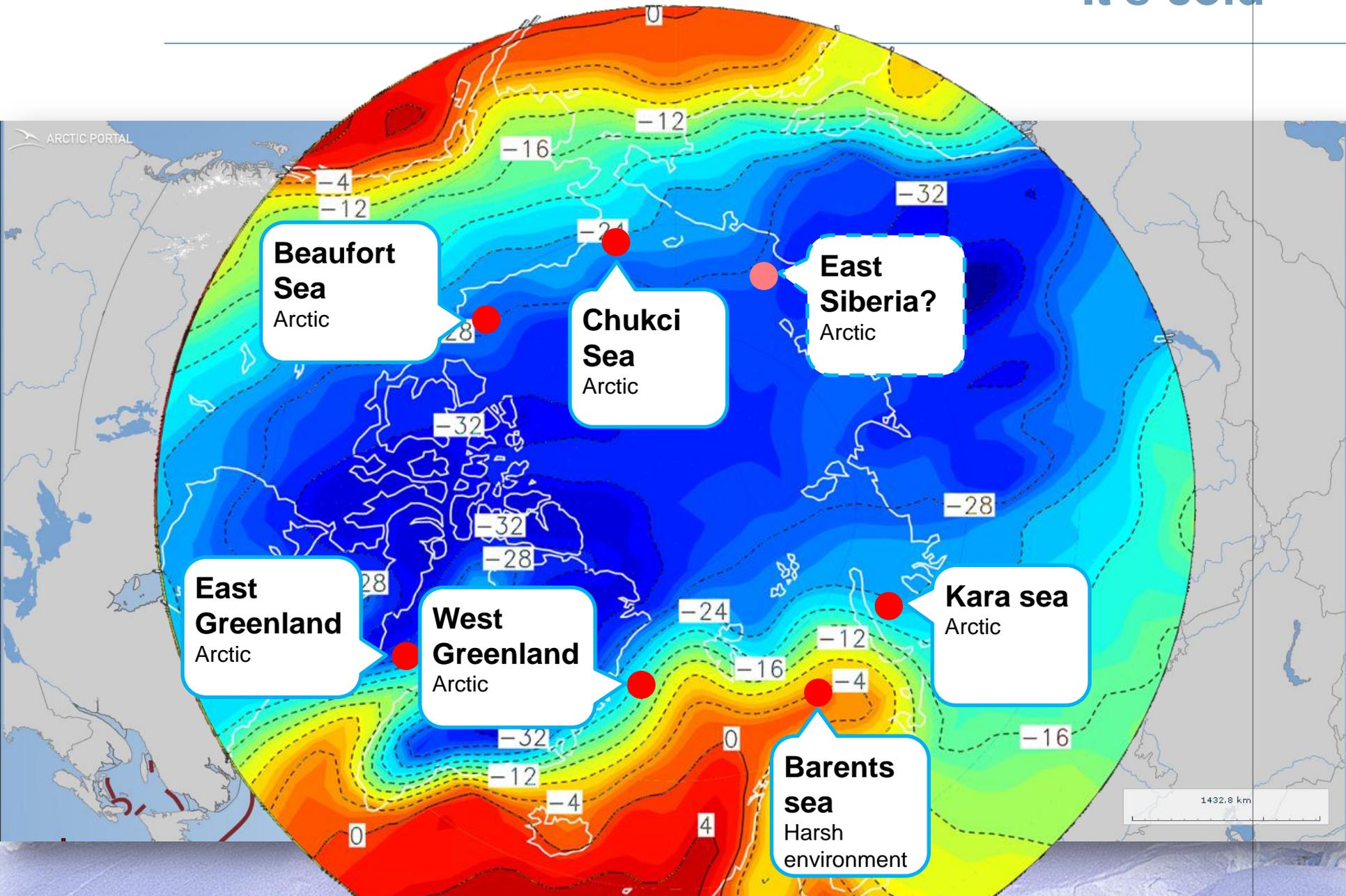


***So, what's the
difficulty?***

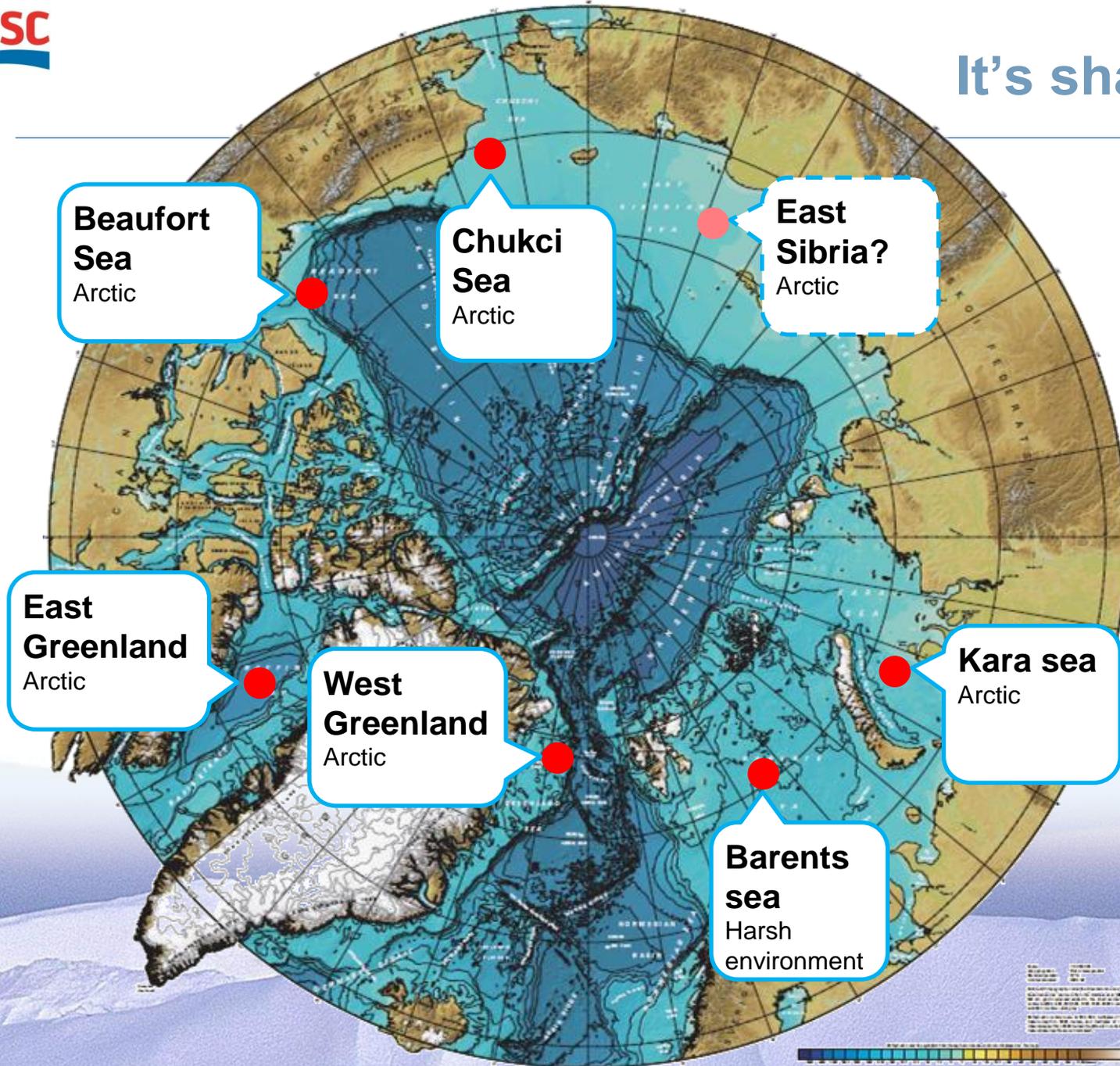
The background of the slide features a soft-focus, blue-tinted image of a mountain range. The foreground shows the jagged, snow-covered peaks of a mountain, while the background consists of rolling, hazy mountain ridges under a clear, light blue sky. The overall aesthetic is clean and professional.

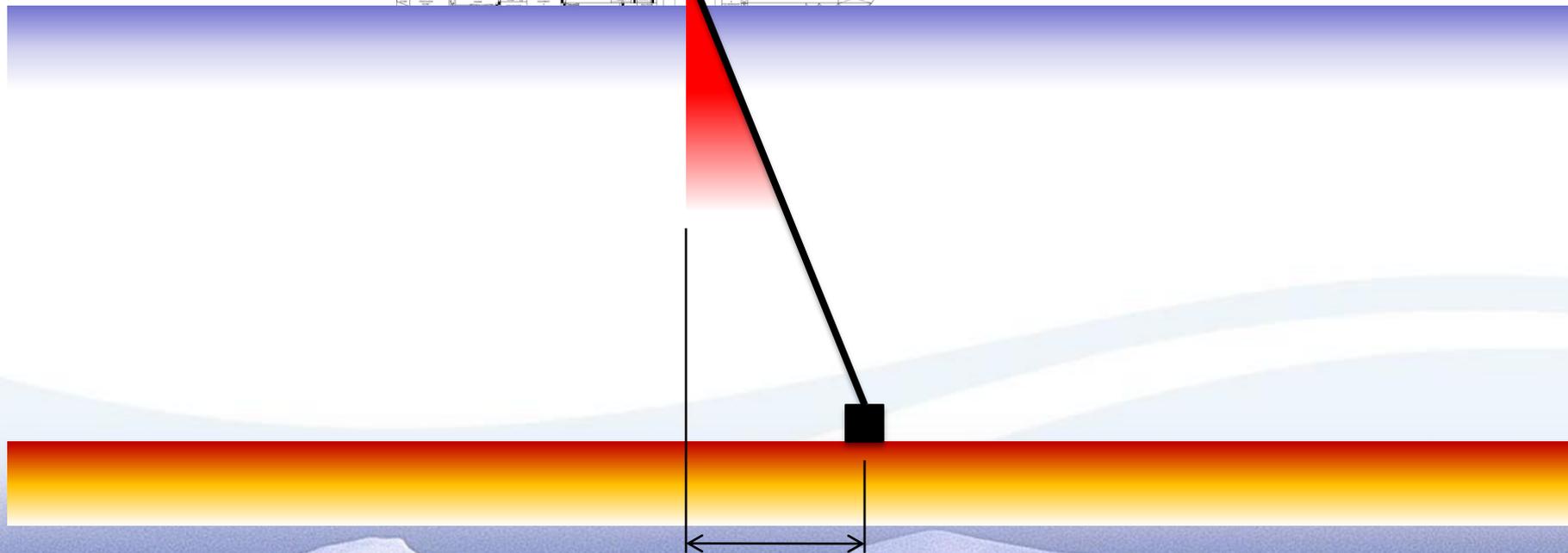
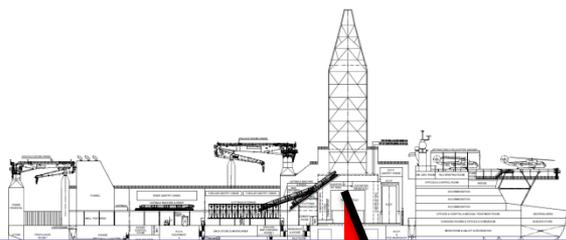












Maximum 2.5 / 6% waterdepth for drilling
Maximum 8-12% waterdepth for disconnect

It's pristine and vulnerable



Offshore exploration in the arctic

PRINCIPLES

Robust and reliable

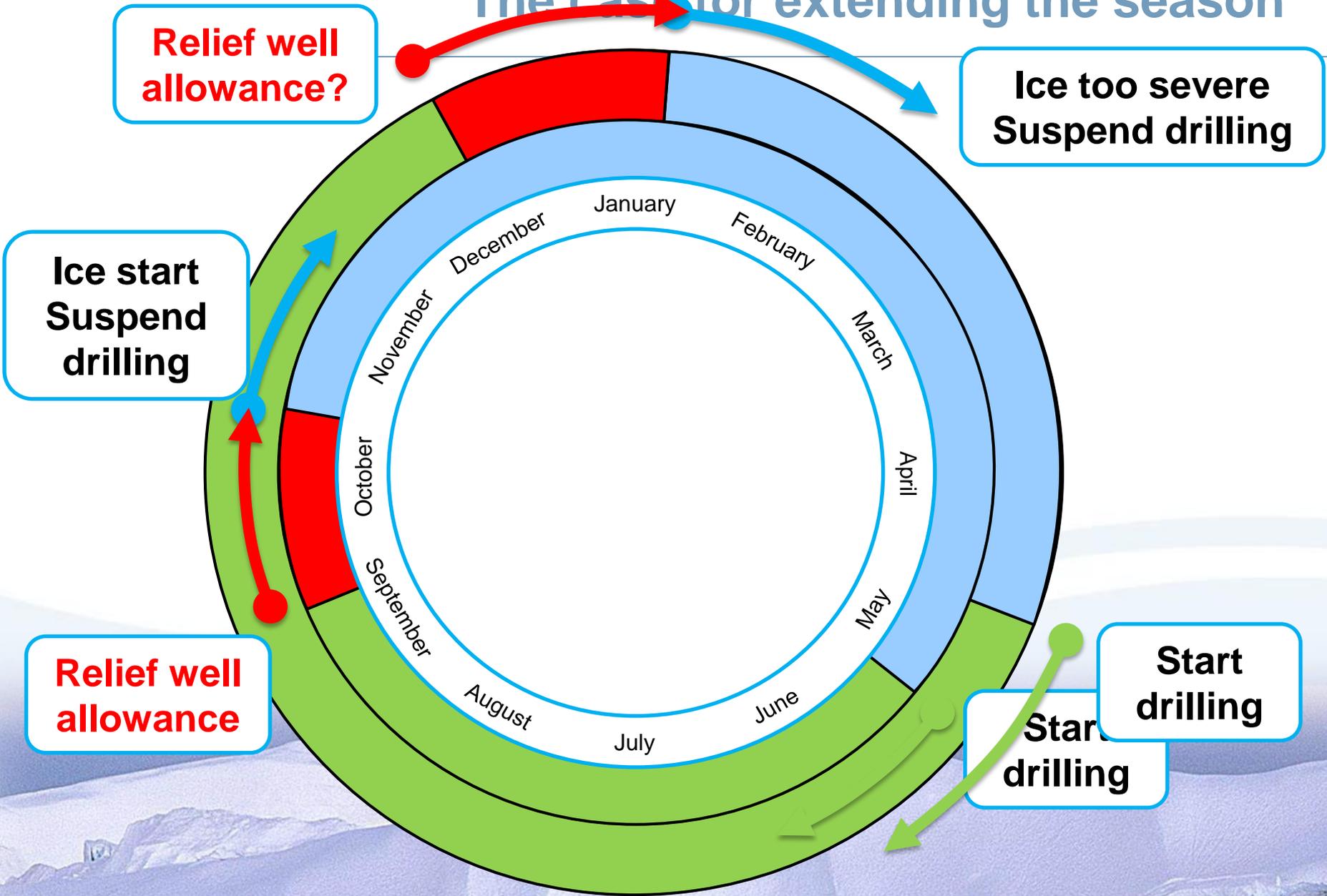
Working environment driven

Shallow and deepwater capable

High autonomy

Highest achievable standards of
environmental protection

The case for extending the season



Relief well allowance?

**Ice too severe
Suspend drilling**

**Ice start
Suspend
drilling**

**Relief well
allowance**

**Start
drilling**

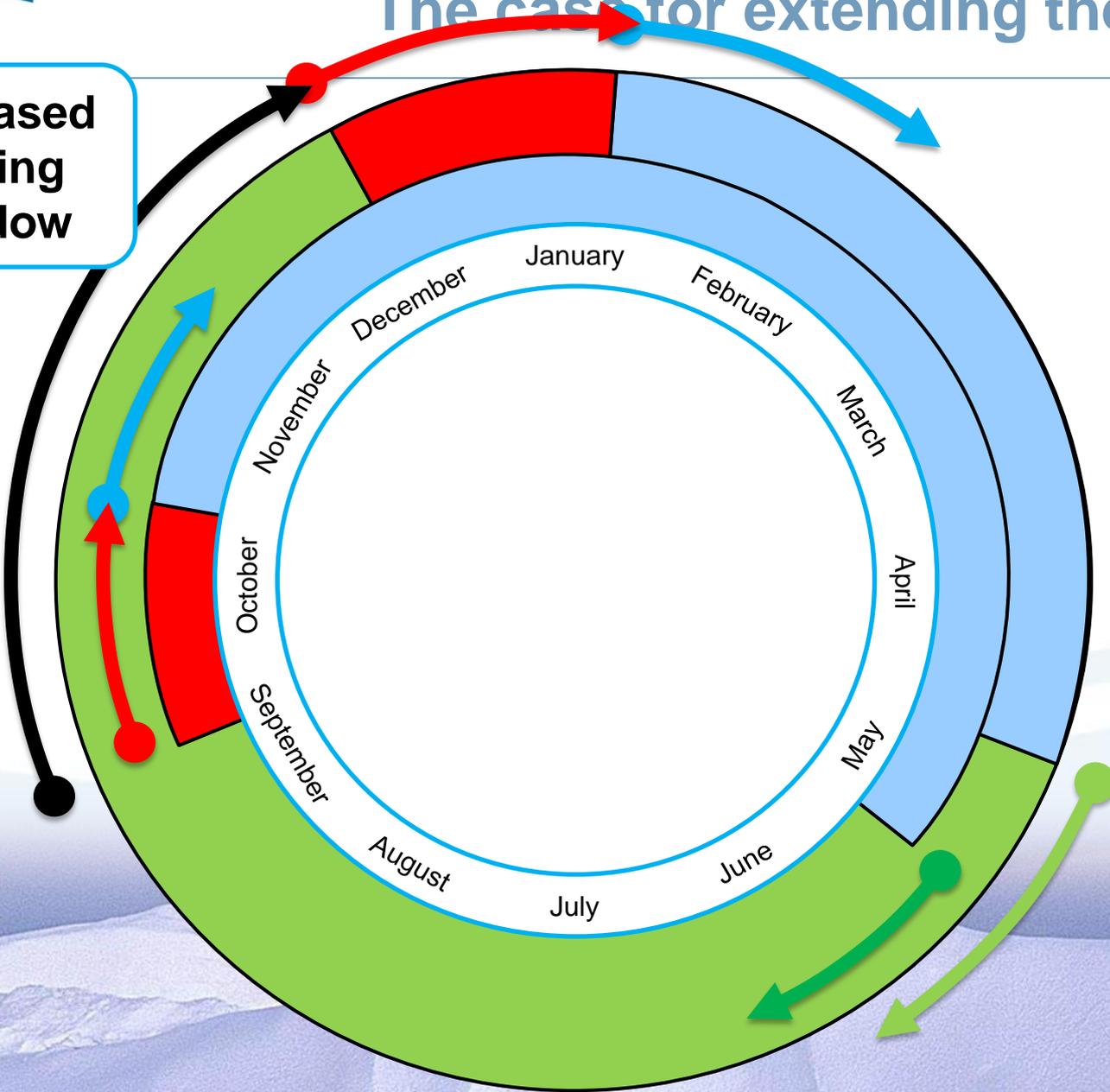
**Start
drilling**

***Imperial Oil (ExxonMobil) for
Beaufort Sea preliminary plan:
One well, three seasons...***



The case for extending the season

**Increased
drilling
window**

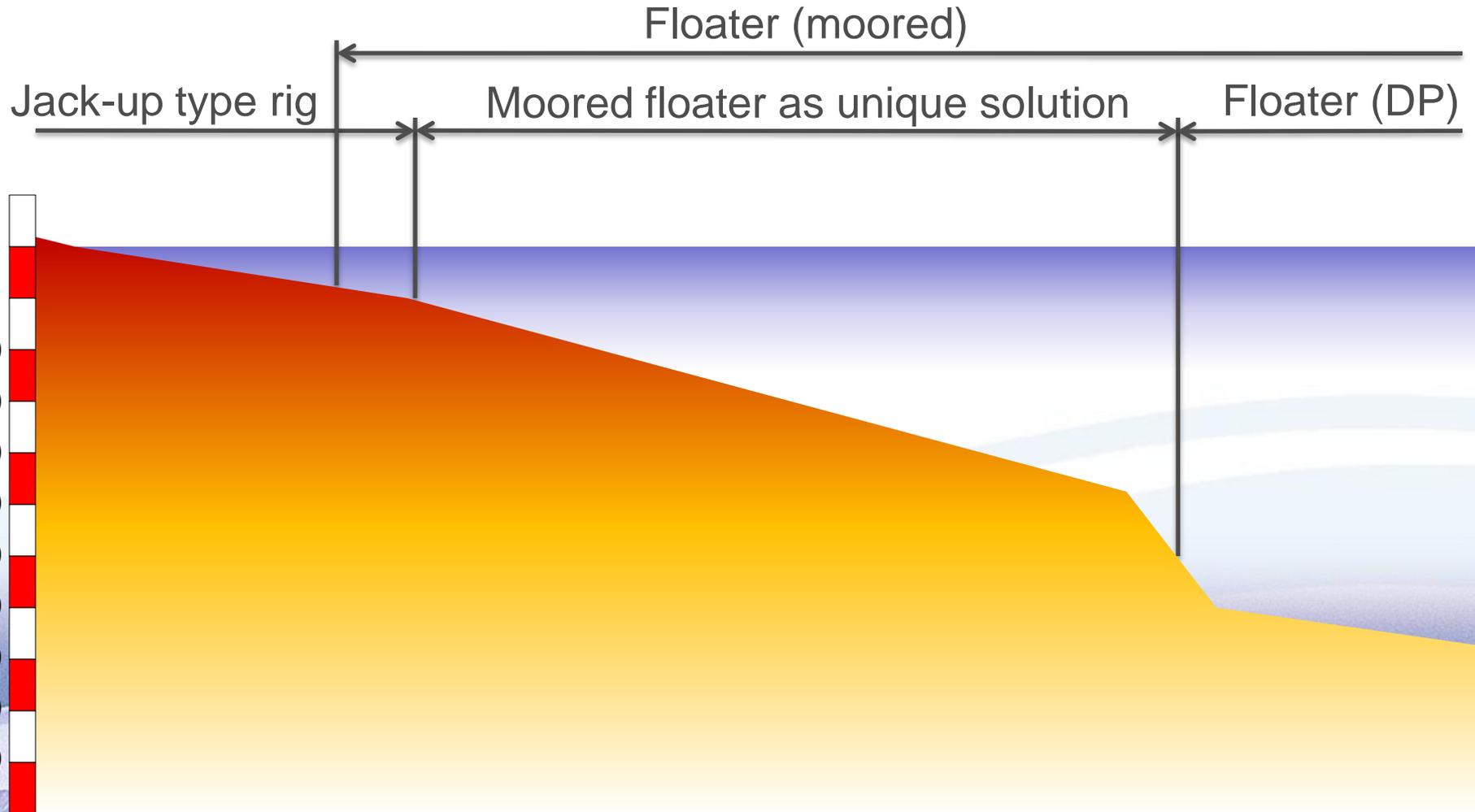


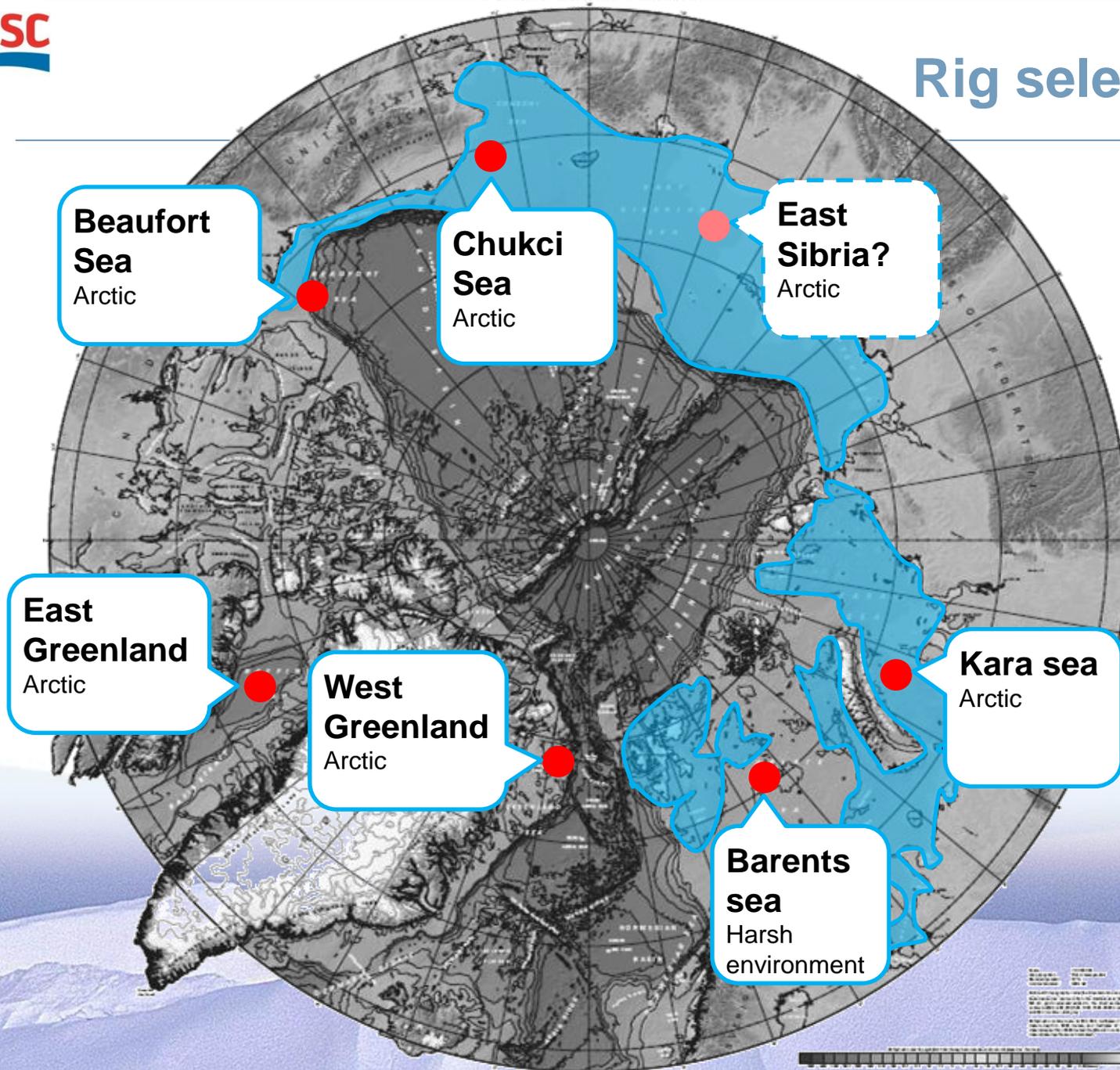
Offshore exploration in the arctic

SOLUTIONS



Rig selection: basic rig type





Rig selection: basic rig type

	Jack-up	Semi-submersible	Vessel
High arctic (Beaufort, Chuckci, Northern Greenland, Kara, East Siberian)	+*	-	++
Sub arctic (Seasonal high arctic and periodic ice infested such as southern Greenland, Barents)	+*	+	++
Winterized / Harsh environment	+*	++	+

Dynamic positioning

Spread mooring

Turret mooring



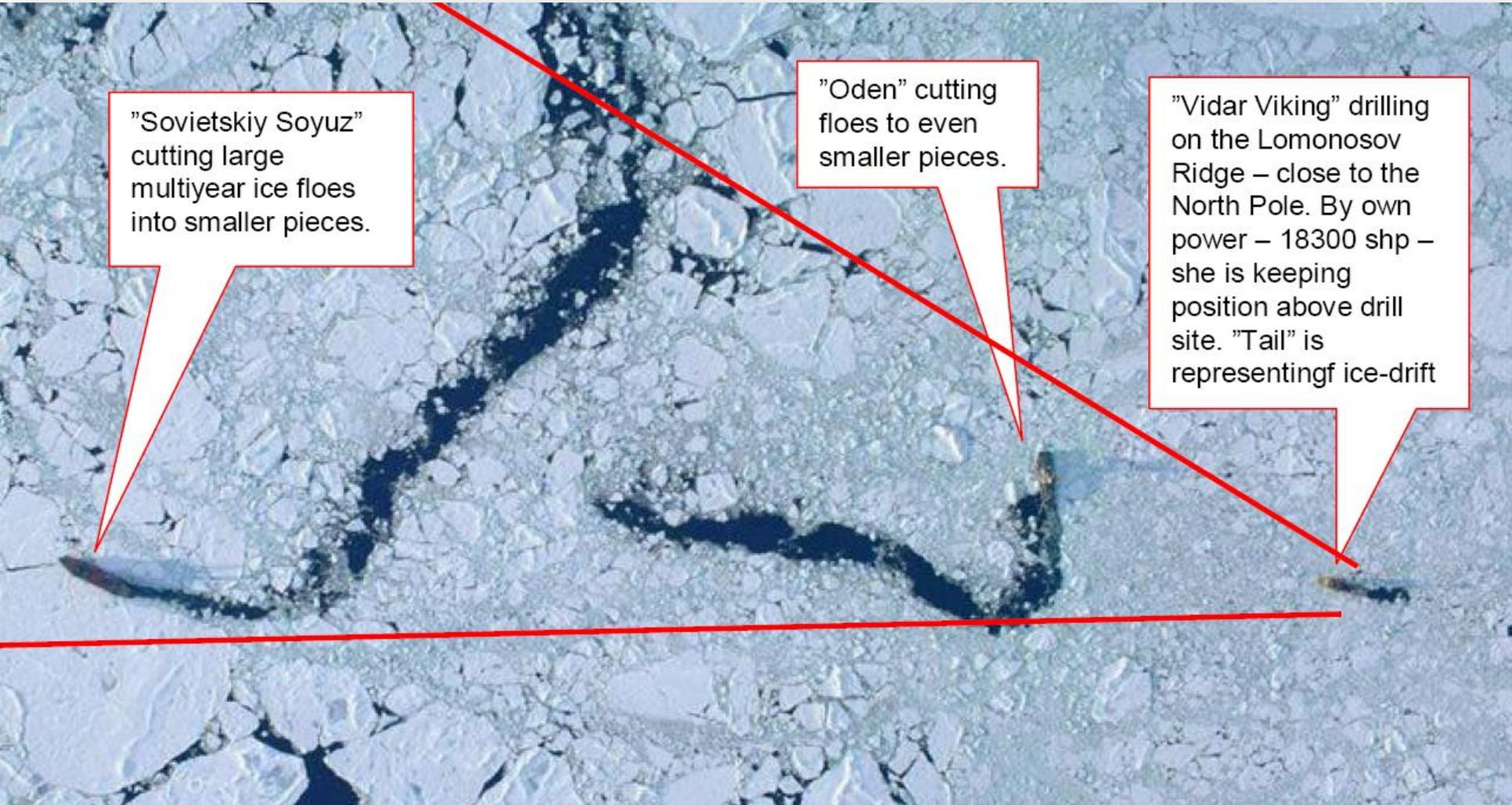
Ice loads are the governing factor

They are a simple(?) resultant of the size of the object

Reduce the size.... Reduce the load



Reducing the load

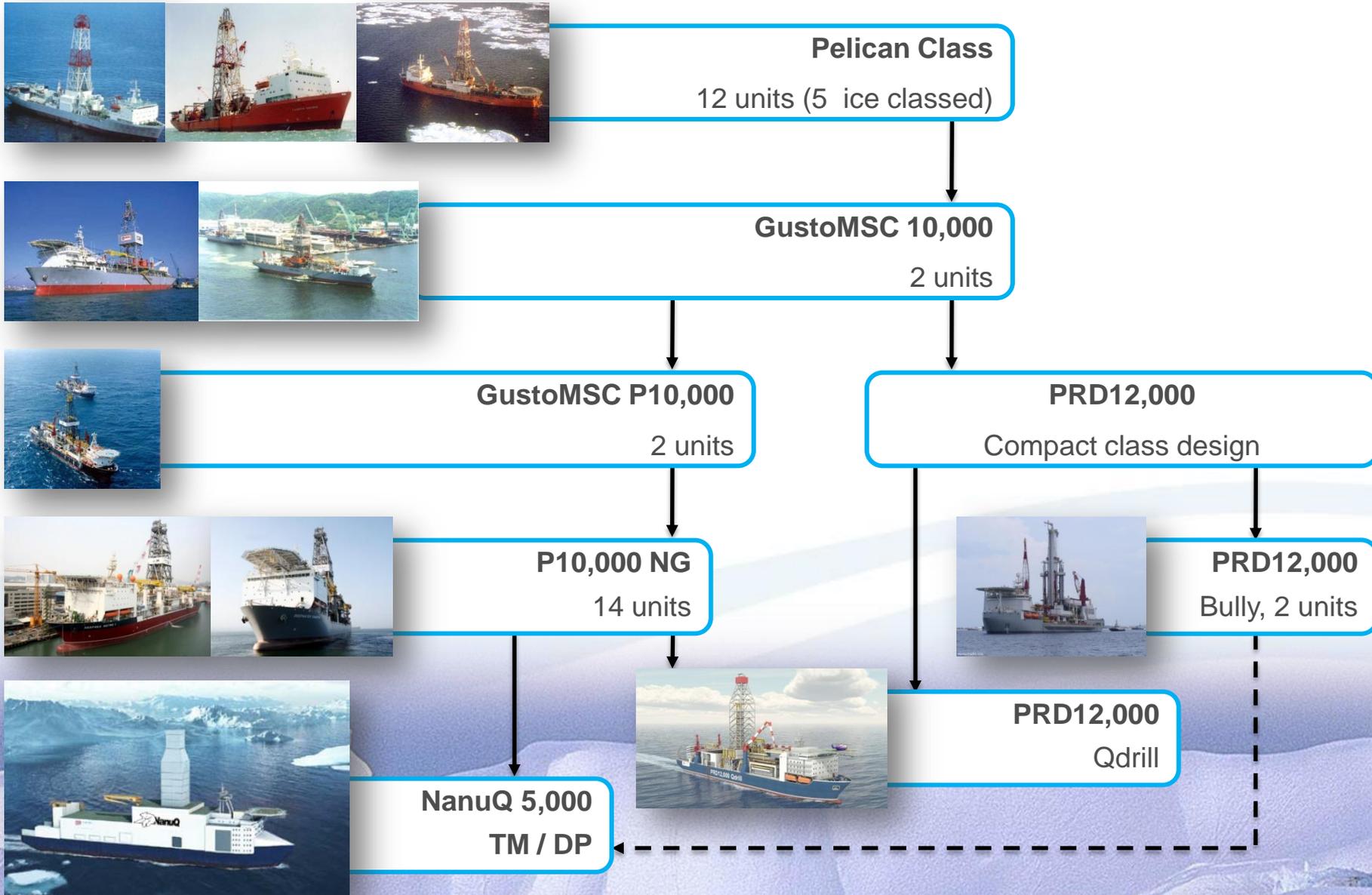


"Sovietskiy Soyuz" cutting large multiyear ice floes into smaller pieces.

"Oden" cutting floes to even smaller pieces.

"Vidar Viking" drilling on the Lomonosov Ridge – close to the North Pole. By own power – 18300 shp – she is keeping position above drill site. "Tail" is representing ice-drift

Drillship solutions

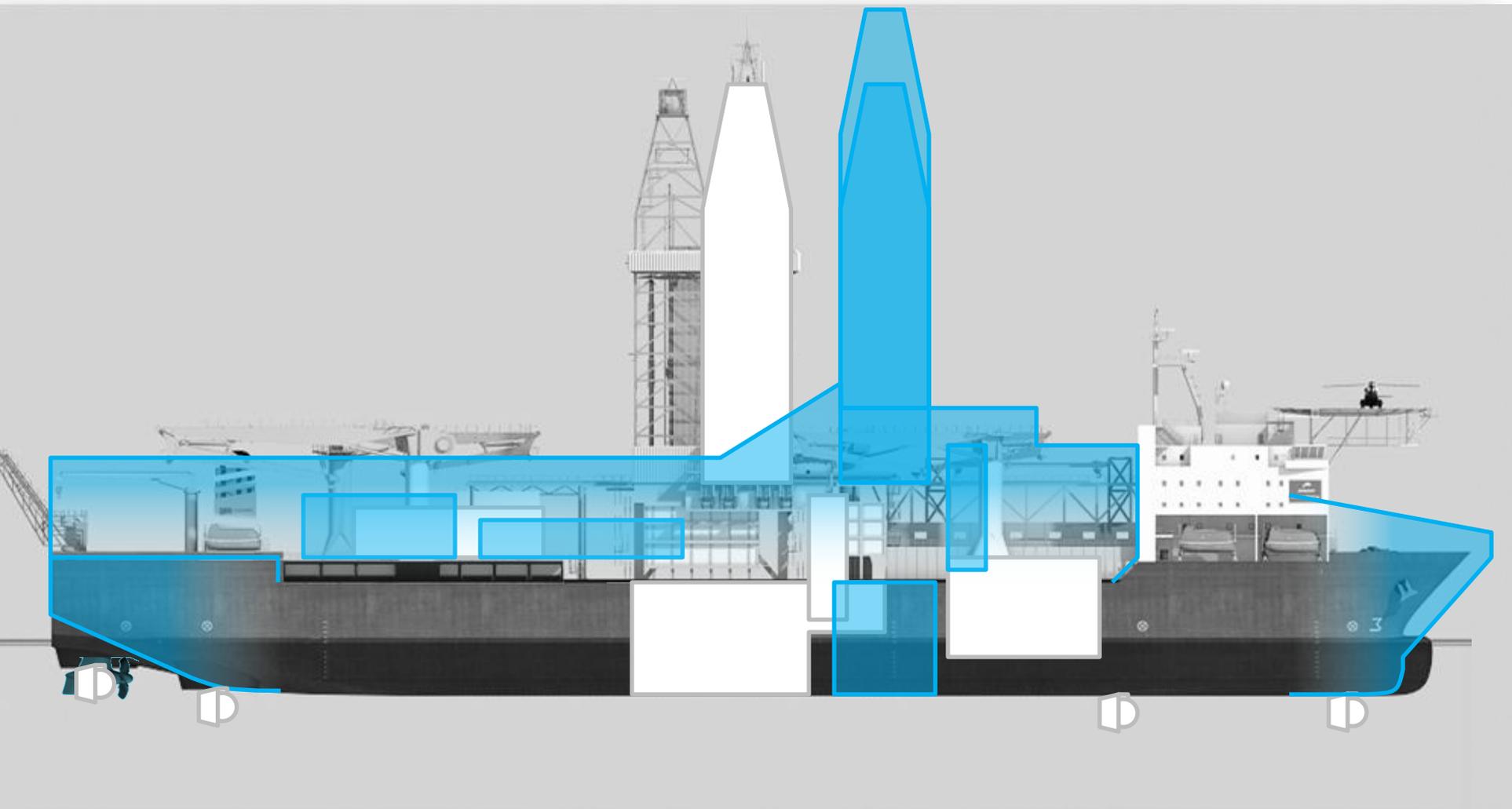


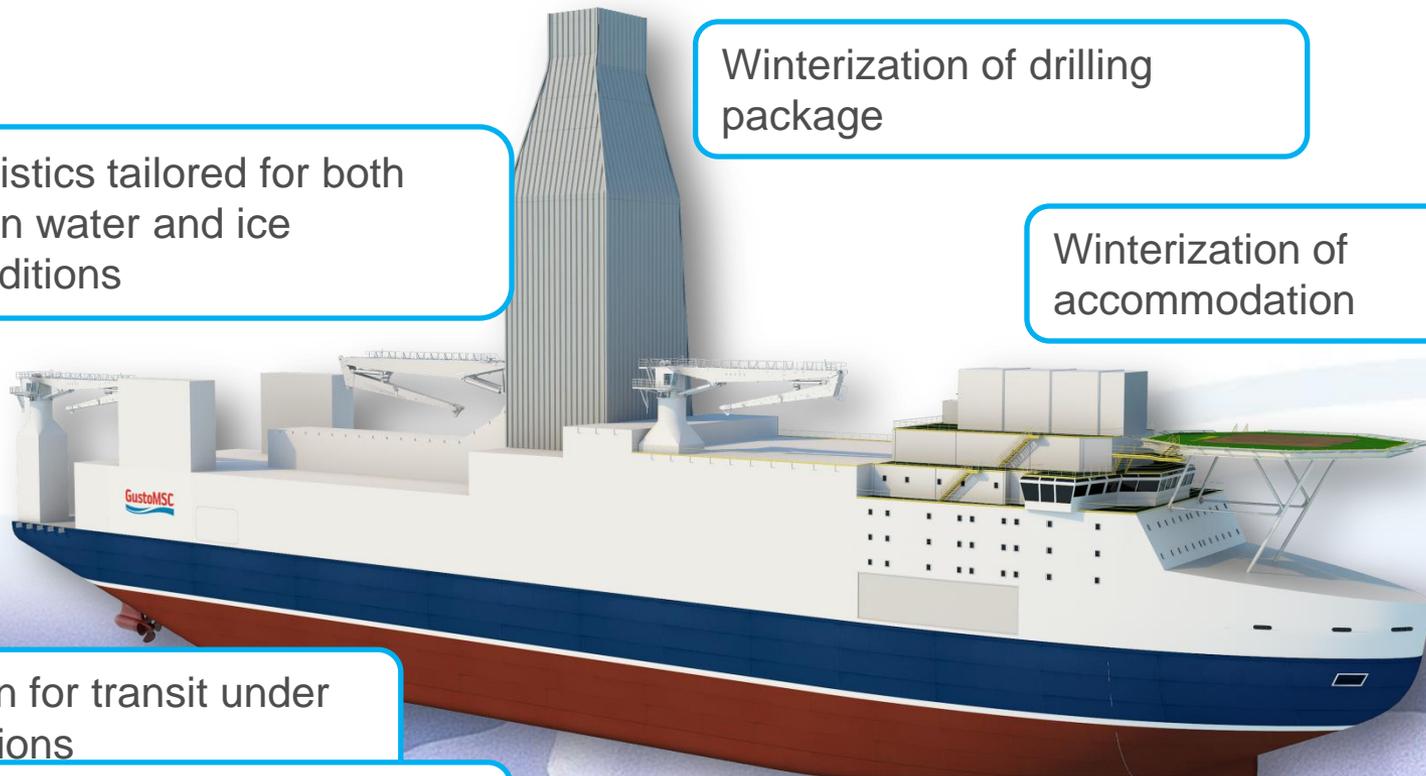
- Example 1: Drillship for extended seasonal drilling: **PRD12,000 Bully class**
- **Main Particulars:**
 - Single derrick with off-line standbuilding
 - 8,250ft waterdepth MDR and 12,000ft waterdepth PRD
 - 150 POB
 - 90 days full autonomy
 - DNV ICE-05
 - Dynamic Positioning and optional position mooring (with underwater fairleads)



- Example 2: Drillship for year round drilling: **NanuQ 5000 TM / DP**
- **Main Particulars:**
 - Single derrick with off-line standbuilding
 - 5,000ft waterdepth, with drilling consumables storage for up to 2 wells
 - 200+ POB
 - 120 days full autonomy
 - PC1..4, supplemented by Russian ice classes to allow operations in all arctic offshore oil projects
 - Turret Moored > 12-16 point mooring, Ø 12.4m moonpool
 - Dynamic Positioning > Based on ice-classed azimuthing units

From P10,000 to NanuQ





Logistics tailored for both open water and ice conditions

Winterization of drilling package

Winterization of accommodation

Propulsion for transit under ice conditions

Dynamic positioning or turret mooring

High ice class hull, winterized marine systems

Arctic experience & drilling solutions

Contact

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February 2012

