

Ice Management – Oil Spill Recovery Operations



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“Creating operating conditions in the Arctic”

Routinely - or in emergencies.

Ice Management



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Creating conditions for operations

- Create operational window
- Safety
- Environment



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Floes left for
SOVIETSKY
SOYOUZ to Process.

Floes left for
ODEN to
Process.

Well managed
Ice in front of
Drilling vessel..

Oden cutting
small floes
into smaller
pieces

Ice drift
0.4 knots

5 hours

3 hours

1 hour

Sovietskiy Soyuz
cutting large MYI
floes into smaller

Non-threatening ice in current ice drift.

Vidar Viking
drilling on the
Lomonosov Ridge
close to the NP by
own power, 18 300
shp. She is keeping
position above
drill site. The
"wake tail" is
representing ice-
drift

Ice Management creates the conditions in
which operations can be carried out.

Ice Management

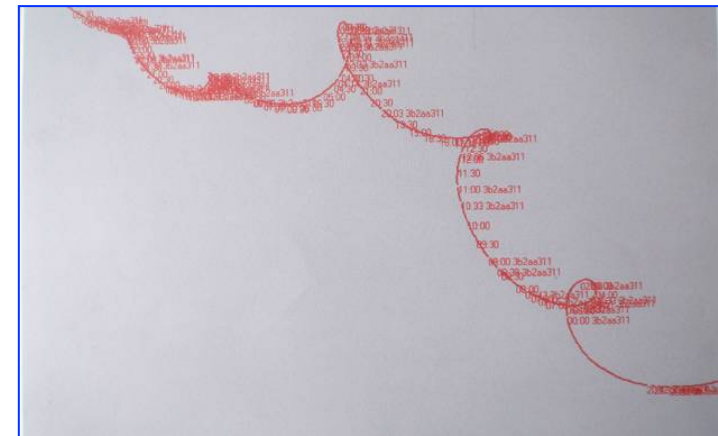
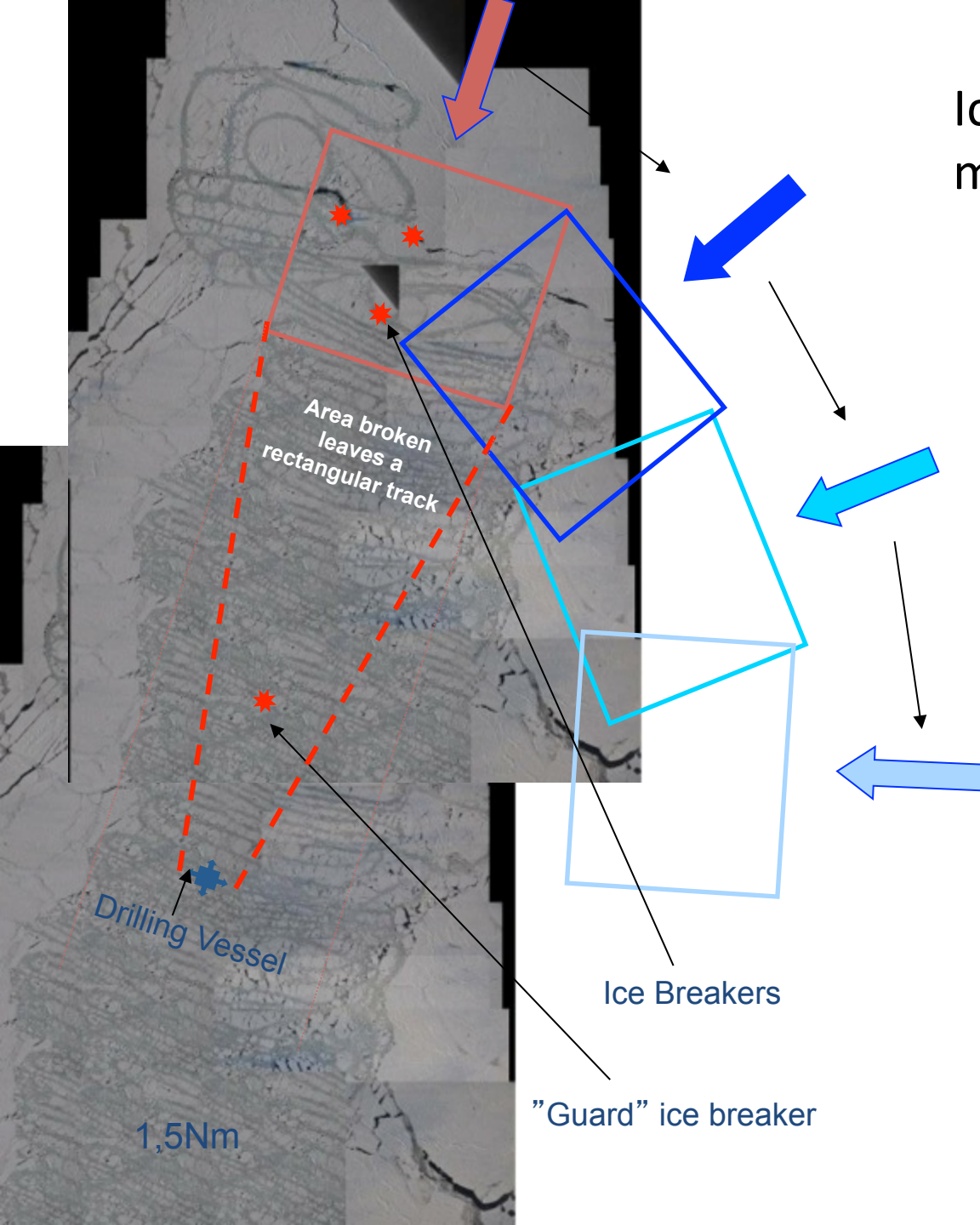
“more than “just breaking the ice”



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Ice Management – more than breaking the ice

Changing ice drift..



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Arctic oil spill recovery:

- Do everything possible to catch the spill – before it reaches the ice
- All methods catching oil before ice will “pay off”
 - Capping stacks?
 - Containment domes?
- Reduce Ice Management and oil recovery needs – catch it early



Dimensioning IM vs oil recovery :

1. What is maximum spill size / flow of oil?
2. Requirement for capability - What area will it cover – volume to collect?
3. Productivity of spill collection - determined by Oil recovery capacity in a given condition?
4. Ice Management shall deliver ice conditions that enable the spill to be collected
5. Size of potential spill decides the size of Oil Recovery operations. Size of oil recovery operation determines the size of Ice Management.



"Ice conditions demand different solutions"

Operations can be performed with

- Existing vessels
- Existing and new-builds
- New-builds only



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Dimensioning of Ice Management

1. Ice conditions in intended operation area
 - Coverge, type, time year, drift speed
2. Intended vessels?
3. Productivity of such vessels – m²/hour
4. Other needs – scouting, supply etc
5. Add redundancy
6. = required capacity



Operational
requirement (e.g
drilling)

The greater of the two + redundancy
= Ice Management required

Oil Spill recovery
requirement

Ice
Management
required

Fleet



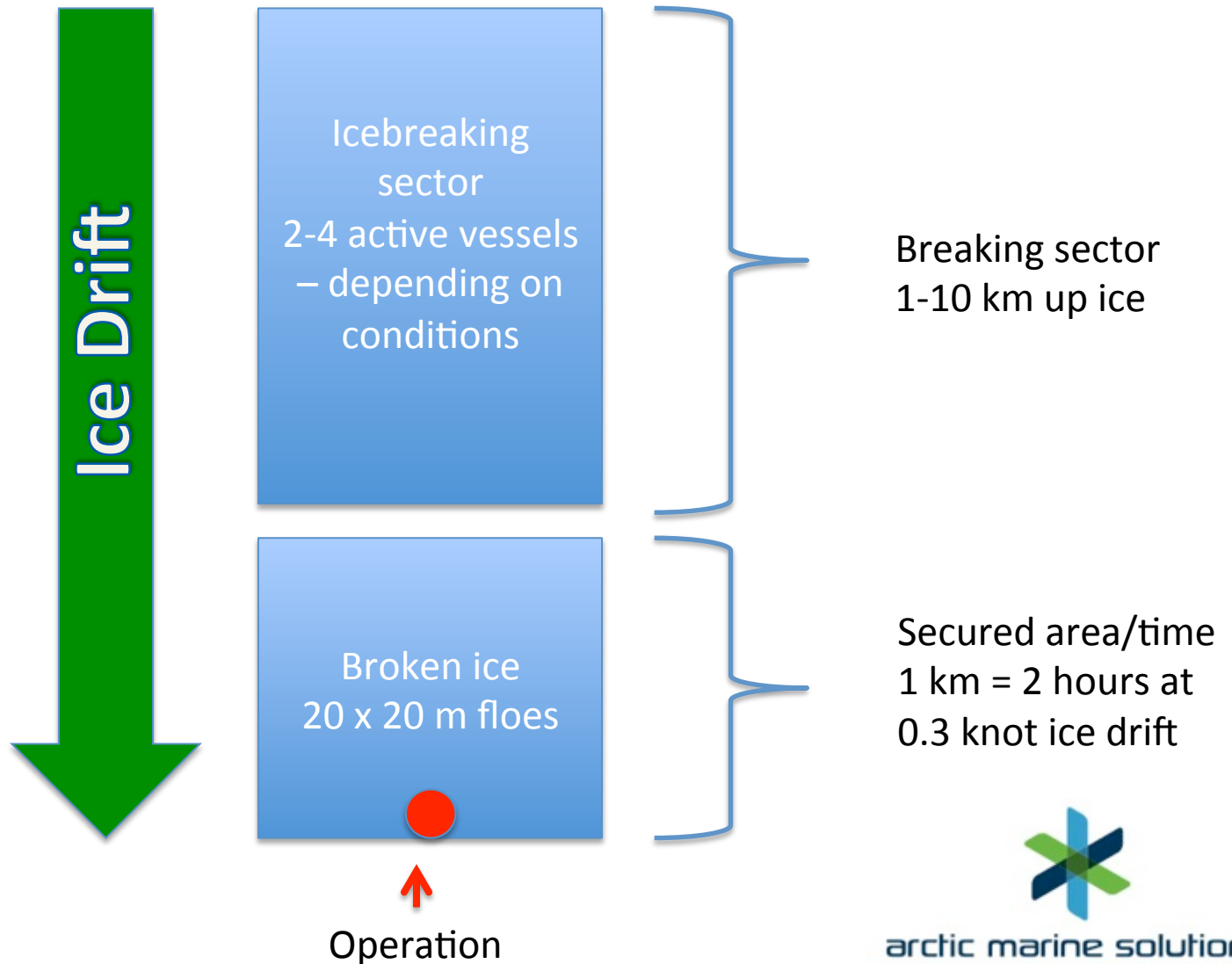
System

Redundancy
required



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Predictable Ice Management



Ice Management – Oil spill response

Operational Redundancy - necessary:

- Ice Management – keeps creating an operational environment
- Available units starts attending spill

This is all you have – Arctic is different from GOM or North Sea



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Shell: "Nanuq", "Kulluk" and "Tor Viking" – Dutch Harbor



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Ice Management – Oil Spill Remoteness of operation



- Vessels must be multi-functional
- Same type – easy substitution - redundancy
- Able deal with immediate response
- Clear plan for how to bring in more resources – that also needs protection from Ice Management



Illustrating capacity:

- Operators will need to demonstrate capacity to Regulators.
- Capacity = ability to deal with possible situations



Illustrating capacity:

Operator needs to illustrate how calculations are made for:

- Total oil spill capability
- Capacity available on site for oil spill response
- Capacity of Ice Management
- Redundancy of Ice Management to support oil recovery
- Available resources vs time?



Arctic Oil Spill Response:

Operators and Regulators need to define:

- Breakability
 - Which ice can be broken by which type of icebreaker?
- Ice Management Productivity
 - What is productivity of Ice Management = how many vessels of which type?
- Oil spill recovery capacity
- What is an acceptable risk?



Ice Management – Oil Spill:

Today:

- High focus on methods and technology
- Less focus on operational Strategies and Human Resources

Going forward:

- Agree on industry guidelines for Arctic operations
- Build knowledge
 - Fund for research
 - Closer cooperation academia/industry
 - Open sharing of knowledge
 - Forum for sharing of “best practices”



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Thoughts going forward

- Individual Projects cannot carry cost of response capacity – long term?
- Agreement needed between Oil companies and Countries distributing cost – and benefit?
- Arctic Rapid Emergency Response Organisation – based on existing state ice breaker fleets?



Conclusion:

- Preventative measures will always be most cost effective
- In Arctic time is at a premium – high capacity is required of all systems
- Both affects size of Ice Management
- Whole system will have to be verified in regulatory process for operating permits





Thank You.
Any questions?



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